



NARLA
environmental

Streamlined Biodiversity Development Assessment Report

298-312 Blaxland Road, Ryde

CD Architects

March 2022



NARLA

environmental

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www.narla.com.au

Report Certification

Works for this report were undertaken by:

Staff Name	Position
Jack Tatler <i>BSc (Hons) PhD</i>	Narla Environmental General Manager and Senior Ecologist Accredited BAM Assessor BAAS21006
Polina Zadorojnaya <i>BSc</i>	Narla Environmental Ecologist
Chris Moore <i>BBioCon</i>	Narla Environmental Project Manager and Ecologist Accredited BAM Assessor BAAS21009

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Glossary

Acronym/ Term	Definition
Accredited Biodiversity Assessor	Individuals accredited by the Department of Planning, Industry and Environment (DPIE) to apply the Biodiversity Assessment Method.
BAM	The NSW Biodiversity Assessment Method (2020)
BAMC	The NSW Biodiversity Assessment Method Calculator
BC Act	New South Wales Biodiversity Conservation Act 2016
BDAR	Biodiversity Development Assessment Report
Biodiversity credit report	The report produced by the Credit Calculator that sets out the number and class of biodiversity credits required to offset the remaining adverse impacts on biodiversity values at a development site, or on land to be biodiversity certified.
Biodiversity offsets	Management actions that are undertaken to achieve a gain in biodiversity values on areas of land in order to compensate for losses to biodiversity from the impacts of development.
Biodiversity values	The composition, structure and function of ecosystems, including threatened species, populations and ecological communities, and their habitats.
BOS	NSW Biodiversity Offset Scheme
CEEC	Critically Endangered Ecological Community
CPW	Cumberland Plain Woodland in the Sydney Basin Bioregion
DA	Development Application
DPIE	NSW Department of Planning, Industry and Environment (formerly OEH)
Ecosystem credit	The class of biodiversity credit that relates to a vegetation type and the threatened species that are reliably predicted by that vegetation type (as a habitat surrogate).
EEC	Endangered Ecological Community
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
ha	Hectares
HTE	High Threat Exotic
km	Kilometres
LALC	Local Aboriginal Land Council
LGA	Local Government Area
Locality	A 1,500m buffer area surrounding the Subject Land
m	metres
Native Vegetation	Means any of the following types of plants native to New South Wales: (a) trees (including any sapling or shrub), (b) understorey plants, (c) groundcover (being any type of herbaceous vegetation), (d) plants occurring in a wetland.
NSW	The State of New South Wales
OEH	Office of Environment and Heritage (now DPIE)
PCT	NSW Plant Community Type

Acronym/ Term	Definition
Proposal	The development, activity or action proposed
SAII	Serious and Irreversible Impacts
SAII entity	Species and ecological communities that are likely to be the subject of serious and irreversible impacts (SAIIs)
SEARs	Secretary's Environmental Assessment Requirements
SEPP	State Environmental Planning Policy
Species credit	The class of biodiversity credit that relate to threatened species that cannot be reliably predicted to use an area of land based on habitat surrogates. Species that require species credits are listed in the Threatened Biodiversity Data Collection.
Subject Land	The footprint of the proposed development
Subject Property	298-312 Blaxland Road, Ryde (Lots 8-11/-/6367 and Lot D/-/D[322336])
TEC	Threatened Ecological Community
Threatened species, populations and ecological communities	Species, populations and ecological communities specified in Schedules 1 and 2 of the BC Act 2016
VI	Vegetation Integrity
VIS Plot	Vegetation Integrity Survey Plot

Executive Summary

Narla Environmental Pty Ltd (Narla) was commissioned by CD Architects ('the proponent') to prepare a Streamlined Biodiversity Development Assessment Report (SBDAR) to accompany a Development Application (DA) for the proposed development at 298-312 Blaxland Road, Ryde (Lots 8-11/-/6367 and Lot D/-/D[322336]). This SBDAR has assessed the biodiversity impacts of the proposed development in accordance with the requirements of the Biodiversity Conservation Act 2016 and Biodiversity Conservation Regulation 2017. The assessment has been completed in accordance with Appendix L of the Biodiversity Assessment Method (BAM; DPIE 2020a).

The proposed development involves the demolition of four dilapidated houses and the construction of six blocks of townhouses and associated structures (e.g. hardstand, wastewater). The proposed development is located largely within the footprint of existing structures but will potentially impact a small portion (0.09ha) of Plant Community Type (PCT): PCT 1237: Sydney Blue Gum - Blackbutt - Smooth-barked Apple moist shrubby open forest on shale ridges of the Hornsby Plateau, Sydney Basin Bioregion. The remainder of the vegetated areas within the Subject Property (approx. 0.4ha) are weed infested with a few planted native species (most of which are outside of their distribution). Of the 0.09ha of native vegetation that exists within the Subject Land, approx. 0.05ha is proposed to be retained and protected however, this biodiversity assessment has followed the precautionary principle and included the entire 0.09ha in the generation of offset credits. The precautionary principle allows the worst-case scenario for impacts to biodiversity to be assessed under the Biodiversity Assessment Method (BAM). An assessment of the condition of the native vegetation within the Subject Land determined it to be in very poor condition and therefore, no ecosystem credits are required to be offset in order to mitigate the impacts upon biodiversity as a result of the proposed development.

Despite occurring slightly below the recognised elevation profile, the presence of characteristic species and the correct soil type suggests the native vegetation identified as PCT 1237 within the Subject Land conforms to the BC Act listed, Critically Endangered Ecological Community (CEEC), Blue Gum High Forest in the Sydney Basin Bioregion (BGHF). Blue Gum High Forest is listed as an 'SAll entity' within the BioNet Threatened Biodiversity Data Collection (DPIE 2021a). Due to the potential sensitivity of this ecological community to any impact, a determination of whether or not the impacts are serious and irreversible has been undertaken in accordance with Section 9.1 of the BAM (DPIE 2020a) 'Additional impact assessment provisions for ecological communities'. Of the six trees representative of BGHF, one is dead, two are in poor health and are proposed to be removed, one is in good health and proposed to be removed and two are in good health and proposed to be retained and protected.

No species credit species are required to be offset as a result of the proposed development.

The current design ensures the persistence of BGHF within the Subject Property and the landscaped areas (particularly the southern and eastern setbacks) will be vegetated with BGHF representative species. This includes the replacement of >2:1 BGHF trees and the creation of a mid-storey and ground layer of BGHF that is currently lacking. The outcome of this is an increased patch size, and greatly increased condition, of the CEEC. In order to further minimise potential impacts of the proposed development on local biodiversity values, a series of avoidance, mitigation and minimisation measures have been identified, which are to be implemented as part of any Construction Environmental Management Plan (CEMP) produced for the site.

1. Introduction

1.1 Overview

Narla Environmental Pty Ltd (Narla) was commissioned by CD Architects ('the proponent') to prepare a Streamlined Biodiversity Development Assessment Report (SBDAR) to accompany a Development Application (DA) for the proposed development at 298-312 Blaxland Road, Ryde (Lots 8-11/-/6367 and Lot D/-/D[322336]; **Figure 1**). This SBDAR has assessed the biodiversity impacts of the proposed development in accordance with the requirements of the Biodiversity Conservation Act 2016 and Biodiversity Conservation Regulation 2017. The assessment has been completed in accordance with Appendix L of the Biodiversity Assessment Method (BAM; DPIE 2020a).

1.2 Assessment Method Applied

The requirements of the BC Act and Biodiversity Conservation Regulation 2017 are mandatory for all DA's assessed pursuant to Part 4 of the Environmental Planning and Assessment Act 1979 (EP&A Act) submitted in the Ryde LGA.

1.2.1 Biodiversity Offset Scheme Triggers

The minimum lot size prescribed by the LEP to the Subject Property is 580m². To avoid triggering the Biodiversity Offset Scheme (BOS) threshold, the proponent must avoid clearing 0.25ha or more of native vegetation. The proposed development will result in the clearing and maintenance of approximately 0.09ha of native vegetation. Therefore, as the proposed development requires the removal of <0.25ha of native vegetation, the BOS is not triggered.

No Biodiversity Values mapping was identified within the Subject Property at the time of the DA submission and therefore this BOS trigger does not apply to the proposed development. Currently, part of the Subject Property contains land mapped as having biodiversity values (**Figure 2**).

A test of significance was carried out to assess whether the proposed development exceeds the BOS threshold by causing a significant impact to Blue Gum High Forest. Developments likely to significantly impact threatened species or communities trigger the BOS and require assessment under the BAM. This assessment found no significant impact is likely to occur to the critically endangered Blue Gum High Forest community. Nevertheless, a precautionary approach to assessing impacts has been employed and as a result, assessment under the BAM (this BDAR) has been carried out to assess all potential direct and indirect impacts to biodiversity as a result of the proposed development. This assessment has been prepared as a site-based 'Streamlined assessment module – small area development that requires consent' as the works do not exceed the area clearing threshold for small area developments as outlined in the BAM (DPIE 2020a; **Table 1**).

Table 1. Area limits for application of small area development threshold. Bold indicates the threshold relevant to this report.

Minimum lot size associated with the property	Maximum area limit for application of the small area development module
Less than 1ha	≤1ha
Less than 40ha but not less than 1ha	≤2ha
Less than 1000ha but not less than 40ha	≤5ha
1000ha or more	≤10ha

1.3 The Proposed Development

The proposed development will involve the demolition of the existing dwellings and the construction of 24 town houses with associated driveways, and areas allocated for private open space/landscaping. All works associated with the development are hereafter referred to as the Subject Land (**Figure 1**). The Subject Land covers an area of approximately 0.69ha and consists of urban blocks that have been unoccupied and unmaintained for an extended period of time. The vegetation within the Subject Property is weed infested with hardly any native species occurring in the ground and mid-layer (some planted native shrubs occur). Canopy species are a mix of native and exotic, with some of the native species clearly planted as they do not naturally occur in Sydney.

Narla was commissioned in 2017 to undertake an Ecological Constraints Assessment (ECA) to inform the design of the proposed development. The aim of an ECA is to identify major ecological constraints so that they can be avoided. Subsequently, in 2017 Narla prepared a Flora and Fauna Assessment (FFA) to accompany the DA. At this time, there was no Biodiversity Values mapped as occurring on the Subject Property and therefore an FFA was the suitable type of ecological assessment.

1.4 Site Location and Description

The Subject Property is situated within an urban landscape in the suburb of Ryde in the Ryde Local Government Area (LGA; **Figure 3**). It is also located within the boundaries of the Metropolitan Local Aboriginal Land Council (Metropolitan LALC; Aboriginal Land Council 2021). It has an area of 0.69ha, has frontage to Blaxland Road to the north east and is bounded by residential properties on all other sides. The Subject Property contains four existing dwellings. The majority of the Subject Property is dominated by exotic vegetation, as a result of its urban setting and recent/current land use, with small areas of remnant canopy present along the southern boundary.

1.5 Sources of Information Used

A thorough literature review was undertaken to gain an insight into the ecology and applicable legislation within the locality and the Ryde LGA, including:

- Relevant State and Commonwealth Databases & Datasets:
 - NSW BioNet. The website of the Atlas of NSW Wildlife (DPIE 2021b);
 - NSW BioNet. Threatened Biodiversity Data Collection (DPIE 2021a);
 - NSW BioNet. Vegetation Classification System (DPIE 2021c); and
 - Six Maps Clip & Ship (NSW Government Spatial Services 2021).
- Vegetation and Soil Mapping:
 - The Native Vegetation of the Sydney Metropolitan Area - Version 3.1 (OEH 2016a);
 - The Native Vegetation of the Sydney Metropolitan Area. Volume 2: Vegetation Community Profiles. Version 3.0. VIS_ID 4489 (OEH 2016b); and
 - Soil Landscapes of the Sydney 1:100,000 Sheets (Chapman et al 2009).
- NSW State Guidelines:
 - Biodiversity Assessment Method (DPIE 2020a);
 - Guidance to assist a decision-maker to determine a serious and irreversible impact (DPIE 2019);
 - Biodiversity Assessment Method Calculator Version 1.3.0.00 (DPIE 2020b);
 - Biodiversity Offsets and Agreement Management System (BOAMS);
 - Surveying threatened plants and their habitats - NSW survey guide for the Biodiversity Assessment Method (DPIE 2020c); and

- Threatened Species Survey and Assessment: Guidelines for developments and activities. Working Draft (DEC 2004).
- Project related documents:
 - Ecological Constraints Assessment (Narla 2017);
 - Flora and Fauna Assessment (Narla 2017);
 - Site Plans (CD Architects, August 2019);
 - Arboricultural Impact Assessment (Footprint Green, September 2021); and
 - Landscape Plan (Botanica, June 2020).

These sources were used to gain an understanding of the natural environment and ecology of the Subject Land and its surrounds. Searches using NSW Wildlife Atlas (BioNet; DPIE 2021b) were conducted to identify current threatened flora and fauna records within and surrounding the Subject Land. These data were used to assist in establishing the presence or likelihood of any biodiversity values as occurring on, or adjacent the Subject Land and helped inform our Ecologist on what to look for during the site assessment.

1.6 Aim and Approach

This report has been prepared in accordance with the BAM (DPIE 2020a) and aims to:

- Describe the biodiversity values present within the Subject Land, including the extent of native vegetation, vegetation integrity and the presence of Threatened Ecological Communities (TECs);
- Determine the habitat suitability within the Subject Land for candidate threatened species;
- Prepare an impact assessment in regard to potential impacts of the proposed development on biodiversity values, including potential prescribed impacts and SALLs within the Subject Land;
- Discuss and recommend efforts to avoid and minimise impacts on biodiversity values; and
- Calculate the biodiversity credits (i.e., ecosystem credits and species credits) that measure potential impacts of the development on biodiversity values. This calculation will inform the decision maker as to the number and class of offset credits required to be purchased and retired as a result of the proposed development.



Figure 1. The components of the Subject Land.



Biodiversity Values Mapping

- Subject Land
- Subject Property
- Biodiversity Values Map (DPIE 2021)

0 10 20 30 40 50 m



Date: 15/10/2021
 Coordinate System: GDA94 MGA Zone 56
 Data Source: NSW SEED Portal
 Image Source: Nearmap Australia Pty Ltd [August 2021]



Figure 2. Location of the Subject Land in relation to the DPIE mapped Biodiversity Values.

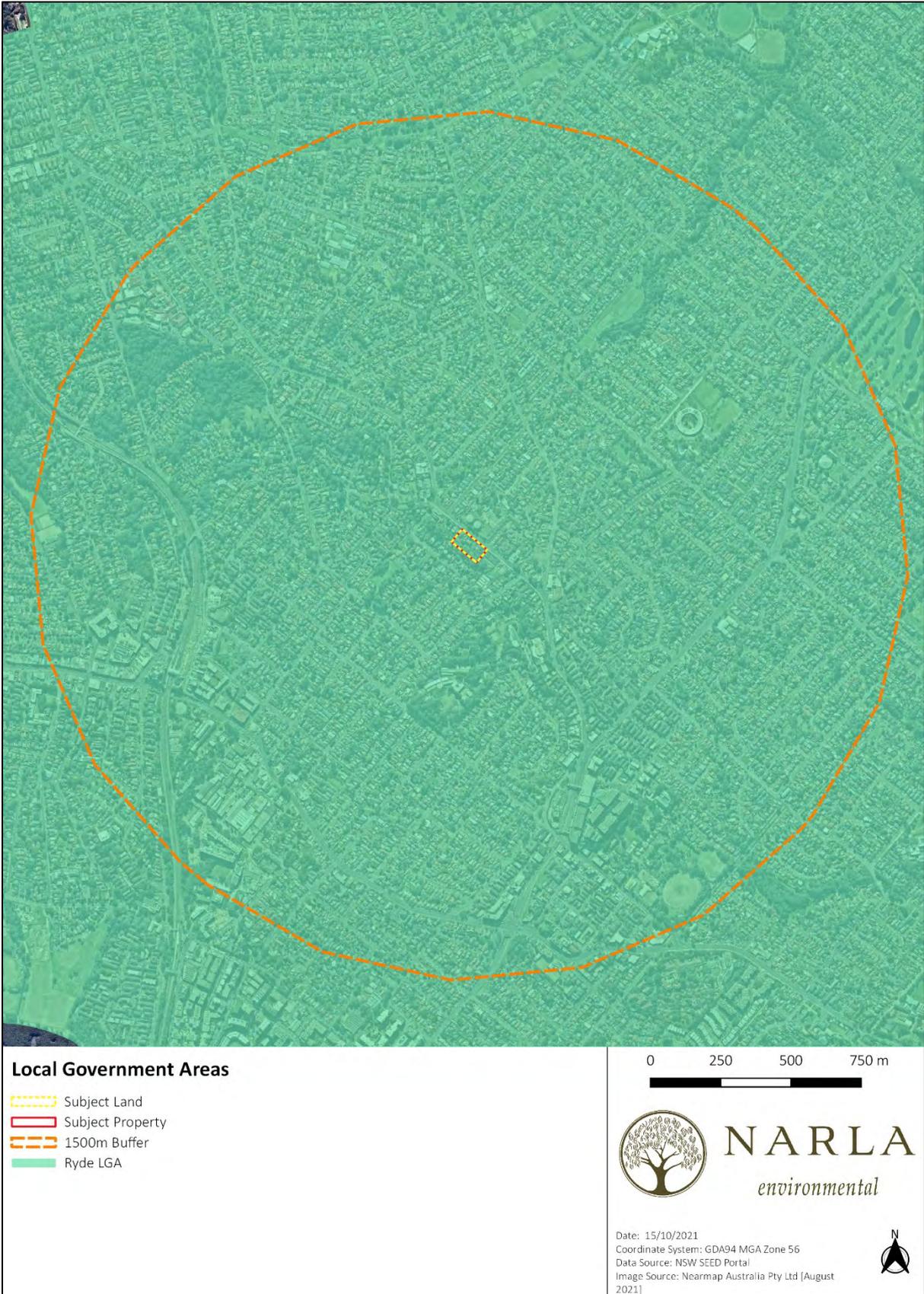


Figure 3. The location of the Subject Land within the locality.

2. Landscape

2.1 IBRA Bioregion and Subregion

The Subject Land occurs within the 'Cumberland' Interim Biogeographic Regionalisation for Australia 7 (IBRA7) Subregion, which is part of the 'Sydney Basin' IBRA7 Bioregion (**Figure 4**).

2.2 Mitchell Landscapes

Mitchell (2002) groups ecosystems into meso-ecosystems representing larger natural entities based on topography and geology. The naming of ecosystems and meso-ecosystems was standardised so that each name provided information on location and a meaningful descriptive landscape term.

The Subject Land occurs within the Pennant Hills Ridges Mitchell Landscape Ecosystems (**Figure 5**).

The Pennant Hills Ridges landscape is characterised rolling to moderately steep hills on horizontal Triassic shales and siltstones. General elevation 10 to 90m, local relief 60m. Deep red texture-contrast soils on narrow hillcrests, red and brown to yellow texture-contrast soils on slopes becoming slightly harsher in drainage lines. Tall open forest of Sydney Blue Gum (*Eucalyptus saligna*), Turpentine (*Syncarpia glomulifera*), Blackbutt (*Eucalyptus pilularis*), White Stringybark (*Eucalyptus globoidea*), Grey Ironbark (*Eucalyptus paniculata*), Forest Oak (*Allocasuarina torulosa*) and Rough-barked Apple (*Angophora floribunda*). Rainforest elements in protected moist gully heads with Sweet Pittosporum (*Pittosporum undulatum*), Cheese Tree (*Glochidion ferdinandi*), Sandpaper Fig (*Ficus coronata*) and Black Wattle (*Callicoma serratifolia*).

2.3 Topography, Geology and Soils

The Subject Land is located on a south west facing slope with elevation ranging from 69m-82m above sea level (Google Earth 2021). The majority of the Subject Land is mapped as occurring on the Glenorie Soil Landscape, with a small section in the western corner being mapped as the West Pennant Hills Soil Landscape (Chapman et al. 2009).

The Glenorie soil landscape is characterised by low rolling and steep hills with soils that are underlain by Wianamatta Group Ashfield Shale and Bringelly Shale formations. The West Pennant Hills soil landscape is described as occurring on steep sideslopes with mass movement derived landforms with soils derived from Wianamatta Group, Ashfield Shale formation-laminite and dark grey shale, Bringelly Shale-shale, calcareous claystone, laminite, fine to medium grained lithic quartz sandstone

The Subject Land did contain a small area of geological significance- a sandstone retaining wall with numerous crevices. The Subject Land is not mapped as occurring on acid sulfate soils however a small area in the wider locality (1,500m buffer) is mapped as occurring on class 5 acid sulfate soils (Naylor 1995; **Figure 6**). The proposed development will not impact upon this area.

2.4 Hydrology

No watercourses (mapped or unmapped) were recorded within the Subject Land. Only one 1st order stream is mapped as occurring within the 1500m buffer surrounding the Subject Land (**Figure 7**).

2.5 State Environmental Planning Policy (Coastal Management) 2018

No areas mapped as containing Coastal Wetlands or Littoral Rainforest are mapped as occurring within the Subject Land or broader locality (1500m buffer).

2.6 Native Vegetation Cover and Connectivity

Native vegetation cover and connectivity have been assessed in accordance with Section 3.1.3 and 3.2 of the BAM (DPIE 2020a). The native vegetation cover will be used to assess the habitat suitability of the Subject Land for threatened species. Areas of connectivity will determine the extent of habitat that may facilitate the movement of threatened species across their range. A 1,500m buffer around the boundary of the Subject Land was calculated to determine the extent of native vegetation and habitat connectivity.

Native vegetation cover was very low at approximately 66ha within the buffer circle (total area = 748ha) and was therefore assigned to the <10% class. Owing to the highly developed nature of the locality surrounding the Subject Land, no areas of habitat connectivity extend from the vegetation present within the Subject Land (**Figure 8**).

2.7 Areas of Outstanding Biodiversity Value

No Areas of Outstanding Biodiversity Value occur on the Subject Land or surrounding area.

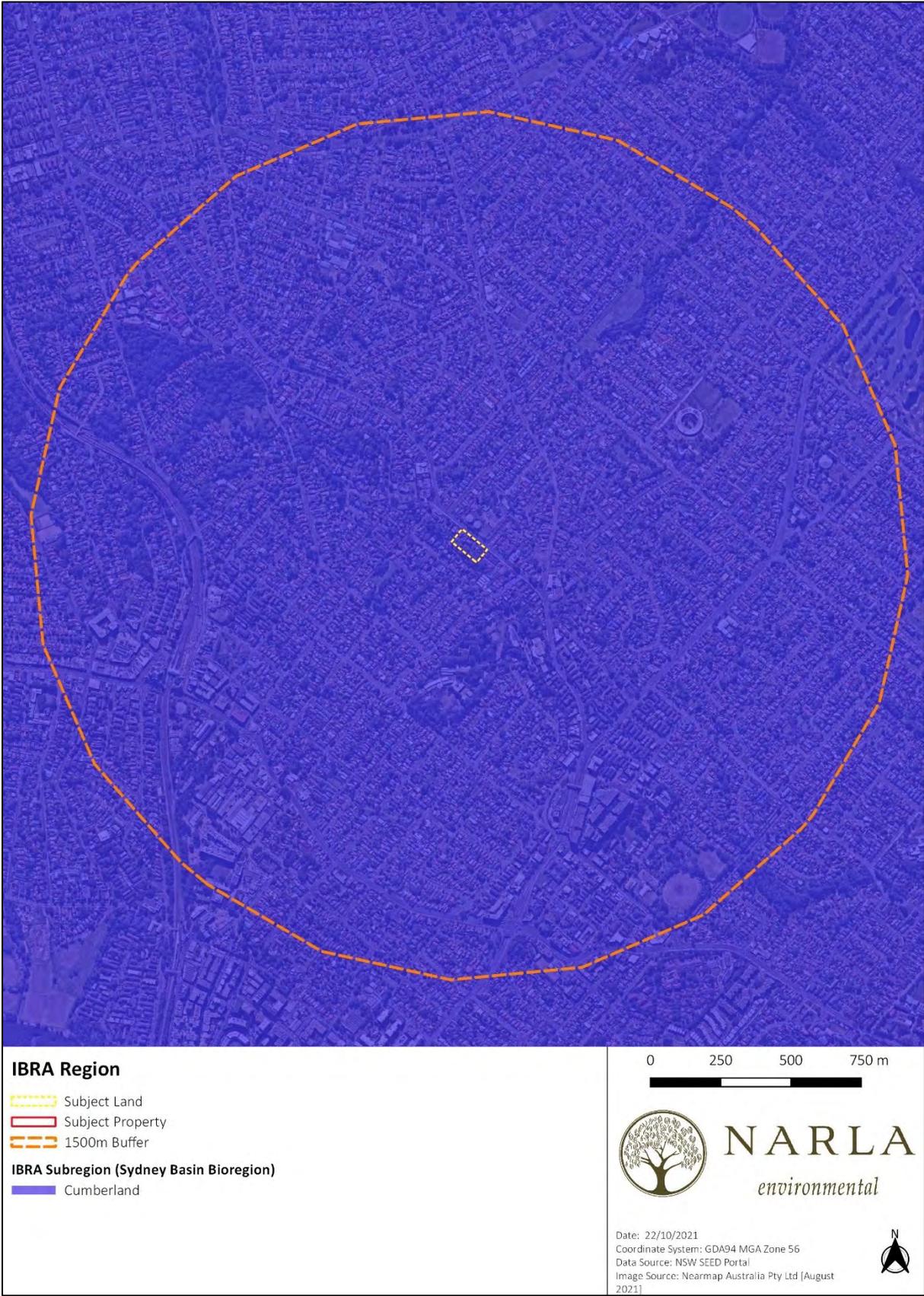


Figure 4. IBRA Bioregion and Subregion of the Subject Property, Subject Land and within a 1,500m buffer.

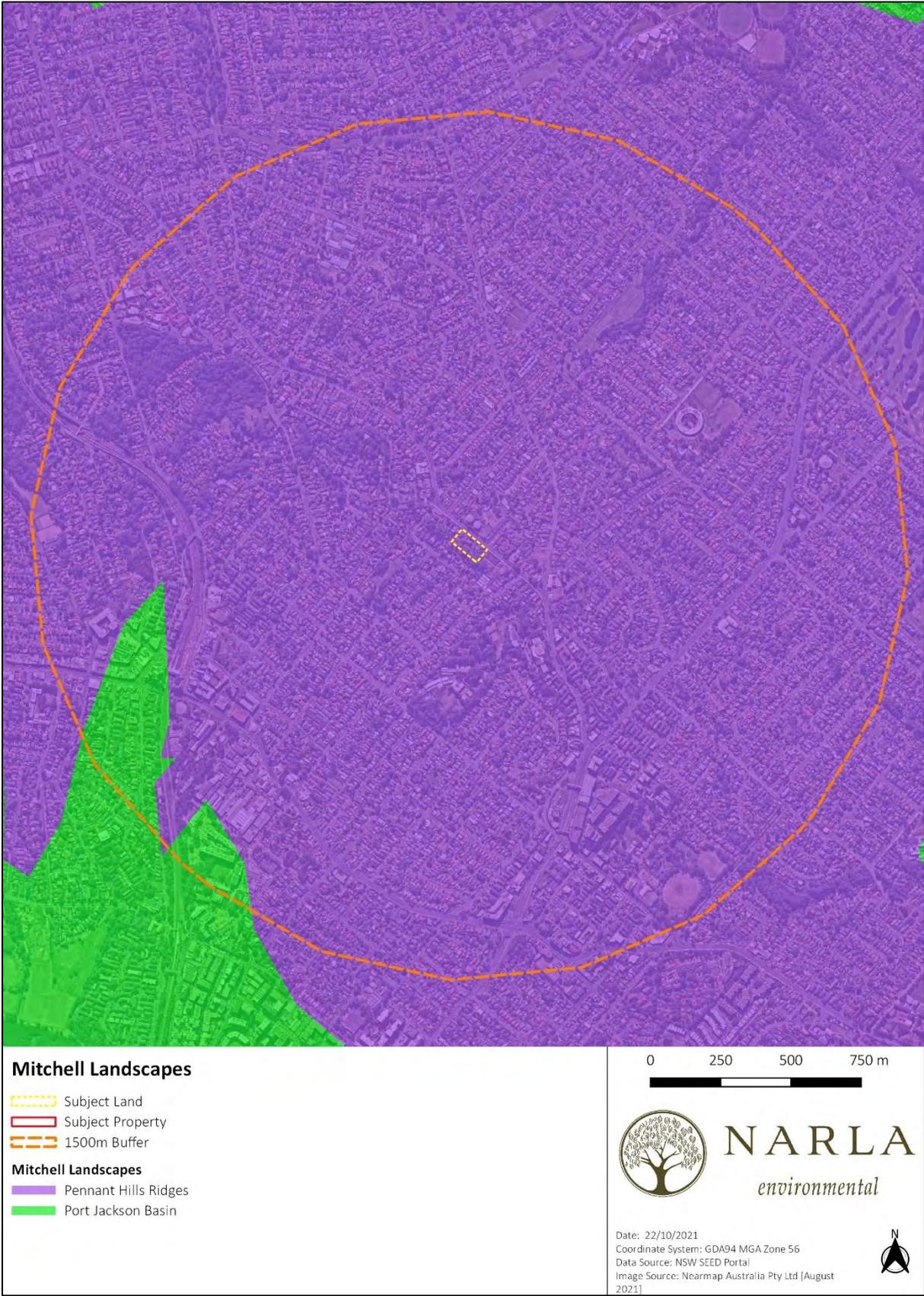


Figure 5. Mitchell Landscapes of the Subject Property, Subject Land and within a 1,500m buffer.

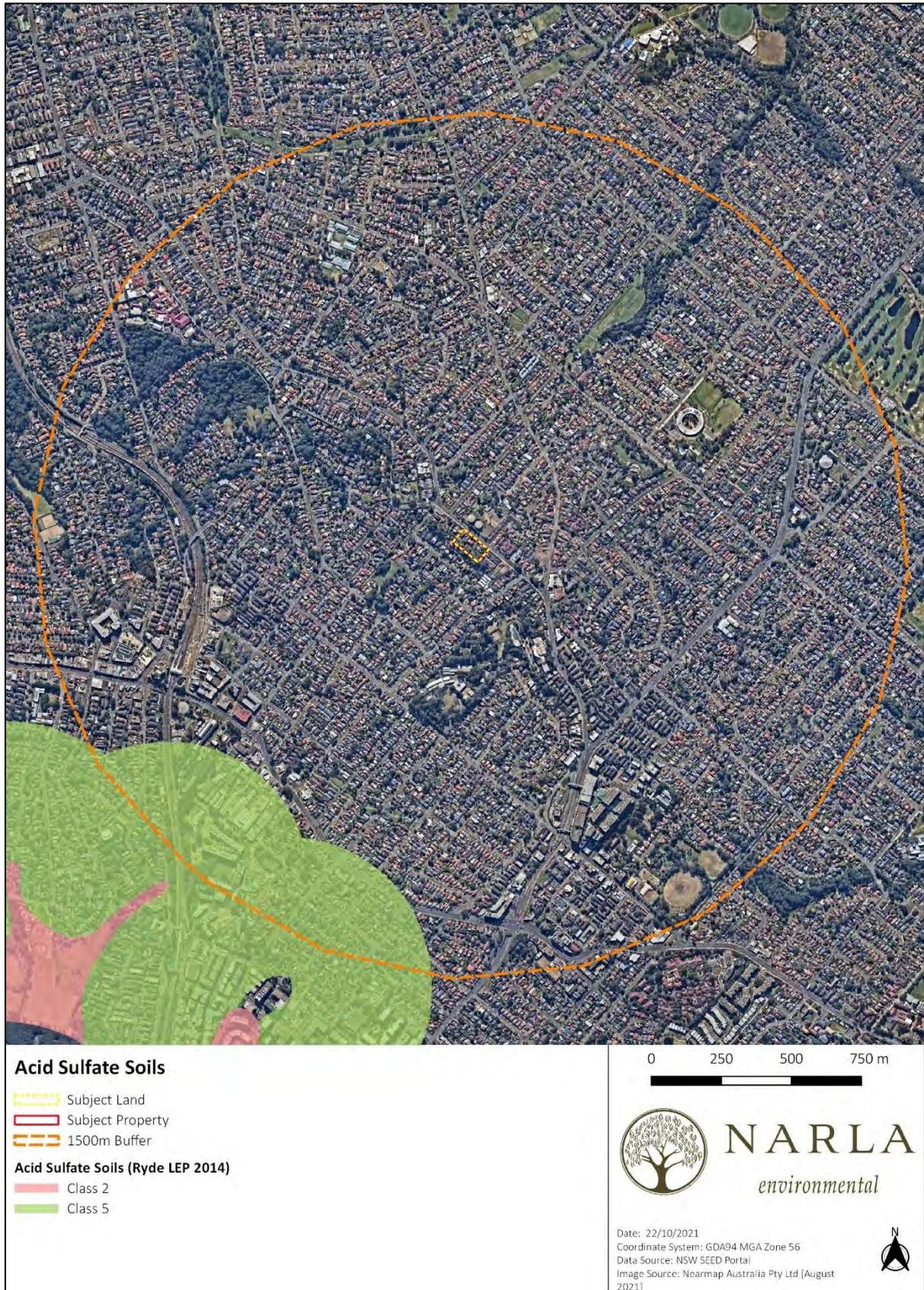


Figure 6. Acid Sulfate Soils occurring in proximity to the Subject Land.

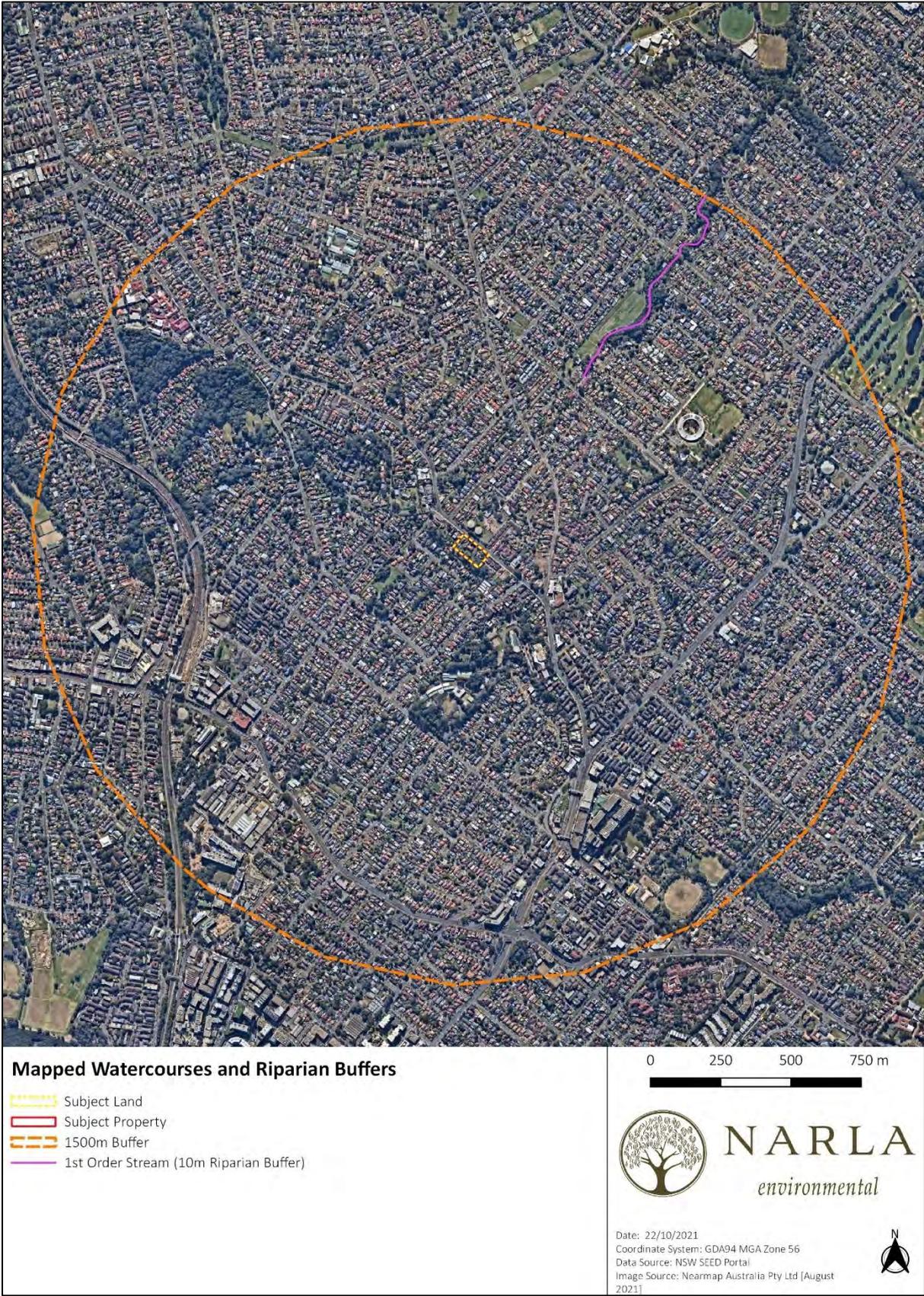


Figure 7. Rivers and streams (with associated riparian buffers) occurring within the 1,500m buffer.

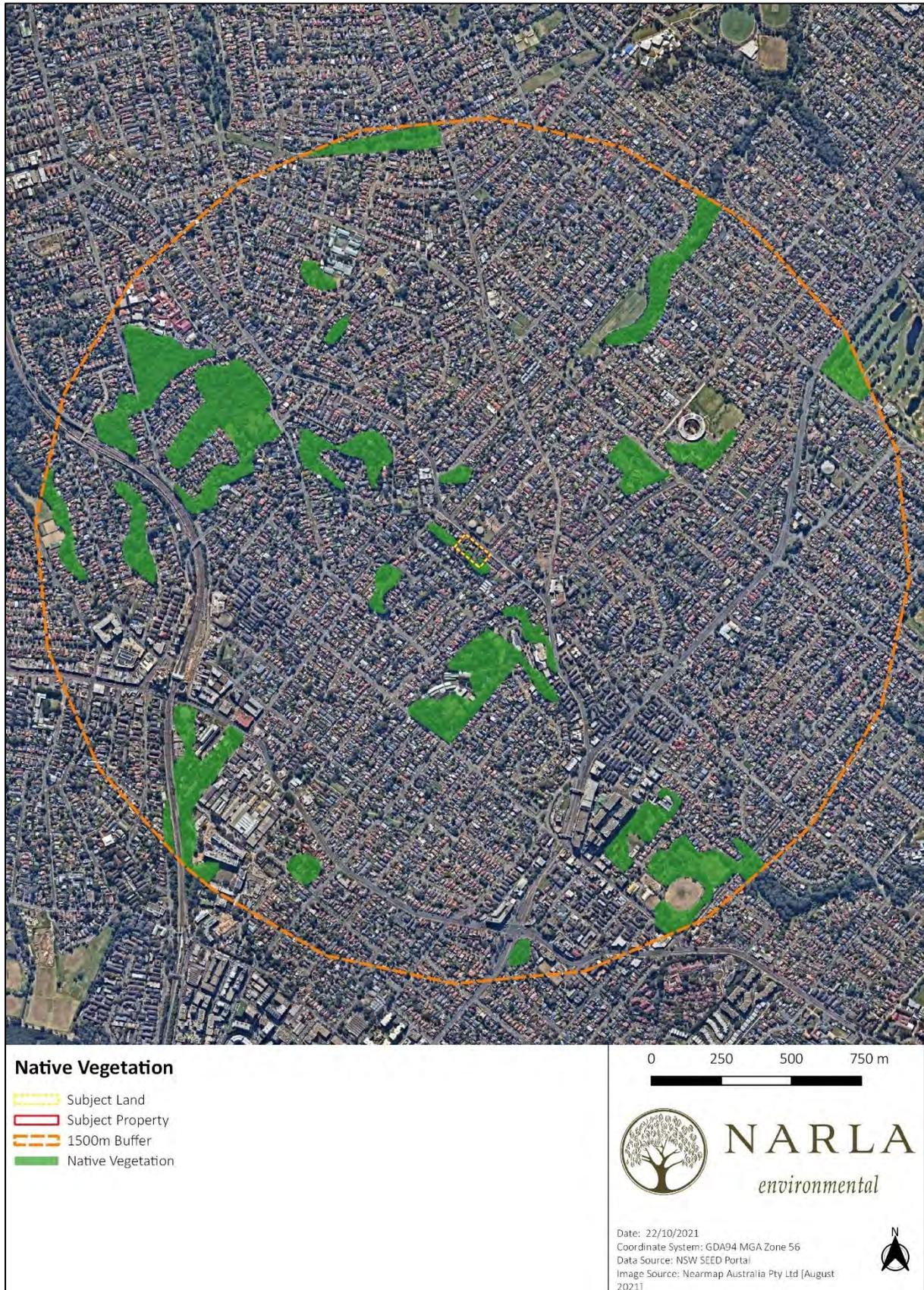


Figure 8. The extent of native vegetation and patch size within the 1,500m buffer.

3. Native Vegetation

3.1 Dominant Plant Community Type (PCT) Identified within the Subject Land

3.1.1 Historically Mapped Vegetation

The Sydney Metropolitan Vegetation Mapping (OEH 2016a) showed the presence of two (2) vegetation types within the Subject Land (**Figure 9**):

- Blue Gum High Forest (PCT 1237);
- Urban Exotic/Native

3.1.2 Plant Community Type Selection Process

Plant Community Type selection for the vegetation community occurring on the Subject Land was undertaken using information and databases provided in the BioNet Vegetation Classification System (DPIE 2021c). The following selection criteria were used in the PCT Filter Tool to develop the PCT shortlist:

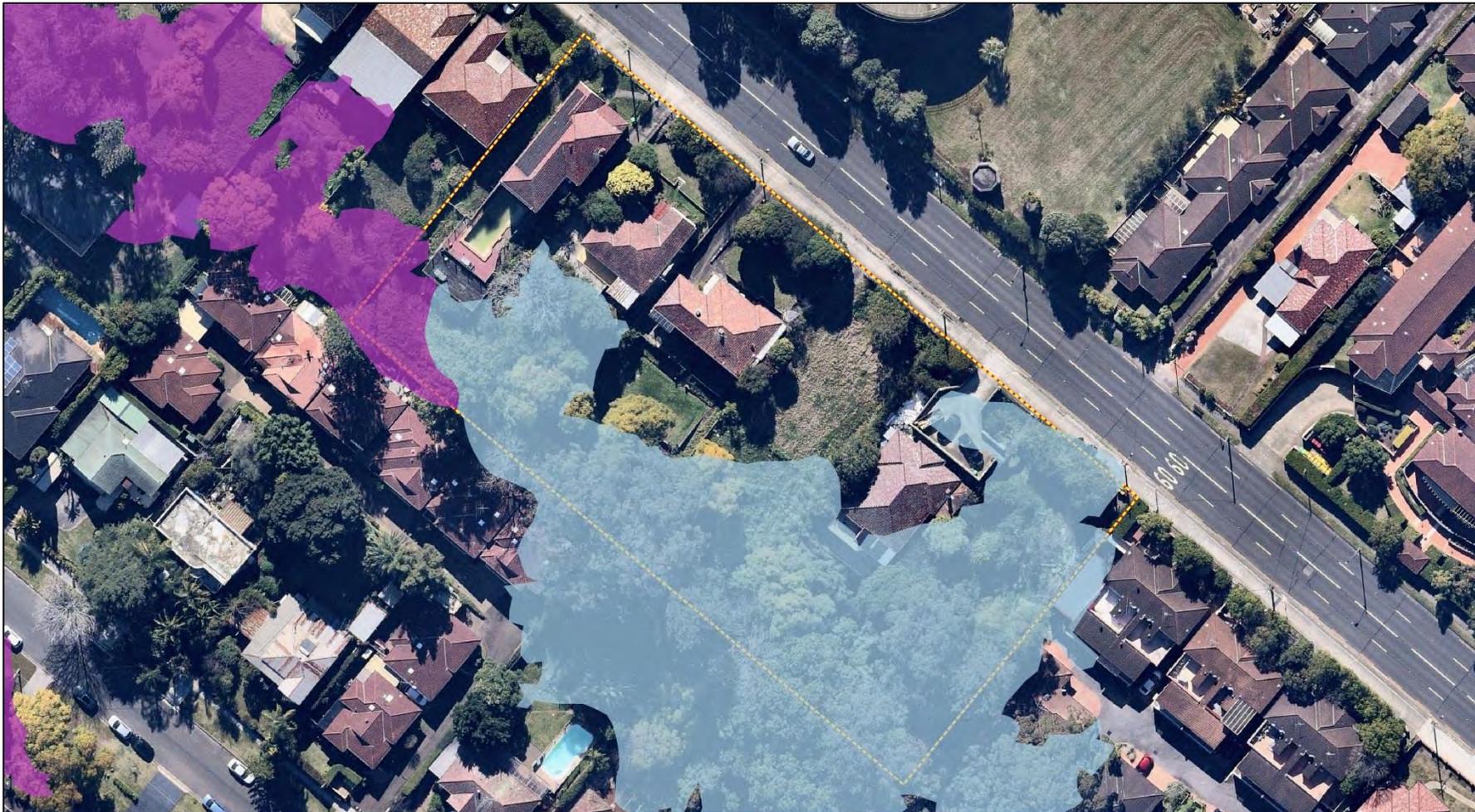
- IBRA Bioregion: Sydney Basin
- IBRA Subregion: Cumberland
- Dominant Species: *Eucalyptus saligna*

This process delivered a selection of four (4) PCT's that occur within the Cumberland IBRA Subregion (and Sydney Basin Bioregion) that had the observed dominant species (i.e., the highest potential of occurring within the Subject Land). The geographical distribution and landscape position characterised by each shortlisted PCT was then compared against the location and landscape of the Subject Land. It was found that the Subject Land was located in the right distribution and contained the appropriate landscape attributes for one candidate PCT (**Table 2**). The steps taken to justify the absence of the candidate PCT within the Subject Land are detailed in **Table 3**.

Table 2. Output from the PCT Filter Tool (DPIE 2021c) and subsequent shortlisting of dominant PCTs. Green shading indicates the selected best fit dominant PCT

Plant Community Type (PCT)	Subject Land within known geographic distribution/ landscape position	No. of floristic Matches	<i>Eucalyptus saligna</i>
PCT 1237: Sydney Blue Gum - Blackbutt - Smooth-barked Apple moist shrubby open forest on shale ridges of the Hornsby Plateau, Sydney Basin Bioregion.	Yes. PCT 1237 is found on fertile shale soils in the high rainfall districts of Sydney's north shore. The Subject Land occurs in a high rainfall area in Sydney's North Shore.	1	✓
PCT 1245: Sydney Blue Gum x Bangalay - Lilly Pilly moist forest in gullies and on sheltered slopes, southern Sydney Basin Bioregion	No. PCT 1245 extends southwards from the Hacking River valley along the escarpment to Nowra. The Subject Land occurs much further north than the Hacking River Valley. The Subject Land occurs	1	✓
PCT 1841: Smooth-barked Apple - Turpentine - Blackbutt tall open forest on enriched sandstone slopes and gullies of the Sydney region	No. PCT 1841 occurs found south of Audley in the Hacking River valley, and extends down the south coast as far as Batemans Bay. The Subject Land occurs further much north than Audley in the Hacking River Valley.	1	✓

Plant Community Type (PCT)	Subject Land within known geographic distribution/ landscape position	No. of floristic Matches	<i>Eucalyptus saligna</i>
PCT 1915: Blue Gum-Bangalay - Turpentine / Cheese Tree - Lilly Pilly tall moist forest on coastal flats of the northern Sydney basin	No. PCT 1915 occurs on coastal flats and adjoining toe slopes. The Subject Land does not occur on coastal flats or adjoining toe slopes.	1	✓



Historical Vegetation Mapping

- Subject Land
- Subject Property

Sydney Metropolitan Vegetation Mapping (OEH 2016)

- S_WSF01: Blue Gum High Forest
- Urban_E/N: Urban Exotic/Native

0 10 20 30 40 50 m



NARLA
environmental

Date: 22/10/2021
 Coordinate System: GDA94 MGA Zone 56
 Data Source: NSW SEED Portal
 Image Source: Nearmap Australia Pty Ltd [August 2021]



Figure 9. Historical vegetation mapping within the Subject Land.

Table 3. PCT selection criteria. Green indicates the selected PCT.

Candidate PCT	Characteristics (DPIE 2021c)	Justification
<p>PCT 1237: Sydney Blue Gum - Blackbutt - Smooth-barked Apple moist shrubby open forest on shale ridges of the Hornsby Plateau, Sydney Basin Bioregion.</p>	<p>Landscape position/ geology</p> <p>The community is found on a range of shale or shale-influenced substrates in areas receiving between 900 and 1300 millimetres of mean annual rainfall. This includes elevated gullies, ridgelines, crests and slopes underlain by Wianamatta shales as well as small gully heads where downslope movement of shale soil lies above sandstone bedrock. In these latter situations sandstone outcrops may be present, although occupying only a minor component of the site. Typically, the community occurs at altitudes above 117 metres above sea level although it is known to occur as low as 30 metres and as high as 185 metres. It is most common across the ridgelines between Castle Hill and St Ives with small areas occurring in Ryde, Lane Cove and Willoughby where it is found at lower elevations.</p>	<p>Narla have assigned this PCT to the vegetation within the Subject Land as it was the only PCT that contained key diagnostic species as well matched the landscape position/geology of the Subject Land.</p> <p>PCT 1237 occupies a range of shale or shale-influenced substrates in areas receiving between 900 and 1300 millimetres of mean annual rainfall. This includes elevated gullies, ridgelines, crests and slopes underlain by Wianamatta shales at altitudes above 117 metres above sea level. The Subject Land occurs on the West Pennant Hills and Glenorie Soil Landscapes which are underlain by Wianamatta shale.</p> <p>PCT 1237 is characterised as a tall wet sclerophyll forest. Although the ground and shrub layer of the Subject Land was highly disturbed, the Subject Land contained diagnostic species <i>Eucalyptus saligna</i>, <i>Eucalyptus pilularis</i> and <i>Pittosporum undulatum</i>.</p> <p>Due to the presence of <i>Eucalyptus saligna</i> on shale dominated soils, within the appropriate landscape position PCT 1237 was identified as the 'best fit' PCT. This was supported by this PCT also being historically mapped within the Subject Land.</p>
	<p>Characteristic canopy</p> <p><i>Allocasuarina torulosa</i>, <i>Angophora costata</i>, <i>Elaeocarpus reticulatus</i>, <i>Eucalyptus saligna</i> and <i>Eucalyptus pilularis</i>.</p>	
	<p>Characteristic mid-storey/ shrub</p> <p><i>Breynia oblongifolia</i>, <i>Pittosporum undulatum</i>, <i>Leucopogon juniperinus</i>, <i>Maytenus silvestris</i>, <i>Clerodendrum tomentosum</i>, <i>Platylobium formosum</i>, <i>Pittosporum revolutum</i>, <i>Eustrephus latifolius</i> and <i>Myrsine variabilis</i>.</p>	
	<p>Characteristic ground layer</p> <p><i>Lomandra longifolia</i>, <i>Adiantum aethiopicum</i>, <i>Entolasia marginata</i>, <i>Pseuderanthemum variabile</i>, <i>Dianella caerulea</i>, <i>Calochlaena dubia</i>, <i>Oplismenus imbecillis</i> and <i>Poa affinis</i>.</p>	

3.1.3 Final PCT and Vegetation Zone Selection

The field survey conducted by experienced Narla Ecologists Jack Tatler and Polina Zadorojnaya confirmed that one (1) PCT was identified within the Subject Land as well some planted natives amongst the exotic dominated and heavily degraded areas:

- PCT 1237: Sydney Blue Gum - Blackbutt - Smooth-barked Apple moist shrubby open forest on shale ridges of the Hornsby Plateau, Sydney Basin Bioregion; and
- Exotic and landscaped vegetation.

Two (2) vegetation zones were identified within the Subject Land that consisted of differing vegetation types:

- Zone 1: PCT 1237– Low Condition
- Zone 2: Planted landscape and exotic vegetation.

These vegetation zones are detailed in **Table 4** and **Table 5** displayed in **Figure 10**.

Table 4. Vegetation zones identified within the Subject Land.

PCT 1237: Sydney Blue Gum - Blackbutt - Smooth-barked Apple moist shrubby open forest on shale ridges of the Hornsby Plateau, Sydney Basin Bioregion	
Vegetation class	North Coast Wet Sclerophyll Forests (Shrubby sub-formation)
Total area	0.09ha
Description in VIS	
<p>Blue Gum High Forest is a tall wet sclerophyll forest found on fertile shale soils in the high rainfall districts of Sydney's north shore. It is dominated by Sydney blue gum (<i>Eucalyptus saligna</i>), blackbutt (<i>Eucalyptus pilularis</i>) and turpentine (<i>Syncarpia glomulifera</i>) with a number of other eucalypts occurring patchily. A sparse to open cover of small trees is found at most sites and includes a variety of sclerophyllous and mesophyllous species. The ground layer is variable in both composition and cover. It may be ferny, grassy or herbaceous depending on topographic situation and disturbance history. At some sites vines and climbers are prolific.</p> <p>Blue Gum High Forest is found on a range of shale or shale-influenced substrates in areas receiving between 900 and 1300mm of mean annual rainfall. This includes elevated gullies, ridgelines, crests and slopes underlain by Wianamatta shales as well as small gully heads where downslope movement of shale soil lies above sandstone bedrock. In these latter situations sandstone outcrops may be present, although occupying only a minor component of the site. Typically, the community occurs at altitudes above 117m above sea level although it is known to occur as low as 30m and as high as 185m. It is most common across the ridgelines between Castle Hill and St Ives with small areas occurring in Ryde, Lane Cove and Willoughby where it is found at lower elevations.</p>	
Condition Class	Vegetation Zone 1: Low Condition
Extent removed	0.04ha
Extent retained	0.05ha
Field survey effort	A site assessment was conducted on the 1 st of October 2021. One (1) 20m x 50m BAM plot was established.
Description of vegetation	The mid and ground layer vegetation within this zone was heavily weed infested, the sparse native canopy was comprised of <i>Eucalyptus saligna</i> , <i>Eucalyptus pilularis</i> , <i>Corymbia maculata</i> and <i>Grevillea robusta</i> . The highly modified mid-storey and groundcover consisted of exotic landscaped plants and High Threat Exotics (HTEs) such as <i>Phoenix canariensis</i> , <i>Ehrharta erecta</i> , and <i>Tradescantia fluminensis</i> (Plate 1).

PCT 1237: Sydney Blue Gum - Blackbutt - Smooth-barked Apple moist shrubby open forest on shale ridges of the Hornsby Plateau, Sydney Basin Bioregion	
Structure of native vegetation	<p>A-sparse canopy cover was evident within the BAM plot, with native trees totalling 12.2% cover. Shrub cover was mostly absent accounting for just 0.2% cover. Native groundcovers were also mostly absent with no grasses, ferns or other species present and forbs comprising just 0.2% coverage. A moderate cover of leaf litter (57%) was also apparent, however no fallen logs were recorded.</p> <p>The BAM plot contained a moderate diversity of tree stem sizes, with tree stems recorded in three (3) DBH classes, including one (1) large tree (>80cm DBH). No regenerating stems were present. Three (3) hollow bearing trees was also recorded within the BAM plot.</p>
BC Act 2016	Zone 1 conforms to the BC Act listed CEEC, Blue Gum High Forest in the Sydney Basin Bioregion (see Section 3.2.1). Zone 2 did not contain any characteristic species of this CEEC (Figure 10).
EPBC Act 1999	Zone 1 does not conform to the EPBC Act listed CEEC, Blue Gum High Forest of the Sydney Basin Bioregion (see Section 3.2.2).
TEC area on-site	0.08ha
Scientific Reference from VIS (DPIE 2021c)	Tozer, M.G., Turner, K., Simpson, C., Keith, D.A., Beukers, P., MacKenzie, B., Tindall, D. & Pennay, C., 2010 Native vegetation of southeast NSW: a revised classification and map for the coast and eastern tablelands. Version 1.0
Estimate of percent cleared value of PCT in the major catchment area	90%

Table 5. Exotic vegetation identified within the Subject Land

Planted landscape and exotic vegetation (cannot be assigned to a PCT)	
Extent within Subject Land (approximate)	0.4ha
Extent removed/ managed	0.4ha
Field survey effort	A site assessment was conducted on 1 st of October 2021. No BAM plots were required as this zone comprised highly altered and disturbed vegetation, typical of a suburban garden landscape. It has therefore been excluded from the credit calculations.
Description of vegetation	The vegetation within this zone comprised of weeds and high threat exotics as well as sporadic planted landscape species. No native canopy or mid-storey species were present in this zone. Exotic species included <i>Ehrharta erecta</i> , <i>Cenchrus clandestinus</i> , <i>Jasminum polyanthum</i> , <i>Jacaranda mimisolia</i> , <i>Celtis sinensis</i> , <i>Pinus radiata</i> , <i>Cinnamomum camphora</i> , <i>Ligustrum lucidum</i> and <i>Wisteria sinensis</i> (Plate 2).

Planted landscape and exotic vegetation (cannot be assigned to a PCT)	
Justification of Vegetation Assignment	<p>The BAM (DPIE 2020a) defines native vegetation using the same definition under s.60B of the LLSA Act.</p> <p>Native vegetation means any of the following types of plants native to New South Wales:</p> <ul style="list-style-type: none"> ▪ trees (including any sapling or shrub or any scrub), ▪ understorey plants ▪ groundcover (being any type of herbaceous vegetation) ▪ plants occurring in a wetland. <p>The vegetation within this area contained no native mid-story or canopy species. Groundcover species consisted predominately of exotic grasses. There were very sporadic occurrences of native groundcover species and it was evident that the zone had been historically altered as it is surrounded by urban development and is part of a residential garden.</p>
Associated TEC	None.

3.1.4 Precautionary Approach: Extent and Type of Impacts to PCT 1237

Of the 0.09ha of PCT 1237 that occurs within the Subject Land, only 0.04ha is proposed to be removed to accommodate the proposed development. The remaining 0.05ha is proposed to be retained and protected throughout the construction works. However, owing to the threatened status of the community it was prudent to assess the impacts to biodiversity assuming a precautionary approach. As a result, for the purposes of this assessment we assume 0.09ha of PCT 1237 is to be impacted:

- direct impacts to 0.04ha; and
- potential indirect impacts to 0.05ha.

By assessing the impacts to biodiversity in this way, it ensures the identification of indirect impacts and that they should be offset based on the assumption that the development will completely destroy all affected vegetation communities and associated species and these communities will be unable to be rehabilitated. This is consistent with the precautionary principle, and biodiversity as a fundamental consideration. It is important to note that this does not give licence to completely impact the entirety of PCT 1237 but provides an offsetting outcome for a scenario where it is completely impacted.



Plate 1. Representative photo of Vegetation Zone 1: Low condition within the Subject Land.



Plate 2. Representative photo of Vegetation Zone 2 within the Subject Land.

3.2 Threatened Ecological Communities

3.2.1 Biodiversity Conservation Act 2016

Vegetation Zone 1 occurs on shale-derived soils from the Wianamatta group, in the northern suburbs of Sydney. Furthermore, the vegetation comprises the following species listed in the final determination for the Blue Gum High Forest in the Sydney Basin Bioregion: *Eucalyptus saligna* (Sydney Blue Gum), *Eucalyptus pilularis* (Blackbutt) and *Pittosporum undulatum* (Sweet Pittosporum). The vegetation within the Subject Land occurs at an elevation that is slightly lower than reported for BGHF. Nevertheless, using the precautionary principal Vegetation Zone 1 conforms to low condition BGHF of the Sydney Basin Bioregion (BGHF; **Figure 10**). This is a BC Act listed CEEC.

Although included in the impact assessment and offset calculations (see **section 3.1.4** for more information), a small part of the native vegetation allocated to Vegetation Zone 1 was comprised of *Grevillea robusta* (Silky Oak), which does not naturally occur in Sydney. Therefore, the parts of Vegetation Zone 1 that are made up solely of *G. robusta* do not conform to the BC Act listing of BGHF.

Given the heavily degraded state of Vegetation Zone 2, the lack of diagnostic canopy and shrub species as well as the overall dominance of exotic species, this zone was considered not to conform to the BC listing of BGHF.

3.2.2 Commonwealth Environment Protection and Biodiversity Conservation Act 1999

The native vegetation within Zone 1 within the Subject Land does not conform to the EPBC Act 1999 listed CEEC Blue Gum High Forest of the Sydney Basin Bioregion as it does not meet the key diagnostic characteristics and condition thresholds as outlined in **Table 6**.

The vegetation within Zone 2 does not meet the EPBC listed community as this zone contained no characteristic species of the CEEC.

Table 6. Condition Threshold for patches that meet the description for Blue Gum High Forest.

Threshold	Zone 1 vegetation within the Subject Land
Patch with a canopy cover greater than 10% and a size greater than 1ha.	No. Whilst the patch has a canopy of greater than 10% the patch size is less than a 1ha.
OR	
Patch with canopy cover less than 10% and exceeds 1ha and occur in areas of native vegetation in excess of 5ha.	The patch size is less than a 1ha.



Field Validated Vegetation Mapping

- Subject Land
- Subject Property
- VIS BAM Plots (20m x 50m)
- Existing Dwelling and Hardstand

Narla Field Validated Vegetation Mapping

- Vegetation Zone 1: PCT 1237 (Low Condition)
- Vegetation Zone 2: Planted Landscape and Exotic Vegetation (not included in calculations)
- Blue Gum High Forest in the Sydney Basin Bioregion (BC Act)

0 10 20 30 40 50 m



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environmental

Date: 30/11/2021
Coordinate System: GDA94 MGA Zone 56
Image Source: Nearmap Australia Pty Ltd [August 2021]



Figure 10. Narla field validated vegetation mapping and location of BAM VIS plots within the Subject Property.

3.3 Assessing Patch Size

As defined by the BAM, a patch is an area of native vegetation that occurs on the Subject Land and includes native vegetation that has a gap of less than 100m from the next area of native vegetation (or $\leq 30\text{m}$ for non-woody ecosystems). A patch may extend onto adjoining land. For each vegetation zone, the assessor must determine the patch size in hectares and assign it to one of the following classes:

- $<5\text{ha}$;
- $5 - <25\text{ha}$;
- $25 - <100\text{ ha}$; or
- $\geq 100\text{ ha}$.

The patch size class is used to assess habitat suitability on the Subject Land for threatened species. The assessor may assign more than one patch size class to the vegetation zone if both of the following apply:

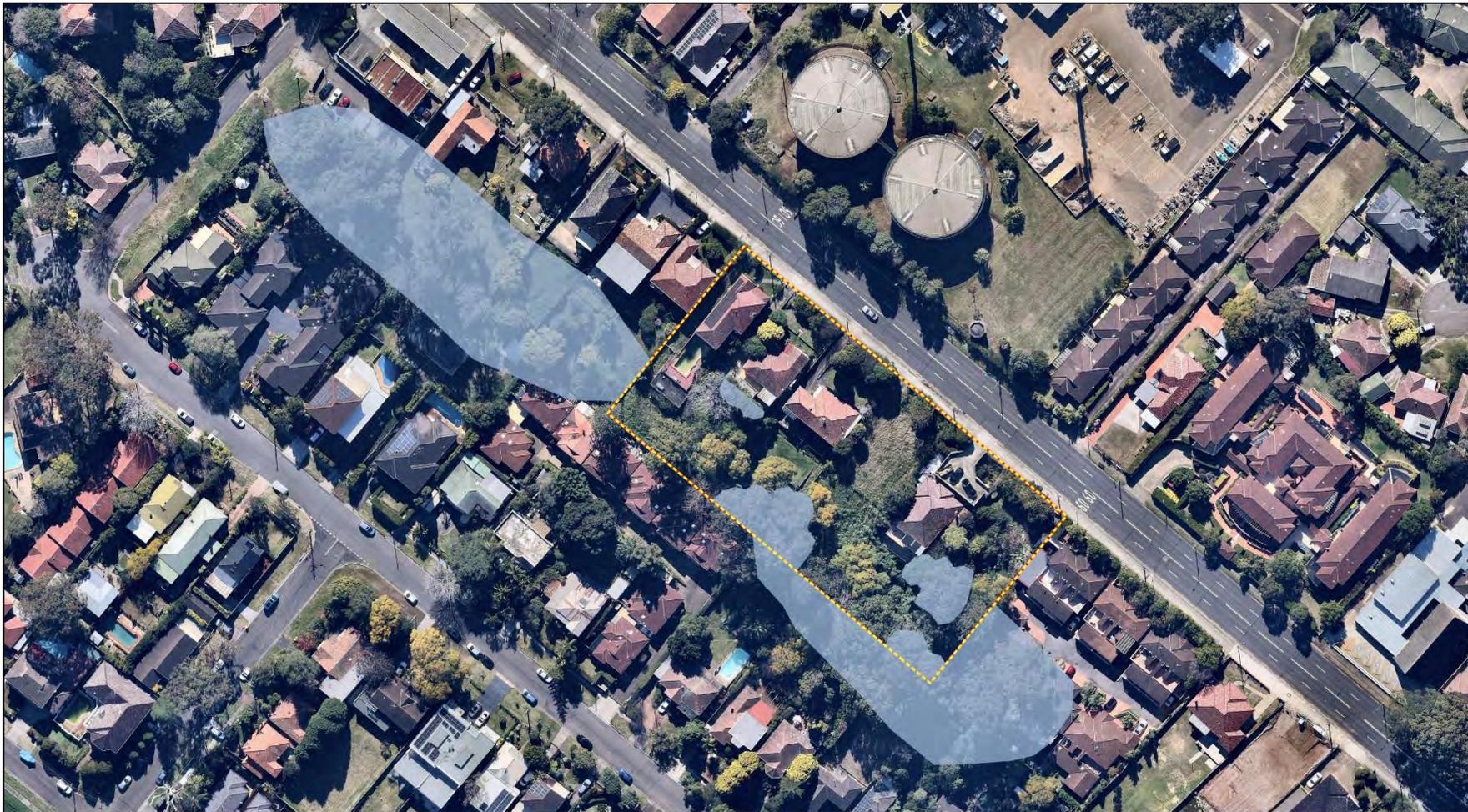
- A vegetation zone comprises two or more discontinuous areas of native vegetation, and
- The areas of discontinuous native vegetation have more than one patch size class.

As areas outside of the Subject Property were not assessed as part of the scope of this assessment, the vegetation zones identified within the Subject Land were separated into the following categories to allow for aerial mapping of patch size within the broader area (**Table 7; Figure 11**):

- Woody Ecosystems:
 - Zone 1: PCT 1237 – Low Condition;

Table 7. Patch size classes of each PCT and associated vegetation zones.

Plant Community Type	Category	Vegetation Zone	Patch Size Class
PCT 1237	Woody Ecosystems	Zone 1	$<5\text{ha}$



Patch Size

-  Subject Land
-  Subject Property
-  Patch Size- Woody Ecosystem (Zone 1)

0 25 50 75 m



NARLA
environmental

Date: 30/11/2021
 Coordinate System: GDA94 MGA Zone 56
 Image Source: Nearmap Australia Pty Ltd [August 2021]



Figure 11. Patch size for vegetation zone 1.

3.4 Vegetation Integrity Survey (VIS) Plots

One (1) BAM VIS plot was undertaken within the Subject Property. Plot data gathered for each attribute used to assess the function of the Subject Land vegetation is detailed in **Appendix A**. Vegetation Integrity (VI) Scores represented by existing vegetation within the vegetation zone is detailed in **Table 8**.

3.4.1 Determining Future Vegetation Integrity Scores

Most projects will result in complete clearing of vegetation and threatened species habitat within the development footprint. In this scenario, the assessor must assess the proposed future value of each of the VI attributes as zero in the BAMC. Although two trees (representative of BGHF) and other native trees are being retained, owing to the scale of the proposed development the Assessor has used the precautionary principle and assessed the proposal as if the entire Subject Land will experience complete clearing. The vegetation zone has been classified into the following management zone (**Figure 12**):

- Vegetation Zone 1: Low condition:
 - Management Zone 1: Precautionary Approach (total Impact).

The attributes influencing the future vegetation score within the management zone are detailed in **Table 8 & Table 9**.



Management Zones

- Subject Land
- Subject Property
- Management Zone 1: PCT 1237- Precautionary Approach (total Impact)

0 10 20 30 40 50 m



NARLA
environmental

Date: 30/11/2021
 Coordinate System: GDA94 MGA Zone 56
 Image Source: Nearmap Australia Pty Ltd [August 2021]



Figure 12. Management zones within the Subject Land.

Table 8. Future vegetation integrity score after impacts are taken into account.

PCT 1237: Sydney Blue Gum - Blackbutt - Smooth-barked Apple moist shrubby open forest on shale ridges of the Hornsby Plateau, Sydney Basin Bioregion									
Vegetation Zone	Management Zone	Area (ha)	Composition Condition Score	Structure Condition Score	Function Condition Score	Current VI Score	Future VI Score	Change in VI Score	Total VI Loss
Zone 1: Low Condition)	Management Zone 1 – Precautionary Approach (total Impact)	0.09	5	2.4	30.3	7.1	0	-7.1	-7.1

Table 9. Management zones within the Subject Land and relevant vegetation attributes (composition, structure and function) affecting future VI scores.

Vegetation Zone	Management Zone	Changes in Current Vegetation Attributes	Vegetation Attributes Not Changed	Future Vegetation Scores and Justification
Zone 1: Low Condition	Management Zone 1 – Precautionary Approach (total Impact)	All vegetation, leaf litter and coarse woody debris will be removed	N/A	<ul style="list-style-type: none"> All vegetation has been removed as a result of the works; and Future composition, structure and function score is 0.

4. Threatened Species

4.1 Candidate Ecosystem Credit Species

Ecosystem credit species associated with the Subject Land are listed below in **Table 10**. No species predicted by the BAM calculator as potential ecosystem credits were excluded from the assessment due to habitat constraints.

Table 10. Candidate ecosystem credits predicted to occur within the Subject Land

Scientific Name	BC Act Status	Excluded from Assessment	Reason for Exclusion from Assessment
<i>Anthochaera phrygia</i> Regent Honeyeater (Foraging)	Critically Endangered	No	-
<i>Artamus cyanopterus cyanopterus</i> Dusky Woodswallow	Vulnerable	No	-
<i>Calyptorhynchus lathami</i> Glossy Black-Cockatoo (Foraging)	Vulnerable	No	-
<i>Dasyurus maculatus</i> Spotted-tailed Quoll	Vulnerable	No	-
<i>Glossopsitta pusilla</i> Little Lorikeet	Vulnerable	No	-
<i>Hirundapus caudacutus</i> White-throated Needle-tail	Not listed; Vulnerable (EPBC)	No	-
<i>Lathamus discolor</i> Swift Parrot (Foraging)	Endangered	No	-
<i>Micronomus norfolkensis</i> Eastern Coastal Free-tailed Bat	Vulnerable	No	-
<i>Miniopterus australis</i> Little Bent-winged Bat (Foraging)	Vulnerable	No	-
<i>Miniopterus orianae oceanensis</i> Large Bent-winged bat (Foraging)	Vulnerable	No	-
<i>Phascolarctos cinereus</i> Koala (Foraging)	Vulnerable	No	-
<i>Pteropus poliocephalus</i> Grey-headed Flying-fox (Foraging)	Vulnerable	No	-
<i>Ptilinopus superbus</i> Superb Fruit-Dove	Vulnerable	No	-

4.2 Candidate Species Credit Species Summary

This section provides a summary of the candidate species credit fauna and flora species for the Subject Land derived from BAMC (DPIE 2020b) and whether or not the species credit needs to be offset through retiring of Biodiversity Offset Credits (Table 11; Table 12).

Table 11. Candidate Fauna Credit Species predicted to occur within the Subject Land.

Scientific Name	Included in Assessment?	Targeted Survey conducted?	Present within Subject Land?	Biodiversity Risk Weighting	Biodiversity Offset Credits Required?
<i>Anthochaera phrygia</i> Regent Honeyeater (Breeding)	No, the Subject Land is not included on the map of important areas for Regent Honeyeaters.	N/A	No	Very High – 3	No
<i>Lathamus discolor</i> Swift Parrot (Breeding)	No, the Subject Land is not included on the map of important areas for Swift Parrots.	N/A	No	Very High - 3	No
<i>Miniopterus australis</i> Little Bent-winged Bat (Breeding)	No. This species is known to breed in caves, tunnels, mines and culverts. As such habitat constraints are not present within the Subject Land, this species was excluded from the assessment.	N/A	No	Very High - 3	No
<i>Miniopterus orianae oceanensis</i> Large Bent-winged Bat (Breeding)	No. This species is known to breed in caves, tunnels, mines and culverts. As such habitat constraints are not present within the Subject Land, this species was excluded from the assessment.	N/A	No	Very High - 3	No

Table 12. Candidate Flora Credit Species predicted to occur within the Subject Land.

Scientific Name	Included in Assessment?	Targeted Survey conducted?	Present within Subject Land?	Biodiversity Risk Weighting	Biodiversity Offset Credits Required?
<i>Galium australe</i> Tangled Bedstraw	No. Tangled Bedstraw has been recorded historically in the Nowra (Colymea) and Narooma areas. Following a taxonomic revision, many recent records in NSW have been re-determined as other species. Records in the Sydney area are yet to be confirmed (DPIE 2019). The Subject Land does not occur within the Nowra and Narooma area. As no records have been confirmed within Sydney to date, it is highly unlikely this species occurs within the Subject Land. Subsequently, this species has been excluded from the assessment.	No	No	Very High – 3	No
<i>Hibbertia spanantha</i> Julian’s Hibbertia	Yes. This species grows in forest with canopy species including <i>Eucalyptus pilularis</i> , <i>E. resinifera</i> , <i>Corymbia gummifera</i> and <i>Angophora costata</i> . The soil is identified as a light clay occurring on a shale sandstone soil transition. As potential habitat is present within the Subject Land, this species was included in the assessment.	Yes	No	Very High – 3	No
<i>Rhodamnia rubescens</i> Scrub Turpentine	Yes. Found in littoral, warm temperate and subtropical rainforest and wet sclerophyll forest usually on volcanic and sedimentary soils. As such habitat is present within the Subject Land, this species was included in the assessment.	Yes	No	Very High – 3	No

4.3 Species Credit Habitat Surveys

Species credit habitat surveys were undertaken for any SAI species credit species considered likely to have suitable habitat within the Subject Land (**Figure 13**). These surveys were implemented in accordance with Section 5.3 of the BAM and all relevant OEH and DPIE threatened species survey guidelines.

Habitat surveys were undertaken on the 1st of October 2021 by experienced Narla Ecologists, Jack Tatler and Polina Zadorojnaya, within the Subject Land. Weather conditions taken from the nearest weather station (Sydney Olympic Park, station no. 066212) in the lead up and during the field survey are outlined in **Table 13**.

Pre-survey weather conditions were generally conducive for identifying threatened species and their habitats should they occur within the Subject Land. Rainfall in the week prior to the targeted flora surveys provided ideal conditions for the flowering and/or emergence of the targeted flora species. Such rainfall also allowed for optimal conditions for the emergence of shrubs and groundcovers within the Subject Land, which ensured maximum species diversity was observed during the site visit.

Table 13. Weather conditions taken from the nearest weather stations (Station number 066212) in the lead up and during the field survey (BOM 2021). Survey date is in bold.

Timing/activities	Date	Day	Temperature		Rainfall (mm)
			Min	Max	
Lead up to the survey	24/09/2021	Friday	8.3	27.3	0
	25/09/2021	Saturday	9.7	21.8	0
	26/09/2021	Sunday	10.6	16.0	0
	27/09/2021	Monday	7.3	19.7	0
	29/09/2021	Tuesday	7.4	23.3	0.2
	29/09/2021	Wednesday	11.6	21.6	0
	30/09/2021	Thursday	13.2	23.8	4.2
Site Assessment & Habitat Survey	01/10/2021	Friday	13.7	26.4	3.2

4.3.1 Fauna Species Credit Survey

A total of four (4) SAI threatened fauna species were identified within the BAMC (DPIE 2020b) as having the potential to occur within the Subject Land. Following the site assessment, none of the species were identified as having the potential to occur within the Subject Land due to the following (BAM Section 5.2.2, DPIE 2020a):

- The assessor determines that microhabitats required by a species are absent from the Subject Land (or specific vegetation zone) [(Section 5.2.3(2ai) of the BAM (DPIE 2020a)]

4.3.2 Flora Species Credit Survey

Three (3) SAI threatened flora species were identified within the BAMC (DPIE 2020b) as having the potential to occur within the Subject Land. Following the site assessment, two (2) species were identified as having the potential to occur within the Subject Land due to suitable habitat. One (1) species was excluded due to the Subject Land being located significantly outside of the confirmed distribution as per the species DPIE species profiles.

Targeted flora surveys were conducted for two (2) species within the DPIE endorsed survey period (**Table 14**). The targeted survey effort undertaken for these species is detailed in **Section 4.3.2.1**.

Table 14. Species credit flora species requiring targeted surveys and DPIE endorsed survey periods.

Candidate Fauna Species	Survey Period (BAMC)											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<i>Hibbertia spanantha</i> Julian's Hibbertia										✓		
<i>Rhodamnia rubescens</i> Scrub Turpentine										✓		
Key	✓ = Time of Site Assessment						= Optimum Survey Period					

4.3.2.1 Targeted Flora Survey Effort

A targeted survey was undertaken in accordance with the "Surveying Threatened Plants and Their Habitats: NSW survey guide for the Biodiversity Assessment Method" (DPIE 2020c) for the following species credit species that were identified within the BAMC (DPIE 2020b) as having the potential to occur within the Subject Land:

- *Hibbertia spanantha* (Julian's Hibbertia); and
- *Rhodamnia rubescens* (Scrub Turpentine)

The targeted survey effort undertaken for these species is detailed in **Table 15** and displayed in **Figure 13**.

Table 15. Targeted flora survey effort undertaken within the Subject Land.

Target Species	Survey Technique	Survey Effort and Timing	Identified?
<i>Hibbertia spanantha</i> Julian's Hibbertia	Parallel transverse across the vegetated portion of the Subject Land	One day on Friday 1 st October 2021	No
<i>Rhodamnia rubescens</i> Scrub Turpentine			

4.4 Species Polygons

No threatened species were identified within the Subject Land or assumed present and therefore no species polygons were created.



Targeted Survey Effort

-  Subject Land
-  Subject Property
-  Targeted Survey Effort for threatened species and their habitats.

0 10 20 30 40 50



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Date: 22/10/2021
 Coordinate System: GDA94 MGA Zone 56
 Data Source: NSW SEED Portal
 Image Source: Nearmap Australia Pty Ltd [August 2021]



Figure 13. Targeted survey effort for threatened species and their habitats within the Subject Land.

5. Prescribed Impacts

Certain projects may have impacts on biodiversity values in addition to, or instead of, impacts from clearing vegetation and/or loss of habitat. For many of these impacts, the biodiversity values may be difficult to quantify, replace or offset, making avoiding and minimising impacts critical. Prescribed biodiversity impacts require an assessment of the impacts of the development on the habitat of threatened species or ecological communities. This is discussed in **Table 16**.

Table 16. Prescribed and uncertain impacts associated with the proposed development.

Will there be impacts on any of the following?	Yes/No	Justification for further assessment
Habitat of threatened entities including: <ul style="list-style-type: none"> ▪ karst, caves, crevices, cliffs, rocks and other geological features of significance, or ▪ human-made structures, or ▪ non-native vegetation. 	Yes	There are no karsts, caves, suitable crevices, cliffs, rocks and other features of geological significance on or near the Subject Land. Non-native vegetation was present within the Subject Land; however, it only existed in the form of exotic grasses and woody weeds, the removal of which is not expected to impact any threatened species. The Subject Land contains existing dwellings that will be demolished as part of the proposed development. Although unlikely, a number of threatened microbat species may utilise this human-made structure for roosting and breeding, including: <ul style="list-style-type: none"> ▪ <i>Falsistrellus tasmaniensis</i> (Eastern False Pipistrelle) ▪ <i>Micronomus norfolkensis</i> (Eastern Coastal Free-tailed Bat) ▪ <i>Saccolaimus flaviventris</i> (Yellow-bellied Sheath-tail-bat). ▪ <i>Scoteanax rueppellii</i> (Greater Broad-nosed Bat).
On areas connecting threatened species habitat, such as movement corridors.	No	It is unlikely the development will interrupt connectivity for any threatened species, as the habitat connectivity extending away from the Subject Land is already extremely fragmented owing to the highly urbanised nature of the locality.
That affect water quality, water bodies and hydrological processes that sustain threatened entities (including from subsidence or upsidence from underground mining).	No	There are no confirmed threatened species and ecological communities within the Subject Land that are sustained by water bodies and hydrological processes. It is

Will there be impacts on any of the following?	Yes/No	Justification for further assessment
		also not expected that the removal of vegetation within the Subject Land will have impacted upon any groundwater processes within the surrounding landscape.
On threatened and protected animals from turbine strikes from a wind farm.	No	No wind farms are associated with the proposed development.
On threatened species or fauna that are part of a TEC from vehicle strikes.	No	Although the development will result in an increase of vehicular traffic, it is highly unlikely that it would result in an increase in vehicle strikes to threatened fauna given the low likelihood threatened fauna use the area. Moreover, the locality already has high levels of vehicle traffic which will not be exacerbated by the proposed development.

6. Avoid, Minimise and Mitigate Impacts

6.1 Impact Mitigation and Minimisation Measures

This section details the measures to be implemented before, during and post construction to avoid and minimise the impacts of the project (Table 17).

Table 17. Mitigation and management of impacts associated with the proposed development.

Action	Outcome	Timing	Responsibility								
Avoid and Minimise Impact - Project Location and Design	<p>An Ecological Constraints Assessment (ECA) was undertaken in 2017 to help the design of the proposed development avoid significant ecological features within the site. The proposed development has since been located largely on the existing developed areas of the site (as well as the vacant blocks that are void of native vegetation). Further, the vast majority of impacts will be to poor condition vegetation that is unsuitable for threatened species. There are six (6) trees of significance that are characteristic of the BGHF CEEC within the Subject Land. Of these, one (1) is already dead, two (2) have considerable health concerns, are unsafe and are being removed, one (1) does not have health concerns but is being removed to accommodate the proposed development and two (2) are being retained and protected.</p> <p>Please see Appendix C for a letter from CD Architects that further discusses the measures employed by the proponent to avoid and minimise impacts to biodiversity during the design phase.</p>	N/A	Proponent								
Landscape planting with BGHF representative species	<p>The design of the proposed development allows for considerable expansion and improvement in the condition of the existing BGHF within the Subject Property. The landscape plan allows for approximately 0.26ha of vegetation to be planted, with the majority of the southern and eastern boundary (approx. 0.14ha) to contain a full ground, mid and upper stratum of BGHF characteristic species (currently there is approx. 0.08ha of BGHF only represented by five canopy species and one shrub). The species characteristic of BGHF to be planted as part of the landscaping include:</p> <table border="0"> <tr> <td>Sydney Blue Gum <i>Eucalyptus saligna</i></td> <td>Prickly Beard-heath <i>Leucopogon juniperinus</i></td> </tr> <tr> <td>Blackbutt <i>Eucalyptus pilularis</i></td> <td>Narrow-leaved Orange Bark <i>Maytenus silvestris</i></td> </tr> <tr> <td>Grey Ironbark <i>Eucalyptus paniculata</i></td> <td>Mock-olive <i>Notelaea longifolia</i></td> </tr> <tr> <td>Turpentine <i>Syncarpia glomulifera</i></td> <td>Paper Daisy <i>Ozothamnus diosmifolius</i></td> </tr> </table>	Sydney Blue Gum <i>Eucalyptus saligna</i>	Prickly Beard-heath <i>Leucopogon juniperinus</i>	Blackbutt <i>Eucalyptus pilularis</i>	Narrow-leaved Orange Bark <i>Maytenus silvestris</i>	Grey Ironbark <i>Eucalyptus paniculata</i>	Mock-olive <i>Notelaea longifolia</i>	Turpentine <i>Syncarpia glomulifera</i>	Paper Daisy <i>Ozothamnus diosmifolius</i>	After construction	Proponent Landscape Specialist
Sydney Blue Gum <i>Eucalyptus saligna</i>	Prickly Beard-heath <i>Leucopogon juniperinus</i>										
Blackbutt <i>Eucalyptus pilularis</i>	Narrow-leaved Orange Bark <i>Maytenus silvestris</i>										
Grey Ironbark <i>Eucalyptus paniculata</i>	Mock-olive <i>Notelaea longifolia</i>										
Turpentine <i>Syncarpia glomulifera</i>	Paper Daisy <i>Ozothamnus diosmifolius</i>										

Action	Outcome	Timing	Responsibility	
	Sydney Red Gum <i>Angophora costata</i> White Mahogany <i>Eucalyptus acmenoides</i> Cheese Tree <i>Glochidion ferdinandi</i> Red Ash <i>Alphitonia excelsa</i> Grey Myrtle <i>Backhousia myrtifolia</i> Sweet Pittosporum <i>Pittosporum undulatum</i> Blueberry Ash <i>Elaeocarpus reticulatus</i> Hickory <i>Acacia implexa</i> Grey Myrtle <i>Backhousia myrtifolia</i> Lilly Pilly <i>Acmena smithii</i> Coffee Bush <i>Breynia oblongifolia</i> Old Man's Beard <i>Clematis glycinoides</i> Wombat Berry <i>Eustrephus latifolius</i> Small-leaf glycine <i>Glycine microphylla</i>	Yellow Pittosporum <i>Pittosporum revolutum</i> Elderberry Ash <i>Polyscias sambucifolia</i> Native Peach <i>Trema tomentosa</i> Blue Flax-lily <i>Dianella caerulea</i> Kidney Weed <i>Dichondra repens</i> Bordered Panic <i>Entolasia marginata</i> Spiny-headed mat-rush <i>Lomandra longifolia</i> Weeping Grass <i>Microlaena stipoides</i> Basket Grass <i>Oplismenus aemulus</i> Creeping Beard Grass <i>Oplismenus imbecillis</i> Native Tussock Grass <i>Poa affinis</i> Native Grape <i>Cayratia clematidea</i> Wonga Wonga Vine <i>Pandorea pandorana</i> Bearded Tylophora <i>Tylophora barbata</i> Water Vine <i>Cissus antarctica</i>		
Vegetation Management Plan (VMP)	A VMP is to be prepared that describes the active and ongoing management of the retained BGHF as well as the planting and maintenance of additional areas of BGHF throughout the site. The VMP will detail the exact species and planting densities for different management zones across the Subject Property, and their long-term management. The VMP will establish criteria to which the condition of the BGHF vegetation must meet during annual monitoring assessments.	Before clearing	Proponent Ecologist	
Erosion and Sedimentation	Appropriate erosion and sediment control must be erected and maintained at all times during operation in order to avoid incurring indirect impacts on biodiversity values. As a minimum, such measures should comply with the relevant industry guidelines such as 'the Blue Book' (Landcom 2004).	N/A	Proponent Construction Contractor	
Assigning a Project Ecologist	A Project Ecologist should be engaged to conduct a pre-clearing survey to identify if any bat species are using the dwellings to be demolished. Possum dreys were also identified within native vegetation on the site and should be inspected prior to removal. The Project Ecologist should be present for all vegetation clearing (native and exotic) and the demolition of the dwellings if bats are detected or if is conducted prior to vegetation removal.	Before, during and after clearing	Proponent Project Ecologist	

Action	Outcome	Timing	Responsibility
Erection of temporary fencing	Temporary fencing should be erected around any retained native vegetation that may incur indirect impacts on biodiversity values.	N/A	Proponent Construction Contractor
Hollow replacement with nest boxes	Should any hollow-bearing trees (native or exotic) be removed, they are to be compensated by the installation of similar-sized nest boxes at a 1:1 ratio within the Subject Property.	After construction	Proponent Project Ecologist

6.2 Vegetation to be Removed, Retained and Restored

To accommodate the development and to mitigate impacts to biodiversity values, some of the native vegetation representative of BGHF within the Subject Land will be removed, some is proposed to be retained and protected and additional areas are proposed for restoration (**Table 18**). The landscaping in the southern portion of the Subject Property will permit the full restoration (ground, mid and upper layer) of BGHF characteristic species. The remaining landscaped areas of the Subject Property will contain a mix of ground and mid stratum planted natives (including BGHF characteristic species) and cultivated exotics (**Figure 14**).

Table 18. Calculations of the amount of BGHF removed and restored within the Subject Land.

Action	Blue Gum High Forest
Current area within Subject Land	0.08ha
To be Removed	0.04ha
To be Retained and Restored	0.04ha
Additional areas to be fully restored (ground, mid and upper stratum)	0.10ha
Total increase in the area of BGHF within the Subject Land	0.06ha
Total area of BGHF within the Subject Land following restoration	0.14ha



Restoration of BGHF within the Subject Land

-  Subject Land
-  Subject Property
-  Proposed Dwellings and Hardstand
-  Very poor condition BGHF currently occurring within the Subject Land

Landscaping areas for BGHF

-  Fully restored BGHF with ground, mid and upper stratum species
-  Partially restored BGHF with a mix of native and cultivated exotic ground and mid stratum species

0 10 20 30 40 50 m



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Date: 30/11/2021
Coordinate System: GDA94 MGA Zone 56
Image Source: Nearmap Australia Pty Ltd [August 2021]



Figure 14. Approximate location of existing BGHF and the areas proposed to be retained and restored.

7. Assessment of Impacts

7.1 Direct Impacts

7.1.1 Total Impacts

The SBDAR has assessed the complete clearing of the following vegetation:

- 0.04ha of PCT 1237 (Low Condition);
- 0.40ha of Planted Landscape and Exotic Vegetation.

7.2 Partial Impacts

No partial impacts have been assessed as part of the proposed development.

7.3 Prescribed Impacts

As there is potential for the Subject Land to contain habitat for a number of threatened microbat species in the form of human-made structures, an assessment of this prescribed impact must be undertaken in accordance with Section 8.3 of the BAM (DPIE 2020a). This is discussed in **Table 19**.

Table 19. Prescribed and uncertain impacts associated with the proposed development.

Prescribed Impact	Nature, Extent and Duration	Threatened Species and Their Habitat Likely to be Impacted	Consequences of the Impacts on Threatened Entities
Habitat of threatened entities: <ul style="list-style-type: none"> • human-made structures. 	There is the low potential that threatened microbat species use buildings (in particular, roof cavities) within the Subject Land for roosting and breeding. The demolition of these buildings is expected to temporarily displace individuals and therefore only have a low impact of short duration. These species are highly mobile and there is ample suitable roosting/breeding habitat nearby.	<ul style="list-style-type: none"> • <i>Falsistrellus tasmaniensis</i> (Eastern False Pipistrelle); • <i>Micronomus norfolkensis</i> (Eastern Coastal Free-tailed Bat); • <i>Saccolaimus flaviventris</i> (Yellow-bellied Sheathtail-bat); and • <i>Scoteanax rueppellii</i> (Greater Broad-nosed Bat). 	While the demolition of potential roost/breeding sites may have a temporary displacement-impact to local populations of threatened microbats, these species are highly mobile and as such, any impacts are likely to be temporary if the mitigation measures in this report are followed.

7.4 Indirect Impacts

Indirect impacts occur when the proposal or activities relating to the construction or operation of the proposal affect native vegetation, threatened ecological communities and threatened species habitat beyond the Subject Land. Impacts may also result from changes to land-use patterns, such as an increase in vehicular access and human activity on native vegetation, threatened ecological communities and threatened species habitat. The indirect impacts that have the potential to occur as a result of the development are outlined in **Table 20**. Following a precautionary approach (see **section 3.1.4**) the SBDAR has assessed potential indirect impacts to the following vegetation:

- 0.05ha of PCT 1237 (Low Condition)
 - This area is proposed to be retained and protected but has the potential to experience short term indirect impacts.

Table 20. Indirect impacts associated with the proposed development

Indirect Impact	Nature, Extent and Duration	TEC's/PCTs and/or Threatened Species and Their Habitat Likely to be Impacted	Consequences of the Impacts for the Bioregional Persistence of the Threatened Species, Threatened Ecological Communities and Their Habitats.
(a) inadvertent impacts on adjacent habitat or vegetation	Vegetation and habitat directly adjacent to the Subject Land has the potential to experience ongoing indirect impacts as a result of the development; although these indirect impacts are likely to be minor given the degraded nature of the Subject Property and the extensive mitigation measures to be put in place. The disturbance caused during construction may increase weed infestations or dust coverage within adjacent vegetation, which in turn may decrease its habitat value in the short term.	One (1) TEC occurs within the Subject Land and possibly the neighbouring properties – Blue Gum High Forest in the Sydney Basin Bioregion (PCT 1237). There is also the potential that threatened species occur in areas adjacent the Subject Land that may be impacted by a decrease in habitat condition.	While minor changes to vegetation condition may have a small and localised impact to threatened species, threatened ecological communities and their habitats, this is not expected to impact on their bioregional persistence. The landscape plan describes the planting of a large number of BGHF species within the Subject Property and the VMP (to be completed) will detail the safe removal of trees (supervised by an experienced ecologist), removal of weeds, planting schedule of BGHF characteristic

Indirect Impact	Nature, Extent and Duration	TEC's/PCTs and/or Threatened Species and Their Habitat Likely to be Impacted	Consequences of the Impacts for the Bioregional Persistence of the Threatened Species, Threatened Ecological Communities and Their Habitats.
			species and ongoing management of BGHF vegetation.
(b) reduced viability of adjacent habitat due to edge effects	The proposed construction and on-going human-use of the Subject Land may lead to a minor increase in weed infiltration into adjacent habitat due to enhanced edge effects. This impact is likely to be restricted to the immediate area surrounding the Subject Land to a couple of metres, which is already heavily disturbed and dominated by exotic vegetation	One (1) TEC occurs within the Subject Land and possibly the neighbouring properties – Blue Gum High Forest in the Sydney Basin Bioregion (PCT 1237). There is also the potential that threatened species occur in areas adjacent the Subject Land that may be impacted by a decrease in habitat condition.	While edge effects may have a small and localised impact to TECs and threatened species, this is not expected to impact on their bioregional persistence, considering the highly urbanised nature of the locality and the impacts already inflicted on these areas of habitat. The proposed development is not expected to significantly exacerbate these impacts and has an extensive amount of mitigation measures to follow.
(c) reduced viability of adjacent habitat due to noise, dust or light spill	An increase in noise is to be expected during construction and human-use. As the Subject Land is located in a semi-rural area, this may have an impact on any species foraging or roosting adjacent to the site during the day/night that are not adapted to such noises. It is not expected that construction would occur throughout the night, and as such would not impact on	One (1) TEC occurs within the Subject Land and possibly the neighbouring properties – Blue Gum High Forest in the Sydney Basin Bioregion (PCT 1237). There is also the potential that threatened species occur in areas adjacent the Subject Land that may	While the occupation of the Subject Land may have a small and localised impact to the TEC and threatened species, this is not expected to impact on their bioregional persistence, considering the highly urbanised nature of the locality and the impacts already inflicted on these areas of

Indirect Impact	Nature, Extent and Duration	TEC's/PCTs and/or Threatened Species and Their Habitat Likely to be Impacted	Consequences of the Impacts for the Bioregional Persistence of the Threatened Species, Threatened Ecological Communities and Their Habitats.
	<p>nocturnal species that may utilise adjacent habitat, or diurnal species that roost in adjacent habitat.</p> <p>The construction may increase dust in adjacent habitat. Dust can impact on a plant's ability to photosynthesise and may increase plant mortality in the adjacent vegetation.</p> <p>It is expected that the construction would occur during normal working hours and as such, light spill is not expected to affect adjacent habitat.</p> <p>Occupation of the area following construction, may result in a decrease in the viability of the adjacent habitat due to increases in noise and light associated with dwellings.</p>	<p>be impacted by a decrease in habitat condition.</p>	<p>habitat. The proposed development is not expected to significantly exacerbate these impacts.</p>
<p>(d) transport of weeds and pathogens from the site to adjacent vegetation</p>	<p>As previously discussed, the proposed construction and utilisation of the Subject Land may lead to an increase in weed infiltration into adjacent habitat due to enhanced edge effects. It is however not expected that weeds will be transported via human or vehicular traffic into surrounding areas during construction. Temporary fencing will be erected around retained native vegetation to avoid the introduction of weeds as well as</p>	<p>One (1) TEC occurs within the Subject Land and possibly the neighbouring properties – Blue Gum High Forest in the Sydney Basin Bioregion (PCT 1237). There is also the potential that threatened species occur in areas adjacent the Subject Land that may be impacted by a decrease in habitat</p>	<p>While weeds and pathogens may have a small and localised impact to TECs and threatened species, this is not expected to impact on their bioregional persistence considering the highly urbanised nature of the locality and the impacts already inflicted on these areas of habitat. The</p>

Indirect Impact	Nature, Extent and Duration	TEC's/PCTs and/or Threatened Species and Their Habitat Likely to be Impacted	Consequences of the Impacts for the Bioregional Persistence of the Threatened Species, Threatened Ecological Communities and Their Habitats.
	pathogens (Myrtle Rust) from spreading into the adjacent vegetation.	condition. The TEC and threatened species may be impacted by weed and pathogen transportation leading to a reduced viability in habitat.	proposed development is not expected to significantly exacerbate these impacts.
(e) increased risk of starvation, exposure and loss of shade or shelter	It is highly unlikely that any threatened fauna would be exposed to increased risks from starvation, exposure, and loss of shade and shelter as a result of the development given the majority of it is already highly fragmented and unsuitable for habitation. No habitat is to be removed beyond the Subject Land, although disturbances from noise during operation may deem such habitats unsuitable for certain species. However, due to the areas of habitat connectivity adjoining the Subject Land, it is unlikely that this impact will be significant as such habitats will continue to provide food resources and shelter for fauna species.	N/A	N/A
(f) loss of breeding habitats	An increase in noise is to be expected during and post-construction. As such, there is potential for disturbance to breeding habitats directly adjacent to the Subject Land. However, due to the highly urbanised nature of the locality, these areas are unlikely to provide suitable breeding habitat for threatened species.	N/A	N/A

Indirect Impact	Nature, Extent and Duration	TEC's/PCTs and/or Threatened Species and Their Habitat Likely to be Impacted	Consequences of the Impacts for the Bioregional Persistence of the Threatened Species, Threatened Ecological Communities and Their Habitats.
(g) trampling of threatened flora species	Although no threatened flora species have been historically recorded directly adjacent to the Subject Land, there is still the potential for such species to exist in these areas. In order to prevent the trampling of threatened flora species that could potentially occur within adjacent habitat, retained vegetation will be demarcated with temporary fencing to avoid impacts associated with construction.	There is potential that threatened flora species occur in habitat adjacent to the Subject Land.	Any potential impacts to threatened species adjacent to the Subject Land is expected to be localised and will not have an overall impact on the bioregional persistence of threatened species.
(h) inhibition of nitrogen fixation and increased soil salinity	It is unlikely that the inhibition of nitrogen fixation will affect vegetation adjacent to the Subject Land. Increased soil salinity may result due to clearing of vegetation leading to the rising of the water table. However, clearing will be limited to the Subject Land and as such is not expected to affect vegetation directly adjacent to the Subject Land.	N/A	N/A
(i) fertiliser drift	This issue is not likely to affect the vegetation within or surrounding the Subject Land.	N/A	N/A
(j) rubbish dumping	It is likely that rubbish dumping (including littering) in adjacent vegetation already occurs. This indirect impact is not likely to occur as a result of the proposed development.	N/A	N/A

Indirect Impact	Nature, Extent and Duration	TEC's/PCTs and/or Threatened Species and Their Habitat Likely to be Impacted	Consequences of the Impacts for the Bioregional Persistence of the Threatened Species, Threatened Ecological Communities and Their Habitats.
(k) wood collection	This issue is not likely to affect the vegetation surrounding the Subject Land during and post-operation, particularly as the majority of vegetation surrounding the Subject Land cannot be accessed as it is private property.	N/A	N/A
(l) bush rock removal and disturbance	This issue is not likely to affect the vegetation surrounding the Subject Land. No bush rock was observed within or adjacent to the Subject Land.	N/A	N/A
(m) increase in predatory species populations	There is potential that predatory species, such as cats, already inhabit areas within and surrounding the Subject Land. This indirect impact is not likely to occur as a result of the proposed development.	N/A	N/A
(n) increase in pest animal populations	There is potential that pest animal populations already inhabit areas within and surrounding the Subject Land. This indirect impact is not likely to occur as a result of the proposed development.	N/A	N/A
(o) increased risk of fire	The removal of vegetation as a result of the development is not expected to increase the bushfire risk of vegetation surrounding the Subject Land.	N/A	N/A

Indirect Impact	Nature, Extent and Duration	TEC's/PCTs and/or Threatened Species and Their Habitat Likely to be Impacted	Consequences of the Impacts for the Bioregional Persistence of the Threatened Species, Threatened Ecological Communities and Their Habitats.
	Especially as the proposed development is not located within an area mapped as bush fire prone land.		
(p) disturbance to specialist breeding and foraging habitat, e.g., beach nesting for shorebirds.	No specialist breeding and foraging habitat was identified within or adjacent to the Subject Land. Therefore, it is not expected that the development will disturb any specialist breeding and foraging habitat.	N/A	N/A

8. Threshold for Assessing and Offsetting

8.1 Impacts on Native Vegetation

The following native vegetation within the Subject Land has been assessed as being impacted as a result of the proposed development (following the precautionary approach):

- 0.09ha representative of PCT 1237: Sydney Blue Gum - Blackbutt - Smooth-barked Apple moist shrubby open forest on shale ridges of the Hornsby Plateau, Sydney Basin Bioregion

The purchase and retirement of Biodiversity Offset Credits will not be required for the vegetation within Zone 1 owing to the low VI score or Zone 2 due to it being comprised of exotic vegetation (**Figure 15**).

8.2 Impacts on Threatened Species

There will be no impacts on threatened species as a result of the proposed development.

8.3 Impacts on Threatened Ecological Communities

One (1) threatened ecological community has been identified as being impacted as a result of the proposed development:

- Blue Gum High Forest in the Sydney Basin Bioregion

Approximately 0.08ha of very poor condition BGHF occurs within the Subject Land. Approximately 0.04ha is proposed to be removed to accommodate the development, with 0.04ha proposed to be retained and protected. The proponent has chosen to remove the weed infestation and landscape largely with BGHF characteristic species and restore the ground, mid and upper stratum in the southern and eastern setbacks. This would bring the total area of restored BGHF within the Subject Property to 0.14ha, with a further 0.12ha of landscape planting throughout the development containing BGHF species (mid and ground layer). The VMP to be prepared will describe the ongoing maintenance of the BGHF vegetation to ensure there is a net gain in biodiversity from the proposed development.



Impact Summary

-  Subject Land
-  Subject Property
-  Impact Zone- No Offsets Required

0 10 20 30 40 50



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Date: 22/10/2021
 Coordinate System: GDA94 MGA Zone 56
 Data Source: NSW SEED Portal
 Image Source: Nearmap Australia Pty Ltd [August 2021]



Figure 15. Impacts and offset requirements.

8.4 Serious and Irreversible Impacts (SAIL's)

One (1) threatened ecological community has been identified as an entity at risk of an SAIL in the Threatened Biodiversity Data Collection (DPIE 2021d):

- Blue Gum High Forest in the Sydney Basin Bioregion

8.4.1 Blue Gum High Forest in the Sydney Basin Bioregion

The threshold for consideration of SAIL for Blue Gum High Forest in the Sydney Basin Bioregion is currently under development. This means that any impact on the potential habitat for this ecological community could be considered 'serious and irreversible'. Due to the potential sensitivity of this ecological community to any impact, a determination of whether or not the impacts are serious and irreversible is to be undertaken in accordance with Section 9.1 of the BAM (DPIE 2020a). This is outlined in **Table 21**.

Table 21. Additional impact assessment provisions for ecological communities that are associated with a serious and irreversible impact.

Serious and Irreversible Impact (SAIL) Impact assessment provisions for ecological communities: Blue Gum High Forest in the Sydney Basin Bioregion	
BC Act Status: Critically Endangered	
a) the action and measures taken to avoid the direct and indirect impact on the potential entity for a SAIL	<p>An Ecological Constraints Assessment (ECA) was undertaken in 2017 to help the design of the proposed development avoid significant ecological features within the site. The proposed development has since been located largely on the existing developed areas of the site (as well as the vacant blocks that are void of native vegetation). Further, the vast majority of impacts will be to very poor condition BGHF that is unsuitable for threatened species. There are six (6) trees of significance that are characteristic of the BGHF CEEC within the Subject Land. Of these, one (1) is already dead, two (2) have considerable health concerns, are unsafe and are being removed, one (1) does not have health concerns but is being removed to accommodate the proposed development and two (2) are being retained and protected (Footprint Green 2021).</p> <p>The proposed development will directly impact approximately 0.04ha of BGHF made up of three canopy trees over a weed infested understorey. Following the precautionary approach, there is the potential for indirect impacts to a further 0.04ha of equally poor condition BGHF made up of two canopy trees. It is very unlikely that these indirect impacts will occur if the mitigation measures set out in this SBDAR are followed (see Table 17).</p>
b) the area (ha) and condition of the threatened ecological community (TEC) to be impacted directly and indirectly by the proposed development. The condition of the TEC is to be represented by the	<p>The proposed development will directly impact approximately 0.04ha of BGHF made up of three canopy trees over a weed infested understorey. Following the precautionary approach, there is the potential for indirect impacts to a further 0.04ha of equally poor condition BGHF made up of two canopy trees. The BGHF within the Subject Land was of very poor condition, with a VI Score of just 7.1.</p> <p>It is very unlikely that any remnant patches of BGHF outside of the Subject Property will be indirectly impacted by the proposed development.</p>

Serious and Irreversible Impact (SII) Impact assessment provisions for ecological communities: Blue Gum High Forest in the Sydney Basin Bioregion	
BC Act Status: Critically Endangered	
vegetation integrity score for each vegetation zone	
c) a description of the extent to which the impact exceeds the threshold for the potential entity that is specified in the Guideline for determining an SII	The impact thresholds for this community are currently under development.
d) the extent and overall condition of the potential TEC within an area of 1,000ha, and then 10,000ha, surrounding the proposed development footprint	<p>Mapping from OEH (2016a), and Tozer (2013) indicates the presence of approximately 29.7ha of BGHF within an area of 1,000ha surrounding the Subject Land, and 97.5ha of BGHF within an area of 10,000ha surrounding the Subject Land.</p> <p>The BGHF within these areas largely comprises fragmented patches of varying sizes. The conditions of these patches cannot be determined without ground truthing, although is expected to be largely degraded due to their positioning within a highly urbanised landscape</p>
e) an estimate of the extant area and overall condition of the potential TEC remaining in the IBRA subregion before and after the impact of the proposed development has been taken into consideration	<p>The Native Vegetation of the Sydney Metropolitan Area - Version 3.1 (OEH 2016a), Tozer (2013) and the Remnant Vegetation of the western Cumberland subregion (OEH 2015) mapping indicate approximately 793.42ha of BGHF occurs within the Cumberland IBRA Subregion. This comprises fragmented patches of varying sizes. The conditions of these patches cannot be determined without ground truthing however it can be assumed that patches within heavily urbanised environments are in poor condition.</p> <p>Following the precautionary approach and assuming both direct and indirect impacts to the very poor condition BGHF within the Subject Land, approximately 0.08ha is at risk, accounting for 0.001% of the extant area of BGHF in the Subregion. This will result in approximately 793.41ha of BGHF remaining within the Cumberland IBRA Subregion after the proposed development.</p>
f) an estimate of the area of the candidate TEC that is in the reserve system within the IBRA region and the IBRA subregion	Approximately 36% of extant areas of the community are reserved, including 20ha in National Parks. This community occurs in reserves in the Dalrymple-Hay, St Ives and Ku-ring-gai LGAs (OEH 2016a).
g) the development, clearing or biodiversity certification proposal's impact on:	<p>i) abiotic factors critical to the long-term survival of the potential TEC; for example, how much the impact will lead to a reduction of groundwater levels or the substantial alteration of surface water patterns</p> <p>The proposed development has the minor potential to alter the existing (already highly altered) hydrology occurring within and surrounding the Subject Land due to excavation works during construction. This may alter water runoff levels and increase nutrients into adjacent areas of BGHF, causing an increase in weed infestations. This however is expected to be localised</p>

Serious and Irreversible Impact (SII)
Impact assessment provisions for ecological communities:
Blue Gum High Forest in the Sydney Basin Bioregion

BC Act Status: Critically Endangered

		and not impact the long-term survival of surrounding vegetation.
	ii) characteristic and functionally important species through impacts such as, but not limited to, inappropriate fire/flooding regimes, removal of understorey species or harvesting of plants	The areas of BGHF within the Subject Land are of a low quality with a sparse native canopy and exotic dominated shrub and ground layer. Fire and flood regimes have been largely altered due to the residential developments that have occurred in the area. Therefore, it is highly unlikely that the proposed development will exacerbate impacts on characteristic and functionally important species as the area is already highly altered. It is not expected that the proposed development will impact any characteristic and functionally important species outside of the Subject Land.
	iii) the quality and integrity of an occurrence of the potential TEC through threats and indirect impacts including, but not limited to, assisting invasive flora and fauna species to become established or causing regular mobilisation of fertilisers, herbicides or other chemicals or pollutants which may harm or inhibit growth of species in the potential TEC	The proposed development may enhance weed infiltration into adjacent habitat by an increase in edge effects. Owing to the highly urbanised nature of the locality and the quality of the vegetation within the Subject Land, it is considered likely that the vegetation in the surrounding areas, already experiences these pressures. It is therefore not expected that the quality and integrity of adjacent BGHF will be significantly reduced by the proposed development.
h) direct or indirect fragmentation and isolation of an important area of the potential TEC	The BGHF within the Subject Land and surrounds does not occur within a 'Priority Management Area' as defined under the Saving our Species Program (DPIE 2021f). Therefore, the development will not directly or indirectly fragment or isolate an important area of BGHF.	
i) the measures proposed to contribute to the recovery of the potential TEC in the IBRA subregion.	<p>The Saving our Species Program (DPIE 2021f) has identified various measures proposed to manage key threats to conserve this ecological community, including:</p> <ul style="list-style-type: none"> ▪ Provide residents within and surrounding the TEC with information on what native species to plant, how to appropriately control weeds and the issues surrounding green waste dumping; ▪ Monitor for weed presence and measure densities of each weed type in designated plot over time; ▪ Liaise with the Rural Fire Service and other land managers about minimising clearing in the TEC by using existing tracks/fire trials as fire breaks or preventing clearing for additional fire breaks; 	

Serious and Irreversible Impact (SII)
Impact assessment provisions for ecological communities:
Blue Gum High Forest in the Sydney Basin Bioregion

BC Act Status: Critically Endangered

- Plan ecological burns based on outcomes of fire-based research action for TEC community forms. If wildfires occur, plan consecutive fires based on regime requirements and date of wildfire. Relay information from research outcomes to the Rural Fire Service, National Parks and other land managers and update all fire management documentation relating to the TEC;
- Consult with landholders about participating in conservation agreements (preferably long-term in perpetuity) to protect the TEC. Engage with land holders through pamphlet drops, information nights and individual contact;
- Develop brochures for land managers/asset (utility) owners that promote hygiene protocols (e.g. phytosphthora) for bush regeneration and land and asset owners. Make sure asset owners are following most-up to date hygiene protocols;
- Liaise with developers to minimise impacts relating to stormwater flows, erosion, foreign soils, nutrient/ pollution runoff and other upstream impacts that may result from the quarry subdivision positioned above the Blue Gum High Forest diatreme remnant. Encourage appropriate reforming/ restoration of land areas above the proposed site with local indigenous species associated with the landscape position, geology and soils; and
- Conduct research into appropriate fire regimes to account for variability in Blue Gum High Forest community forms (dry, diatreme, sandstone-gully, typical forms). To identify fire regimes, ecological burning should be done at differing intensities and multiple sites. A combination of species diversity, condition, recruitment post fire should be used as indicators of condition response to differing fire regimes. Pre and post fire weeding and fencing is critical.

9. Biodiversity Offset Credit Requirements

9.1 Offset Requirement for Ecosystem Credits

The native vegetation within the Subject Land was in a very poor condition such that no (0) ecosystem credits are required to offset the biodiversity impacts of the proposed development (Table 22).

Table 22. Ecosystem credits required to offset the development.

PCT	BC Act Status	Zone	Total Area (ha)	Ecosystem Credits Required
PCT 1237: Sydney Blue Gum - Blackbutt - Smooth-barked Apple moist shrubby open forest on shale ridges of the Hornsby Plateau, Sydney Basin Bioregion	Critically Endangered Ecological Community	Zone 1: Low Condition	0.09	0
Total Ecosystem Credits				0

9.2 Offset Requirement for Species Credits

No species credit species require offsetting as a result of the proposed development.

10. Other Relevant Legislation and Planning Policies

10.1 State Environmental Planning Policy (Koala Habitat Protection) 2021

This Policy aims to encourage the conservation and management of areas of natural vegetation that provide habitat for koalas to support a permanent free-living population over their present range and reverse the current trend of koala population decline. This SEPP applies to LGAs that are listed in Schedule 1 'Local government areas' of the SEPP. As the Ryde LGA is not included in Schedule 1, this SEPP does not apply to the Subject Land.

10.2 State Environmental Planning Policy No 19—Bushland in Urban Areas

SEPP 19 – Bushland in Urban Areas applies to the areas and parts of areas specified in Schedule 1 of the SEPP that adjoin bushland zoned or reserved for public open space purposes. Although the Penrith LGA is listed in Schedule 1 of the SEPP, the Subject Land does not adjoin any bushland zoned or reserved for public open space purposes. As such, this SEPP does not apply to the Subject Land.

10.3 State Environmental Planning Policy (Coastal Management) 2018

State Environmental Planning Policy (Coastal Management) 2018 applies to land within the coastal zone. The coastal zone means the area of land comprised of the following coastal management areas:

- The coastal wetlands and littoral rainforests area;
- The coastal vulnerability area;
- The coastal environment area; or
- The coastal use area.

As the Subject Land does not occur within any of these listed areas, this SEPP does not apply.

10.4 Water Management Act 2000

Controlled activities carried out in, on, or under waterfront land are regulated by the Water Management Act 2000 (WM Act). The NRAR administers the WM Act and is required to assess the impact of any proposed controlled activity to ensure that no more than minimal harm will be done to waterfront land as a consequence of carrying out the controlled activity.

No controlled activities will be carried out on waterfront land within the Subject Land.

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12. Appendices

Appendix A. BAM Site - Field Survey Forma (copied directly from Electronic Data Sheet).

Appendix B. BAMC Generated Biodiversity Credit Report.

Appendix C. Letter from CD Architects discussing the avoidance measures implemented in the design stage of the proposed development.

Appendix D. 5-Part Test of Significance for Blue Gum High Forest.

Appendix A. BAM Site - Field Survey Forma (copied directly from Electronic Data Sheet).

BAM Site – Field Survey Form					
Date:	1.10.2021	Plot ID:	1	Photo #:	0
Zone:	0	Plot Dimensions:	20x50m	Easting:	324251.14 m E
Datum:	56H	Middle bearing from 0m:	133	Northing:	6258016.14 m S
PCT:	Zone 1: PCT 1237 (Low Condition)				
Growth Form	Scientific Name		Cover	Abundance	
Exotic	<i>Conyza sumatrensis</i>		0.2	50	
Exotic	<i>Jasminum polyanthum</i>		4	100	
High Threat Exotic (HTE)	<i>Ehrharta erecta</i>		40	1000	
Exotic	<i>Sida rhombifolia</i>		0.2	35	
Exotic	<i>Geranium molle</i>		0.1	25	
Exotic	<i>Oxalis pes-caprae</i>		0.1	20	
Exotic	<i>Dracaena trifasciata</i>		0.1	2	
Exotic	<i>Hedychium gardnerianum</i>		0.1	1	
High Threat Exotic (HTE)	<i>Araujia sericifera</i>		0.2	50	
High Threat Exotic (HTE)	<i>Tradescantia fluminensis</i>		5	200	
Exotic	<i>Monstera deliciosa</i>		0.2	2	
Exotic	<i>Thunbergia alata</i>		10	500	
Exotic	<i>Rosa sp.</i>		0.1	5	
Exotic	<i>Parietaria judaica</i>		0.1	25	
Exotic	<i>Wisteria sinensis</i>		3	100	
Exotic	<i>Celtis sinensis</i>		2	3	
Forb (FG)	<i>Solanum americanum</i>		0.2	30	
Exotic	<i>Jacaranda mimosifolia</i>		1	1	
Tree (TG)	<i>Grevillea robusta</i>		2	2	
HTE	<i>Phoenix canariensis</i>		1	1	
Exotic	<i>Sonchus oleraceus</i>		0.1	20	
Exotic	<i>Stellaria media</i>		0.1	60	
Exotic	<i>Phyllostachys sp.</i>		0.5	50	
Exotic	<i>Modiola caroliniana</i>		0.1	20	
High Threat Exotic (HTE)	<i>Bidens pilosa</i>		0.1	20	
Exotic	<i>Plantago lanceolata</i>		0.5	80	
Exotic	<i>Avena barbata</i>		0.1	10	
Exotic	<i>Taraxacum officinale</i>		0.1	3	
High Threat Exotic (HTE)	<i>Cenchrus clandestinus</i>		3	200	
Exotic	<i>Petrorrhagia dubia</i>		0.1	50	
Exotic	<i>Bromus catharticus</i>		0.1	20	
Exotic	<i>Cerastium glomeratum</i>		0.1	10	
Exotic	<i>Vicia hirsuta</i>		0.1	5	
Exotic	<i>Briza minor</i>		0.1	15	

Exotic	<i>Aechmea gamosepala</i>	0.1	1
Exotic	<i>Camellia oleifera</i>	0.1	5
Exotic	<i>Yucca sp.</i>	0.1	1
Tree (TG)	<i>Eucalyptus saligna</i>	10	3
Shrub (SG)	<i>Pittosporum undulatum</i>	0.2	1
High Threat Exotic (HTE)	<i>Rubus fruticosus agg.</i>	0.1	5
High Threat Exotic (HTE)	<i>Olea europaea</i>	0.1	1
Exotic	<i>Jasminum sp.</i>	0.1	15
High Threat Exotic (HTE)	<i>Senna pendula</i>	0.1	30
Exotic	<i>Nerium oleander</i>	0.1	5
High Threat Exotic (HTE)	<i>Lonicera japonica</i>	0.1	10
Tree (TG)	<i>Macadamia tetraphylla</i>	0.2	1
DBH	# Tree Stems Count	# Hollow Bearing Trees	
80+cm	1	3	
50-79cm	1	0	
30-49cm	present	0	
20-29cm	0	0	
10-19cm	0	0	
5-9cm	0	0	
<5cm	0	0	
Length of Logs (m)		0	
BAM Attribute (1x1m)	Litter Cover (%)		
1 (5m)	90		
2 (15m)	40		
3 (25m)	45		
4 (35m)	30		
5 (45m)	80		
Average	57		
Growth Form	Composition Data (Count of Native Cover)	Structure Data (Sum of Cover)	
Tree	3	12.2	
Shrub	1	0.2	
Grass	0	0	
Forb	1	0.2	
Fern	0	0	
Other	0	0	
High Threat Exotics	10	49.7	

Appendix B. BAMC Generated Biodiversity Credit Report.



BAM Biodiversity Credit Report (Like for like)

Proposal Details

Assessment Id	Proposal Name	BAM data last updated *
00028909/BAAS21006/21/00028910	298-312 Blaxland Road Ryde	24/11/2021
Assessor Name	Assessor Number	BAM Data version *
Jack Tatler	BAAS21006	S0
Proponent Names	Report Created	BAM Case Status
Ibrahim Elmustapha	08/03/2022	Finalised
Assessment Revision	Assessment Type	Date Finalised
1	Part 4 Developments (Small Area)	08/03/2022
BDS entry trigger	* Disclaimer: BAM data last updated may indicate either complete or partial update of the BAM calculator database. BAM calculator database may not be completely aligned with Bionet	
BOS Threshold: Biodiversity Values Map		

Potential Serious and Irreversible Impacts

Name of threatened ecological community	Listing status	Name of Plant Community Type/ID
Blue Gum High Forest in the Sydney Basin Bioregion	Critically Endangered Ecological Community	1237-Blue Gum high forest

Species

Nil

Additional Information for Approval

Assessment Id	Proposal Name
00028909/BAAS21006/21/00028910	298-312 Blaxland Road Ryde

Page 11 of 4



BAM Biodiversity Credit Report (Like for like)

PCT Outside Ibra Added

None added

PCTs With Customized Benchmarks

PCT

No Changes

Predicted Threatened Species Not On Site

Name

No Changes

Ecosystem Credit Summary (Number and class of biodiversity credits to be retired)

Name of Plant Community Type/ID	Name of threatened ecological community	Area of impact	HBT Cr	No HBT Cr	Total credits to be retired
1237-Blue Gum high forest	Blue Gum High Forest in the Sydney Basin Bioregion	0.1	0	0	0

Assessment Id

00028909/BAAS21006/21/00028910

Proposal Name

298-312 Blaxland Road Ryde

Page 2 of 4



BAM Biodiversity Credit Report (Like for like)

1237-Blue Gum high forest	Like-for-like credit retirement options					
	Name of offset trading group	Trading group	Zone	HBT	Credits	IBRA region
	Blue Gum High Forest in the Sydney Basin Bioregion This includes PCT's: 1237	-	1237_Low	Yes	0	Cumberland, Burragorang, Pittwater, Sydney Cataract, Wollemi and Yengo. or Any IBRA subregion that is within 100 kilometers of the outer edge of the impacted site.

Species Credit Summary

No Species Credit Data

Credit Retirement Options

Like-for-like credit retirement options

Assessment Id
00028909/BAAS21006/21/00028910

Proposal Name
298-312 Blaxland Road Ryde

Page 3 of 4



BAM Biodiversity Credit Report (Like for like)

Assessment Id

00028909/BAAS21006/21/00028910

Proposal Name

298-312 Blaxland Road Ryde

Page 4 of 4



27th January 2022

To whom it may concern:

Subject: Proposed Development at 298-312 Blaxland Rd Ryde

Matter: Kool Family Developments v City of Ryde Council

CDArchitects were engaged by the client in 2015 for early investigative work in relation to the above-mentioned proposed development at Ryde and the potential yield outcomes achievable.

In doing so, it was established early on that any proposed development would need to have consideration for the existing Flora and Fauna across the site. During this stage, we sought to seek out the most appropriate experts in their fields to provide advice and guidance on the existing ecology of the site and how to work with it so as to minimise impacts by any proposed development.

In the initial stages, the client engaged Earthscape Horticultural Services (EHS) to provide the team advice on such matters. Final report completed and provided November 2016 (Report Ver 3 - dated November 2016 attached).

The introduction to the report provided EHS is outlined below which provides a clear and concise account of the process undertaken between CDA and EHS prior to the report being issued to assist in informing the scheme.

“This report was commissioned by CDArchitects on behalf of Bella Ikea Ryde Pty Ltd to assess the health and condition of eighty-two (82) trees located within or immediately adjacent to 298- 312 Blaxland Road, Ryde.

“The report has been prepared to aid in the assessment of a Development Application (DA) for the demolition of the existing dwellings and ancillary structures and construction of a multi-unit residential development (townhouses) within the property.

The purpose of the report was to assess the potential impact of the proposed development on the subject trees, together with recommendations for amendments to the design or construction methodology where necessary to minimise any adverse impact.”

The report also provides recommended tree protection measures to ensure the long-term preservation of the trees to be retained where appropriate.

This report has been prepared in accordance with Ryde City Council’s guidelines for preparation of Arborists Reports as outlined in Section 4 of the Urban Forest Technical

ABN: 79 097 830 754
Level 2, 60 Park Street, Sydney NSW 2000
phone 9267 2000
info@cdarchitects.com.au
Nominated Architect: Liljana Ermilova NSW – Reg No 7887

www.cdarchitects.com.au

Manual (September 2014) and Sections 2.3.2 – 2.3.5 of the Australian Standard for Protection of Trees on Development Sites (AS 4970:2009)”

It identifies that the key purpose of the engagement of EHS was to advise on mitigation of adverse impacts on the site.

In March 2016, simultaneous to the EHS consultation, NARLA Environmental were engaged to provide advice and reporting on a Due Diligence Ecological Assessment for the subject site (report dated March 2016 attached).

The introduction to the report provided NARLA is outlined below and further provides a clear and concise account of the process undertaken between CDA/Client and EHS prior to the report being issued to assist in informing the scheme.

“Narla Environmental Pty Ltd was engaged by Bella – Ikea Ryde Pty Ltd to undertake a Pre-development Due Diligence Ecological Survey of their proposed development, which spans properties 298, 300, 302, 308, 2010 and 312 Blaxland Rd, Ryde (here forward referred to as ‘the subject site’).

Bella - Ikea Ryde Pty Ltd (the client) has taken the initiative by commissioning this study to gain an informed understanding of the ecological and biodiversity values of the site in order to (as best possible) avoid and minimise any potential impacts.

The aim of this ecological assessment was to identify the potential for conservation significant vegetation and trees, notably Blue Gum High Forest in the Sydney Basin Critically Endangered Ecological Community (CEEC) under the Environmental Protection and Biodiversity Conservation Act 1999 (EPBC Act) or the New South Wales Threatened Species Conservation Act 1995 (TSC Act).”

It is evident from the information outlined above, that the project team took all necessary precautions and steps to ensure mitigation of adverse impacts on the subject site by the engagement of both an Arboriculture expert and a Senior Ecological consultant.

The design over time evolved based on feedback from these consultants as well other key experts in ensuring the final subject design for the site was appropriate and took into consideration all aspects of the site’s ecology.

I trust this outline provides a clear summation of the process undertaken in mitigating the effects the development would have on the site. Should you have any further queries, please don’t hesitate to contact the undersigned.

Regards

Ziad Chanine
Director
B A Arch Hons (UTS)
CD Architects



EARTHSCAPE HORTICULTURAL SERVICES
Arboricultural, Horticultural and Landscape Consultants

ABN 36 082 126 027

**ARBORICULTURAL IMPACT
ASSESSMENT REPORT**

**PROPOSED MULTI-UNIT RESIDENTIAL
DEVELOPMENT (TOWNHOUSES)**

298-312 BLAXLAND ROAD, RYDE

November 2016

Prepared for: Bella Ikea Ryde Pty Ltd
c/- CDA Architects
PO Box A102
SYDNEY SOUTH NSW 1235

Ph:- 02 9267 2000

Prepared by: Andrew Morton
Dip. (Arboriculture) [AQF Level 5]
B. App. Sci. (Horticulture)
A. Dip. App. Sci. (Landscape)

EARTHSCAPE HORTICULTURAL SERVICES
Ph: - 0402 947 296

*Member of Arboriculture Australia
Member International Society of Arboriculture – Australian Chapter (ISAAC)
Member Local Government Tree Resources Association (LGTRA)*



PO Box 364, BEROWRA NSW 2081
Ph: (02) 9456 4787 Mobile: 0402 947 296 Fax: (02) 9456 5757
Email: earthscape@iinet.net.au

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1 INTRODUCTION

- 1.1.1 This report was commissioned by CDA Architects on behalf of Bella Ikea Ryde Pty Ltd to assess the health and condition of eighty-two (82) trees located within or immediately adjacent to 298-312 Blaxland Road, Ryde. The report has been prepared to aid in the assessment of a Development Application (DA) for the demolition of the existing dwellings and ancillary structures and construction of a multi-unit residential development (townhouses) within the property.
- 1.1.2 The purpose of this report is to assess the potential impact of the proposed development on the subject trees, together with recommendations for amendments to the design or construction methodology where necessary to minimise any adverse impact. The report also provides recommended tree protection measures to ensure the long-term preservation of the trees to be retained where appropriate.
- 1.1.3 This report has been prepared in accordance with Ryde City Council's guidelines for preparation of Arborists Reports as outlined in Section 4 of the *Urban Forest Technical Manual* (September 2014) and Sections 2.3.2 – 2.3.5 of the Australian Standard for *Protection of Trees on Development Sites* (AS 4970:2009).

2 THE SITE

- 2.1.1 The subject property consists of six (6) residential allotments known as Lot D in DP 322336 and Lots 8, 9, 10, 11 & 12 in DP 6367, being 298-312 Blaxland Road, Ryde. For the purposes of this report, the subject allotments will be referred to as "the Site". The total area of the site is 6,878 m². The site is zoned Low Density Residential [R2] under the *Ryde Local Environmental Plan* (RLEP) 2014. With exception of Lot 12 (298 Blaxland Road), which is currently vacant, each lot contains an existing residential dwelling in the north-eastern portion of the lot. Lot D (312 Blaxland Road) also contains an existing in-ground swimming pool in the rear yard. The site has a moderate to steep south-westerly gradient with established lawns and gardens surrounding the dwellings. The site contains numerous mature trees. These include a variety of locally-indigenous, non-local native and exotic (introduced) species.
- 2.1.2 The soils of this area are typical of the West Pennant Hills Soil Landscape Group (as classified in the Soil Landscapes of the Sydney 1:100,000 Sheet), consisting of "deep (>2000 mm) *Red & Brown Podzolic Soils* on upper and mid-slopes, *Yellow & Brown Podzolic Soils* on colluvial benches; and *Yellow Podzolic Soils* and *Gleyed Podzolic Soils* in drainage lines and poorly drained areas". Soil materials are derived from Wianamatta Shales and are generally of moderate fertility. The landscape generally consists of rolling to steep side slopes, with slopes ranging from 20%-40% grade.¹
- 2.1.3 The original vegetation of this area consisted of tall open forest (Blue Gum High Forest) which was progressively logged for timber-getting from early in the nineteenth century then cleared for agricultural use (mainly orchards and market gardens) and later for residential development.² The dominant locally-indigenous tree species formerly found in this area include *Eucalyptus saligna* (Sydney Blue Gum) and *Eucalyptus pilularis* (Blackbutt). Other species occurring in this vegetation community may include *Syncarpia glomulifera* (Turpentine), *Eucalyptus paniculata* (Grey Ironbark), *Angophora floribunda* (Rough Barked Apple), *Eucalyptus acmenoides* (White Mahogany), *Angophora costata* (Sydney Red Gum), *Eucalyptus resinifera* (Red Mahogany) and *Allocasuarina torulosa* (Forest Oak).

3 SUBJECT TREES

- 3.1.1 The subject trees were inspected by Earthscape Horticultural Services (EHS) on the 22nd September 2016. Each tree has been provided with an identification number for reference purposes

denoted on the attached Tree Location Plan (**Appendix 5**), based on the survey prepared by Daw & Walton, Dwg. Ref No. 3132-16 dated 27/04/2016. The numbers used on this plan correlate with the Tree Assessment Schedule (**Appendix 3**). Tree No.s T2a, T9a, T13a, T13b, T33a & T46a were not shown on the original survey and have been plotted on the drawing in their approximate positions by taking offsets from existing features.

4 HEALTH AND CONDITION ASSESSMENT

4.1 Methodology

4.1.1 An assessment of each tree was made using the Visual Tree Assessment (VTA) procedure.³ All of the trees were assessed in view from the ground. No aerial inspection or diagnostic testing has been undertaken as part of this assessment.

4.1.2 The following information was collected for each tree:-

- Tree Species (Botanical & Common Name);
- Approximate height;
- Canopy spread; measured using a metric tape and an average taken.
- Trunk diameter (measured at 1.4 metres from ground level);
- Live Crown Size; (measured by subtracting the total height of the tree from the lowest point of the crown and multiplying by the average crown spread to give a value in square metres).
- Health & vigour; using foliage size, colour, extension growth, presence of disease or pest infestation, canopy density, presence of deadwood, dieback and 4fricana4s growth as indicators,
- Condition; using visible evidence of structural defects, instability, evidence of previous pruning and physical damage as indicators.
- Suitability of the tree to the site and its existing location; in consideration of damage or potential damage to services or structures, available space for future development and nuisance issues.

4.1.3 This information is presented in a tabulated form in **Appendix 3**.

4.2 Safe Useful Life Expectancy (SULE)

4.2.1 The remaining Safe Useful Life Expectancy⁴ of the tree is an estimate of the sustainability of the tree in the landscape, calculated based on an estimate of the average age of the species in an urban area, less its estimated current age. The life expectancy of the tree has been further modified where necessary in consideration of its current health and vigour, condition and suitability to the site. The estimated SULE of each tree is shown in **Appendix 3**.

4.2.2 The following ranges have been allocated to each tree:-

- Greater than 40 years (Long)
- Between 15 and 40 years (Medium)
- Between 5 and 15 years (Short)
- Less than 5 years (Transient)
- Dead or immediately hazardous (defective or unstable)

5 LANDSCAPE SIGNIFICANCE

5.1 Methodology for Determining Landscape Significance

5.1.1 The significance of a tree in the landscape is a combination of its environmental, heritage and amenity values. Whilst these values may be fairly subjective and difficult to assess consistently, some measure is necessary to assist in determining the retention value of each tree. To ensure a

consistent approach, the assessment criteria shown in **Appendix 1** have been used in this assessment.

5.1.2 A rating has been applied to each tree to give an understanding of the relative significance of each tree in the landscape and to assist in determining priorities for retention, in accordance with the following categories:-

1. **Significant**
2. **Very High**
3. **High**
4. **Moderate**
5. **Low**
6. **Very Low**
7. **Insignificant**

5.2 Environmental Significance

5.2.1 Tree Management Controls

Prescribed Trees within the Ryde City Local Government Area (LGA) are protected under Part 9.5 (Tree Preservation) of the *Ryde Development Control Plan (RDCP) 2014* made pursuant to Clause 5.9 of the *Ryde Local Environment Plan (RLEP) 2014*. The RDCP generally protects all trees (including palm trees) of a height of five (5) metres or greater or with a trunk circumference of 450mm (140mm in diameter). Some exemptions apply. The following trees are exempt (not protected) under the provisions of the RDCP 2014:-

Tree No.	Species	Exemption
T17, T20, T22, T24, T25, T32 & T74	<i>Cinnamomum camphora</i> (Camphor Laurel)	Environmental Weed Species
T28 & T73	<i>Erythrina x sykesii</i> (Indian Coral tree)	Environmental Weed Species
T1, T2, T3 & T31	<i>Ligustrum lucidum</i> (Broad Leaf Privet)	Noxious Weed
T16, T46 & T50	<i>Olea europaea subsp. 5fricana</i> (African Olive)	Noxious Weed
T42 & T69	<i>Mangifera indica</i> (Mango Tree)	Edible Fruit Tree
T43, T70, T71	<i>Camellia japonica</i> (Camellia)	Less than Prescribed Dimensions
T44a	<i>Grevillea 'Sandra Gordon'</i> (Grevillea)	Less than Prescribed Dimensions
T41 & T57	<i>Callistemon viminalis</i> (Weeping Bottlebrush)	Within 4 metres of an existing dwelling
T56	<i>Chamaecyparis 5frica 'Crippsii'</i> (Golden Hinoki Cypress)	Within 4 metres of an existing dwelling
T40	<i>Camellia japonica</i> (Camellia)	Within 4 metres of an existing dwelling
T9a*	<i>Brachychiton acerifolius</i> (Illawarra Flame Tree)	Within 4 metres of an existing dwelling

* Note that these trees are located within the adjoining property.

The remainder of the trees are protected under the RDCP 2014.

5.2.2 *Wildlife Habitat*

Angophora floribunda (Rough-barked Apple) [T52], *Ceratopetalum gummiferum* (NSW Christmas Bush) [T44], *Eucalyptus paniculata* (Grey Ironbark) [T33a], *Eucalyptus pilularis* (Blackbutt) [35], *Eucalyptus saligna* (Sydney Blue Gum) [T13, T34 & T51] and *Doryphora sassafras* (Sassafras) [T8 & T11] are all locally-indigenous species, representative of the original vegetation of the area and would be of benefit to native wildlife. However, none of the trees contain cavities that would be suitable as nesting hollows for arboreal mammals or birds. T7 (Whau) contains an active Tawny Frogmouth nest in the canopy. T35 (Blackbutt) contains a Ringtail Possum Dray. Several trees also show evidence of foraging by Brushtail or Ringtail Possums. There were no other visible signs of wildlife habitation.

5.2.3 *Noxious Plants & Environmental Weeds*

Olea europaea subsp. africana (African Olive) [T16, T46 & T50] and *Ligustrum lucidum* (Broad Leaf Privet) [T1, T2, T3 & T31] are both classified as Class 4 Noxious Weeds under the meaning of the *Noxious Weeds Act* (NSW) 1993. The growth of these plant species must be managed in a manner that continuously inhibits the ability of the plant to spread and the plant must not be sold, propagated or knowingly distributed.

Grevillea robusta (Silky Oak) [T13b, T14, T19, T33, T45 T48, T49 & T75], whilst protected under the RDCP 2014, is considered to be an Environmental Weed Species in some Local Government Areas within the Sydney Metropolitan Area.

5.2.4 *Threatened Species & Ecological Communities*

None of the subject trees are listed as Threatened or Vulnerable Species under the provisions of the *Threatened Species Conservation Act* 1995 (NSW) or the *Environmental Protection and Biodiversity Conservation Act* 1999.

The National Parks and Wildlife Service (NPWS) 1:25000 Mapping Series (Native Vegetation of the Cumberland Plain)⁵ indicates that there are no remnant native vegetation communities within or in the vicinity of the site.

Ryde Council's 'Ecological Communities' mapping series prepared by Oculus (forming part of a report on remnant vegetation entitled "*Urban Bushland in the Ryde LGA*")⁶, indicates that the original vegetation community of this area was Blue Gum High Forest (BGHF) and that remnants of this vegetation community may be present within this site. BGHF is listed as a Critically Endangered Ecological Community (EEC) under the *Threatened Species Conservation Act* 1995 (NSW) and the *Environmental Protection and Biodiversity Conservation Act* 1999. The NSW Scientific Community has determined that highly modified relics of this vegetation community may persist as small clumps of trees [or individual remnants] without a native understorey. As such, small groups and individual remnants of locally-indigenous trees are considered to form part of this vegetation community even where they are not contiguous with any bushland area or larger stand of trees.

Eucalyptus pilularis (Blackbutt) [T35] and *Eucalyptus saligna* (Sydney Blue Gum) [T13, T34 & T51] are both Positive Diagnostic Species of BGHF.⁷ *Eucalyptus paniculata* (Grey Ironbark) [T33a] and *Angophora floribunda* (Rough-barked Apple) [T46a], are also associated canopy species of this EEC, occurring less frequently in this vegetation community.

The 1943 aerial photo of the site (SIX Maps) indicates that the majority of the site had been cleared of vegetation for residential development at this time. However, some trees are visible within the site, including T13. It is likely that the abovementioned trees are progeny of the original forest.

5.3 Heritage Significance

5.3.1 Heritage Items

The subject property is *not* listed as an item of Environmental Heritage under Schedule 5, Part 1 of the *Ryde Local Environmental Plan (RLEP) 2014*. None of the trees have any known or suspected heritage significance.

5.3.2 Heritage Conservation Area

The subject property is *not* located within a Heritage Conservation Area under Schedule 5, Part 2 of the *Ryde Local Environmental Plan (LEP) 2014*.

5.3.3 Significant Tree Register

None of the subject trees are listed on Ryde City Council's *Significant Tree Register* (August 2007).

Doryphora sassafras (Sassafras) [T8 & T11] and *Scolopia braunii* (Flintwood) [T13a] are both rainforest species native to NSW, but are both uncommon ornamental plantings in residential gardens in Sydney. *Entelea sp.* (Whau) [T7], endemic to New Zealand, is also rare in cultivation in Sydney. All of these trees appear to have been planted within the site.

5.4 Amenity Value

5.4.1 Criteria for the assessment of amenity values are incorporated into **Appendix 1**. The amenity value of a tree is a measure of its live crown size, visual appearance (form, habit, crown density), visibility and position in the landscape and contribution to the visual character of an area. Generally the larger and more prominently located the tree, and the better its form and habit, the higher its amenity value.

6 TREE RETENTION VALUES

6.1.1 The Retention Values shown in **Appendix 3** and **Appendix 5** have been determined on the basis of the estimated longevity of the trees and their landscape significance rating, in accordance with **Table One**. Together with guidelines contained in **Section 7** (Tree Protection Zones) this information should be used to determine the most appropriate position of building footprints and other infrastructure within the site, with due consideration to other site constraints, to minimise the impact on trees considered worthy of preservation.

TABLE 1 – TREE RETENTION VALUES – ASSESSMENT METHODOLOGY

Estimated Life Expectancy	Landscape Significance Rating						
	1	2	3	4	5	6	7
Long – Greater than 40 Years	High Retention Value						
Medium- 15 to 40 Years			Moderate Retention Value				
Short – 5 to 15 years				Low Ret. Value			
Transient – Less than 5 Years				Very Low Retention Value			
Dead or Potentially Hazardous							

7 TREE PROTECTION ZONES

- 7.1.1 The Tree Protection Zone (TPZ) is a radial distance measured from the centre of the trunk of the tree as specified in **Appendix 4**. These have been calculated in accordance with AS 4970-2009 (Protection of Trees on Development Sites).⁸
- 7.1.2 The intention of the TPZ is to ensure protection of the root system and canopy from the potential damage from construction works and ensure the long-term health and stability of each tree to be retained. Incursions to the root zone may occur due to excavations, changes in ground levels, (either lowering or raising the grade), trenching or other forms or soil disturbance such as ripping, grading or inverting the soil profile. Such works may cause damage or loss of part of the root system, leading to an adverse impact on the tree.

7.2 Structural Root Zone (SRZ)

- 7.2.1 The Structural Root Zone (SRZ) provides the bulk of mechanical support and anchorage for a tree. This is also a radial distance measured from the centre of the trunk as specified in **Appendix 4**. The SRZ has been calculated in accordance with AS 4970-2009 (Protection of Trees on Development Sites).
- 7.2.2 Incursions within the SRZ are not recommended as they are likely to result in the severance of woody roots which may compromise the stability of the tree or lead to its decline and demise.

7.3 Acceptable Encroachments to the Tree Protection Zone.

- 7.3.1 Where encroachment to the TPZ is unavoidable, an incursion to the TPZ of not exceeding 10% of the area of the TPZ and outside the SRZ may be acceptable. Examples of acceptable incursions are shown in **Appendix 2**. Greater incursions to the TPZ may result in an adverse impact on the tree.
- 7.3.2 Where incursions greater than 10% of the TPZ are unavoidable, exploratory excavation using non-destructive methods may be required to evaluate the extent of the root system affected and determine whether or not the tree can remain viable

7.4 Acceptable Encroachments to the Canopy

- 7.4.1 The removal of a small portion of the crown (foliage and branches) is generally tolerable provided that the extent of pruning required is less than 10% of the total foliage volume of the tree and the removal of branches does not create large wounds or disfigure the natural form and habit of the tree. All pruning cuts must be undertaken in accordance with AS 4373:2007. This generally involves reduction of the affected branches back to the nearest branch collar at the junction with the parent branch, rather than at an intermediate point. The latter is referred to as “lopping” and is no longer an acceptable arboricultural practice. Generally speaking, the minimum pruning as required to accommodate any proposed works is desirable. Extensive pruning can result in a detrimental impact on tree health and may lead to exposure of remaining branches to wind forces that they were previously sheltered from, leading to a greater risk of branch failure.
- 7.4.2 Clearance to between the building line and canopy should take into account any projecting structures, such as balconies, awnings and the roofline and any requirement for temporary scaffolding to be erected during construction (typically 1-1.5 metres wide). High structures should preferably be located outside the canopy dripline (as shown indicatively on the attached plans) in order to avoid or minimise canopy pruning.

8 PROPOSED DEVELOPMENT

8.1.1 The proposed development includes the demolition of the existing dwellings and ancillary structures and construction of a multi-unit residential development (townhouses) within the property.

9 IMPACT ASSESSMENT

9.1.1 The intention of this assessment is to determine the incursions to the root zones and canopies created by the proposed development and evaluate the likely impact of the proposed works on the subject trees. Details shown on the following plans were used in this assessment:-

Title	Author	Dwg No.	Date
<i>Site Plan</i>	CDArchitects	J15284 DA001 [A]	21/10/2016
<i>Demolition Plan</i>	CDArchitects	J15284 DA003 [A]	21/10/2016
<i>Basement Floor Plan</i>	CDArchitects	J15284 DA100 [A]	21/10/2016
<i>Ground Floor Plan</i>	CDArchitects	J15284 DA101 [A]	21/10/2016
<i>Level 01 Floor Plan</i>	CDArchitects	J15284 DA102 [A]	21/10/2016
<i>Elevations</i>	CDArchitects	J15284 DA200-201 [A]	21/10/2016
<i>Section A</i>	CDArchitects	J15284 DA301 [A]	21/10/2016
<i>Stormwater Drawings</i>	Australian Consulting Engineers	160921 D00-D11 [A]	20/10/2016
<i>Landscape Plan</i>	Greenland Design	1488.GD.01 [A]	16/10/2016

9.1.2 A summary of the impact of the proposed development on each tree within the site is shown in **Appendix 5**. The following criteria have been examined as part of this assessment:-

- Existing Relative Levels (R.L.);
- Tree Protection Zone (TPZ);
- Structural Root Zone (SRZ);
- Footprint and envelope of the proposed development and temporary structures (scaffolding, hoardings etc);
- Incursions to the TPZ & SRZ, including estimated cut & fill beyond the building footprint;
- Incursions to the tree canopy from the building envelope and temporary structures; and
- Assessment of the likely impact of the works on existing trees.

9.1.3 The proposed development will necessitate the removal of fifty-nine (59) trees of low and very low retention value. These include Tree No.s T52 (Rough-barked Apple), T39, T41, & T57 (Weeping Bottlebrush), T40, T43, T70 & T71 (Camellia), T44 (NSW Christmas Bush), T10 & T56 (Golden Hinoki Cypress), T17, T20, T22, T24, T25, T32, & T74 (Camphor Laurel), T5 (Fiddlewood), T4 (Bhutan Cypress), T8 (Sassafras), T28 & T73 (Indian Coral), T35 (Blackbutt), T13 (Sydney Blue Gum), T53 (Eucalypt), T13b & T48 (Silky Oak), T44a (Grevillea), T30 (Sentry Palm), T15 (Jacaranda), T55 (Crepe Myrtle), T1, T2, T3 & T31 (Broad Leaf Paperbark), T68 (Liquidambar), T26 (Brushbox), T38 (Macadamia), T12 (Bullbay Magnolia), T46a (Lily Magnolia), T42 & T69 (Mango Tree), T58, T59, T60, T61, T62, T63, T64, T65, T66 & T67 (Prickly Paperbark), T2a (Port Wine Magnolia), T16, T46 & T50 (African Olive), T36 (Canary Island Palm) and T6 (Chinese Elm). None of these trees are considered worthy of special measures to ensure their preservation. Whilst trees T13 & T35 are locally indigenous species and

representative of the original vegetation community, both trees have relatively short remaining SULEs. As such, the removal of these trees to accommodate the proposed development is considered warranted in this instance. It should be noted that twenty-five (25) of these trees (T1, T2, T3, T16, T17, T20, T22, T24, T25, T28, T31, T32, T41, T42, T43, T44a, T46, T50, T56, T57, T69, T70, T71, T73 & T74) are exempt from the RDCP 2014.

- 9.1.4 The proposed development will also necessitate the removal of twelve (12) trees of moderate retention value. These include Tree No.s T7 (Whau), T14, T45 & T49 (Silky Oak), T21 Outeniqua Yellowwood), T23 (Blackbean), T27, T29, T37 & T47 (Jacarandas) T34 (Sydney Blue Gum) and T54 (Italian Cypress). Whilst T34 is a locally indigenous species and representative of the original vegetation community, this tree has a relatively short remaining SULE. The other trees are not considered significant, but are in good health and condition and make a fair contribution to the amenity of the site and surrounding properties. In order to compensate for loss of amenity resulting from the removal of these trees to accommodate the proposed development, consideration should be given to replacement planting within the site in accordance with Section 11.
- 9.1.5 The proposed development will also necessitate the removal of nine (9) trees of high retention value. These include Tree No.s T9 & T72 (Jacaranda), T11 (Sassafras), T13a (Flintwood), T18 (Spotted Gum), T19 & T33 (Silky Oak), T33a (Grey Ironbark) and T51 (Sydney Blue Gum). All of these trees are in good health and condition and make a positive contribution to the amenity of the site and surrounding properties. T13a & T11 are both native species and uncommon in cultivation in urban areas. T33a & T51 are typical of the species assemblage of Blue Gum High Forest, which is listed as an EEC. In order to preserve these trees and minimise any adverse impact, the site layout would need to be amended to minimise encroachments to the TPZs. In particular the proposed stormwater pipeline routes would need to be amended and relocated outside TPZs or alternatively installed using trenchless technology (such as Horizontal Directional Drilling) to minimise potential for root severance and damage. The Invert Levels of the pipelines may also need to be adjusted to provide adequate clearance to the root plates. Greater setbacks may also be required between proposed buildings and basement to limit encroachments to TPZs to no greater than 10% (including any over excavation to facilitate construction) and to avoid canopy pruning to clear the building envelope, temporary scaffolding and to facilitate construction. Given the nature and extent of the development, the preservation of these trees is not considered feasible without substantial changes to the site layout and design, which would overly compromise the desired yield and is therefore not considered acceptable. As such, compensatory planting is the only viable alternative that can be recommended in this instance. In order to compensate for loss of amenity resulting from the removal of these trees to accommodate the proposed development, consideration should be given to replacement planting within the site in accordance with Section 11.
- 9.1.6 The proposed new dwellings and basement are located within the TPZs of T75 (Silky Oak) Assuming that the basement is constructed using a methodology requiring minimal over-excavation to facilitate construction (such as soldier piles with infill shotcrete panels, constructed on the line of the basement), the extent of the encroachment from the proposed building and basement is less than 10% of the TPZ, which is within acceptable limits under AS 4970:2009. As such, the proposed development should not result in any adverse impact on this tree, provided all excavations for the proposed building and basement foundations within the TPZs are undertaken in accordance with Section 10.6. The extent of over-excavation (beyond the basement footprint) (such as temporary batters) should be minimised to limit the encroachments to no greater than 10% of the TPZ.
- 9.1.7 Proposed stormwater pipelines are located within the TPZs of T9a (Illawarra Flame) and T75 (Silky Oak), both located within adjoining properties. Open trenching for the pipelines has the potential to result in severance and damage to woody roots, which would result in an adverse impact on these trees. In order to avoid any adverse impact, the pipelines should either be

relocated (re-routed) outside TPZs, or alternatively installed using trenchless technology, such as Horizontal Directional Drilling (HDD) in accordance with Section 10.7. Adequate cover (between surface levels and the top of the pipe) should be provided to adequately clear the root plate. Under these soil conditions, the cover should be a minimum of one (1) metre. This may require some adjustment of the proposed pipeline Invert Levels (ILs).

9.1.8 A proposed On-site Stormwater Detention (OSD) tank is located within the TPZ of T75 (Silky Oak). Excavations to facilitate the construction of the OSD will result in an encroachment to the TPZ of greater than 10%, which exceeds acceptable limits under AS 4970:2009. In order to avoid any adverse impact on this tree, it is recommended that the OSD be relocated such that any over-excavation required to facilitate construction does not result in any encroachment to the TPZ.

9.1.9 No other trees will be adversely affected by the proposed development.

10 RECOMMENDED TREE PROTECTION MEASURES

10.1 Tree Protection Plan

10.1.1 The following Tree Protection Measures should be read in accordance with the Tree Protection Plan (**Appendix 6**). The Tree Protection Plan (TPP) indicates the position of tree protection devices and other recommended measures to ensure the protection of trees within the site to be retained as part of the proposed development.

10.2 Prohibited Activities

10.2.1 The following activities should be avoided within specified Tree Protection Zones (refer **Appendix 4 & 6** for extent of the TPZ for each tree):-

- Excavations and trenching (with exception of the approved remediation works, underground services, building foundations or pavement sub-grade);
- Soil disturbance, surface grading, compaction, tining, ripping or cultivation of soil;
- Mechanical removal of vegetation, including extraction of tree stumps;
- Soil level changes including the placement of fill material (excluding imported validated fill for remediation works or placement of fill for approved works)
- Movement and storage of plant, equipment & vehicles (except within defined temporary haul roads, where ground protection has been installed, or within the footprint of existing floor slabs or paved areas);
- Erection of site sheds (except where approved by the site arborist);
- Affixing of signage, barricades or hoardings to trees;
- Storage of building materials, waste and waste receptacles;
- Stockpiling of spoil or fill;
- Stockpiling of bulk materials, such as soil, sand, gravel, roadbase or the like;
- Stockpiling of demolition waste;
- Disposal of waste materials and chemicals including paint, solvents, cement slurry, fuel, oil and other toxic liquids;
- Other physical damage to the trunk or root system; and
- Any other activity likely to cause damage to the tree.

10.3 Tree Protection Fencing

10.3.1 All trees within the site to be retained shall be protected prior to and during construction from all activities that may result in detrimental impact by erecting a suitable protective fence beneath the canopy to the full extent of the Tree Protection Zone, excluding the footprint of the proposed works and areas within adjoining properties, as indicated on the Tree Protection Plan. As a

minimum, the fence should consist of temporary chain wire panels of 1.8 metres in height, supported by steel stakes as required and fastened together and supported to prevent sideways movement using corner braces where required. The fence shall be erected prior to the commencement of any work on-site and shall be maintained in good condition for the duration of construction. Where tree protection zones merge together a single fence encompassing the area is deemed to be adequate. Existing site boundary fences may form part of the enclosure.

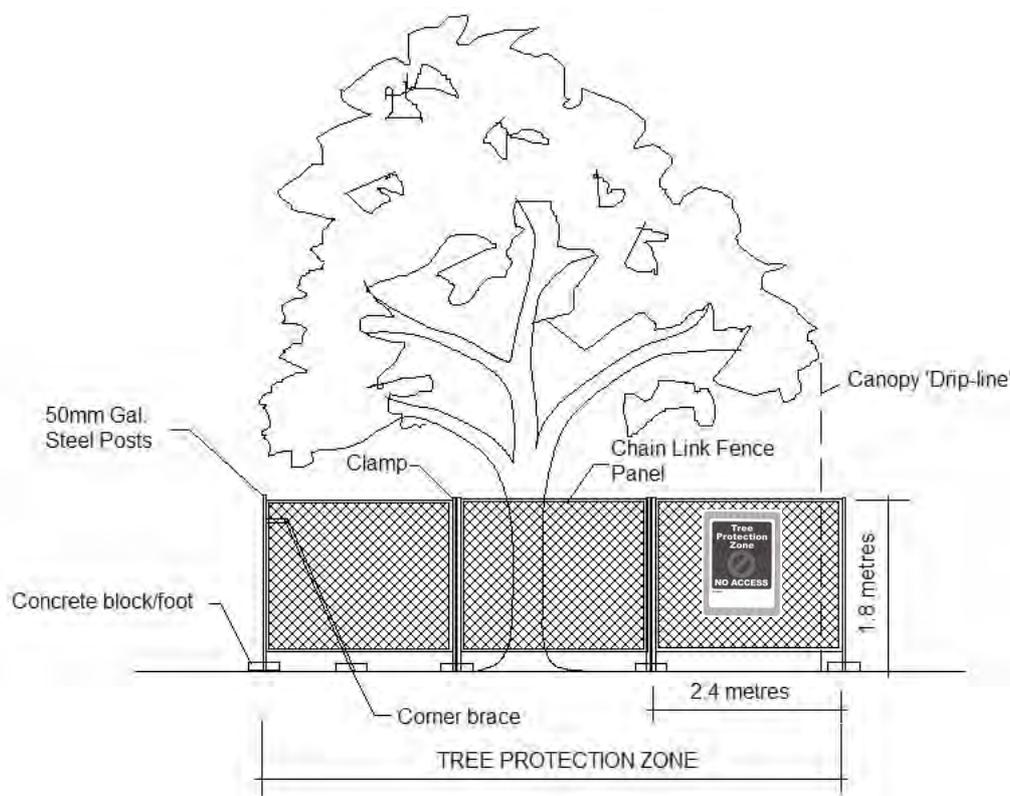


Figure 1 – Detail of Tree Protection Fence

10.4 Tree Protection Signs

10.4.1 Signs shall be installed on the Tree Protection Fence to prevent unauthorised movement of plant and equipment or entry to the Tree Protection Zone. The signs shall be securely attached to the fence using cable ties or equivalent. Signs shall be placed at minimum 10 metre intervals. The wording and layout of the sign shall comply with AS 4970-2009 as shown in **Figure 2**.



Figure 2 – Detail of Tree Protection Sign

10.5 Demolition Works within Tree Protection Zones

10.5.1 Demolition of paved areas within the Tree Protection Zones of trees to be retained shall be undertaken under the supervision of the Site Arborist. The pavement surface and sub-base within the TPZ shall be gradually removed in layers of no greater than 50mm thick using a small rubber tracked excavator or alternative approved method to avoid damage to underlying roots and minimise disturbance and compaction of the underlying soil profile. The machine shall work within the footprint of the existing paved surfaces to avoid compaction of the underlying soil. The

final layer of sub-base material shall be removed using hand tools were required to avoid compaction of the underlying soil profile and damage to woody roots.

- 10.5.2 Following removal of the pavement surface and sub-base, clean, friable topsoil shall be used to fill in the excavated area and bring flush with surrounding levels within new landscape areas. Soil shall only be imported and spread when the underlying soil conditions are dry to avoid compaction of the soil profile. Where there is insufficient recovered site topsoil for this purpose, any imported material shall be free of rocks, vegetation, heavy clay or other extraneous matter. Any imported soil material should be similar in texture to the existing site topsoil.
- 10.5.3 Demolition of existing walls, kerbs and other structures within the Tree Protection Zone of trees to be retained shall be undertaken under the supervision of the Site Arborist. The structures shall be demolished using equipment on stationed outside the TPZ where possible or within the footprint of existing hardstand areas. Care shall be taken to avoid the root systems, trunks and lower branches of trees in the vicinity of the structures during demolition works, with special attention required during demolition of the footings and other sub-surface members to avoid damage to woody roots.

10.6 Excavations within Tree Protection Zones

- 10.6.1 Prior to any mechanical excavations for building foundations or pavement sub-grade within the Tree Protection Zone of all trees nominated for retention, exploratory excavation using non-destructive techniques shall be taken along the perimeter of the structure or pavement within the TPZ. Non-destructive excavation techniques may include the use of hand-held implements, air pressure (using an Air-spade[®] device) or water pressure. The exploratory excavation shall be undertaken along the perimeter of the foundation or pavement (within the TPZ) to the depth of the foundation or to a maximum of 800mm from surface levels, to locate and expose any woody roots prior to any mechanical excavation. All care shall be undertaken to preserve woody roots intact and undamaged during exploratory excavation. Any roots encountered of less than 40mm in diameter may be cleanly severed with clean sharp pruning implements at the face of the excavation. The root zone in the vicinity of the excavation shall be kept moist following excavation for the duration of construction to minimise moisture stress on the tree.
- 10.6.2 Where large woody roots (greater than 50mm diameter) are encountered during exploratory excavations, further advice from a qualified arborist shall be sought prior to severance. Where necessary, (to avoid severing large woody roots) consideration should be given to the installation of an elevated structure (e.g. pier and beam footing, suspended slab or floor supported on piers, cantilevered slab, up-turned edge beam etc) in preference to structures requiring a deep edge beam or continuous perimeter strip footing. The beam section of any pier and beam footing should be placed **above** grade to avoid excavation within the SRZ. Pier footings intersecting large woody roots should be slightly offset where necessary to avoid root severance.
- 10.6.3 For masonry walls or fences it may be acceptable to delete continuous concrete strip footings and replace with suspended in-fill panels (eg steel or timber pickets, lattice etc) fixed to pillars. For paved areas, consideration should be given to raising the proposed pavement level and using a porous fill material in preference to excavation where large woody roots are found within the sub-base.

10.7 Underground Services

- 10.7.1 All proposed stormwater lines and other underground services should be located outside TPZs of trees proposed to be retained wherever possible or installed by alternative measures. Alternative measures include suspending pipelines beneath the floor of a building or structure (to avoid excavation within the TPZ), non-destructive excavation methods or Horizontal Directional Drilling

(HDD). Where the installation of service lines within TPZs is unavoidable, the pipelines or conduits should be installed as follows.

- 10.7.2 Where the extent of the incursion to the root zone is less than 10% of the TPZ including any excavations for benching and shoring the trench, the pipeline or conduit may be installed by open trenching using standard construction methods (excavator or trenching machine). 10% of the TPZ is equivalent to one-third of the TPZ radius on one side (refer to **Appendix 2**). Refer to **Appendix 4** for radial distances of TPZs for each tree.
- 10.7.3 Where the extent of the incursion to the root zone exceeds 10% of the TPZ, but is outside the SRZ, non-destructive excavation methods must be adopted in accordance with **Section 10.6**. Where large woody roots are encountered during excavation or trenching (root diameter greater than 50mm), these shall be retained intact wherever possible (e.g. by tunnelling beneath roots and inserting the pipeline or conduit beneath or re-routing the service etc). Where this is not practical and root pruning is the only alternative, proposed root pruning should be assessed by a qualified arborist [AQF 5] to evaluate the potential impact on the health and stability of the subject tree.
- 10.7.4 Excavations required for underground services within the Structural Root Zone of any tree to be retained should only be undertaken by sub-surface boring (Horizontal Directional Drilling). The Invert Level of the pipe, plus the pipe diameter, must be lower than the estimated root zone depth as specified. At this site a minimum depth of 1 metre to the invert level of the pipe is specified.

10.8 Pavements

- 10.8.1 Pavements should be avoided within the Tree Protection Zone of trees to be retained where possible. Proposed paved areas within the Tree Protection Zone of trees to be retained should be placed above grade to minimise excavations within the root zone and avoid root severance and damage. Pavement sub-base material should be as per **Section 10.9**.

10.9 Fill Material

- 10.9.1 Placement of fill material within the Tree Protection Zone of trees to be retained should be avoided wherever possible. Where placement of fill is unavoidable, the material should be a well-drained friable material, equivalent in texture to the existing site topsoil material. The fill should be free from rocks, vegetation and other extraneous material complying with AS 4419:2003 (*Soils for Landscaping and Garden Use*). The fill may be consolidated but should not be compacted to engineering standards. No fill material should be placed in direct contact with the trunk. Plant and equipment used to place and spread fill material should be stationed outside the TPZ where possible. Where not possible, suitable ground protection should be installed in accordance with **Section 10.14**.
- 10.9.2 Where placement of fill is required for pavement sub-grade is required within TPZs of trees to be retained, a coarse, gap-graded material such as 20 – 50mm crushed basalt (Blue Metal) or equivalent shall be used to provide some aeration to the root zone. Note that road base or crushed sandstone or other similar material containing a high percentage of fines is unacceptable for this purpose. The fill material should be consolidated with a non-vibrating roller to minimise compaction of the underlying soil. A permeable geotextile may be used beneath the sub-base to prevent migration of the stone into the sub-grade.

10.10 Canopy & Root Pruning

- 10.10.1 All canopy pruning work required shall be carried out in accordance with Australian Standard 4373-2007 – Pruning of Amenity Trees. Written approval from Council may be required under the Tree Preservation Order prior to undertaking this work. All pruning work shall be carried out by a

qualified and experienced arborist or tree surgeon [Australian Qualification Framework Level 3] in accordance with the NSW WorkCover Code of Practice for the Amenity Tree Industry (1998). No branches of greater than 100mm in diameter should be removed or pruned without further advice from a Consulting Arborist [Australian Qualification Framework Level 5].

10.10.2 Where root pruning is required, roots shall be severed with clean, sharp pruning implements and retained in a moist condition during the construction phase using Hessian material or mulch where practical. Severed roots shall be treated with a suitable root growth hormone containing the active constituents Indol-3-yl-Butric Acid (IBA) and 1-Naphthylacetic Acid (NAA) to stimulate rapid regeneration of the root system.

10.11 Tree Damage

10.11.1 Care shall be taken when operating cranes, drilling rigs and similar equipment near trees to avoid damage to tree canopies (foliage and branches). Under no circumstances shall branches be torn-off by construction equipment. Where there is potential conflict between tree canopy and construction activities, the advice of the Site Arborist must be sought.

10.11.2 In the event of any tree becoming damaged for any reason during the construction period a consulting arborist [Australian Qualification Framework Level 5] shall be engaged to inspect and provide advice on any remedial action to minimise any adverse impact. Such remedial action shall be implemented as soon as practicable and certified by the arborist.

10.12 Tree Removal

10.12.1 The approval of Ryde City Council shall be obtained prior to the removal or pruning of any tree protected under the Tree Preservation Order.

10.12.2 Tree removal work shall be carried out by an experienced tree surgeon in accordance with the NSW WorkCover Code of Practice for the Amenity Tree Industry (1998). Care shall be taken to avoid damage to other trees during the felling operation.

10.12.3 Stumps located within the TPZs of trees to be retained shall be grubbed-out where required using a mechanical stump grinder (or by hand where less than 150mm in diameter) without damage to the root system of other trees. Where trees to be removed are within the SRZ of any trees to be retained, consideration should be given to cutting the stump close to ground level and retaining the root crown intact. Stumps within the Tree Protection Zone of other trees to be retained shall **not** be pulled out using excavation equipment or similar.

10.13 Temporary Scaffolding

10.13.1 Where temporary scaffolding must be erected within the TPZ of trees to be retained (as indicated in **Appendix 6**), the scaffold shall be erected in accordance with **Figure 5**. Where foliage or branches project through the scaffold and create a safety hazard, this foliage and branches shall be temporarily excluded from the inner part of the scaffold by affixing a shade cloth screen on the outside of the scaffold (refer to **Figure 5**), or alternatively temporarily tying back branches where required. The pruning or removal of branches to accommodate the scaffold should be avoided wherever possible. Suitable ground protection shall be installed beneath the scaffold as shown in **Figure 5** to prevent contamination, disturbance and compaction of the soil profile within the scaffold zone during construction.

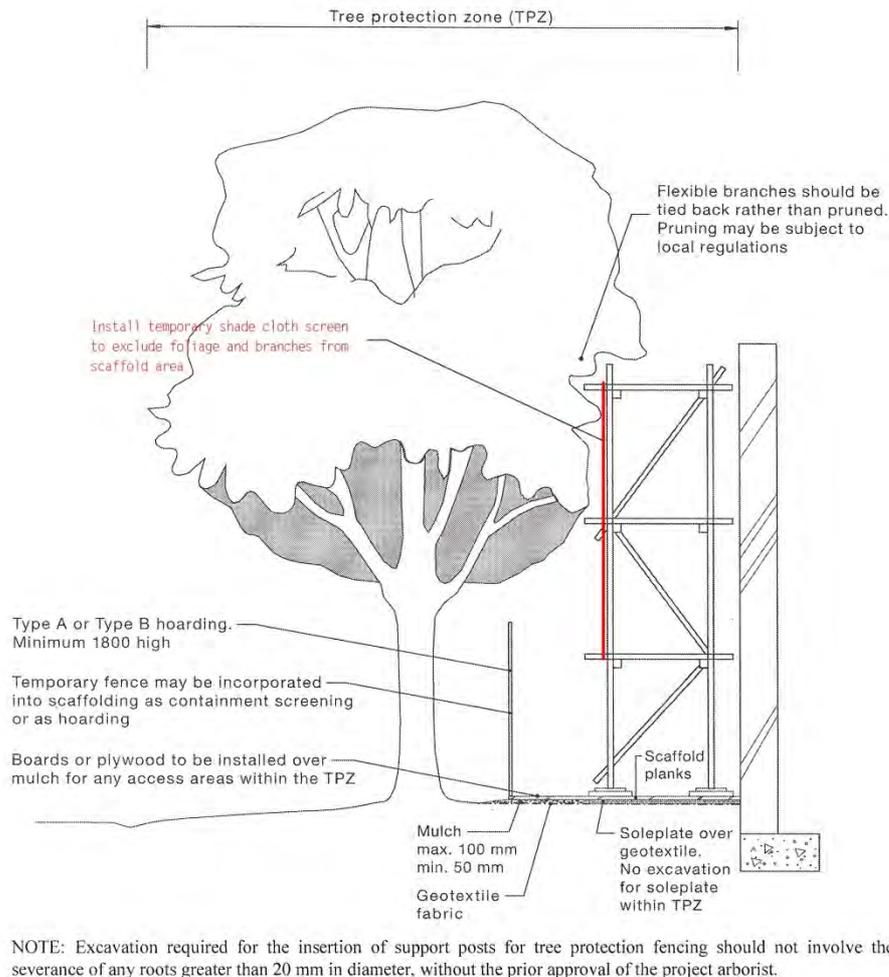


Figure 5 - Detail of Temporary scaffolding within a Tree Protection Zone

10.13.2 Where pruning or removal of branches to accommodate temporary scaffolding is unavoidable, all such pruning work shall be undertaken in accordance with **Section 10.8**.

10.14 Ground Protection

10.14.1 A 100mm layer of woodchip mulch or washed river sand shall be installed within designated areas of the Tree Protection Zone of nominated trees as indicated on the Tree Protection Plan (Appendix 7) to minimise compaction of the underlying soil profile during construction activity and haulage. A Geotextile fabric, such as Geotex® ‘ST’ Series manufactured by Synthetic Industries or an equivalent product, shall be installed beneath the mulch/sand layer to minimise compaction to the underlying soil profile and limit migration of mulch into the underlying soil profile. Mulch/sand shall be installed and spread by hand to avoid soil disturbance and compaction within the root zone. To minimise displacement of woodchip/sand in highly trafficked areas, 20mm thick marine ply sheets or truck mats (such as Envirex Versadeck® access mats) should be placed over the top of the woodchip/sand. Ground protection shall be installed prior to any site works and maintained in good condition for the duration of the construction period. On completion of the works, ground protection shall be removed without damage or disturbance to the underlying soil profile.

11 REPLACEMENT PLANTING

11.1.1 In order to compensate for loss of amenity resulting from the removal of trees to accommodate the proposed development, a minimum number of thirty (30) new trees capable of attaining a height of at least twelve (12) metres at maturity should be planted within the site.

11.1.2 Replacement trees should preferably include some locally indigenous species. These will be most appropriate to the site conditions and be most valuable in terms of preserving the landscape character and wildlife habitat of the area. The following species are appropriate to the site conditions and could be considered for replacement planting:-

- *Syzygium paniculatum* (Magenta Cherry)
- *Glochidion ferdinandi* (Cheese Tree)
- *Syncarpia glomulifera* (Turpentine)
- *Angophora costata* (Sydney Red Gum),
- *Eucalyptus paniculata* (Grey Ironbark)
- *Corymbia maculata* (Spotted Gum)
- *Allocasuarina torulosa* (Forest Oak).



Andrew Morton

EARTHSCAPE HORTICULTURAL SERVICES

1st November 2016

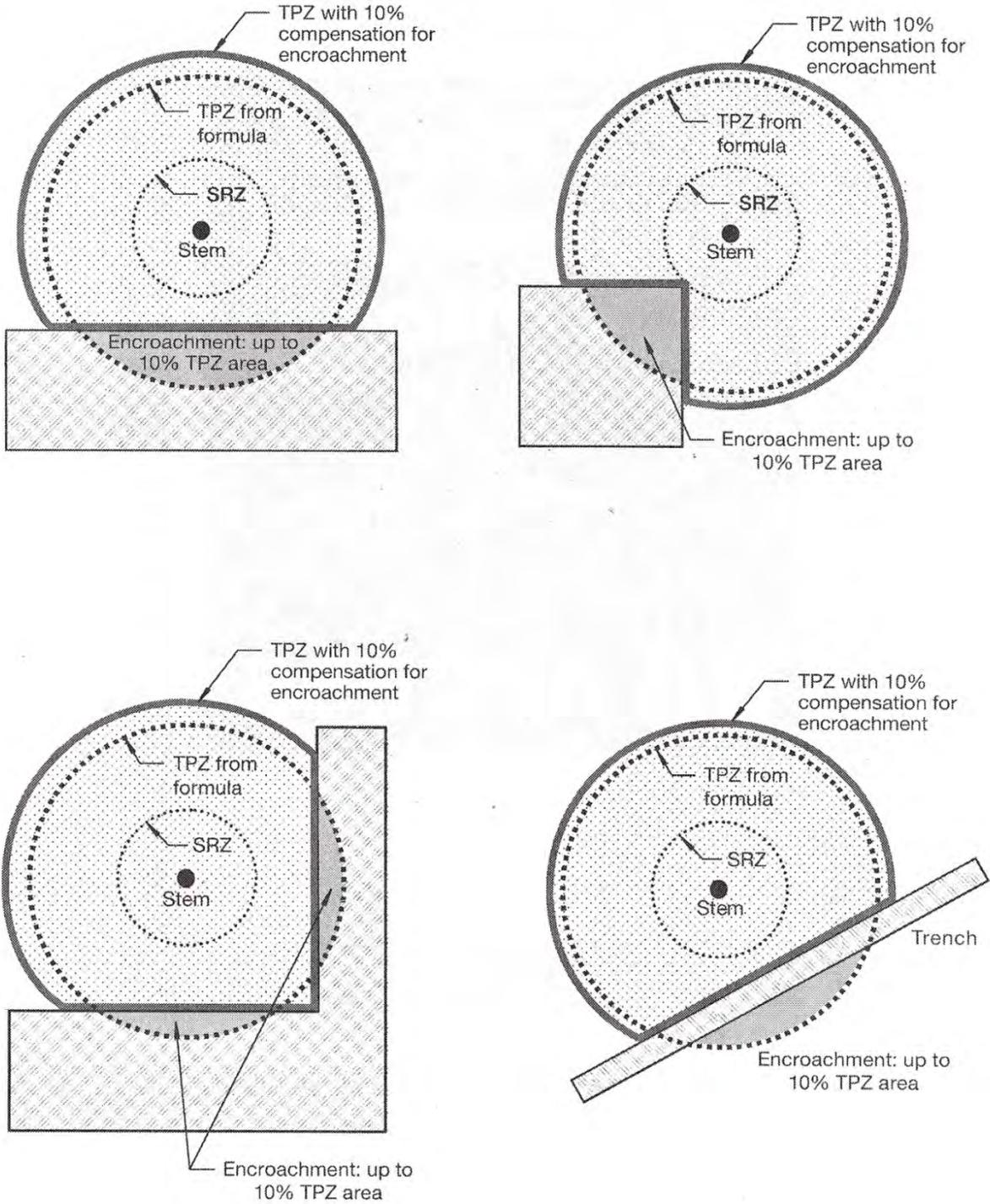
APPENDIX 1 - CRITERIA FOR ASSESSMENT OF LANDSCAPE SIGNIFICANCE

RATING	HERITAGE VALUE	ECOLOGICAL VALUE	AMENITY VALUE
1. SIGNIFICANT	The subject tree is listed as a Heritage Item under the Local Environment Plan (LEP) with a local, state or national level of significance or is listed on Council's Significant Tree Register	The subject tree is scheduled as a Threatened Species as defined under the Threatened Species Conservation Act 1995 (NSW) or the Environmental Protection and Biodiversity Conservation Act 1999	The subject tree has a very large live crown size exceeding 300m ² with normal to dense foliage cover, is located in a visually prominent position in the landscape, exhibits very good form and habit typical of the species
	The subject tree forms part of the curtilage of a Heritage Item (building /structure /artefact as defined under the LEP) and has a known or documented association with that item	The tree is a locally indigenous species, representative of the original vegetation of the area and is known as an important food, shelter or nesting tree for endangered or threatened fauna species	The subject tree makes a significant contribution to the amenity and visual character of the area by creating a sense of place or creating a sense of identity
	The subject tree is a Commemorative Planting having been planted by an important historical person (s) or to commemorate an important historical event	The subject tree is a Remnant Tree, being a tree in existence prior to development of the area	The tree is visually prominent in view from surrounding areas, being a landmark or visible from a considerable distance.
2. VERY HIGH	The tree has a strong historical association with a heritage item (building/structure/artefact/garden etc) within or adjacent the property and/or exemplifies a particular era or style of landscape design associated with the original development of the site.	The tree is a locally-indigenous species, representative of the original vegetation of the area and is a dominant or associated canopy species of an Endangered Ecological Community (EEC) formerly occurring in the area occupied by the site.	The subject tree has a very large live crown size exceeding 200m ² ; a crown density exceeding 70% (normal-dense), is a very good representative of the species in terms of its form and branching habit or is aesthetically distinctive and makes a positive contribution to the visual character and the amenity of the area
3. HIGH	The tree has a suspected historical association with a heritage item or landscape supported by anecdotal or visual evidence	The tree is a locally-indigenous species and representative of the original vegetation of the area and the tree is located within a defined Vegetation Link / Wildlife Corridor or has known wildlife habitat value	The subject tree has a large live crown size exceeding 100m ² ; The tree is a good representative of the species in terms of its form and branching habit with minor deviations from normal (e.g. crown distortion/suppression) with a crown density of at least 70% (normal); The subject tree is visible from the street and surrounding properties and makes a positive contribution to the visual character and the amenity of the area
4. MODERATE	The tree has no known or suspected historical association, but does not detract or diminish the value of the item and is sympathetic to the original era of planting.	The subject tree is a non-local native or exotic species that is protected under the provisions of this DCP.	The subject tree has a medium live crown size exceeding 40m ² ;The tree is a fair representative of the species, exhibiting moderate deviations from typical form (distortion/suppression etc) with a crown density of more than 50% (thinning to normal); and
			The tree is visible from surrounding properties, but is not visually prominent – view may be partially obscured by other vegetation or built forms. The tree makes a fair contribution to the visual character and amenity of the area.
5. LOW	The subject tree detracts from heritage values or diminishes the value of a heritage item	The subject tree is scheduled as exempt (not protected) under the provisions of this DCP due to its species, nuisance or position relative to buildings or other structures.	The subject tree has a small live crown size of less than 40m ² and can be replaced within the short term (5-10 years) with new tree planting
6. VERY LOW	The subject tree is causing significant damage to a heritage Item.	The subject tree is listed as an Environment Weed Species in the relevant Local Government Area, being invasive, or is a known nuisance species.	The subject tree is not visible from surrounding properties (visibility obscured) and makes a negligible contribution or has a negative impact on the amenity and visual character of the area. The tree is a poor representative of the species, showing significant deviations from the typical form and branching habit with a crown density of less than 50% (sparse).
7. INSIGNIFICANT	The tree is completely dead and has no visible habitat value	The tree is a declared Noxious Weed under the Noxious Weeds Act (NSW) 1993 within the relevant Local Government Area.	The tree is completely dead and represents a potential hazard.

Ref:- Morton, A (2006) **Determining the Retention Value of Trees on Development Sites**

TreeNet - Proceedings of the 7th National Street Tree Symposium 2006 Government of South Australia Department for Transport, Energy and Infrastructure

APPENDIX 2 – ACCEPTABLE INCURSIONS TO THE TREE PROTECTION ZONE (TPZ)



NOTE: Less than 10% TPZ area and outside SRZ. Any loss of TPZ compensated for elsewhere.

REF:- Council of Standards Australia (August 2009)
AS 4970 – 2009 – Protection of Trees on Development Sites
 Standards Australia, Sydney

REFERENCES:-

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² Benson, Doug & Howell, Jocelyn (1990)

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³ Mattheck, Dr. Claus & Breloer, Helge (1994) – Sixth Edition (2001)

The Body Language of Trees – A Handbook for Failure Analysis

The Stationery Office, London, England

⁴ Barrell, Jeremy (1996)

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Proceedings of the International Conference on Trees and Building Sites (Chicago)

International Society of arboriculture, Illinois, USA

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NPWS, Sydney NSW

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⁷ Tozer, Mark (2003)

The Native Vegetation of the Cumberland Plain, Western Sydney: Systematic Classification and Field Identification of Communities

Cunninghamia 8 (1) 2003, (Journal of Plant Ecology for Eastern Australia)

National Herbarium of NSW, Botanic Gardens Trust, Sydney

⁸ Council of Standards Australia (August 2009)

AS 4970 – 2009 – Protection of Trees on Development Sites

Standards Australia, Sydney

APPENDIX 3 - TREE HEALTH AND CONDITION ASSESSMENT SCHEDULE

Tree Identification No.	Species	Height (m)	Spread (m)	Trunk Diameter (mm)	Live Crown Size (m ²)	Maturity Class	Condition	Previous Pruning	Health		Remaining Safe Useful Life Expectancy (SULE)	Landscape Significance Rating	Retention Value	Location
									Vigour	Pest & Disease				
1	<i>Ligustrum lucidum</i> (Broad Leaf Privet)	8	5	100x6	30	M	Appears stable with poor branching structure. Exhibits elite epicormic arising from old pruning wounds. Some dieback with 10% deadwood.	Previously cut to GL (crown restored)	Fair with thinning crown	No Evidence	Short 5-15 Years	7	Very Low	On-site
2	<i>Ligustrum lucidum</i> (Broad Leaf Privet)	7	4	200 + 150x2	20	M	Appears stable with poor branching structure. Exhibits elite epicormic arising from old pruning wounds.	Previously cut to GL (crown restored)	Fair	No Evidence	Short 5-15 Years	7	Very Low	On-site
2a	<i>Michelia figo</i> (Port Wine Magnolia)	4	4	350	16	M	Appears stable with fair branching structure. Exhibits multiple moderate wounds due to previous pruning. Multiple elite epicormic arising from old pruning wounds. Large basal cavity.	Previously cut to GL (crown restored)	Very Good	No Evidence	Short 5-15 Years	5	Low	On-site
3	<i>Ligustrum lucidum</i> (Broad Leaf Privet)	8	7	180x2 + 140x3	42	OM	Appears stable with fair branching structure. Exhibits multiple moderate bark inclusions at GL. Exhibits moderate dieback with 40% deadwood.	No Evidence	Fair with thinning crown	No Evidence	Transient (less than 5 years)	7	Very Low	On-site
4	<i>Cupressus torulosa</i> (Bhutan Cypress)	12	3	255	21	OM	Appears stable with fair branching structure. Located immediately adjacent existing driveway. Exhibits substantial dieback with 90% deadwood.	No Evidence	Poor with sparse crown	No Evidence	Transient (less than 5 years)	5	Very Low	On-site
5	<i>Citharexylum spinosum</i> (Fiddlewood)	11	10	320x2 + 200	110	M	Appears stable with fair branching structure. Crown suppressed on the south side due to crowding. Exhibits multiple moderate wounds to upper crown due previous branch loss (storm damage) (5 x SLs of 100mm Ø)	Selectively pruned	Good	No Evidence	Short 5-15 Years	4	Low	On-site
6	<i>Ulmus parvifolia</i> (Chinese Elm)	13	7	300	63	M	Appears stable with fair branching structure. Crown suppressed on the east side due to crowding. Exhibits multiple moderate wounds to upper crown due previous branch loss (storm damage) (6-8 x SLs of 100mm Ø)	No Evidence	Fair	No Evidence	Short 5-15 Years	4	Low	On-site
7	<i>Entelea sp.</i> (Whau)	13	13	400x2 + 350	143	M	Appears stable with fair branching structure. Exhibits multiple moderate bark inclusions at GL. Exhibits some dieback with 10% deadwood.	No Evidence	Fair with thinning crown	No Evidence	Short 5-15 Years	3	Moderate	On-site

APPENDIX 3 - TREE HEALTH AND CONDITION ASSESSMENT SCHEDULE

Tree Identification No.	Species	Height (m)	Spread (m)	Trunk Diameter (mm)	Live Crown Size (m ²)	Maturity Class	Condition	Previous Pruning	Health		Remaining Safe Useful Life Expectancy (SULE)	Landscape Significance Rating	Retention Value	Location
									Vigour	Pest & Disease				
8	<i>Doryphora sassafras</i> (Sassafras)	8	4.5	300	36	M	Appears stable with poor branching structure. Main leader suppressed due dieback with decay evident. Multiple epicormics arising from lower trunk.	No Evidence	Good	No Evidence	Short 5-15 Years	5	Low	On-site
9	<i>Jacaranda mimosifolia</i> (Jacaranda)	14	13	470	130	M	Appears stable with sound branching structure. Exhibits co-dominant PLs at 2 metres. Crown suppressed on SE side due to overshadowing.	No Evidence	Good	No Evidence	Long - more than 40 years	3	High	On-site
9a	<i>Brachychiton acerifolius</i> (Illawarra Flame Tree)	9	8	350	56	M	Appears stable with sound branching structure.	No Evidence	Very Good	No Evidence	Long - more than 40 years	6	Moderate	Adjoining property
10	<i>Chamaecyparis obtusa</i> 'Crippsii' (Golden Hinoki Cypress)	8	4.5	160	31.5	SM	Appears stable with fair branching structure. Crown suppressed on SE side due to overshadowing. Prominent lean to the NW.	Lower PLs lopped	Good	No Evidence	Short 5-15 Years	5	Low	On-site
11	<i>Doryphora sassafras</i> (Sassafras)	22	7	400	126	M	Appears stable with sound branching structure.	No Evidence	Very Good	No Evidence	Long - more than 40 years	3	High	On-site
12	<i>Magnolia grandiflora</i> (Bullbay Magnolia)	12	8	400	72	OM	Appears stable with fair branching structure. Exhibits a high bark inclusion at 3.5 metres at junction of co-dominant PLs. Exhibits some dieback with 15% deadwood.	No Evidence	Fair with thinning crown	No Evidence	Short 5-15 Years	4	Low	On-site
13	<i>Eucalyptus saligna</i> (Sydney Blue Gum)	27	15	1100	315	M	Appears stable with fair branching structure. Exhibits multiple moderate wounds due to previous branch loss (storm damage) (6-8 x SLs of 150-250mm Ø). Large basal wound from GL to 3 metres due borer damage affecting 60% circumference.	No Evidence	Fair	High borer infestation (Longicorn beetle)	Transient (less than 5 years)	2	Low	On-site
13a	<i>Scolopia braunii</i> (Flintwood)	15	12	300 + 220x2 + 200	180	M	Appears stable with fair branching structure. Exhibits multiple moderate bark inclusions at GL.	No Evidence	Very Good	No Evidence	Long - more than 40 years	3	High	On-site

APPENDIX 3 - TREE HEALTH AND CONDITION ASSESSMENT SCHEDULE

Tree Identification No.	Species	Height (m)	Spread (m)	Trunk Diameter (mm)	Live Crown Size (m ²)	Maturity Class	Condition	Previous Pruning	Health		Remaining Safe Useful Life Expectancy (SULE)	Landscape Significance Rating	Retention Value	Location
									Vigour	Pest & Disease				
13b	<i>Grevillea robusta</i> (Silky Oak)	18	9	400	117	M	Appears stable with fair branching structure. Crown suppressed on NW side due branch loss and upper crown suppressed due overshadowing. Poor form and habit. Multiple moderate wounds due previous branch loss (storm damage). Lesion on trunk at 2 metres.	No Evidence	Fair	Suspected Canker infection at 2 metres	Short 5-15 Years	4	Low	On-site
14	<i>Grevillea robusta</i> (Silky Oak)	25	12	650	228	OM	Appears stable with fair branching structure. Exhibits a prominent lean to the NE (Self corrected). Multiple moderate wounds due to previous branch loss. Some dieback with 10% deadwood.	Selectively pruned & deadwooded	Fair with slightly thinning crown	No Evidence	Short 5-15 Years	3	Moderate	On-site
15	<i>Jacaranda mimosifolia</i> (Jacaranda)	12	9	280	63	OM	Appears stable with sound branching structure. Exhibits moderate dieback with 20% deadwood.	No Evidence	Fair with thinning crown	No Evidence	Short 5-15 Years	4	Low	On-site
16	<i>Olea europaea subsp. africana</i> (African Olive)	12	9	300x3 + 200	90	M	Appears stable with fair branching structure. Exhibits multiple moderate bark inclusions at GL. Exhibits moderate dieback with 20% deadwood.	No Evidence	Fair with thinning crown	No Evidence	Short 5-15 Years	7	Very Low	On-site
17	<i>Cinnamomum camphora</i> (Camphor Laurel)	5	4	150	20	I	Appears stable with sound branching structure.	No Evidence	Very Good	No Evidence	Long - more than 40 years	6	Low	On-site
18	<i>Corymbia maculata</i> (Spotted Gum)	23	12	685	204	M	Appears stable with sound branching structure. Crown suppressed on NW side due to crowding. Multiple moderate wounds due to branch loss.	No Evidence	Good	No Evidence	Long - more than 40 years	3	High	On-site
19	<i>Grevillea robusta</i> (Silky Oak)	25	15	850	270	M	Appears stable with sound branching structure.	No Evidence	Good	No Evidence	Medium 15-40 Years	2	High	On-site
20	<i>Cinnamomum camphora</i> (Camphor Laurel)	12	9	330	81	SM	Appears stable with sound branching structure. Upper crown suppressed due to overshadowing.	Selectively pruned	Good	Low Monstera vine infestation	Long - more than 40 years	6	Low	On-site
21	<i>Afrocarpus [syn Podocarpus] falcatus</i> (Outeniqua Yellowwood)	12	8	232	72	SM	Appears stable with sound branching structure. Crown suppressed on the NW side due to overshadowing	No Evidence	Good	No Evidence	Medium 15-40 Years	4	Moderate	On-site

APPENDIX 3 - TREE HEALTH AND CONDITION ASSESSMENT SCHEDULE

Tree Identification No.	Species	Height (m)	Spread (m)	Trunk Diameter (mm)	Live Crown Size (m ²)	Maturity Class	Condition	Previous Pruning	Health		Remaining Safe Useful Life Expectancy (SULE)	Landscape Significance Rating	Retention Value	Location
									Vigour	Pest & Disease				
22	<i>Cinnamomum camphora</i> (Camphor Laurel)	18	16	430x2	192	M	Appears stable with sound branching structure. Crown suppressed on the NE & SW side due to crowding.	Selectively pruned	Good	No Evidence	Long - more than 40 years	6	Low	On-site
23	<i>Castanospermum australe</i> (Blackbean)	14	9	320 + 160	108	SM	Appears stable with sound branching structure. Exhibits a low bark inclusion at 1 metre.	No Evidence	Very Good	Low Monstera vine infestation	Long - more than 40 years	4	Moderate	On-site
24	<i>Cinnamomum camphora</i> (Camphor Laurel)	14	4	260	16	SM	Appears stable with sound branching structure.	No Evidence	Fair with thinning crown	No Evidence	Short 5-15 Years	6	Very Low	On-site
25	<i>Cinnamomum camphora</i> (Camphor Laurel)	20	20	800	300	M	Appears stable with sound branching structure.	No Evidence	Very Good	No Evidence	Long - more than 40 years	6	Low	On-site
26	<i>Lophostemon confertus</i> (Brushbox)	17	7	516	63	M	Appears stable with fair branching structure. Crown suppressed on SE side due to crowding. Exhibits moderate dieback with 30% deadwood (including main leader).	No Evidence	Fair with thinning crown	No Evidence	Short 5-15 Years	4	Low	On-site
27	<i>Jacaranda mimosifolia</i> (Jacaranda)	16	12	400	156	M	Appears stable with sound branching structure. Crown suppressed on the SW side due to overshadowing. Prominent lean to the north. Poor form and habit.	No Evidence	Good	No Evidence	Medium 15-40 Years	3	Moderate	On-site
28	<i>Erythrina x sykesii</i> (Indian Coral)	18	16	550 + 650	208	M	Appears stable with fair branching structure. Exhibits a high bark inclusion at GL. Multiple co-dominant PLs at 1 metre.	No Evidence	Good	No Evidence	Medium 15-40 Years	6	Low	On-site
29	<i>Jacaranda mimosifolia</i> (Jacaranda)	13	13	450	104	M	Appears stable with sound branching structure. Crown suppressed on south side due to overshadowing. Poor form and habit.	No Evidence	Good	No Evidence	Medium 15-40 Years	3	Moderate	On-site
30	<i>Howea belmoreana</i> (Sentry Palm)	8	1.5	150	1.5	OM	Appears stable with poor branching structure. Exhibits a large axial wound at 1 to 5 metres with decay evident.	No Evidence	Poor with sparse crown	No Evidence	Transient (less than 5 years)	5	Very Low	On-site
31	<i>Ligustrum lucidum</i> (Broad Leaf Privet)	7	5	100x4	25	SM	Appears stable with fair branching structure.	No Evidence	Very Good	No Evidence	Medium 15-40 Years	7	Very Low	On-site
32	<i>Cinnamomum camphora</i> (Camphor Laurel)	10	5	220	35	I	Appears stable with fair branching structure. Exhibits a moderate bark inclusion at 2 metres.	No Evidence	Good	No Evidence	Long - more than 40 years	6	Low	On-site

APPENDIX 3 - TREE HEALTH AND CONDITION ASSESSMENT SCHEDULE

Tree Identification No.	Species	Height (m)	Spread (m)	Trunk Diameter (mm)	Live Crown Size (m ²)	Maturity Class	Condition	Previous Pruning	Health		Remaining Safe Useful Life Expectancy (SULE)	Landscape Significance Rating	Retention Value	Location
									Vigour	Pest & Disease				
33	<i>Grevillea robusta</i> (Silky Oak)	25	13	650	247	M	Appears stable with sound branching structure.	No Evidence	Good	No Evidence	Medium 15-40 Years	2	High	On-site
33a	<i>Eucalyptus paniculata</i> (Grey Ironbark)	18	11	446	165	SM	Appears stable with sound branching structure.	No Evidence	Very Good	No Evidence	Long - more than 40 years	2	High	On-site
34	<i>Eucalyptus saligna</i> (Sydney Blue Gum)	25	23	1045	391	M	Appears stable with fair branching structure. Exhibits a large wound due branch loss at 13 metres with decay evident at junction of main PLs. Large dead suspended branch at 11 metres.	No Evidence	Fair	High Phellinus sp. (Bracket Fungus) infection at 13 metres.	Short 5-15 Years	2	Moderate	On-site
35	<i>Eucalyptus pilularis</i> (Blackbutt)	20	8	450	104	M	Appears stable with fair branching structure. Exhibits a prominent lean to the NE. Crown suppressed on SW side due to overshadowing. Poor form and habit. Large axial wound from GL to 3 metres.	No Evidence	Fair	Moderate borer infestation	Transient (less than 5 years)	2	Low	On-site
36	<i>Phoenix canariensis</i> (Canary Island Palm)	7	8	380	48	SM	Appears stable with sound branching structure.	No Evidence	Very Good	No Evidence	Medium 15-40 Years	5	Low	On-site
37	<i>Jacaranda mimosifolia</i> (Jacaranda)	14	15	494	150	M	Appears stable with sound branching structure. Crown suppressed on the SW side due to overshadowing. Prominent lean to the NE (self-corrected).	Lower PLs selectively pruned	Good	No Evidence	Medium 15-40 Years	3	Moderate	On-site
38	<i>Macadamia tetraphylla</i> (Macadamia Nut)	8	6	160x2	36	SM	Appears stable with poor branching structure. Exhibits a high bark inclusion at GL. Large wound at 1-2 metres due branch loss & sunburn with fracture.	Previously topped at 2.5 metres	Good	Low borer infestation	Transient (less than 5 years)	5	Very Low	On-site
39	<i>Callistemon viminalis</i> (Weeping Bottlebrush)	5	4	191	16	SM	Appears stable with sound branching structure. Exhibits a prominent lean to the south (self corrected)	Selectively pruned	Very Good	No Evidence	Medium 15-40 Years	5	Low	On-site
40	<i>Camellia japonica</i> (Camellia)	5	3.5	70x5	10.5	M	Appears stable with poor branching structure. Exhibits multiple moderate bark inclusions at GL.	Crown lifted to 2 metres	Good	No Evidence	Medium 15-40 Years	5	Low	On-site

APPENDIX 3 - TREE HEALTH AND CONDITION ASSESSMENT SCHEDULE

Tree Identification No.	Species	Height (m)	Spread (m)	Trunk Diameter (mm)	Live Crown Size (m ²)	Maturity Class	Condition	Previous Pruning	Health		Remaining Safe Useful Life Expectancy (SULE)	Landscape Significance Rating	Retention Value	Location
									Vigour	Pest & Disease				
41	<i>Callistemon viminalis</i> (Weeping Bottlebrush)	4.5	3	180	9	M	Appears stable with poor branching structure.	Crown lifted to 2 metres	Good	No Evidence	Short 5-15 Years	6	Very Low	On-site
42	<i>Mangifera indica</i> (Mango Tree)	4	4	270	16	I	Appears stable with sound branching structure.	No Evidence	Very Good	High Possum defoliation	Medium 15-40 Years	6	Low	On-site
43	<i>Camellia japonica</i> (Camellia)	3.5	2.5	100	6.25	M	Appears stable with fair branching structure.	No Evidence	Fair	No Evidence	Short 5-15 Years	6	Very Low	On-site
44	<i>Ceratopetalum gummiferum</i> (NSW Christmas Bush)	5	3.5	70 + 110	10.5	M	Stability suspect with poor branching structure. Exhibits a prominent lean to the SW. High bark inclusion at GL.	Crown lifted to 2 metres	Good	No Evidence	Transient (less than 5 years)	5	Very Low	On-site
44a	<i>Grevillea 'Sandra Gordon'</i> (Grevillea)	3.5	3	120	7.5	OM	Stability suspect with poor branching structure. Exhibits multiple moderate wounds due branch loss (PLs). Some dieback with 10% deadwood.	No Evidence	Fair with thinning crown	No Evidence	Transient (less than 5 years)	6	Very Low	On-site
45	<i>Grevillea robusta</i> (Silky Oak)	9	4.5	248	36	I	Appears stable with sound branching structure.	No Evidence	Very Good	No Evidence	Long - more than 40 years	5	Moderate	On-site
46	<i>Olea europaea subsp. africana</i> (African Olive)	5	5	250	20	SM	Appears stable with sound branching structure.	No Evidence	Very Good	No Evidence	Long - more than 40 years	7	Very Low	On-site
46a	<i>Magnolia lilliflora</i> (Lily Magnolia)	3.5	3.5	70x5	12.25	SM	Appears stable with fair branching structure. Exhibits multiple high bark inclusions at GL.	No Evidence	Very Good	No Evidence	Medium 15-40 Years	5	Low	On-site
47	<i>Jacaranda mimosifolia</i> (Jacaranda)	14	9	370	90	M	Appears stable with sound branching structure. Crown suppressed on south side due to overshadowing.	No Evidence	Good	No Evidence	Long - more than 40 years	4	Moderate	On-site
48	<i>Grevillea robusta</i> (Silky Oak)	20	9	600	135	OM	Appears stable with sound branching structure. Exhibits a prominent lean to the north. Crown suppressed on south side due to crowding. Substantial dieback with 50% deadwood.	Deadwooded	Poor with sparse crown	No Evidence	Transient (less than 5 years)	3	Very Low	On-site

APPENDIX 3 - TREE HEALTH AND CONDITION ASSESSMENT SCHEDULE

Tree Identification No.	Species	Height (m)	Spread (m)	Trunk Diameter (mm)	Live Crown Size (m ²)	Maturity Class	Condition	Previous Pruning	Health		Remaining Safe Useful Life Expectancy (SULE)	Landscape Significance Rating	Retention Value	Location
									Vigour	Pest & Disease				
49	<i>Grevillea robusta</i> (Silky Oak)	20	7	382	133	SM	Appears stable with sound branching structure. Exhibits some dieback with 10% deadwood.	No Evidence	Fair with slightly thinning crown	No Evidence	Medium 15-40 Years	4	Moderate	On-site
50	<i>Olea europaea subsp. africana</i> (African Olive)	6	6	350	30	M	Appears stable with fair branching structure. Exhibits multiple moderate wounds due to previous pruning with multiple epicormics emanating from old pruning wounds. Large axial wound from GL to 2 metres with decay.	All PLs previously lopped at 2 metres (Crown restored)	Good	High vine infestation	Short 5-15 Years	7	Very Low	On-site
51	<i>Eucalyptus saligna</i> (Sydney Blue Gum)	23	16	600	272	M	Appears stable with sound branching structure. Crown suppressed on SE side due to crowding.	No Evidence	Very Good	No Evidence	Long - more than 40 years	2	High	On-site
52	<i>Angophora floribunda</i> (Rough-barked Apple)	7	4	300	0	OM	Stability suspect with poor branching structure. Exhibits multiple moderate wounds due branch loss (PLs) with decay. Completely dead.	No Evidence	Dead	Severe Wisteria Vine infestation	Nil	2	Very Low	On-site
53	<i>Eucalyptus sp.</i> (Eucalypt)	5	3	200	0	OM	Stability suspect with poor branching structure. Completely dead.	No Evidence	Dead	Severe Wisteria Vine infestation	Nil	2	Very Low	On-site
54	<i>Cupressus sempervirens</i> (Italian Cypress)	10	5	300	50	M	Appears stable with sound branching structure.	No Evidence	Very Good	No Evidence	Long - more than 40 years	4	Moderate	On-site
55	<i>Lagerstroemia indica</i> (Crepe Myrtle)	6	5	70x6	25	SM	Appears stable with fair branching structure. Exhibits multiple epicormics emanating from old pruning wounds	Previously lopped at 2 metres (crown restored)	Good	No Evidence	Short 5-15 Years	5	Low	On-site
56	<i>Chamaecyparis obtusa 'Crippsii'</i> (Golden Hinoki Cypress)	7	6	250	36	M	Appears stable with sound branching structure.	Crown lifted to 2 metres	Very Good	No Evidence	Long - more than 40 years	6	Low	On-site
57	<i>Callistemon viminalis</i> (Weeping Bottlebrush)	6	5	150	25	SM	Appears stable with fair branching structure. Exhibits a prominent lean to the north. Crown suppressed on the SE side due to building. Located close to existing dwelling.	Crown lifted to 1.5 metres	Very Good	No Evidence	Short 5-15 Years	6	Very Low	On-site
58	<i>Melaleuca styphelioides</i> (Prickly Paperbark)	4	4	200	12	SM	Appears stable with poor branching structure. Exhibits multiple epicormics emanating from old pruning wounds	Topped at 1.5 metres (Crown restored)	Very Good	No Evidence	Short 5-15 Years	5	Low	On-site

APPENDIX 3 - TREE HEALTH AND CONDITION ASSESSMENT SCHEDULE

Tree Identification No.	Species	Height (m)	Spread (m)	Trunk Diameter (mm)	Live Crown Size (m ²)	Maturity Class	Condition	Previous Pruning	Health		Remaining Safe Useful Life Expectancy (SULE)	Landscape Significance Rating	Retention Value	Location
									Vigour	Pest & Disease				
59	<i>Melaleuca styphelioides</i> (Prickly Paperbark)	4	4	200	12	SM	Appears stable with poor branching structure. Exhibits multiple epicormics emanating from old pruning wounds	Topped at 1.5 metres (Crown restored)	Very Good	No Evidence	Short 5-15 Years	5	Low	On-site
60	<i>Melaleuca styphelioides</i> (Prickly Paperbark)	4	4	200	8	SM	Appears stable with poor branching structure. Exhibits multiple epicormics emanating from old pruning wounds	Topped at 1.5 metres (Crown restored)	Very Good	No Evidence	Short 5-15 Years	6	Low	On-site
61	<i>Melaleuca styphelioides</i> (Prickly Paperbark)	4	4	200	4	SM	Appears stable with poor branching structure. Exhibits multiple epicormics emanating from old pruning wounds	Topped at 1.5 metres (Crown restored)	Very Good	No Evidence	Short 5-15 Years	7	Low	On-site
62	<i>Melaleuca styphelioides</i> (Prickly Paperbark)	5	5	200	5	SM	Appears stable with poor branching structure. Exhibits multiple epicormics emanating from old pruning wounds	Topped at 1.5 metres (Crown restored)	Very Good	No Evidence	Short 5-15 Years	8	Low	On-site
63	<i>Melaleuca styphelioides</i> (Prickly Paperbark)	5	5	200	0	SM	Appears stable with poor branching structure. Exhibits multiple epicormics emanating from old pruning wounds	Topped at 1.5 metres (Crown restored)	Very Good	No Evidence	Short 5-15 Years	9	Low	On-site
64	<i>Melaleuca styphelioides</i> (Prickly Paperbark)	5	5	200	-5	SM	Appears stable with poor branching structure. Exhibits multiple epicormics emanating from old pruning wounds	Topped at 1.5 metres (Crown restored)	Very Good	No Evidence	Short 5-15 Years	10	Low	On-site
65	<i>Melaleuca styphelioides</i> (Prickly Paperbark)	5	5	200	-10	SM	Appears stable with poor branching structure. Exhibits multiple epicormics emanating from old pruning wounds	Topped at 1.5 metres (Crown restored)	Very Good	No Evidence	Short 5-15 Years	11	Low	On-site
66	<i>Melaleuca styphelioides</i> (Prickly Paperbark)	5	5	200	-15	SM	Appears stable with poor branching structure. Exhibits multiple epicormics emanating from old pruning wounds	Topped at 1.5 metres (Crown restored)	Very Good	No Evidence	Short 5-15 Years	12	Low	On-site
67	<i>Melaleuca styphelioides</i> (Prickly Paperbark)	5	5	200	-20	SM	Appears stable with poor branching structure. Exhibits multiple epicormics emanating from old pruning wounds	Topped at 1.5 metres (Crown restored)	Very Good	No Evidence	Short 5-15 Years	13	Low	On-site
68	<i>Liquidambar styraciflua</i> (Liquidambar)	14	13	850	130	OM	Appears stable with fair branching structure. Exhibits multiple large wounds on lower trunk due previous pruning with decay in branch collars.	Crown lifted to 5 metres	Fair with thinning crown	No Evidence	Short 5-15 Years	3	Low	On-site
69	<i>Mangifera indica</i> (Mango Tree)	4	5	160	20	SM	Appears stable with sound branching structure.	No Evidence	Very Good	No Evidence	Long - more than 40 years	6	Low	On-site

APPENDIX 3 - TREE HEALTH AND CONDITION ASSESSMENT SCHEDULE

Tree Identification No.	Species	Height (m)	Spread (m)	Trunk Diameter (mm)	Live Crown Size (m ²)	Maturity Class	Condition	Previous Pruning	Health		Remaining Safe Useful Life Expectancy (SULE)	Landscape Significance Rating	Retention Value	Location
									Vigour	Pest & Disease				
70	<i>Camellia japonica</i> (Camellia)	3	2	90x2	6	SM	Appears stable with sound branching structure.	No Evidence	Good	No Evidence	Medium 15-40 Years	6	Low	On-site
71	<i>Camellia japonica</i> (Camellia)	3	3	50x6	9	SM	Appears stable with sound branching structure.	No Evidence	Very Good	No Evidence	Long - more than 40 years	6	Low	On-site
72	<i>Jacaranda mimosifolia</i> (Jacaranda)	13	13	561	130	M	Appears stable with sound branching structure.	No Evidence	Good	No Evidence	Long - more than 40 years	3	High	On-site
73	<i>Erythrina x sykesii</i> (Indian Coral)	13	11	800	110	M	Appears stable with fair branching structure. Exhibits a high bark inclusion at 1.5 metres at junction of PLs. Multiple moderate wounds due branch loss (storm damage) with large axial wound from GL to 5 metres with decay evident.	No Evidence	Good	No Evidence	Short 5-15 Years	6	Very Low	On-site
74	<i>Cinnamomum camphora</i> (Camphor Laurel)	16	16	700	240	M	Appears stable with sound branching structure. Exhibits minor dieback with 5% deadwood.	Selectively pruned & deadwooded	Fair with slightly thinning crown	No Evidence	Medium 15-40 Years	6	Low	On-site
75	<i>Grevillea robusta</i> (Silky Oak)	21	9	550	180	M	Appears stable with fair branching structure. Exhibits a high bark inclusion at 10 metres at junction of co-dominant PLs. Exhibits some dieback with 10% deadwood.	No Evidence	Fair with slightly thinning crown	No Evidence	Medium 15-40 Years	3	Moderate	On-site

APPENDIX 4 - IMPACT ASSESSMENT SCHEDULE

Tree Identification No.	Species	Construction Tolerance	Tree Protection Zone (m R)	Structural Root Zone (m R)	TPZ (m ²)	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
1	<i>Ligustrum lucidum</i> (Broad Leaf Privet)	M	3.6	2.0	40.7	Located within footprint of proposed basement.	Proposed works will necessitate removal.	Remove tree.
2	<i>Ligustrum lucidum</i> (Broad Leaf Privet)	M	4.2	2.1	55.4	Located within footprint of proposed basement.	Proposed works will necessitate removal.	Remove tree.
2a	<i>Michelia figo</i> (Port Wine Magnolia)	M	3.0	2.1	28.3	Located within footprint of proposed basement.	Proposed works will necessitate removal.	Remove tree.
3	<i>Ligustrum lucidum</i> (Broad Leaf Privet)	M	4.3	2.2	58.6	Located within footprint of proposed basement.	Proposed works will necessitate removal.	Remove tree.
4	<i>Cupressus torulosa</i> (Bhutan Cypress)	M	3.1	1.9	29.4	Located within footprint of proposed basement.	Proposed works will necessitate removal.	Remove tree.
5	<i>Citharexylum spinosum</i> (Fiddlewood)	M	7.2	2.7	162.8	Proposed dwelling offset 1.4 metres NW at RL 75.48 (1 metre below grade). Excavations for basement foundations within SRZ/TPZ.	Proposed works will necessitate removal.	Remove tree.
6	<i>Ulmus parvifolia</i> (Chinese Elm)	M	5.0	2.0	78.5	Located within footprint of proposed basement/dwelling.	Proposed works will necessitate removal.	Remove tree.

APPENDIX 4 - IMPACT ASSESSMENT SCHEDULE

Tree Identification No.	Species	Construction Tolerance	Tree Protection Zone (m R)	Structural Root Zone (m R)	TPZ (m ²)	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
7	<i>Entelea sp.</i> (Whau)	M	7.2	2.7	162.8	Proposed basement offset 4.7 metres NE at RL 75.48 (1 metre below grade) and 4.3 metres SW at RL 69.275 (4.3 metres below grade). Excavations for basement foundations within TPZ. Encroachment to TPZ = 18%. Proposed dwelling offset 2.7 metres SW at RL at RL 74.275 and patio offset 0.6 metres SW at RL 74.275 (1.2 metres below grade). Excavations for dwelling and patio foundations within TPZ/SRZ. Cumulative encroachment = 36%.	Proposed works will necessitate removal.	Undertake replacement planting with a new tree elsewhere within the property to compensate for loss of amenity in accordance with Section 11.
8	<i>Doryphora sassafras</i> (Sassafras)	M	3.6	2.0	40.7	Proposed basement offset 3.5 metres west at RL 69.275 (4.3 metres below grade). No encroachment to TPZ (assuming no excavation beyond the building footprint to facilitate construction). Proposed dwelling offset 2.9 metres NW at RL? Excavations for building foundations within TPZ. Minor encroachment to TPZ (<5%)	No adverse impact. Proposed to be removed to accommodate new landscape works.	Remove tree.

APPENDIX 4 - IMPACT ASSESSMENT SCHEDULE

Tree Identification No.	Species	Construction Tolerance	Tree Protection Zone (m R)	Structural Root Zone (m R)	TPZ (m ²)	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
9	<i>Jacaranda mimosifolia</i> (Jacaranda)	M	7.0	2.4	153.9	Proposed basement offset 2.7 metres NW at RL 69.275 (4.3 metres below grade). Excavations for basement and building foundations within TPZ. Extent of encroachment to TPZ = 26% (assuming no excavation beyond the building footprint to facilitate construction). Some canopy pruning may be required to clear building envelope and facilitate construction. Proposed Ø stormwater pipeline offset 0.8 metres SE at IL?. Open trenching for SW pipeline within SRZ.	Extent of encroachment to TPZ exceeds acceptable limits under AS 4970:2009. Proposed works are likely to result in an adverse impact on this tree. Rendered exempt under RDCP 2014. Trenching for stormwater pipeline is likely to result in severance of woody roots, leading to a significant adverse impact.	Consider amending the site layout to minimise encroachment to the TPZ. Retain in accordance with recommended Tree Protection Measures (Section 10). Undertake all excavations for building and basement foundations within TPZ in accordance with Section 10.6. Extent of any batter (to facilitate basement) should not be located closer than 4.8 metres from the trunk. . Any required canopy pruning (that essential to clear the building envelope and any temporary scaffolding) should be undertaken in accordance with Section 10.10. Consider installing SW pipeline by Horizontal Directional Drilling (HDD) within TPZ.
9a	<i>Brachychiton acerifolius</i> (Illawarra Flame Tree)	M	4.2	2.1	55.4	No proposed works within TPZ (assuming no excavation beyond the building footprint to facilitate construction). Proposed Ø stormwater pipeline offset 1.1 metres NW at IL? Open trenching for SW pipeline within SRZ.	Trenching for stormwater pipeline is likely to result in severance of woody roots, leading to a significant adverse impact.	Proposed to be retained. Retain in accordance with recommended Tree Protection Measures (Section 10). Undertake all excavations for building and basement foundations within TPZ in accordance with Section 10.6. Extent of any batter (to facilitate basement) should not be located closer than 2.9 metres from the trunk. Install SW pipeline by Horizontal Directional Drilling (HDD) within TPZ in accordance with Section 10.7.
10	<i>Chamaecyparis obtusa</i> 'Crippsii' (Golden Hinoki Cypress)	M	3.0	1.5	28.3	Proposed dwelling offset 3 metres SW at RL? and patio offset 1.1 metres SW at RL 74.275 (2 metres above grade). Excavations for patio foundations within TPZ/SRZ. Encroachment to TPZ = 27%.	Extent of encroachment to TPZ exceeds acceptable limits under AS 4970:2009. Proposed works are likely to result in an adverse impact on this tree.	Remove tree.

APPENDIX 4 - IMPACT ASSESSMENT SCHEDULE

Tree Identification No.	Species	Construction Tolerance	Tree Protection Zone (m R)	Structural Root Zone (m R)	TPZ (m ²)	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
11	<i>Doryphora sassafras</i> (Sassafras)	M	4.8	2.3	72.3	Located within footprint of proposed dwelling (blade wall) and patio area. Proposed ∅ stormwater pipeline offset 0.8 metres SW at IL? Open trenching for SW pipeline within SRZ.	Proposed works will necessitate removal (High Retention Value). Given the nature and extent of the development it is understood that there are no feasible alternatives that would permit the retention of this tree without compromising the desired yield.	Undertake replacement planting with a new tree elsewhere within the property to compensate for loss of amenity in accordance with Section 11. Consider amending the site layout to ensure the preservation of this tree and minimise encroachment to the TPZ.
12	<i>Magnolia grandiflora</i> (Bullbay Magnolia)	M	4.8	2.3	72.3	Located within footprint of proposed basement/dwelling.	Proposed works will necessitate removal.	Remove tree.
13	<i>Eucalyptus saligna</i> (Sydney Blue Gum)	P	13.2	3.4	547.1	Located within footprint of proposed basement/dwelling.	Proposed works will necessitate removal.	Remove tree.
13a	<i>Scolopia braunii</i> (Flintwood)	M	7.2	2.7	162.8	Located within footprint of proposed basement/dwelling.	Proposed works will necessitate removal (High Retention Value). Given the nature and extent of the development it is understood that there are no feasible alternatives that would permit the retention of this tree without compromising the desired yield.	Undertake replacement planting with a new tree elsewhere within the property to compensate for loss of amenity in accordance with Section 11.
13b	<i>Grevillea robusta</i> (Silky Oak)	M	4.8	2.3	72.3	Proposed basement offset 1.6 metres NE at RL 69.275 (3.5 metres below grade). Excavations for basement and building foundations within SRZ/TPZ. Extent of encroachment to TPZ = 71% (assuming no excavation beyond the building footprint to facilitate construction).	Proposed works will necessitate removal.	Remove tree.

APPENDIX 4 - IMPACT ASSESSMENT SCHEDULE

Tree Identification No.	Species	Construction Tolerance	Tree Protection Zone (m R)	Structural Root Zone (m R)	TPZ (m ²)	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
14	<i>Grevillea robusta</i> (Silky Oak)	M	7.8	2.8	191.0	Located within footprint of proposed basement.	Proposed works will necessitate removal.	Undertake replacement planting with a new tree elsewhere within the property to compensate for loss of amenity in accordance with Section 11.
15	<i>Jacaranda mimosifolia</i> (Jacaranda)	M	5.0	1.9	78.5	Located within footprint of proposed pathway	Proposed works will necessitate removal.	Remove tree.
16	<i>Olea europaea subsp. africana</i> (African Olive)	M	6.0	2.5	113.0	Located within footprint of proposed basement.	Proposed works will necessitate removal.	Remove tree.
17	<i>Cinnamomum camphora</i> (Camphor Laurel)	M	1.8	1.5	10.2	No proposed works within TPZ (assuming no excavation beyond the building footprint to facilitate construction).	No adverse impact. Proposed to be removed to accommodate new landscape works.	Remove tree (Environmental Weed Species).
18	<i>Corymbia maculata</i> (Spotted Gum)	P	8.2	2.8	212.0	Proposed basement offset 5.0 metres NE at RL 69.275 (1.4 metres below grade). Excavations for basement and building foundations within TPZ. Extent of encroachment to TPZ = 6% (assuming no excavation beyond the building footprint to facilitate construction). Proposed deck/verandah offset 3.1 metres north at RL 70.50 (close to existing grade to 1 metre above grade). Assuming the structure is supported on post footings with void beneath (TBC) , no further encroachment to TPZ. Some excavations required for isolated pad/pier footings within TPZ. Proposed Ø stormwater pipeline offset 0.1 metres SW and 3 metres NE at IL? Open trenching for SW pipeline within SRZ. Proposed On-site Stormwater Detention (OSD) tank offset 3 metres NE at IL? Excavations for OSD within SRZ.	Extent of encroachment to root zone is less than 10% of the TPZ, which is within acceptable limits under AS 4970:2009. No adverse impact provided that all proposed works within TPZ are undertaken as recommended. Trenching for stormwater pipeline and excavations for OSD is likely to result in severance of woody roots, leading to a significant adverse impact.	Consider amending the site layout to ensure the preservation of this tree and minimise encroachment to the TPZ. Retain in accordance with recommended Tree Protection Measures (Section 10). Undertake all excavations for building and basement foundations within TPZ in accordance with Section 10.6. Extent of any batter (to facilitate basement) should not be located closer than 5.0 metres from the trunk. Consider installing SW pipeline by Horizontal Directional Drilling (HDD) within TPZ and relocating OSD outside TPZ and relocating pipelines outside SRZ.

APPENDIX 4 - IMPACT ASSESSMENT SCHEDULE

Tree Identification No.	Species	Construction Tolerance	Tree Protection Zone (m R)	Structural Root Zone (m R)	TPZ (m ²)	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
19	<i>Grevillea robusta</i> (Silky Oak)	M	10.2	3.1	326.7	<p>Proposed basement offset 5.8 metres NE at RL 69.275 (1.4 metres below grade). Excavations for basement within TPZ. Extent of encroachment to TPZ = 15% (assuming no excavation beyond the building footprint to facilitate construction). Proposed dwelling offset 4.1 metres NW at RL 70.495 (1.8 metres above grade). Excavations for building foundations within TPZ. Encroachment from building = 7% (cumulative 22%). Proposed deck/verandah offset 3.8 metres NE and 3.9 metres NW at RL 70.50 (1.8 metres above grade). Excavations for deck footings within TPZ. No further encroachment to TPZ from deck assuming the structure is supported on post footings with void beneath (TBC). Some canopy pruning (crown lifting) may be required to clear the building envelope. Proposed Ø stormwater pipeline offset 0.6 metres SW and 4 metres NE at IL? Open trenching for SW pipeline within SRZ. Proposed On-site Stormwater Detention (OSD) tank offset 6.8 metres east at IL? Excavations for OSD within TPZ.</p>	<p>Extent of encroachment to TPZ exceeds acceptable limits under AS 4970:2009. Proposed works are likely to result in an adverse impact on this tree. Rendered exempt under RDCP 2014. Trenching for stormwater pipeline and excavations for OSD is likely to result in severance of woody roots, leading to a significant adverse impact.</p>	<p>Consider amending the site layout to ensure the preservation of this tree and minimise encroachment to the TPZ. Retain in accordance with recommended Tree Protection Measures (Section 10). Undertake all excavations for building and basement foundations within TPZ in accordance with Section 10.6. Extent of any batter (to facilitate basement) should not be located closer than 5.8 metres from the trunk. Any required canopy pruning (that essential to clear the building envelope and any temporary scaffolding) should be undertaken in accordance with Section 10.10. Consider installing SW pipeline by Horizontal Directional Drilling (HDD) within TPZ and relocating OSD outside TPZ and relocating pipelines outside SRZ.</p>

APPENDIX 4 - IMPACT ASSESSMENT SCHEDULE

Tree Identification No.	Species	Construction Tolerance	Tree Protection Zone (m R)	Structural Root Zone (m R)	TPZ (m ²)	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
20	<i>Cinnamomum camphora</i> (Camphor Laurel)	M	4.0	2.1	49.2	Proposed basement offset 6 metres NE at RL 69.275 (1.4 metres below grade). No encroachment to TPZ (assuming no excavation beyond the building footprint to facilitate construction). Proposed dwelling offset 2 metres north at RL 70.495 (2.9 metres above grade). Excavations for building foundations within TPZ. Encroachment to TPZ = 15%. Proposed deck/verandah offset 4 metres NE and 1.4 metres NW at RL 70.495 (2.9 metres above grade). Excavations for deck footings within TPZ. No further encroachment to TPZ from deck assuming the structure is supported on post footings with void beneath (TBC). Some excavations required for isolated pad/pier footings within TPZ.	Extent of encroachment to TPZ exceeds acceptable limits under AS 4970:2009. Proposed works are likely to result in an adverse impact on this tree. Rendered exempt under RDCP 2014.	Remove tree.
21	<i>Afrocarpus [syn Podocarpus] falcatus</i> (Outeniqua Yellowwood)	M	4.5	1.8	63.6	Located within footprint of proposed deck and close to proposed dwelling.	Proposed works will necessitate removal.	Undertake replacement planting with a new tree elsewhere within the property to compensate for loss of amenity in accordance with Section 11.
22	<i>Cinnamomum camphora</i> (Camphor Laurel)	M	7.2	2.7	162.8	Located within footprint of proposed deck and close to proposed dwelling.	Proposed works will necessitate removal.	Remove tree.
23	<i>Castanospermum australe</i> (Blackbean)	M	4.8	2.3	72.3	Located within footprint of proposed deck and close to proposed dwelling.	Proposed works will necessitate removal.	Undertake replacement planting with a new tree elsewhere within the property to compensate for loss of amenity in accordance with Section 11.
24	<i>Cinnamomum camphora</i> (Camphor Laurel)	M	3.1	1.9	30.6	Located within footprint of proposed deck and close to proposed dwelling.	Proposed works will necessitate removal.	Remove tree.
25	<i>Cinnamomum camphora</i> (Camphor Laurel)	M	9.6	3.0	289.4	Located within footprint of proposed deck and close to proposed dwelling.	Proposed works will necessitate removal.	Remove tree.

APPENDIX 4 - IMPACT ASSESSMENT SCHEDULE

Tree Identification No.	Species	Construction Tolerance	Tree Protection Zone (m R)	Structural Root Zone (m R)	TPZ (m ²)	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
26	<i>Lophostemon confertus</i> (Brushbox)	M	6.2	2.5	120.4	Located within footprint of proposed deck and close to proposed dwelling.	Proposed works will necessitate removal.	Remove tree.
27	<i>Jacaranda mimosifolia</i> (Jacaranda)	M	4.8	2.3	72.3	Located within footprint of proposed basement/dwelling.	Proposed works will necessitate removal.	Undertake replacement planting with a new tree elsewhere within the property to compensate for loss of amenity in accordance with Section 11.
28	<i>Erythrina x sykesii</i> (Indian Coral)	M	10.0	3.0	314.0	Located within footprint of proposed deck and close to proposed dwelling.	Proposed works will necessitate removal.	Remove tree.
29	<i>Jacaranda mimosifolia</i> (Jacaranda)	M	7.0	2.4	153.9	Located within footprint of proposed basement/dwelling.	Proposed works will necessitate removal.	Undertake replacement planting with a new tree elsewhere within the property to compensate for loss of amenity in accordance with Section 11.
30	<i>Howea belmoreana</i> (Sentry Palm)	G	1.8	1.5	10.2	Located within footprint of proposed pathway & stairs.	Proposed works will necessitate removal.	Remove tree.
31	<i>Ligustrum lucidum</i> (Broad Leaf Privet)	M	2.4	1.7	18.1	Located within footprint of proposed pathway & stairs.	Proposed works will necessitate removal.	Remove tree.
32	<i>Cinnamomum camphora</i> (Camphor Laurel)	M	2.6	1.8	21.9	Located within footprint of proposed pathway & stairs.	Proposed works will necessitate removal.	Remove tree.

APPENDIX 4 - IMPACT ASSESSMENT SCHEDULE

Tree Identification No.	Species	Construction Tolerance	Tree Protection Zone (m R)	Structural Root Zone (m R)	TPZ (m ²)	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
33	<i>Grevillea robusta</i> (Silky Oak)	M	7.8	2.8	191.0	<p>Proposed basement offset 5.2 metres NE at RL 69.275 (2.7 metres above grade). Excavations/engineered fill for basement foundations within TPZ. Extent of encroachment to TPZ = 7% (assuming no excavation/fill beyond the basement footprint to facilitate construction). Proposed dwelling offset 4.2 metres NE at RL 70.50 (4.7 metres above grade). Excavations for building foundations within TPZ. Encroachment to TPZ = 8%. Proposed deck/verandah offset 2.1 metres NE at RL 70.50 (4.7 metres above grade). No further encroachment to TPZ from deck assuming the structure is supported on post footings with void beneath (TBC). Proposed paved area offset 2 metres east at RL? (assumed at grade). Excavations for pavement sub-grade within TPZ/SRZ. Encroachment to TPZ = 13%. Cumulative encroachment = 28%. Some canopy pruning (crown lifting) may be required to clear building envelope and temporary scaffolding. Proposed Ø stormwater pipeline offset 0.8 metres SW and 3 metres NW at IL? Open trenching for SW pipeline within SRZ.</p>	<p>Extent of encroachment to TPZ exceeds acceptable limits under AS 4970:2009. Proposed works are likely to result in an adverse impact on this tree. Trenching for stormwater pipeline is likely to result in severance of woody roots, leading to a significant adverse impact.</p>	<p>Consider amending the site layout to ensure the preservation of this tree and minimise encroachment to the TPZ. Retain in accordance with recommended Tree Protection Measures (Section 10). Undertake all excavations for building and basement foundations within TPZ in accordance with Section 10.6. Extent of any batter (to facilitate basement) should not be located closer than 5.2 metres from the trunk. Any required canopy pruning (that essential to clear the building envelope and any temporary scaffolding) should be undertaken in accordance with Section 10.10. Consider deleting pathway from within TPZ to reduce encroachment. Consider elevated building (supported by piers/piles) within TPZ to reduce encroachment. Consider installing SW pipelines by Horizontal Directional Drilling (HDD) within TPZ and relocating pipelines outside SRZ.</p>

APPENDIX 4 - IMPACT ASSESSMENT SCHEDULE

Tree Identification No.	Species	Construction Tolerance	Tree Protection Zone (m R)	Structural Root Zone (m R)	TPZ (m ²)	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
33a	<i>Eucalyptus paniculata</i> (Grey Ironbark)	P	6.5	2.4	132.7	Proposed basement offset 5.4 metres NE at RL 69.275 (1.4 metres above grade). Excavations/engineered fill for basement foundations within TPZ. Extent of encroachment to TPZ = 7% (assuming no excavation/fill beyond the basement footprint to facilitate construction). Proposed dwelling offset 3.3 metres NE at RL 70.50 (4.6 metres above grade). Excavations/engineered fill for building foundations within TPZ. Cumulative encroachment to TPZ = 19%. Proposed deck/verandah offset 1.1 metres NE at RL 70.50 (3.3 metres above grade). No further encroachment to TPZ from deck assuming the structure is supported on post footings with void beneath (TBC). Some canopy pruning (crown lifting) may be required to clear building envelope and temporary scaffolding. Proposed Ø stormwater pipeline offset 1.8 metres SW, 2.2 metres NE and 1.1 metres NW at IL? Open trenching for SW pipeline within SRZ.	Extent of encroachment to TPZ exceeds acceptable limits under AS 4970:2009. Proposed works are likely to result in an adverse impact on this tree. Trenching for stormwater pipeline is likely to result in severance of woody roots, leading to a significant adverse impact.	Consider amending the site layout to ensure the preservation of this tree and minimise encroachment to the TPZ. Retain in accordance with recommended Tree Protection Measures (Section 10). Undertake all excavations for building and basement foundations within TPZ in accordance with Section 10.6. Extent of any batter (to facilitate basement) should not be located closer than 5.4 metres from the trunk. Any required canopy pruning (that essential to clear the building envelope and any temporary scaffolding) should be undertaken in accordance with Section 10.10. Consider elevated building (supported by piers/piles) within TPZ to reduce encroachment. Consider installing SW pipelines by Horizontal Directional Drilling (HDD) within TPZ and relocating pipelines outside SRZ.
34	<i>Eucalyptus saligna</i> (Sydney Blue Gum)	P	12.5	3.4	493.4	Located within footprint of proposed dwelling/patio.	Proposed works will necessitate removal.	Undertake replacement planting with a new tree elsewhere within the property to compensate for loss of amenity in accordance with Section 11.
35	<i>Eucalyptus pilularis</i> (Blackbutt)	P	6.0	2.4	113.0	Located within footprint of proposed basement/dwelling.	Proposed works will necessitate removal.	Remove tree.

APPENDIX 4 - IMPACT ASSESSMENT SCHEDULE

Tree Identification No.	Species	Construction Tolerance	Tree Protection Zone (m R)	Structural Root Zone (m R)	TPZ (m ²)	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
36	<i>Phoenix canariensis</i> (Canary Island Palm)	P	4.6	2.2	65.3	Located within footprint of proposed basement/dwelling.	Proposed works will necessitate removal.	Remove tree.
37	<i>Jacaranda mimosifolia</i> (Jacaranda)	M	9.0	2.5	254.3	Located within footprint of proposed basement/dwelling.	Proposed works will necessitate removal.	Undertake replacement planting with a new tree elsewhere within the property to compensate for loss of amenity in accordance with Section 11.
38	<i>Macadamia tetraphylla</i> (Macadamia Nut)	M	2.9	1.8	26.0	Located within footprint of proposed basement/dwelling.	Proposed works will necessitate removal.	Remove tree.
39	<i>Callistemon viminalis</i> (Weeping Bottlebrush)	M	2.3	1.7	16.5	Located within footprint of proposed patio/deck	Proposed works will necessitate removal.	Remove tree.
40	<i>Camellia japonica</i> (Camellia)	M	2.4	1.7	18.1	Located within footprint of proposed basement/dwelling.	Proposed works will necessitate removal.	Remove tree.
41	<i>Callistemon viminalis</i> (Weeping Bottlebrush)	M	2.2	1.6	14.6	Located within footprint of proposed basement/dwelling.	Proposed works will necessitate removal.	Remove tree.
42	<i>Mangifera indica</i> (Mango Tree)	M	3.2	1.9	33.0	Located within footprint of proposed basement/dwelling.	Proposed works will necessitate removal.	Remove tree.
43	<i>Camellia japonica</i> (Camellia)	M	1.2	1.3	4.5	Located within footprint of proposed basement.	Proposed works will necessitate removal.	Remove tree.
44	<i>Ceratopetalum gummiferum</i> (NSW Christmas Bush)	M	1.8	1.5	10.2	Located within footprint of proposed basement.	Proposed works will necessitate removal.	Remove tree.
44a	<i>Grevillea 'Sandra Gordon'</i> (Grevillea)	M	1.4	1.4	6.5	Located within footprint of proposed basement.	Proposed works will necessitate removal.	Remove tree.

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Tree Identification No.	Species	Construction Tolerance	Tree Protection Zone (m R)	Structural Root Zone (m R)	TPZ (m ²)	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
45	<i>Grevillea robusta</i> (Silky Oak)	M	3.0	1.8	27.9	Located within footprint of proposed basement.	Proposed works will necessitate removal.	Undertake replacement planting with a new tree elsewhere within the property to compensate for loss of amenity in accordance with Section 11.
46	<i>Olea europaea subsp. africana</i> (African Olive)	M	3.0	1.8	28.3	Located within footprint of proposed basement.	Proposed works will necessitate removal.	Remove tree.
46a	<i>Magnolia liliiflora</i> (Lily Magnolia)	M	2.4	1.7	18.1	Located within footprint of proposed basement.	Proposed works will necessitate removal.	Remove tree.
47	<i>Jacaranda mimosifolia</i> (Jacaranda)	M	6.0	2.2	113.0	Located within footprint of proposed basement/dwelling.	Proposed works will necessitate removal.	Undertake replacement planting with a new tree elsewhere within the property to compensate for loss of amenity in accordance with Section 11.
48	<i>Grevillea robusta</i> (Silky Oak)	M	7.2	2.7	162.8	Located within footprint of proposed basement/dwelling.	Proposed works will necessitate removal.	Remove tree.
49	<i>Grevillea robusta</i> (Silky Oak)	M	4.6	2.2	66.0	Located within footprint of proposed deck/verandah.	Proposed works will necessitate removal.	Undertake replacement planting with a new tree elsewhere within the property to compensate for loss of amenity in accordance with Section 11.
50	<i>Olea europaea subsp. africana</i> (African Olive)	M	4.2	2.1	55.4	No proposed works within TPZ (assuming no excavation beyond the building footprint to facilitate construction).	No adverse impact. Proposed to be removed to accommodate new landscape works.	Remove tree (Environmental Weed Species).

APPENDIX 4 - IMPACT ASSESSMENT SCHEDULE

Tree Identification No.	Species	Construction Tolerance	Tree Protection Zone (m R)	Structural Root Zone (m R)	TPZ (m ²)	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
51	<i>Eucalyptus saligna</i> (Sydney Blue Gum)	P	8.5	2.7	226.9	Proposed basement offset 4.9 metres NE at RL 69.275 (1.2 metres above grade). Excavations/engineered fill for basement foundations within TPZ. Extent of encroachment to TPZ = 15% (assuming no excavation/fill beyond the basement footprint to facilitate construction). Proposed dwelling offset 2.8 metres NE at RL 70.50 (2.6 metres above grade). Excavations/engineered fill for building foundations within TPZ. Cumulative encroachment to TPZ = 32%. Proposed deck/verandah offset 0.7 metres NE at RL 70.50 (3.2 metres above grade). No further encroachment to TPZ from deck assuming the structure is supported on post footings with void beneath (TBC). Some canopy pruning (crown lifting) may be required to clear building envelope and temporary scaffolding. Proposed Ø stormwater pipeline offset 2.2 metres SW, 1.8 metres NE and 1.8 metres NW at IL? Open trenching for SW pipeline within SRZ.	Extent of encroachment to TPZ exceeds acceptable limits under AS 4970:2009. Proposed works are likely to result in an adverse impact on this tree. Trenching for stormwater pipeline is likely to result in severance of woody roots, leading to a significant adverse impact.	Consider amending the site layout to ensure the preservation of this tree and minimise encroachment to the TPZ. Retain in accordance with recommended Tree Protection Measures (Section 10). Undertake all excavations for building and basement foundations within TPZ in accordance with Section 10.6. Extent of any batter (to facilitate basement) should not be located closer than 5.8 metres from the trunk. Any required canopy pruning (that essential to clear the building envelope and any temporary scaffolding) should be undertaken in accordance with Section 10.10. Consider elevated building (supported by piers/piles) within TPZ to reduce encroachment. Consider reduction in the verandah by at least 1 metre to allow for future growth. Consider installing SW pipelines by Horizontal Directional Drilling (HDD) within TPZ and relocating pipelines outside SRZ.
52	<i>Angophora floribunda</i> (Rough-barked Apple)	P	3.6	2.0	40.7	No proposed works within TPZ (assuming no excavation beyond the building footprint to facilitate construction).	No adverse impact. Proposed to be removed to accommodate new landscape works.	Remove tree.
53	<i>Eucalyptus sp.</i> (Eucalypt)	P	2.4	1.7	18.1	No proposed works within TPZ (assuming no excavation beyond the building footprint to facilitate construction).	No adverse impact. Proposed to be removed to accommodate new landscape works.	Remove tree.
54	<i>Cupressus sempervirens</i> (Italian Cypress)	M	3.6	2.0	40.7	Located within footprint of proposed basement/dwelling.	Proposed works will necessitate removal.	Undertake replacement planting with a new tree elsewhere within the property to compensate for loss of amenity in accordance with Section 11.

APPENDIX 4 - IMPACT ASSESSMENT SCHEDULE

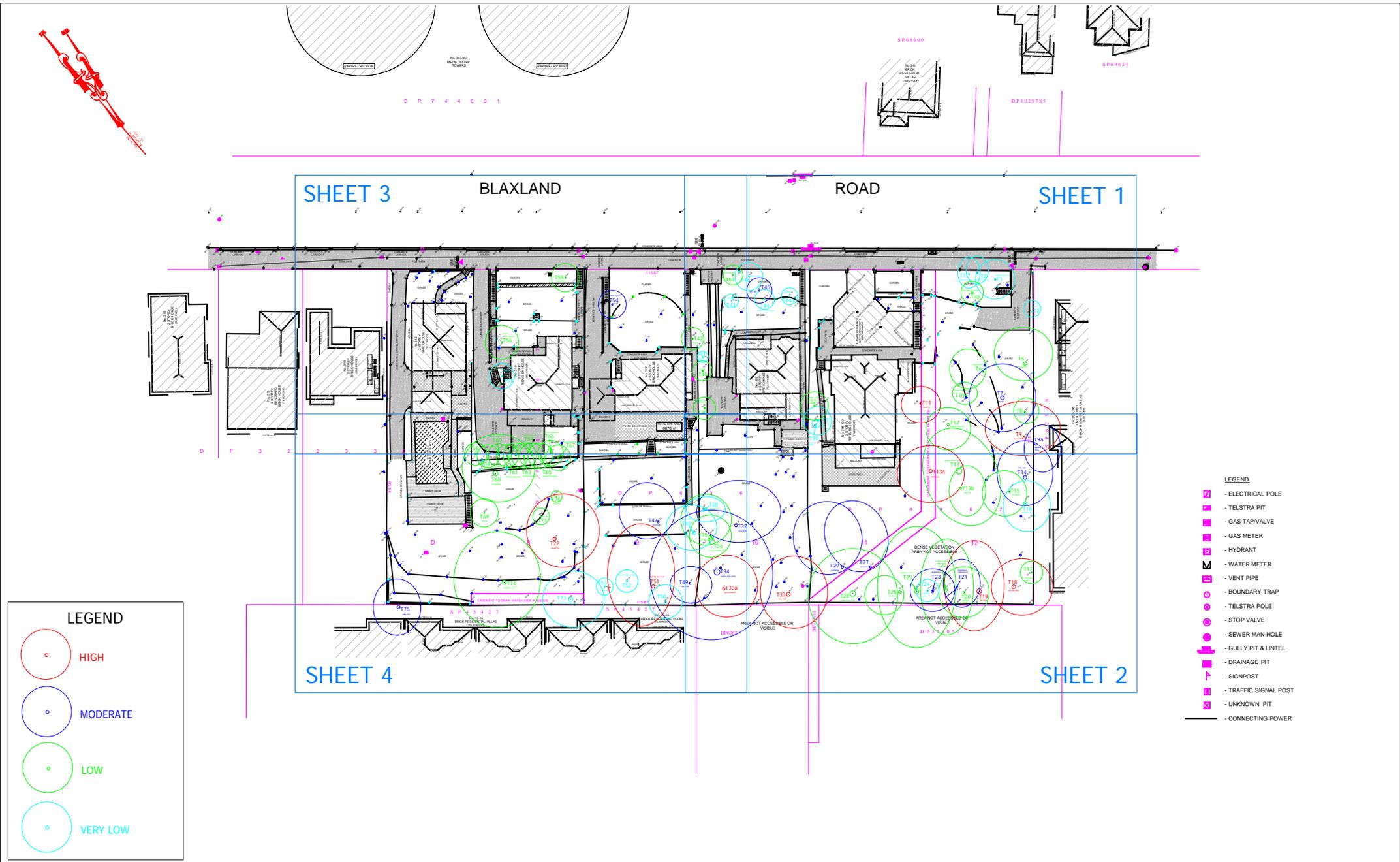
Tree Identification No.	Species	Construction Tolerance	Tree Protection Zone (m R)	Structural Root Zone (m R)	TPZ (m ²)	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
55	<i>Lagerstroemia indica</i> (Crepe Myrtle)	M	3.0	1.8	28.3	Located within footprint of proposed basement.	Proposed works will necessitate removal.	Remove tree.
56	<i>Chamaecyparis obtusa</i> 'Crippsii' (Golden Hinoki Cypress)	M	3.0	1.8	28.3	Located within footprint of proposed basement/dwelling.	Proposed works will necessitate removal.	Remove tree.
57	<i>Callistemon viminalis</i> (Weeping Bottlebrush)	M	1.8	1.5	10.2	Located close to footprint of proposed patio (<1 metre).	Proposed works will necessitate removal.	Remove tree.
58	<i>Melaleuca styphelioides</i> (Prickly Paperbark)	M	2.4	1.7	18.1	Located within footprint of proposed basement/dwelling.	Proposed works will necessitate removal.	Remove tree.
59	<i>Melaleuca styphelioides</i> (Prickly Paperbark)	M	2.4	1.7	18.1	Located within footprint of proposed basement/dwelling.	Proposed works will necessitate removal.	Remove tree.
60	<i>Melaleuca styphelioides</i> (Prickly Paperbark)	M	2.4	1.7	18.1	Located within footprint of proposed basement/dwelling.	Proposed works will necessitate removal.	Remove tree.
61	<i>Melaleuca styphelioides</i> (Prickly Paperbark)	M	2.4	1.7	18.1	Located within footprint of proposed basement/dwelling.	Proposed works will necessitate removal.	Remove tree.
62	<i>Melaleuca styphelioides</i> (Prickly Paperbark)	M	2.4	1.7	18.1	Located within footprint of proposed basement/dwelling.	Proposed works will necessitate removal.	Remove tree.
63	<i>Melaleuca styphelioides</i> (Prickly Paperbark)	M	2.4	1.7	18.1	Located within footprint of proposed basement/dwelling.	Proposed works will necessitate removal.	Remove tree.
64	<i>Melaleuca styphelioides</i> (Prickly Paperbark)	M	2.4	1.7	18.1	Located within footprint of proposed basement/dwelling.	Proposed works will necessitate removal.	Remove tree.
65	<i>Melaleuca styphelioides</i> (Prickly Paperbark)	M	2.4	1.7	18.1	Located within footprint of proposed basement/dwelling.	Proposed works will necessitate removal.	Remove tree.

APPENDIX 4 - IMPACT ASSESSMENT SCHEDULE

Tree Identification No.	Species	Construction Tolerance	Tree Protection Zone (m R)	Structural Root Zone (m R)	TPZ (m ²)	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
66	<i>Melaleuca styphelioides</i> (Prickly Paperbark)	M	2.4	1.7	18.1	Located within footprint of proposed basement/dwelling.	Proposed works will necessitate removal.	Remove tree.
67	<i>Melaleuca styphelioides</i> (Prickly Paperbark)	M	2.4	1.7	18.1	Located within footprint of proposed basement/dwelling.	Proposed works will necessitate removal.	Remove tree.
68	<i>Liquidambar styraciflua</i> (Liquidambar)	M	10.2	3.1	326.7	Located within footprint of proposed basement/dwelling.	Proposed works will necessitate removal.	Remove tree.
69	<i>Mangifera indica</i> (Mango Tree)	M	3.0	1.5	28.3	Located within footprint of proposed basement/dwelling.	Proposed works will necessitate removal.	Remove tree.
70	<i>Camellia japonica</i> (Camellia)	M	1.8	1.5	10.2	Located within footprint of proposed basement.	Proposed works will necessitate removal.	Remove tree.
71	<i>Camellia japonica</i> (Camellia)	M	1.8	1.5	10.2	Located within footprint of proposed basement/dwelling.	Proposed works will necessitate removal.	Remove tree.
72	<i>Jacaranda mimosifolia</i> (Jacaranda)	M	8.0	2.6	201.0	Located within footprint of proposed basement/dwelling.	Proposed works will necessitate removal (High Retention Value). Given the nature and extent of the development it is understood that there are no feasible alternatives that would permit the retention of this tree without compromising the desired yield.	Undertake replacement planting with a new tree elsewhere within the property to compensate for loss of amenity in accordance with Section 11.
73	<i>Erythrina x sykesii</i> (Indian Coral)	M	9.6	3.0	289.4	Proposed patio offset 1.2 metres NE at RL 72.30 (4.3 metres above grade). Excavations/engineered fill for building foundations within TPZSRZ	Proposed works will necessitate removal.	Remove tree.

APPENDIX 4 - IMPACT ASSESSMENT SCHEDULE

Tree Identification No.	Species	Construction Tolerance	Tree Protection Zone (m R)	Structural Root Zone (m R)	TPZ (m ²)	Incursions To Root Zone &/or Canopy	Likely Impact	Recommendation
74	<i>Cinnamomum camphora</i> (Camphor Laurel)	M	8.4	2.8	221.6	Located within footprint of proposed dwelling/patio area.	Proposed works will necessitate removal.	Remove tree.
75	<i>Grevillea robusta</i> (Silky Oak)	M	6.6	2.6	136.8	Proposed basement offset 8.7 metres NE at RL 69.275 (1.2 metres above grade). No encroachment to TPZ (assuming no excavation/fill beyond the basement footprint to facilitate construction). Proposed dwelling offset 5 metres NE at RL 72.30 (3.3 metres above grade). Excavations/engineered fill for building foundations within TPZ. Encroachment to TPZ = 3%. Proposed patio offset 2.6 metres NE at RL 72.30 (3.3 metres above grade). No further encroachment to TPZ from deck assuming the structure is supported on post footings with void beneath (TBC). Proposed Ø stormwater pipeline offset 2.6 metres east at IL? Open trenching for SW pipeline within SRZ. Proposed On-site Stormwater Detention (OSD) tank offset 4.8 metres NE at IL? Excavations for OSD within TPZ. Encroachment to TPZ = 19%.	Extent of encroachment to TPZ exceeds acceptable limits under AS 4970:2009. Proposed works are likely to result in an adverse impact on this tree. Trenching for stormwater pipeline is likely to result in severance of woody roots, leading to a significant adverse impact.	Retain in accordance with recommended Tree Protection Measures (Section 10). Undertake all excavations for building and basement foundations within TPZ in accordance with Section 10.6. Extent of any batter (to facilitate basement) should not be located closer than 4.5 metres to the trunk. Install SW pipeline by Horizontal Directional Drilling (HDD) within TPZ in accordance with Section 10.7. Consider relocating OSD outside TPZ.



LEGEND

- HIGH
- MODERATE
- LOW
- VERY LOW

LEGEND

- - ELECTRICAL POLE
- - TELSTRA PIT
- - GAS TAP/VALVE
- - GAS METER
- - HYDRANT
- - WATER METER
- - VENT PIPE
- - BOUNDARY TRAP
- - TELSTRA POLE
- - STOP VALVE
- - SEWER MAN-HOLE
- - GULLY PIT & LINTEL
- - DRAINAGE PIT
- - SIGNPOST
- - TRAFFIC SIGNAL POST
- - UNKNOWN PIT
- - CONNECTING POWER

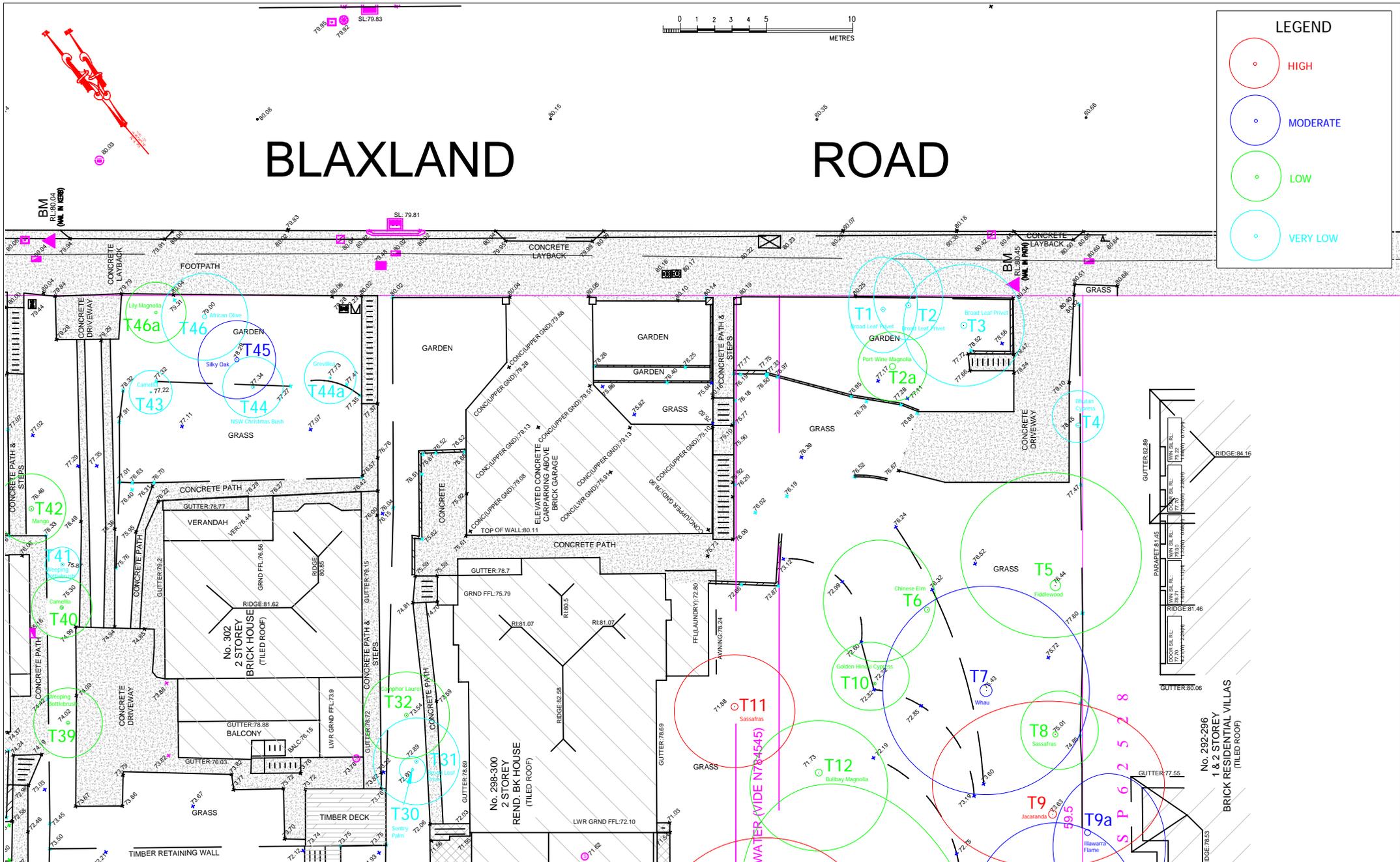
APPENDIX 5
TREE LOCATION PLAN SHOWING
TREE RETENTION VALUES
 298-312 Blaxland Road, RYDE, NSW



Earthscape Horticultural Services
 Arboricultural and Horticultural Consultants
 PO Box 364
 BEROWRA NSW 2081
 Ph: 02 9456 4787
 Fax: 02 9456 5757 e: earthscape@iinet.net.au

Based on the Survey Drawing
 prepared by Daw & Watson Pty Ltd
 Dwg Ref No. 3132-16
 Dated 27/04/2016

DWG No. T16-093001
 KEY PLAN
 DATE: 30/09/2016



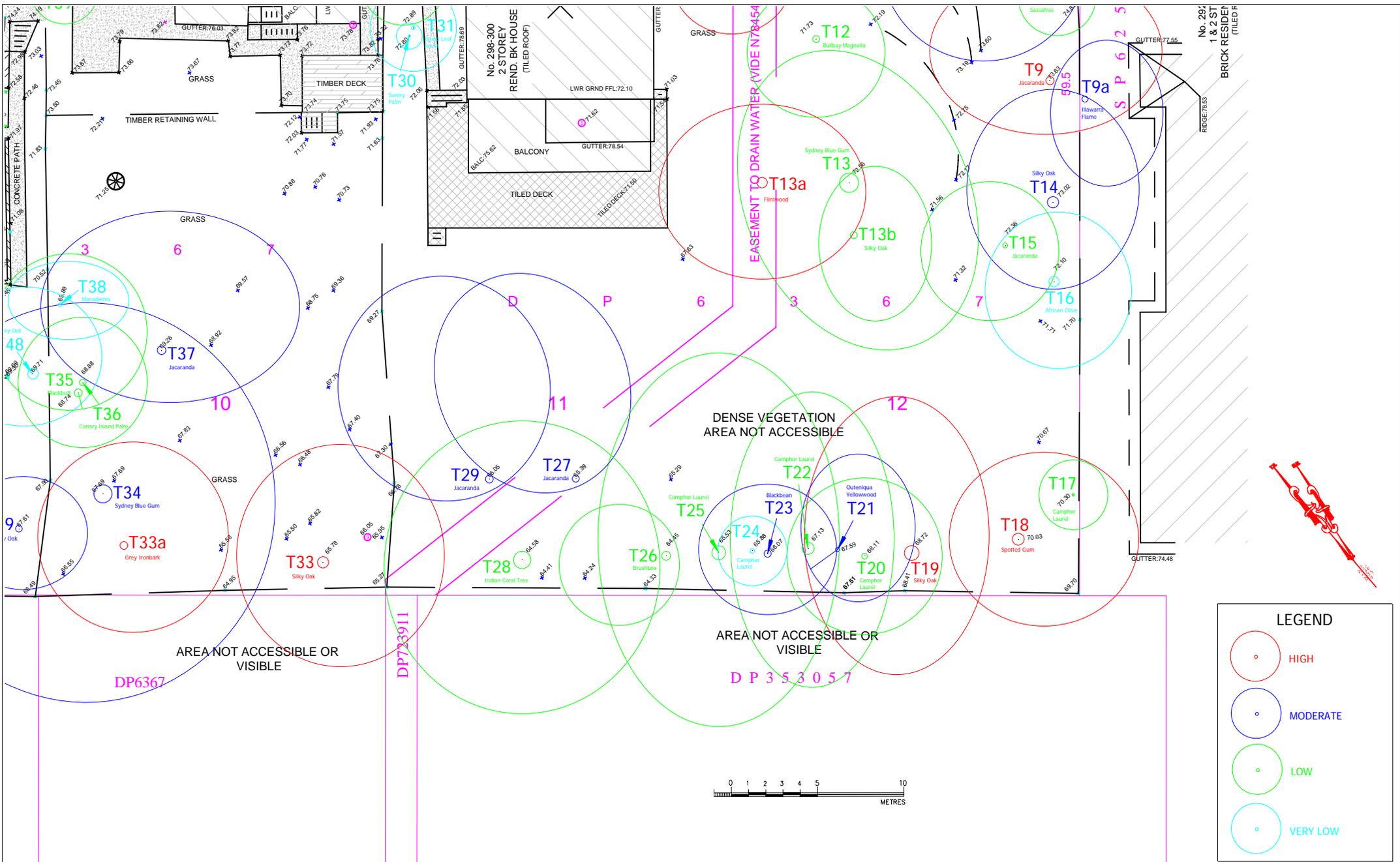
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 SHEET 1
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DWG No. T16-093001
 SHEET 2
 DATE: 30/09/2016



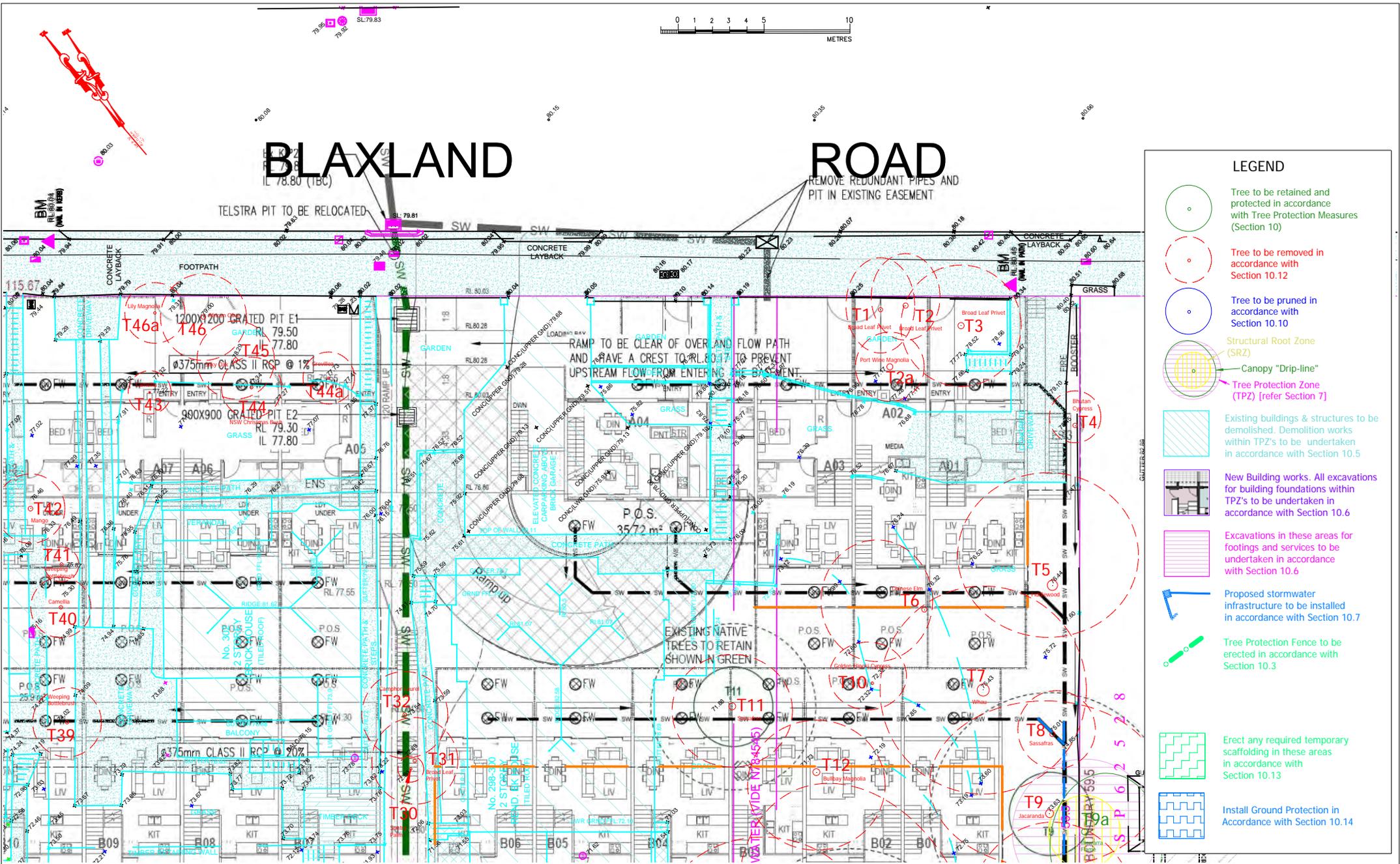
APPENDIX 5
 TREE LOCATION PLAN SHOWING
 TREE RETENTION VALUES
 298-312 Blaxland Road, RYDE, NSW



Earthscape Horticultural Services
 Arboricultural and Horticultural Consultants
 PO Box 364
 BEROWRA NSW 2081
 Ph: 02 9456 4787
 Fax: 02 9456 5757 e: earthscape@iinet.net.au

Based on the Survey Drawing
 prepared by Daw & Watson Pty Ltd
 Dwg Ref No. 3132-16
 Dated 27/04/2016

DWG No. T16-093001
 SHEET 3
 DATE: 30/09/2016



LEGEND

-  Tree to be retained and protected in accordance with Tree Protection Measures (Section 10)
-  Tree to be removed in accordance with Section 10.12
-  Tree to be pruned in accordance with Section 10.10
-  Structural Root Zone (SRZ)
-  Canopy "Drip-line"
-  Tree Protection Zone (TPZ) [refer Section 7]
-  Existing buildings & structures to be demolished. Demolition works within TPZ's to be undertaken in accordance with Section 10.5
-  New Building works. All excavations for building foundations within TPZ's to be undertaken in accordance with Section 10.6
-  Excavations in these areas for footings and services to be undertaken in accordance with Section 10.6
-  Proposed stormwater infrastructure to be installed in accordance with Section 10.7
-  Tree Protection Fence to be erected in accordance with Section 10.3
-  Erect any required temporary scaffolding in these areas in accordance with Section 10.13
-  Install Ground Protection in Accordance with Section 10.14

APPENDIX 6
TREE PROTECTION PLAN

298-312 Blaxland Road, RYDE, NSW



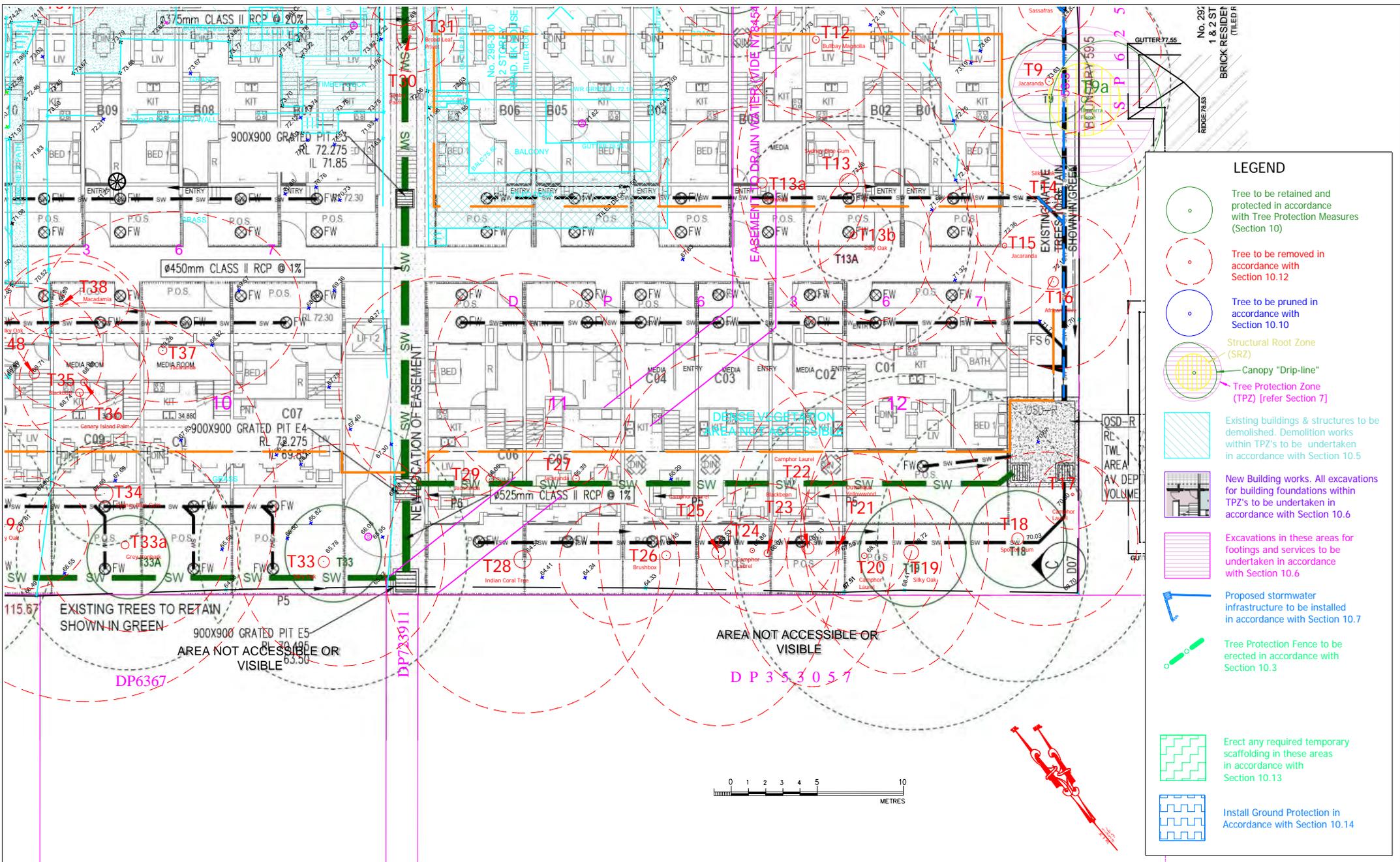
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 BEROWRA NSW 2081
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Based on the Survey Drawing
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 Dwg Ref No. 3132-16
 Dated 27/04/2016

DWG No. T16-093002

SHEET 1

DATE: 01/11/2016



APPENDIX 6
 TREE PROTECTION PLAN
 298-312 Blaxland Road, RYDE, NSW



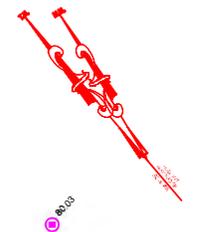
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 Ph: 02 9456 4787
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DWG No. T16-093002
 SHEET 2
 DATE: 01/11/2016

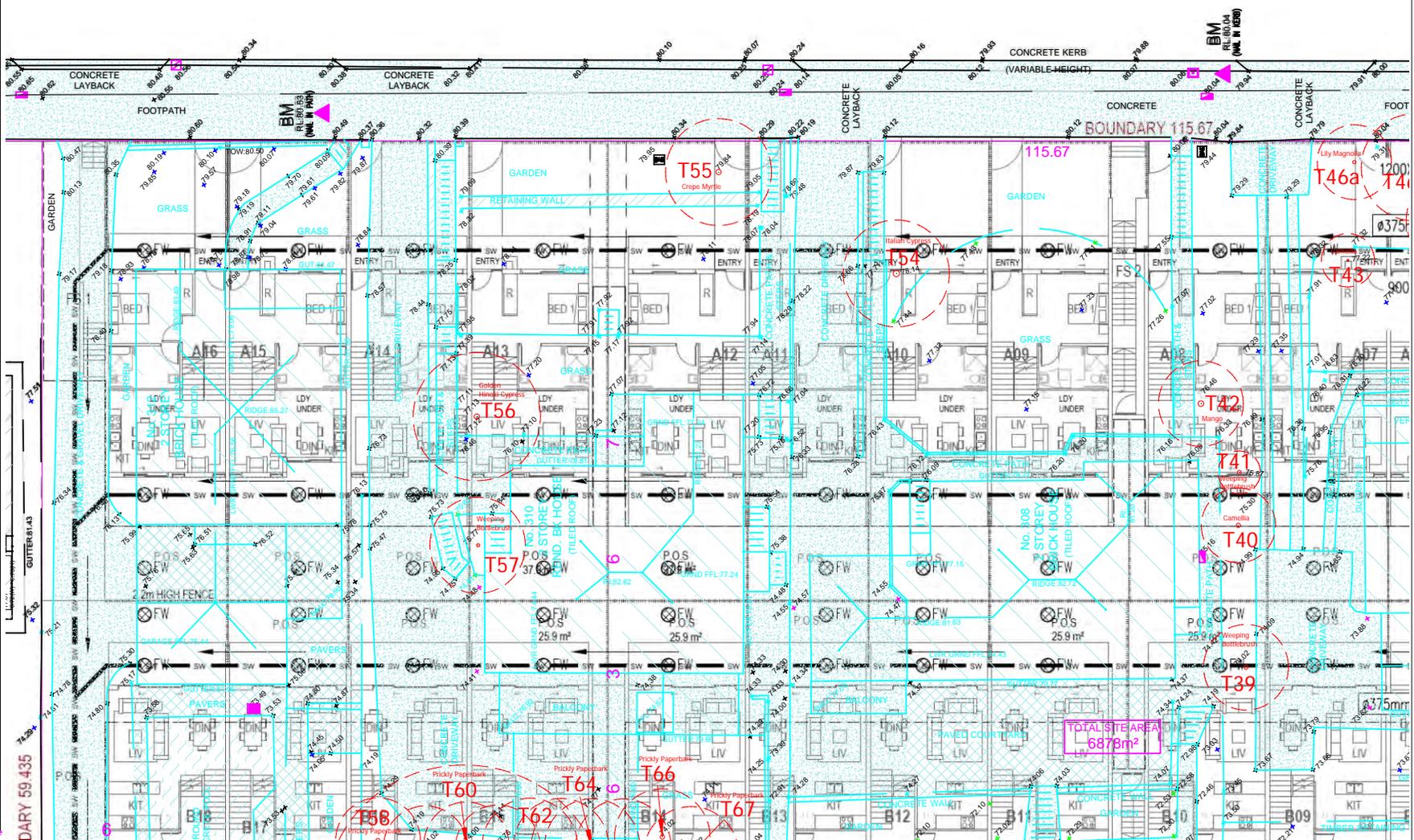


BLAXLAND ROAD



LEGEND

-  Tree to be retained and protected in accordance with Tree Protection Measures (Section 10)
-  Tree to be removed in accordance with Section 10.12
-  Tree to be pruned in accordance with Section 10.10
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APPENDIX 6
TREE PROTECTION PLAN

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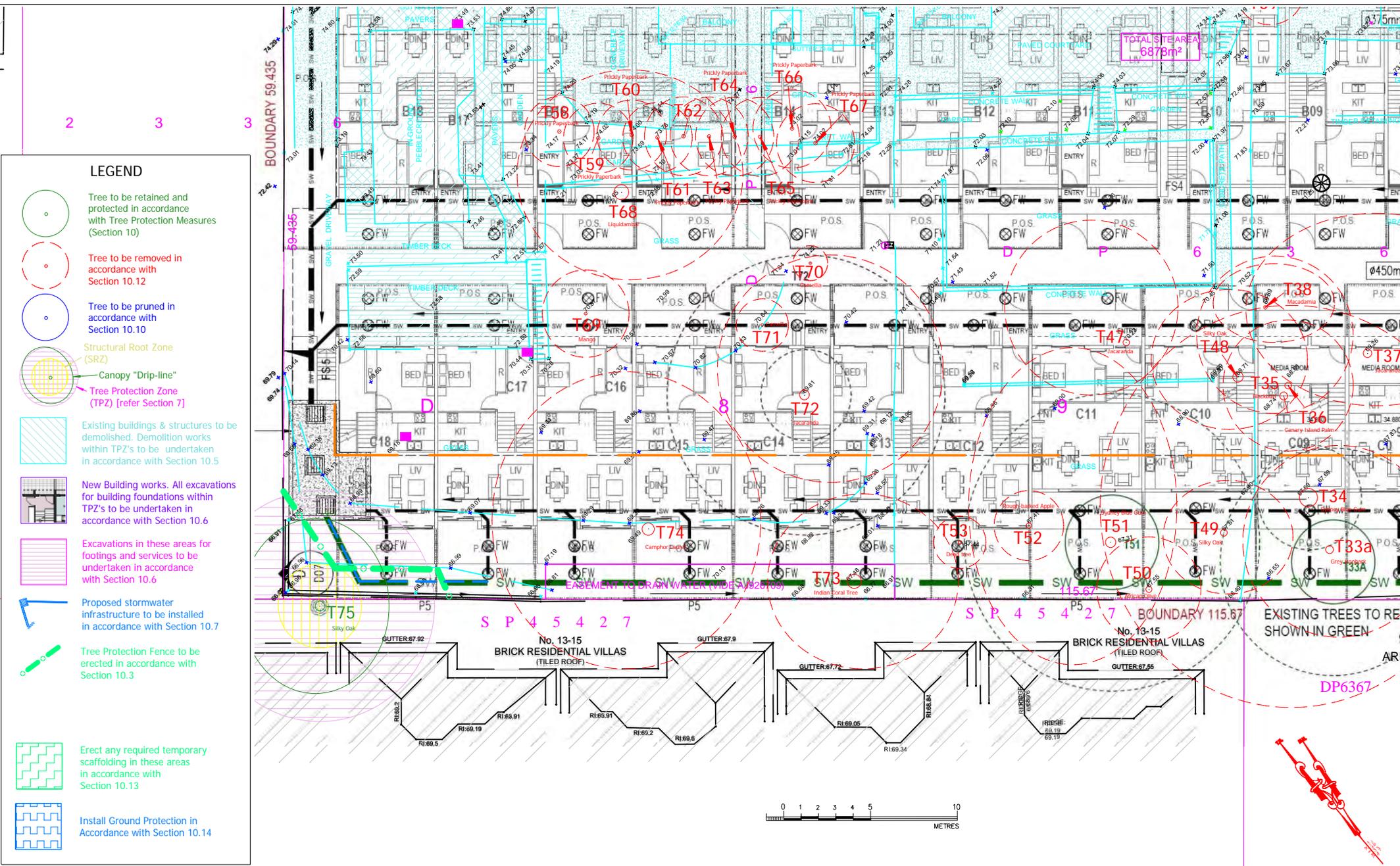
Based on the Survey Drawing
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Dwg Ref No. 3132-16
 Dated 27/04/2016

DWG No. T16-093002

SHEET 3

DATE: 01/11/2016



LEGEND

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**APPENDIX 6
TREE PROTECTION PLAN**

298-312 Blaxland Road, RYDE, NSW



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 PO Box 364
 BEROWRA NSW 2081
 Ph: 02 9456 4787
 Fax: 02 9456 5757 e: earthscape@iinet.net.au

Based on the Survey Drawing
 prepared by Daw & Watson Pty Ltd
 Dwg Ref No. 3132-16
 Dated 27/04/2016

DWG No. T16-093002
 SHEET 4
 DATE: 01/11/2016



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Due Diligence Ecological Assessment for
Development Proposal on Blaxland Rd, Ryde

Prepared by Narla Environmental for Bella – Ikea Ryde Pty Ltd

March 2016



NARLA
environmental

Project	Due Diligence Ecological Assessment for Development Proposal on Blaxland Rd, Ryde
Prepared for:	Bella – Ikea Ryde Pty Ltd
Prepared by:	Emily Straufins and Kurtis Lindsay
Project no:	BIRY1
Date:	March 2016
Version:	V1

Report Certification

Works for this report were undertaken by:

Name	Company / Position	Role
Kurtis Lindsay BSc (Hons)	Narla Environmental – Senior Ecologist Consultant	Co-author , mapping, project management
Emily Strautins BSc (Hons)	Narla Environmental – Junior Ecologist Consultant	Co-author

Introduction

Narla Environmental Pty Ltd was engaged by Bella – Ikea Ryde Pty Ltd to undertake a Pre-development Due Diligence Ecological Survey of their proposed development, which spans properties 298, 300, 302, 308, 2010 and 312 Blaxland Rd, Ryde (here forward referred to as 'the subject site').

Bella - Ikea Ryde Pty Ltd (the client) has taken the initiative by commissioning this study to gain an informed understanding of the ecological and biodiversity values of the site in order to (as best possible) avoid and minimise any potential impacts.

The aim of this ecological assessment was to identify the potential for conservation significant vegetation and trees, notably *Blue Gum High Forest in the Sydney Basin Critically Endangered Ecological Community* (CEEC) under the *Environmental Protection and Biodiversity Conservation Act 1999* (EPBC Act) or the *New South Wales Threatened Species Conservation Act 1995* (TSC Act).

Currently this area is mapped as containing remnants of *Blue Gum High Forest* by the City of Ryde Council (here forward referred to as 'Council'). Council presently administers the protection of all vegetation and trees in private property within the City of Ryde under a Tree Preservation Order excepting where a number of exempt situations or tree species have been approved.

This report is an Ecological Due Diligence Assessment. Its aim is to highlight any significant Ecological Constraints that may require formal assessment through standard Ecological / Flora and Fauna Impact Assessment channels. It was not the intention of this report to assess the impact of the proposed development on threatened species, trees and vegetation. An Ecological / Flora and Fauna Impact Assessment may be required if the proposed development was perceived to have potential impact on biodiversity values such as threatened ecological communities and threatened species or their habitat.

This report is not an Arborist Assessment, and as such does not address tree health, hazard potential, Tree Protection Zone (TPZ), social, historical or cultural significance of the vegetation on the subject site. Such issues should be addressed by a qualified Level 5 Consulting Arborist or other qualified consultant as per Council requirements.

Site Description

The subject site exists on a south-west – south facing slope of a ridgetop along which Blaxland Road runs. The elevation varies from 70 metres (m) – 80 m above mean sea level. The slope declines a maximum of 10 m from Blaxland road to the southern edge of the subject site.

The geology of the subject site is shales of the Wianamatta group.

The City of Ryde has an annual rainfall of 863.3mm (City of Ryde 2015). Each block is dominated by a residential dwelling, except for block 298 which adjoins block 300 with now boundary fence in between.

Methods

A rapid ecological survey of the subject site was undertaken by Kurtis Lindsay, Senior Ecologist at Narla, on March 9th 2016. The survey was completed with the aid of Emily Strautins, Junior Ecologist at Narla, on March 11th 2016.

The survey involved inspection of vegetation within the area of proposed works to identify the indigenous flora species within, and assess the corresponding ecological community.

Any observed fauna within the subject site and significant fauna habitat on the subject site, such as tree hollows or nesting sites, were identified and recorded.

Results and Discussion

Vegetation Communities

While no confirmed *Blue Gum High Forest* CEEC or other Threatened Ecological Communities (TEC) listed under the TSC Act or EPBC Act were confirmed within the subject site during this survey, a small patch of approximately 270 m² of vegetation centred on properties' 298 and 300 (see the yellow polygon in Figure 1) contained an assemblage of locally indigenous native canopy, midstorey and ground cover plants (Table 1). The patch occurred predominantly under the canopy of a single large, mature *Eucalyptus saligna* (Blue Gum) tree. The assemblage was low in species diversity and heavily infested with exotic plants and weeds (Table 2).

This patch contained a small selection of species considered characteristic of '*Blue Gum High Forest in the Sydney Basin*' CEEC under both the TSC Act and EPBC Act, however the small area (<1ha) and low diversity and abundance of each species present made the site ineligible for classification as *Blue Gum High Forest* CEEC under the EPBC Act. It may still be illegible for listing as *Blue Gum High Forest in the Sydney Basin*' CEEC under the TSC Act based on the following statement from the Approved TSC Act Listing Advice "Highly modified relics of the community also persist as small clumps of trees without a native understorey. ...A number of stands of Blue Gum Forests have highly modified understories, in which the native woody component has been largely replaced by woody exotic species or by increased abundance of native and exotic grasses." (NSW Threatened Species Scientific Committee 2007).

Narla have listed the locally indigenous species present in the subject site within in Table 1 and have included columns to delineate which species characterise each legislative listing.

Adjacent to the house on property 300 was a large, mature native *Doryphora sassafrass* (Sassafrass) tree which is likely to be remnant but not a typical Blue Gum High Forest species. This species is considered to be regionally uncommon.

A small cluster of two mature Blue Gum trees and one mature *Eucalyptus paniculata* (Grey Gum) tree exist at the southern end of property 302 (Figure 1). A single, mature outlying Blue Gum tree was present at the southern end of property 308 (Figure 1). The shrub layer and ground cover beneath these trees was purely exotic lawn, garden and weed growth and as such, the trees do not constitute confirmed CEEC under the EPBC Act but may be eligible for protection under the TSC Act.

Tozer (2003) describes Blue Gum High Forest (Map Unit 152) as occurring "mainly in areas with shale derived soil receiving more than 1050 mm rainfall per year, although it may be present in sheltered locations with lower rainfall. The community is generally confined to altitudes higher than 100 m above sea level on the Hornsby Plateau. In lower rainfall zones it grades into Map Unit 15." While the subject site occurs on shale soils, the rainfall is believed to be substantially lower than 1050mm.

We have highlighted which species identified on the subject site correspond to the relevant map units identified in Tozer (2003) Map Unit 152 and Map Unit 15 in attempt to gain a better understanding as to what indigenous vegetation community once dominated on the subject site (Table 1).

The site floristic assemblage showed a stronger tendency toward Map Unit 15 than Map Unit 152. This is supported by Tozer (2003) who states, "Floristic differences between these communities are not always reliably indicated by overstorey composition. Turpentine Ironbark forest may be dominated by *Eucalyptus saligna* at the upper end of its rainfall/elevation range, for example in Darvall Park and Denistone Park near Eastwood." This does not rule out the potential for this vegetation to qualify for listing as *Blue Gum High Forest in the Sydney Basin* CEEC under the TSC Act.

The remaining area of the vegetation present across the subject site was classified as 'Gardens/ Modified Vegetation Community' based on the dominance of weeds and introduced garden plants. This vegetation was consistent with a high level of disturbance (Table 2).

Fauna Observations

During the survey seven bird species were observed (Table 1). Noisy Miner (*Manorina melanocephala*), Grey Butcherbird (*Cracticus torquatus*), Rainbow Lorikeet (*Trichoglossus haematodus*), Australian Magpie (*Cracticus tibicen*), Tawny Frogmouth (*Podargus strigoides*) and Laughing Kookaburra (*Dacelo gigas*) are considered locally common. Musk Lorikeet (*Glossopsitta concinna*) is a nomadic species, widespread across Eastern NSW but notably attracted to areas containing tall eucalyptus trees. One incomplete nest of a Tawny Frogmouth was observed on the subject site.

Two species of mammal were identified during the survey, the exotic Black Rat (*Rattus rattus*) and Brush-tailed Possum (*Trichosurus vulpecula*). Two reptiles were also observed within the subject site, Garden Sunskink (*Lampropholis delicata*) and Pale-fleck Sunskink (*Lampropholis guichenoti*). All of these species are considered common within the region.

Small limb and bark-crevice hollows were recorded in only two of the mature native trees recorded on the subject site. These hollows were small, but may provide roosting habitat for microbats, frogs, and small reptiles and nesting habitat for the small bird, Spotted Pardalote (*Pardalotus punctatus*).

Further Discussion and Recommendations

Much of the proposed work area falls within regions of the site identified as "Altered Vegetation – Gardens", which has been signified as holding little biodiversity value. There is no obligation to protect the vegetation within these areas from an Ecological perspective other than for its residual value as surrogate fauna habitat. It is recommended that development is focused on these areas, and any areas retained are managed to promote regeneration of locally indigenous native vegetation.

Many of the identified plant species in the subject site are considered environmental weeds (Table 2), their removal is recommended. Weed removal and control of the subject site may be conducted under a Vegetation Management Plan (VMP) for the site following requirements of the Ryde Urban Forest Plan and Technical Manual (2013).

The Blue Gum trees and Grey Ironbark tree on the subject site are isolated but may be considered as 'stepping stones' for connectivity to more significant stands of Blue Gum High Forest within Denistone Park (<2km away), Darvall Park (~2.5km away) and Brush Farm Park (~4km away).

Pending the final design of the development an Arborists assessment may be required which stipulates Tree Protection Zones (TPZ) established around trees that must be retained and protected during construction works, as outlined in the Urban Forest Technical Manual, City of Ryde 2014.

If the removal of any trees (including exotic) is required, an Ecologist should be present on site to supervise tree felling and check hollows for wildlife. Replacement plantings will then need to be considered based on the number and size of trees removed.

As this report is solely focused on Ecological and Biodiversity values of the site, a qualified Arborist will be required determine the retention value of a tree if any development is proposed within the Tree Protection Zone of that tree. This includes:

- trees on land upon which development is proposed
- trees on adjoining land
- street trees.

The indigenous trees and shrubs mapped in Figure 1, should be protected and retained where possible. If removal is required, impacts will require assessment, and trees will most likely require replacement.

Any native canopy trees, shrubs or ground covers that can be retained on the site during and post development should be managed by encouraging growth, and reducing competition through weed removal under a VMP. Any proposed Landscape Plans may incorporate elements from a Blue Gum High Forest assemblage as has been successfully illustrated at other sites where apartment blocks have been constructed in areas formerly dominated by Blue Gum and other forest assemblages.

A photographic example of a recently built apartment block (<10 years) in Wahroonga, Northern Sydney is presented in Figure 2. This development successfully incorporated Blue Gum High Forest elements into its landscape plantings. This example illustrates how indigenous forest vegetation and medium-high density living can co-exist.

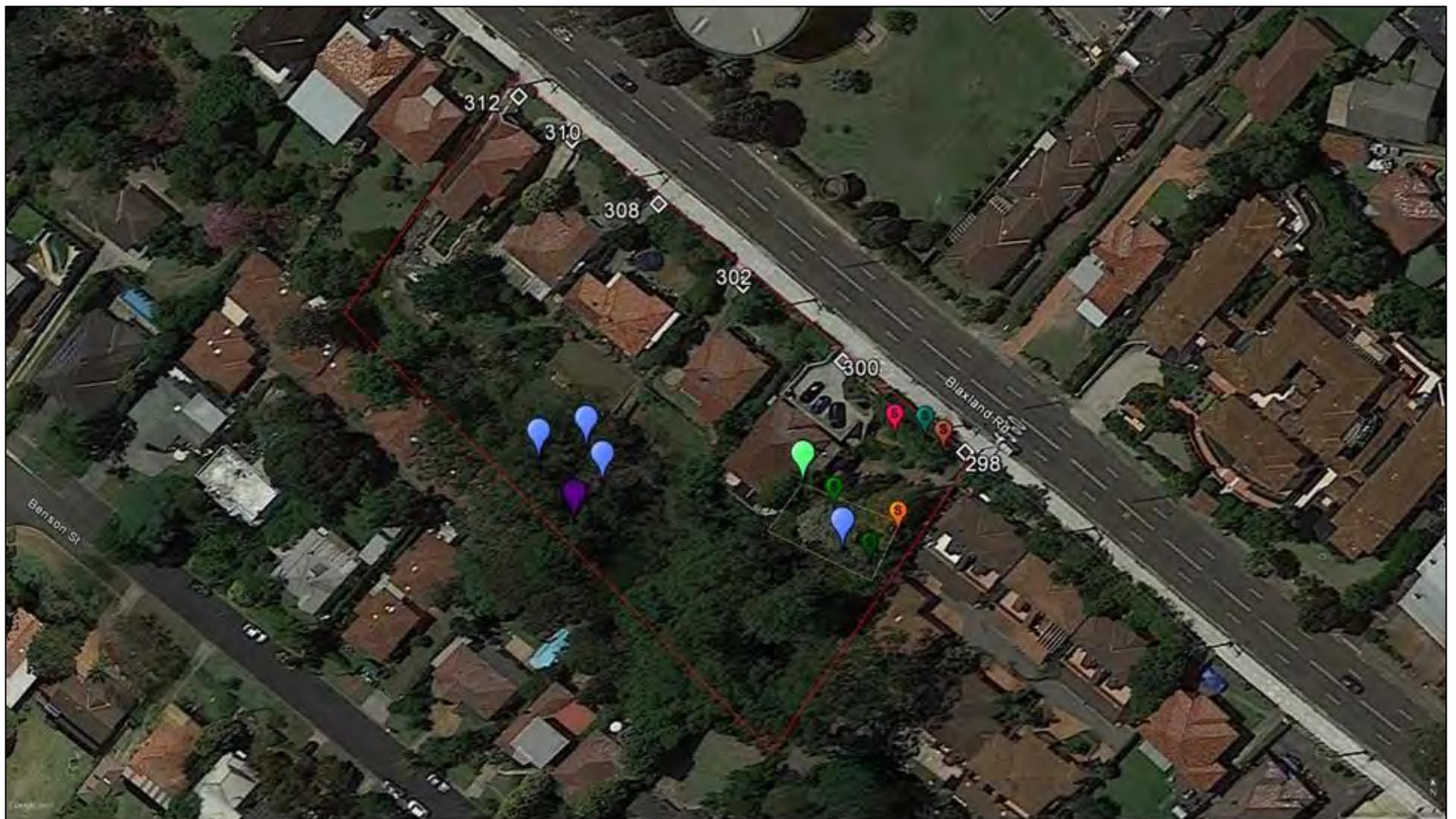
Table 1. Native Flora identified within the Blaxland Rd Subject Site

Scientific Name	Common Name	Individuals (Unless specified)	Part of TSC Act BGHF Listing	Part of EPBC Act BGHF Diagnostic	Map Unit 152 (Tozer 2003)	Map Unit 15 (Tozer 2003)
<i>Acacia parramattensis</i>	Parramatta Green Wattle	1	x			x
<i>Cayratia clematidea</i>	Native Grape					x
<i>Ceratopetalum apetalum</i>	Christmas Bush	1				
<i>Commelina cyanea</i>	Scurvy Weed	~250m ²				
<i>Commersonia frasei</i>	Brush Kurrajong	1				
<i>Cyperus gracilis</i>	Cyperus	10				
<i>Doryphora sassafras</i>	Sassafras	2				
<i>Eucalyptus paniculata</i>	Grey Ironbark	1	x	x	x	x
<i>Eucalyptus saligna</i>	Sydney Blue Gum	4	x	x	x	
<i>Geranium solanderi</i>	Geranium	~100				x
<i>Glochidion ferdinandi</i>	Cheese Tree	1	x			
<i>Microlaena stipoides</i>	Weeping Rice Grass	~50				
<i>Oplismenus aemulus</i>	Basket Grass	~250m ²	x	x	x	x
<i>Pittosporum undulatum</i>	Sweet Pittosporum	2	x	x	x	x
<i>Scolopia braunii</i>	Mountain Cherry	1				
<i>Synoum glandulosum</i>	Scentless Rosewood	1				

*BGHF Diagnostic = Species diagnostic of Blue Gum High Forest Ecological Community

Table 2. Flora Species Characteristic of Gardens/ Modified Vegetation Community identified within the Blaxland Rd Subject Site

Scientific Name	Common Name	Undesirable Species / Listed Weed
<i>Alstroemeria psittacina</i>	Peruvian Christmas Bells	*
<i>Anredera cordifolia</i>	Madeira Vine	*
<i>Araujia sercifera</i>	Moth Vine	*
<i>Asparagus plumosus</i>	Climbing Asparagus Fern	*
<i>Asparagus asparagoides</i>	Asparagus Weed	*
<i>Bambusa sp.</i>	Bamboo	*
<i>Bougainvillea sp.</i>	Bougainvillea	
<i>Bidens pilosa</i>	Bidens	
<i>Camellia sinensis</i>	Camellia	
<i>Castanospermum australe</i>	Black Bean	
<i>Cardiospermum grandiflorum</i>	Balloon Vine	*
<i>Cestrum parqui</i>	Green Cestrum	*
<i>Celtis sp</i>	Hackberry	*
<i>Cinnamomum camphora</i>	Camphor Laurel	*
<i>Cordyline rubra</i>	Palm-lily	
<i>Corymbia maculata</i>	Spotted Gum	
<i>Conyza sp.</i>	Fleabane	
<i>Cupressus sempervirens</i>	Golden Pencil Pine	
<i>Erythrina crista-galli</i>	Coral Tree	*
<i>Ehrharta erecta</i>	Panic Veldtgrass	*
<i>Grevillea robusta</i>	Silky Oak	
<i>Hypochaeris radicata</i>	Catsear	
<i>Hypoestes phyllostachya</i>	Pink Polka Dot Plant	
<i>Jacaranda mimosifolia</i>	Jacaranda	
<i>Jasminum polyanthum</i>	White Jasmine	*
<i>Liquidambar styraciflua</i>	Liquidambar	
<i>Lonicera japonica</i>	Japanese Honeysuckle	*
<i>Macadamia sp.</i>		
<i>Mangifera sp.</i>	Mango	
<i>Melaleuca styphelioides</i>		
<i>Monstera deliciosa</i>	Monstera	
<i>Nephrolepis cordifolia</i>	Fishbone fern	*
<i>Ochna serrulata</i>	Ochna	*
<i>Olea europaea</i>	African Olive	*
<i>Paspalum dilatatum</i>	Paspalum	
<i>Podocarpus spinulosa</i>	Plum Pine	
<i>Phoenix canariensis</i>	Canary Island Date Palm	
<i>Senna pendula</i>	Senna	*
<i>Setaria palmifolia</i>	Palm Grass	*
<i>Solanum mauritianum</i>	Wild Tobacco	
<i>Sonchus oleraceus</i>	Sowthistle	
<i>Tecoma capensis</i>	Orange Trumpet Vine	
<i>Tradscantia flumensis</i>	Trad	*
<i>Ulmus parvifolia</i>	Chinese Elm	
<i>Wisteria sp</i>	Wisteria	



Legend



Subject Site Boundary



Property No / Entry Point

Local Indigenous Trees



Blue Gum (*Eucalyptus saligna*)



Grey Ironbark (*Eucalyptus paniculata*)



Sassafrass (*Doryphora sassafrass*)

Local Indigenous Shrubs



Cheese Tree (*Glochidion ferdinandi*)



Parramatta Green Wattle (*Acacia parramattensis*)



Scentless Rosewood (*Synoum glandulosum*)



Christmas Bush (*Ceratopetalum apetalum*)



Mountain Cherry (*Scolopia braunii*)



N

40 metres



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Figure 1. Indigenous Trees and Shrubs Recorded on the Subject Site



Figure 2. Example of a Blue Gum High Forest type planting incorporated into the Landscape Design of a recently constructed apartment block in Northern Sydney (Photo by Kurtis Lindsay)

References

City of Ryde (2012), Urban Forest Technical Manual, A tool to assist the Ryde community to understand the requirements for the protection of trees within the City of Ryde, updated 2014

City of Ryde (2013), Urban Forest Plan, City of Ryde (2012), Urban Forest Technical Manual, A tool to assist the Ryde community to understand the requirements for the protection of trees within the City of Ryde, adopted 2013

City of Ryde (2015) City Profile <http://www.ryde.nsw.gov.au/Living-in-Ryde/About-Ryde/City-Profile>

Herbert C., (1983), Sydney 1:100 000 Geological Sheet 9130, 1st edition. Geological Survey of New South Wales, Sydney.

NSW Threatened Species Scientific Committee (2014), Approved Conservation Advice for Blue Gum High Forest of the Sydney Basin Bioregion,

NSW Threatened Species Scientific Committee (2007) Listing Advice - Blue Gum High Forest in the Sydney Basin Bioregion - critically endangered ecological community listing

Tozer, M (2003) The native vegetation of the Cumberland Plain, western Sydney: systematic classification and field identification of communities. NSW National Parks and Wildlife Service.

Appendix D. 5-Part Test of Significance for Blue Gum High Forest



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5-Part Test of Significance - Blue Gum High Forest

298-312 Blaxland Road, Ryde

Report prepared by Narla Environmental

January 2022



NARLA

environmental

Report:	5-Part Test of Significance - Blue Gum High Forest - 298-312 Blaxland Road, Ryde
Prepared for:	Fortis Law
Prepared by:	Narla Environmental Pty Ltd
Project no:	cdar2
Date:	January 2022
Version:	Draft v1.0

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Any survey of flora and fauna will be unavoidably constrained in a number of respects. In an effort to mitigate those constraints, we applied the precautionary principle described in the methodology section of this report to develop our conclusions. Our conclusions are not therefore based solely upon conditions encountered at the site at the time of the survey. The passage of time, manifestation of latent conditions or impacts of future events may require further examination of the project and subsequent data analysis, and re-evaluation of the data, findings, observations and conclusions expressed in this report. Narla Environmental has prepared this report in accordance with the usual care and thoroughness of the consulting profession, for the sole purpose described above and by reference to applicable standards, guidelines, procedures and practices at the date of issue of this report. For the reasons outlined above, however, no other warranty or guarantee, whether expressed or implied, is made as to the data, observations and findings expressed in this report, to the extent permitted by law. This report should be read in full and no excerpts are to be taken as representative of the findings. No responsibility is accepted by Narla Environmental for use of any part of this report in any other context. The review of legislation undertaken by Narla Environmental for this project does not constitute an interpretation of the law or provision of legal advice. This report has not been developed by a legal professional and the relevant legislation should be consulted and/or legal advice sought, where appropriate, before applying the information in particular circumstances. This report has been prepared on behalf of, and for the exclusive use of, the client who commissioned this report, and is subject to and issued in accordance with the provisions of the contract between Narla Environmental and the client who commissioned this report. Narla Environmental accepts no liability or responsibility whatsoever for, or in respect of, any use of, or reliance upon, this report by any third party. Narla Environmental Pty Ltd has completed this assessment in accordance with the relevant federal, state and local government legislation as well as current industry best practices including guidelines. Narla Environmental Pty Ltd accepts no liability for any loss or damages sustained as a result of reliance placed upon this report and any of its content or for any purpose other than that for which this report was intended.

Narla Environmental Pty Ltd
www.narla.com.au

5-Part Test of Significance

Environmental Planning and Assessment Act 1979 and Biodiversity Conservation Act 2016– Assessment of Significance (5-part Test) for Blue Gum High Forest in the Sydney Basin Bioregion (BGHF)	
BC Act Status: Critically Endangered Ecological Community	
Species Ecology	A moist, tall open forest community, with dominant canopy trees of Sydney Blue Gum (<i>Eucalyptus saligna</i>) and Blackbutt (<i>E. pilularis</i>). Forest Oak (<i>Allocasuarina torulosa</i>) and Sydney Red Gum (<i>Angophora costata</i>) also occur. Species adapted to moist habitat such as Lilly Pilly (<i>Acmena smithii</i>), Sandpaper Fig (<i>Ficus coronata</i>), Rainbow Fern (<i>Calochleana dubia</i>) and Common Maidenhair (<i>Adiantum aethiopicum</i>) may also occur. Occurs only in areas where rainfall is high (above 1100mm per year) and the soils are relatively fertile and derived from Wianamatta shale. In lower rainfall areas, it grades into Sydney Turpentine-Ironbark Forest.
(a) in the case of a threatened species, whether the proposed development or activity is likely to have an adverse effect on the life cycle of the species such that a viable local population of the species is likely to be placed at risk of extinction,	Not Applicable – BGHF is not a species.
(b) in the case of an endangered ecological community or critically endangered ecological community, whether the proposed development or activity:	(i) is likely to have an adverse effect on the extent of the ecological community such that its local occurrence is likely to be placed at risk of extinction, or
	(ii) is likely to substantially and adversely modify the composition of the ecological community such that its local occurrence is likely to be placed at risk of extinction,

Environmental Planning and Assessment Act 1979 and Biodiversity Conservation Act 2016– Assessment of Significance (5-part Test)

for

Blue Gum High Forest in the Sydney Basin Bioregion (BGHF)

BC Act Status: Critically Endangered Ecological Community

		<p>three canopy trees representative of BGHF, and several scattered mid and ground layer individuals. The existing composition of BGHF canopy species is extremely lacking. Two canopy species that are representative of BGHF will be retained and protected, and ≥8 individuals will be planted as part of the landscape plan. The existing composition of mid and ground layer species representative of BGHF is severely lacking, but will be greatly improved by the planting of a suite of BGHF species as per the landscape plan.</p>
<p>(c) in relation to the habitat of a threatened species, population or ecological community:</p>	<p>(i) the extent to which habitat is likely to be removed or modified as a result of the proposed development or activity, and</p>	<p>Only three canopy trees representative of BGHF will be directly impacted as a result of the proposed development. These trees currently exist over a weed infested understorey, which is proposed to be removed as part of the proposed development. As a result of the weed removal the quality of the BGHF habitat will be drastically improved. Moreover, two canopy trees representative of BGHF will be retained and protected (thus maintaining canopy habitat within the Subject Property), and a total of 0.1ha being restored across all strata (equating to a net increase in BGHF habitat of 0.06ha).</p>
	<p>(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</p>	<p>The area of BGHF will not become further fragmented or isolated from other areas of BGHF as a result of the proposed development. A small area of 0.04ha will be directly impacted by the proposed development however, 0.04ha will be retained and protected. Furthermore, the proposed development will produce a net increase in BGHF habitat of 0.06ha through targeted planting of BGHF species across all strata.</p>

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	(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,	All areas that support viable patches of BGHF are important. However, the BGHF within the Subject Property is in extremely poor condition, with a Vegetation Integrity Score of 7.1. Two canopy species representative of BGHF will be retained and protected, and the habitat of BGHF will be improved through targeted planting of BGHF representative species across all strata. The proposed development will see a net gain of BGHF in the Subject Property.
(d) 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),	The development proposed is not likely to have an adverse effect on any declared area of outstanding biodiversity value, directly or indirectly.	
(e) whether the action proposed constitutes or is part of a key threatening process or is likely to result in the operation of, or increase the effect of, a key threatening process.	<p>The following Key Threatening Processes (KTPs) are documented to impact upon the survival of BGHF:</p> <ul style="list-style-type: none"> • Clearing and fragmentation; • Weed infestation, notably by Lantana, exotic vines and scramblers, and exotic perennial grasses; • Increased nutrient load and sedimentation from urban runoff and stormwater discharge; • Inappropriate fire regimes; • Mowing or clearing of the understorey in a way that limits regeneration of native species; and • Pathogen invasion and dieback (e.g. myrtle rust). <p>The removal of three trees is proposed for the development although connectivity will be maintained between the BGHF vegetation within the Subject Property and the local occurrence. The trees to be removed will be replaced at a 2:1 ratio. The weed infestation that currently threatened the persistence of the BGHF within the Subject Property will be extirpated as part of the proposed development. The proposed development is considered unlikely to result in a significant impact on BGHF.</p>	
Conclusion		
There will be no significant impact on Blue Gum High Forest in the Sydney Basin Bioregion assuming the two canopy trees are retained and protected, the weed infestation is removed, and planting is carried out in accordance with the landscape plan.		
References:		
NSW Scientific Committee – Final Determination (2011) Blue Gum High Forest in the Sydney Basin Bioregion - critically endangered ecological community listing		



NARLA

environmental

Eastern Sydney Office
2/8 Apollo Street
Warriewood
NSW 2102
Ph: 02 9986 1295

Western Sydney Office
7 Twentyfifth Avenue
West Hoxton
NSW 2171

Hunter Valley Office
10/103 Glenwood Drive
Thornton
NSW 2322

www.narla.com.au