arboricultural impact assessment report

LT-AI-01-E0
Issued for SSDA Submission
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PROJECT
HammondCare – Wahroonga Stage 2
4-12 Neringah Avenue
Wahroonga, NSW

CLIENT / PRINCIPAL
HammondCare
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i EXECUTIVE SUMMARY

This Arboricultural Impact Assessment (AIA) report supports a State Significant Development Application (SSD-45121248) for the redevelopment of part of the site at 4-12 Neringah Avenue South, Wahroonga for the purposes of delivering additional health services, aged care and seniors housing. HammondCare proposes the demolition and redevelopment of the existing Neringah Hospital as Stage 2 of HammondCare Wahroonga project — an integrated, contemporary aged care and seniors living campus that provides specialist cares services and a continuum of care for aging in place. Arterra have been engaged to provide guidance on tree related matters and prepare the AIA.

Arterra undertook arboricultural assessments of the trees on the site, including those on the adjacent streets and on the boundary of neighbouring properties, that have potential to be affected by the development. The arboricultural survey extended to an area along Archdale Walk, opposite the Wahroonga Post Office Shop, where minor re-grading of Archdale Walk for accessibility is required under the previously issued SEPP Compatibility Certificate.

- **113** trees associated with the development proposal were recorded and assessed.
- **51** trees are located within the site.
- **62** trees are located outside the site boundary including:
  - **43** in adjacent streets and neighbouring properties.
  - **19** trees (at No. 14-18 Coonanbarra Road, Wahroonga) are adjacent to proposed re-grading works on Archdale Walk.

A preliminary tree assessment report was prepared to identify the most significant trees and guide tree retention and protection. There are 14 trees that were identified as having a High retention value. The most significant trees relating to the site are representatives of the endangered Blue Gum High Forest, and cultural plantings associated with Woonona Cottage. These are represented by the following trees.

- **T32** an *Angophora costata* (Smooth-barked Apple) on the north-eastern corner of the site.
- **T47**, **T48** and **T49** are large *Eucalyptus saligna* (Sydney Blue Gum) street trees, in the vicinity of T32.
- **T63** a *Cupressus cashmeriana* (Kashmir Cypress), is a cultural planting associated with the Woonona Cottage curtilage.
- **T66** *a Cedrus deodara* (Himalayan cedar) is a cultural planting associated with the Woonona Cottage curtilage.
- **T1 & T6** are *Lophostemon confertus* (Brush Box) trees and form part of the setting of Woonona Cottage.

Figure i – Photo illustrating some of the higher value tree and neighbouring property trees in the southern western portion of Stage 2 . (Photo: Arterra 11/07/22)

Arterra has been involved during the design development phase of the project and has worked closely with the design team to ensure that any major construction activities have been situated away from required tree protection zones. In the current design **81** of the trees are to be retained and **32** trees are proposed for removal. The following data summarises the arboricultural impact of the development of the site.

- **All High retention value trees** (**14 trees**) are proposed to be retained and protected.
- **The majority of Moderate retention value trees** (48 out of 55 trees) are being retained and protected.
- Of the 32 trees proposed for removal, **23** trees are within the footprint of the proposed works and **9** trees are identified as poor specimens or weeds. This includes **7** small street trees on Neringah Avenue South that are proposed to be replaced with healthier and better placed new street trees.

Of the **81** trees to be retained and protected:

- **5** trees have a minor encroachment (less than or equal to 10%) into the nominal TPZ and can be retained with acceptable impacts that are unlikely to adversely impact the trees in the long term.
- **1** tree has 17% encroachment in the nominal TPZ. For this trees, it is not anticipated the TPZ encroachment would result in any significant impact as there has been a previous building situated within this part of their TPZ and the species is highly tolerant of root disturbance.
- **12** trees out of a row planting of 18 young Elaeocarpus have an encroachment of greater than 10% into their nominal TPZ as a result of pedestrian ramp re-grading at Archdale Walk. However, due to the topography and a pre-existing sleeper retaining wall, it is the author's opinion that it is unlikely that any significant roots will be found in the area of the proposed works. The trees are still very small and any roots that are found are likely to be far less than 40mm ø. Given the trees' age and size such impacts, even if roots are found and need to be pruned, are considered acceptable.

All works undertaken within the nominated TPAs, including demolition and trenching, are to be carried out using non-destructive methods, under the direct oversight of a Project Consulting Arborist who will provide direction if any roots over 40mm diameter are encountered. In view of the supervision proposed and detailed specifications for tree works contained in this report, all trees identified for retention are expected to remain viable and continue to contribute the future landscape and tree canopy of the site.

Robert Smart AAILA, ISA, AA
Director, Registered Landscape Architect (054),
Registered Consulting Arborist (1804).

1.0 INTRODUCTION

1.1 Background

This Arboricultural Impact Assessment report is submitted to the Department of Planning and Environment (DPE) in support of a State Significant Development Application (SSD-45121248) for the redevelopment of part of the site at 4-12 Neringah Avenue South, Wahroonga for the purposes of delivering additional community health services, seniors housing, as well as upgraded palliative care facilities that will contribute to the broader operation of 'Neringah Hospital.' The extent of the site is shown below.

Figure 1 – Site context – Outline of the site, with the portion of the site subject to the SCC shaded dark red (R4 zone) (Source: HammondCare)

Specifically, this SSDA seeks approval for the following:

- Site preparation works comprising:
  - Demolition of the Neringah Hospital building, kiosk, and existing at-grade carparks;
  - Clearing of nominated vegetation on the proposed development areas;
  - Bulk earthworks including basement excavation; and
  - Remediation works where necessary across the site.

- Construction and use of an integrated seniors housing and health services facility across two buildings ranging from 4-5 storeys above-ground, comprising:
  - 2 basement levels containing minimum of 130 car parking spaces and service dock;
  - 12 residential aged care facility beds (extension to existing Stage 1 provision);
  - 18 palliative care hospice beds (Schedule 3 health services facility);
  - Community healthcare services, including outpatient palliative care, centre for positive aging and Hammond at Home;
  - 57 seniors housing dwellings; and
  - On-site administration, amenities, and ancillary operations spaces.

- Ground level and on-building landscaping works, including the provision of a through site pedestrian link connecting Archdale Park and Balcombe Park;
- Public domain works, specifically, regrading of part of the pedestrian walkway known as 'Archdale Walk' to provide accessible connection; and
- Extension and augmentation of infrastructure and services as required including new site signage.

This report responds to the Secretary's Environmental Assessment Requirements (SEARs) for SSD-45121248 that were issued on 24 June 2022. This assessment has been prepared to assess the likely impacts of the development on the site's trees. It also identifies the trees to be retained and removed so that the client can take a proactive

approach to managing those trees that are to be retained by implementing appropriate measures to protect them during the construction.

SEARs	Relevant report section
8. Trees and Landscaping • Assess the number, location, condition and significance of trees to be removed and retained and note any existing canopy coverage to be retained on-site.	• Tree Data: Section 2.2 & Appendix 4.3 • Canopy coverage: Section 2.2

Arterra was engaged by the HammondCare to undertake an arboricultural assessment of the site and prepare the relevant reports and plans to help guide the re-development. The assessment includes the trees within the site and those immediately adjacent, in the street and neighbouring properties, that had potential to be impacted by the proposed works. Initial consideration was given to including trees in Archdale Park (across from the site on Neringah Road) however subsequent analysis revealed that most trees in Archdale Park are well outside the extent of any proposed works and unlikely to be impacted, so are not addressed in this arboricultural impact assessment report, apart from those that are immediately adjacent the Australia Post facility fronting Coonanbarra Rd.

Figure 2 – The Kashmir Cypress (in the middle-right) is a significant cultural planting associated with the garden of Woonona Cottage. Woonona's garden is outside of the primary development area, however, forms part of the proposed pedestrian access route through the site. (Photo: Arterra 11/07/22)

1.2 Aims of This Report

The aim of this report is to assess the impact of the new development on the existing trees within, and adjacent to, the site. Specifically, the report aims to:

- assess the health and condition of the existing trees and record all relevant tree information;
- assess the significance, Safe Useful Life Expectancy (SULE) and retention value of the existing trees;
- assess the likely arboricultural impacts of the development on the trees;
- provide clear recommendations as to which trees should ideally be retained and protected;
- identify Tree Protection Zones (TPZ) for the trees being retained; and
- provide preliminary advice on the tree protection measures that will be required during construction to ensure the trees are successfully retained.

All tree plans contained in this report are based on information provided to Arterra, including site survey and architectural drawings. The tree plans should only be used for reference relating to tree issues and are not suitable for any other purpose.

1.3 Relevant Controls or Legislation

The subject development will undergo an approval pathway via a State Significant Development Application process (SSDA). The Minister for Planning/ Independent Planning Commission will consider the local planning

instruments in evaluating and determining the development application. The following is an outline of tree controls relating to development within the Ku-ring-gai Local Government Area (LGA).

Provisions of the State Environmental Planning Policy (Vegetation in Non-Rural Areas) 2017 and Ku-ring-gai Development Control Plan 2021 (KDCP 2021) apply to the management and maintenance of existing trees and vegetation in the Ku-ring-gai LGA. Together these documents require that consent or a permit is obtained before removing or altering any "Prescribed Trees and Vegetation". Council's definition of "Prescribed Trees and Vegetation" is provided under clause 13.1.1 of the KDCP 2021, as including:

- trees;
- other vegetation; and
- native vegetation.

A "tree" means:

i. any perennial plant with at least one self-supporting woody, fibrous stem, whether native or exotic, of 5 metres or more in height; and
ii. any plant that has a trunk diameter of 150mm or more measured at ground level.

"other vegetation" means:

i. vegetation that is either a remainder of the natural vegetation of the land or, if altered, is still representative of the structure and floristics of the natural vegetation. Including any of the following:
    - trees (including any sapling or shrub),
    - understorey plants,
    - groundcover (being any type of herbaceous vegetation),
    - plants occurring in a wetland.

"native vegetation" means:

i. trees or other vegetation (as defined above) native to New South Wales. This includes plants established in NSW before European settlement. (As referred to within PlantNet (https://plantnet.rbgsyd.nsw.gov.au/)).

Section 13.2 of the KDCP 2021 provides exemptions for tree and vegetation works, however these exemptions do not apply to heritage items or items within Heritage Conservation Areas as defined in the KDCP 2021. Woonona Cottage, located within the subject site, is an item of local heritage significance, though its curtilage has been reduced to the immediate area surrounding the dwelling. This is reflected in the Local Environmental Plan listing identification as 3 Woonona Avenue, with separate property identification (Lot B DP 420513).

In accordance with Clause 5.10 of the Ku-ring-gai Local Environmental Plan 2012 (KLEP 2012), development consent is required to undertake works in relation to a tree or vegetation that is or forms part of a Heritage Item, however, it may not be required in the following circumstances:

1. Works in relation to a tree or other vegetation may be carried out with the written consent of Council where Council is satisfied that:

i) the proposed works is of a minor nature,
ii) is for the maintenance of the Heritage Item or place withing the Heritage Conservation Area, and
iii) would not adversely affect the heritage significance of the Heritage Item or Heritage Conservation Area.

2. For the purpose of 1i) above the following tree works in relation to a tree or other vegetation that is or forms part of a Heritage Item or is within a Heritage Conservation Area may be regarded by Council as being of minor nature:

i) Tree branches directly over roof lines
- removal of tree branches which directly overhang the roof of a residence or commercial building, pruned back to the nearest branch junction or collar to remove from the roofline. Detached garages, carports and ancillary buildings are not included (Note: Pruning must be consistent with the Australian Standard for Pruning of Amenity Trees (AS4373-2007) and must not result in a detrimental impact to the future health or stability of the tree or compromise the form of the tree.

ii) Minor pruning
-pruning of trees and other vegetation provided:
- branches pruned, are not more than 50mm in diameter, and
- roots pruned are not more than 50mm in diameter. Note: Pruning is consistent with the Australian Standard for Pruning of Amenity Trees (AS4373-2007)

iii) Removal of dead wood
- removal of completely dead branches attached to a tree (s) and other vegetation within the property. Note: Pruning is consistent with the Australian Standard for Pruning of Amenity Trees (AS4373-2007)

iv) Dead or dying trees and other vegetation
-removal of completely dead or dying trees and other vegetation.

3. The removal of a tree(s) which is structurally unsound and/or unstable, which displays a high degree of hazard, provided that prior to any work being carried out, Council has advised that applicant of its satisfaction that the

subject tree(s) is posing an imminent risk to human life or property. Note: An arborists report and testing may be required for significant trees.

KDCP 2021 identifies a small portion of land, in the northeast corner of the site, as a 'Landscape Remnant'. This area is subject to Clause 6.3 Biodiversity Protection of the KLEP 2012, which has the objective of protecting, maintaining and improving the diversity and condition of native vegetation and habitat. Council's controls for Landscape Remnants, set out in Section 18.4 of the KDCP 2021, are as follows:

1. Avoid locating development on land identified as - Landscape Remnant on the Greenweb map.
2. Vegetation retention and rehabilitation on sites that include land identified as Landscape Remnant must be designed to improve connectivity with existing vegetation and habitat.
3. Planting within land identified as Landscape Remnant on the Greenweb map is to consist of:
   i) not less than 50% locally native species;
   ii) species that reflect the relevant vegetation communities within the area; and
   iii) a mix of groundcover, shrubs and trees, and is to exclude monocultures.
4. Where the site contains high species diversity or is dominated by weeds within any stratum, preparation of a Vegetation Management Plan by a suitably qualified person may be required. This plan must identify ongoing initiatives to preserve, protect and promote the environmental values of the land.

An area of 'Canopy Remnant' is identified along Archdale Walk. KDCP 2021controls are as follows:

1. Retain trees identified as Canopy Remnant on the Greenweb map
2. Planting within land identified as Canopy Remnant is to consist of:
   i) not less than 30% locally native species;
   ii) species that reflect the relevant vegetation communities within the area; and
   iii) a mix of groundcover, shrubs and trees and is to exclude monocultures.

Additionally, the Industry Specific SEARs issued for this project, identify the following key issues in relation to Trees and Landscaping.

- Assess the number, location, condition and significance of trees to be removed and retained and note any existing canopy coverage to be retained on-site.
- Provide a detailed site-wide landscape plan, that:
  - details the proposed site planting, including location, number and species of plantings, heights of trees at maturity and proposed canopy coverage.
  - provides evidence that opportunities to retain significant trees have been explored and/or informs the plan.
  - demonstrates how the proposed development would:
    - contribute to long term landscape setting in respect of the site and streetscape.
    - mitigate the urban heat island effect and ensure appropriate comfort levels on-site.
    - contribute to the objective of increased urban tree canopy cover.
    - maximise opportunities for green infrastructure, consistent with Greener Places.

1.4 Conduct and Author Qualifications

This report has been prepared by Christina Kanellaki Lowe and reviewed by Robert Smart, (AQF Level 5) Consulting Arborists, qualified to provide arboricultural assessment and advice. Furthermore, Robert Smart is a member of the International Society of Arboriculture - Australian Chapter, a Registered Consulting Arborist with Arboriculture Australia and a licenced Quantified Tree Risk Assessment practitioner, with 25 years' experience in managing trees in complex development sites.

Arterra provides specialist consulting arborist services only; and does not provide any physical tree services such as climbing, pruning, removal, root investigations or root pruning. Our advice is based on impartial professional assessment, as we do not derive any financial benefit from specifying pruning or other physical arborist services. We do not specify any such activities unless we determine them to be essential to ongoing tree health or stability.

1.5 Key Definitions and Abbreviations

The following abbreviations are used throughout this report.

Tree Protection Zone (TPZ)

The TPZ is defined by the Australian Standard AS 4970 – "Protection of Trees on Development Sites" as a nominal minimum area above and below ground, at a given distance from a tree trunk, required for the protection of the tree. In summary the standard applies the calculation for the radius of the TPZ as 12 x (the tree trunk diameter (in metres) calculated at breast height (DBH)). DBH is taken at 1.4m above ground level.

Most importantly, it represents the extent of the root zone required to be left undisturbed in order to maintain a healthy and viable tree. It should be noted that roots will usually extend well beyond this zone, so this represents the minimum remaining root zone required, assuming all others are lost or damaged due to construction. It is typically calculated as a circle centred on the trunk unless existing site conditions can be assessed and indicate otherwise.

In order to ensure the long-term survival and growth of any tree to be retained on the development site, a suitable area is required to be protected around the tree. This area should typically be as large as possible. It should also take into consideration:

- the size and age of the tree;
- above and below-ground properties;
- the health and condition of the tree;
- the species of tree and its tolerance to disturbance;
- soil conditions, type, depth and site hydrology; and
- site-specific conditions and any existing obstructions to root development.

A maximum TPZ radius will be 15m (unless crown protection is required) while the minimum TPZ radius shall be 2m. The TPZ is typically assumed to be radial and centred on the centre of the tree's trunk unless other site factors or tree canopy size and location dictate an adjustment. Encroachments of up to 10% of the area may be accepted within the TPZ as long as it is outside of the Structural Root Zone (SRZ). This is known as a "minor encroachment". Encroachments greater than this, known as "major encroachments ", will only be accepted with additional specific evidence that the tree will not be unduly impacted. Whenever an encroachment is made into a TPZ, a suitable compensation should be made elsewhere and physically contiguous to the remaining TPZ.

Tree Protection Area (TPA)
Based on the nominal TPZ described above, the TPA is a consolidated and often simplified area to be applied during construction for tree protection. This area is often shaped to deal with practical construction realities whilst maintaining appropriate protection of the nominal TPZ (i.e fencing a nominal circular TPZ can be difficult and impractical. TPA areas often define a square or rectangular shape which includes the area calculated as the nominal TPZ). It often amalgamates and simplifies tree protection zones, particularly when they are overlapping and can be amended for items such as buildings, walls, pathways and existing fences. It also protects areas that are contiguous to the calculated nominal TPZ, which are to be applied when the nominal TPZ is not completely circular due to structures potentially impeding root growth, or when there is a necessary incursion calculated within the TPZ.

Structural Root Zone (SRZ)
The SRZ is defined by AS 4970 – "Protection of Trees on Development Sites" as the area immediately around the base of the tree at a given distance from the trunk within which the woody roots and soil cohesion are considered vital to the structural stability of the tree. Disturbance, damage or removal of soil and roots within this area will typically render the tree unstable and require its removal. It is typically calculated as a circle, centred on the trunk, unless existing site conditions can be assessed and indicate otherwise.

Diameter at Breast Height (DBH)
This is the diameter of the trunk measured at 1.4m above ground level.

Diameter at Ground Level (DGL)
This is the diameter of the trunk measured at ground level, but just above any root flare.

Non-destructive Digging
This is the process of carefully excavating the ground surface to minimise the risk of damage to existing tree roots. This method is used to locate and map existing tree roots within the TPZ and/or SRZ and helps to guide and inform the installation and/or construction of proposed services and/or structures which are in close proximity to retained trees. This is often achieved through hand-digging using a shovel, trowel and/or fork with care not to damage the bark and wood of any roots. Compressed air (air spade) or water vacuum extraction are appropriate non-destructive alternatives to hand digging. Much reduced pressures may be required to avoid stripping root bark and other live tissue. When this work occurs within a TPZ and/or SRZ of a tree to be retained, a qualified consulting arborist should always be present to monitor the works.

Inclusion or Included Bark Branch Union
Growth of bark at the interface of two or more branches on the inner side of the branch union which is unable to be lost from the tree and accumulates, or is trapped, between the acutely divergent branches. This can form a weakened branch union in some species.

Epicormic Growth

Juvenile shoots produced along branches or trunks from dormant or latent buds concealed beneath bark. Production can be stimulated by fire, pruning, wounding or root damage and when excessively produced may also be an indicator of tree stress or decline.

1.6 Documents Reviewed

The following plans and documents were reviewed as part of this tree impact assessment:

LTS Lockley Surveyors

- Plan of Detail and Levels Over Lot 52 in DP2666, Lot 1 in DP1199937 & Lot 1 in DP960051 Known as "Neringah Hospital", Wahroonga, Reference No 32844 007DT Sheets 1-20 (25/07/18))

Bickerton Masters Architects - Architectural Plan Set (issued 19 October 2022)

- Floor Plan – Basement 2 - DG-03-01 rev P8
- Floor Plan – Basement 1 - DG-03-03 rev P11
- Floor Plan – Lower Ground - DG-03-03 rev P10
- Floor Plan – Ground - DG-03-04 rev P10
- Floor Plan – Level 1 - DG-03-05 rev P10
- Floor Plan – Level 2 - DG-03-06 rev P10
- Floor Plan – Level 3 - DG-03-07 rev P10
- Floor Plan – Level 4 - DG-03-08 rev P10
- Floor Plan – Level 5 - DG-03-09 rev P10

Northrop Engineers – Draft Civil Plan Set (issued 31/10/22)

- Stormwater Drainage Concept - Site Plan

Arterra must be notified of any alterations to the development proposal and drawings, so that we can advise on tree related implications before any work is undertaken.

1.7 Site Location, History and Context

The site is located in Wahroonga and is within the Ku-ring-gai LGA. It is situated on one of the highest points on the Hornsby plateau adjacent to the large masonry structure of the Wahroonga Water Reservoir. The site is characterised by reasonably significant slopes and enjoys a north-easterly aspect. HammondCare proposes the demolition and redevelopment of the existing Neringah Hospital as stage 2 of HammondCare Wahroonga project providing an integrated, contemporary aged care and seniors living campus that provides specialist cares services and a continuum of care for aging in place.

The property is located in a residential precinct and extends to two street frontages. It includes the completed HammondCare Stage 1 building and the heritage-listed Woonona Cottage, both of which address Woonona Avenue, on the western part of the site. The Stage 1 building (known as Wahroonga building) is currently operated as a 54-bed Residential Aged Care Facility (RACF) with Woonona Cottage utilised for administrative offices.

The proposed Stage 2 development area is currently occupied by the aging Neringah Hospital building, 2 car parking areas, gardens, scattered established trees, pathways and other infrastructure throughout. Neringah Hospital and its associated infrastructure are to be demolished to make way for the new buildings that will occupy the site. The construction work on the site may have a range of impacts on a variety of established trees.

Historic aerial imagery of the locality, from the 1930s, shows generous residential blocks with grand residences set amidst elegant gardens. From the 1950s onwards, the area became more closely subdivided and patches of remnant forest were gradually cleared. By 1961 the first wing of Neringah Hospital had been constructed.

1.8 Site Ownership and Zoning

The site comprises three lots: Lot 1 DP 1199937, Lot 52 DP2666, and Lot1 DP96005 with an approximate land area of 10,770m2. It is owned by HammondCare who operates an existing seniors housing and health service across the three lots. The site is zoned R4 High Density Residential, with the exception of Woonona Cottage which is zoned R2 Low Density Residential.

1.9 Methodology

Data Collection

On the 11 July 2022, R. Smart and C. Kanellaki Lowe, of Arterra, attended the site to undertake a detailed assessment of the trees within and immediately adjacent to the site, and likely to be impacted by the proposed development. The trees' health and condition were assessed via a visual inspection undertaken from the ground only. Requisite tree data (including DBH, DGL, height & canopy spread, condition & proximity to services) were recorded using an Apple iPad and Filemaker Pro database.

The basic health and condition criteria that were inspected for each tree is summarised as follows:

- tree size, broad age-class and general balance of the tree;
- canopy foliage size, colour and density;
- dieback and epicormic growth;
- trunk or branch wounding, branch tear outs and pruning history;
- structural defects such as co-dominant stems, cracks, splits, included bark, decay;
- pests and disease evidence or occurrence;
- above-ground obstructions; and
- evidence of recent site disturbance.

All trees were photographed, given a unique identification number and plotted onto a scaled base plan for referencing and identification throughout the report and for future discussions and co-ordination. The photographic record of trees and general site context was taken using the inbuilt Apple iPad camera and a Panasonic Lumix TZ220 digital camera. Files have been resized, dated, named and filed in accordance with normal office procedures and protocols. No other image manipulation has been undertaken.

Tree trunk diameters were measured using a metric diameter tape measure. Tree heights were measured using the two-point clinometer function of a Nikon Forestry Pro laser range finder. Canopy spreads were estimated by pacing out distances along the cardinal axis of the canopy and cross-referencing to survey information and aerial photos. Canopy position and extents were then altered on the plans to more accurately portray the canopy extent and position.

No specialised equipment or methods were employed to test for the extent of decay in any of the trees, apart from a nylon 'sounding' mallet. No plant samples were analysed or independently tested to verify or formally identify any pests or diseases.

The information gathered in the field was tabulated and the retention value assessed using a combination of techniques commonly used and recognised in the arboricultural industry. The tree life expectancy was established using the Safe Useful Life Expectance (SULE) system. A brief summary of these systems is provided below.

SULE

This is a system developed by Jeremy Barrell in 1993 that determines the time a tree may be expected to be retained based on its age, health, condition, safety and location. This is then moderated by the economics of maintenance or other costs of retaining the tree. A long SULE means the tree is presently expected to live longer than 40 years with minimal intervention and cost. A short SULE indicates a tree that is not expected to live longer than 5 years or may require substantial intervention or costs to retain it.

Retention Values

The proposed retention value of the trees was determined based on a considered combination of the size, age, condition and suitability of the tree. Each tree was then ranked according to one of 4 retention categories.

1. **"High" Retention Value** – these are trees that are typically in good or very good condition, large and visually prominent, historically or environmentally important. They may also be lesser quality trees, but part of an important grouping of trees. They should represent a serious physical constraint to the development and their removal avoided where possible and feasible.
2. **"Moderate" Retention Value** – these are trees that are in good to reasonable condition and should be retained where possible and feasible to do so. They may also be lesser trees, but part of an important grouping of trees and therefore warrant retention based on the group's value.
3. **"Low" Retention Value** – these are trees that are in poor condition or have structural defects, are particularly small or commonplace, are not historically, environmentally or socially significant and should not be considered as a constraint to the development. They could be retained only if they are not likely to be impacted by, or constrain potential desirable, development outcomes.
4. **"Should Remove" / No Retention Value** – these are trees that are in very poor health, exhibit poor form, or have serious structural defects, are considered weeds or combination of all these, and therefore should be considered for removal regardless of any development.

Consideration has also been given to the relationship of the trees to one another and their proximity to the likely development areas on the site. For example, trees that are part of a closely spaced group, or are likely to be significantly misshapen or unstable with the removal of surrounding trees and structures are considered with these factors in mind.

Tree Protection

TPZs and SRZs have been calculated in accordance with the formulae and criteria outlined in the Australian Standard *AS 4970-2009 Protection of Trees on Development Sites*.

Desktop Review and Research

Digital CAD files of the proposed works were imported into Arterra's standard CAD software (ArchiCAD v24) and superimposed over the tree and site survey information. The extent of site disturbance was analysed for the proposed building works, landscaping, services and other site grading. An assessment was made of the likely extent of impacts on the TPZs, taking into account the likely construction impacts depending on the type of work being undertaken (ie: cut or fill, suspended slabs, decks, service trenches). Various area calculations and measurements were made in the CAD software of the likely incursions into the TPZs or SRZs.

Recent aerial photography data was obtained from the Nearmap website with aerial photos of the site dating from December 2020 imported into the above software for cross checking and assessment. (http://www.nearmap.com/ accessed 21/06/2021)

Climatic data was obtained from the Bureau of Meteorology using statistics from the Terry Hills weather station which is approximately 8km east of the site. (http://www.bom.gov.au/climate/averages/tables/cw_066059.shtml accessed 28/09/22).

Figure 3 – View south-west from the main driveway entry on Neringah Ave South, looking across the former site of "Neringah" house. The current neat garden beds, low hedging and small trees are typical of the existing vegetation adjacent to buildings and structures. The two large Lophostemon confertus (Brush Box), seen the middle of the image are high value trees to be retained and protected. (Photo: Arterra 11/07/22)

Figure 4 – View from the south-east corner of the site, looking north-west towards HammondCare Stage 1 building. The scattered trees including the Jacaranda mimosifolia (Jacaranda) and Gordonia axillaris (Fried Egg Tree) relate to the garden of a former residence on this site. (Photo: Arterra 11/07/22)

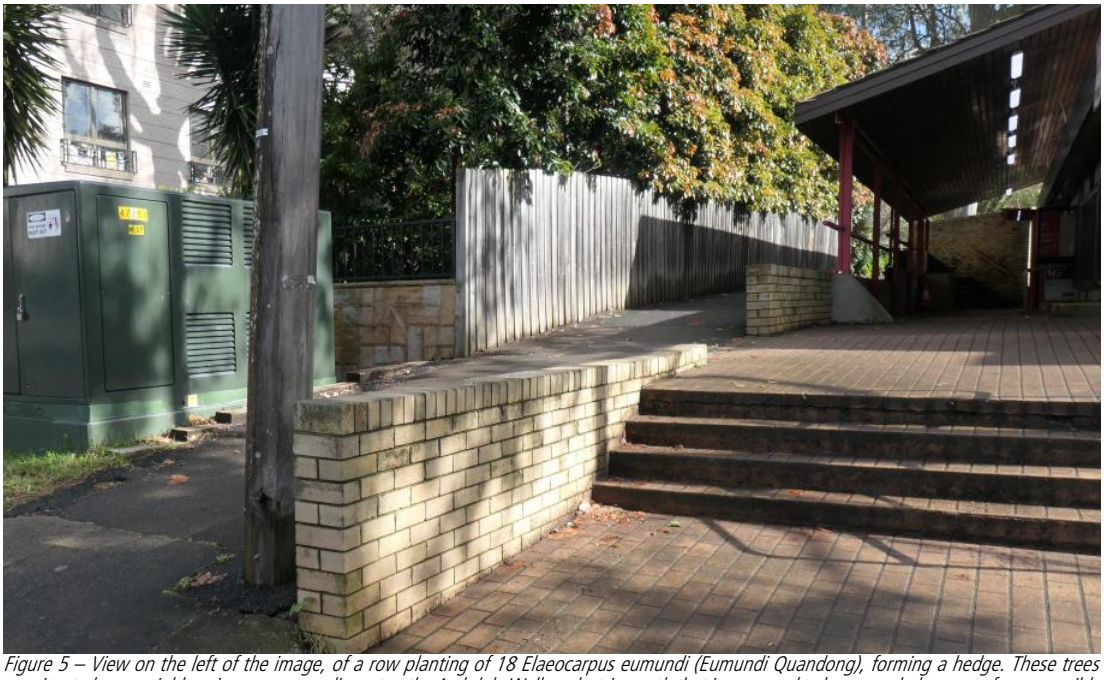


Figure 5 – View on the left of the image, of a row planting of 18 Elaeocarpus eumundi (Eumundi Quandong), forming a hedge. These trees are situated on a neighbouring property, adjacent to the Archdale Walk pedestrian path that is proposed to be re-graded as part of an accessible route from the site to the Wahroonga local centre and public transport. (Photo: Arterra 11/07/22)

Figure 6 –The remnant Angophora costata (Smooth-barked Apple) seen in the middle of the image and two Eucalyptus saligna (Blue Gum) street trees beyond on the left, are all assessed as high value trees to be retained and protected during the construction phase. (Photo: Arterra 11/07/22)

2.0 BACKGROUND, OBSERVATIONS & ASSESSMENT

2.1 The Proposed Development

The redevelopment proposal for the site is outlined in section 1.1. The proposed works will result in a major site disturbance which will have potentially significant impacts on the trees within and adjacent to the site. The proposed development will involve:

- major demolition works;
- use of large scale civil and earthmoving equipment;
- major excavations;
- access to and from the site with large trucks and construction plant;
- large stockpiles of excavated material and demolition waste;
- stockpiles/ storage of building materials;
- trenching for services;
- major building works involving general construction, concreting, painting;
- use of large cranes;
- parking for site personnel and deliveries;
- paving and retaining walls; and
- landscaping.

Key Assumptions:

- All excavations and demolition work within the defined TPAs shall be done using hand tools and or other non-destructive methods only and only under the oversight of an appropriately qualified consulting arborist. Roots of 40mm diameter or greater are not to be cut or damaged unless specifically approved by the supervising consulting arborist.
- Pedestrian paths within the TPA shall be constructed at or above the existing surface levels to minimised surface root impacts.
- Temporary battering is not to be applied into the designated TPAs.
- Despite the above, the line of disturbance outside of the building line has been typically estimated at a minimum of 1.0m from the face of the building to allow for provision of water proofing, services, access and scaffolding around the building during construction.
- All new services for the building will enter and exit from Neringah Avenue South and will typically be clear of any TPAs.
- All construction access and deliveries are to be made via existing site access from surrounding streets. Concrete will typically be pumped and will not require truck movements through TPAs.
- Where no spot levels or proposed contours are indicated it is assumed that the existing surface levels are retained.
- It is assumed that any new landscape grading within the nominated tree protection areas will be minimal and installed using high quality, imported manufactured topsoil. No cultivation of the existing soils shall be undertaken within the defined TPA.
- That retaining wall footings, when near trees, will be oriented away from the trees (ie: footings extending to the front of the face of the wall).
- Demolition and or excavations within a defined TPA will be under the supervision and direction of the project arborist.

2.2 Existing Tree Population and Assessment

A total of 141 trees were assessed initially, as part of the preliminary arboricultural assessment, which included 30 trees within Archdale Park. As the design development progressed it became clear that the Archdale Park trees would be well beyond the works area and any potential impact from construction.

This AIA therefore focuses on the following 113 trees:

- 94 trees relate to the site or the immediately adjacent streets and neighbouring properties.
- 19 trees (at No. 14-18 Coonanbarra Road, Wahroonga) that are some distance from the site, situated adjacent to the section of Archdale Walk requiring re-grading.

Detailed information on each (tree including heights, trunk diameters, canopy spreads, age classes and condition) is provided in Appendix 4.2.

The tree population of the HammondCare site is consistent with the character of the wider Kur-ring-gai Council area. The site enjoys two separate street frontages, enhanced by numerous mature exotic and native street trees. Woonona Avenue includes plantings of the deciduous *Liquidambar styraciflua*, (Liquidambar) while Neringah

Avenue South, also planted with deciduous exotics, has some significant native *Eucalyptus saligna* (Sydney Blue Gum) and a very large *Angophora costata* (Smooth-barked Apple) within the vicinity of the site.

T32, an *Angophora costata* (Smooth-barked Apple) at the north-east part of the site, has been identified for its biodiversity value, as a species reflective of the critically Endangered Ecological Community – Sydney Blue Gum High Forest. (EEC).

Tree T1 and T3 *Lophostemon confertus* (Brush Box) are two of the older trees on the site and appears to have been planted pre 1940s, as part of the former residential garden in this part of the site. Tree T63, a *Cupressus cashmeriana* (Kashmir Cypress) is historically associated with Woonona Cottage and can be clearly distinguished as a large tree in the 1943 aerial image (Figure 10). These three trees, together with the more recent T66 *Cedrus deodara* (Himalayan Cedar) are mature trees contributing to the setting of the historic house.

The site currently has an existing canopy cover of 1663m^2, which is approximately 15.5% of the site. 1052m^2 of the existing canopy cover is proposed to be retained, representing approximately 10% of the site area. The landscaping proposal aims to increase the canopy cover to greater than 25% of the site area.

The following is a summary of the Retention Value of the 113 trees assessed and included within this report. These are the trees that would be considered 'prescribed trees' under the Council's DCP. Small trees, shrubs (<3.5m) and dead trees have typically not been included in our assessment. Tree retention values for all trees surveyed are included in the Schedule in Appendix 4.2 and Tree Data Summary Sheets at Appendix 4.3.

Table 1 – Tree Retention Values

Tree Retention Values	No. of Trees
High	14
Moderate	55
Low	38
Very Low/Should Remove	6
TOTAL	**113**

Table 2 – High Retention Value Trees – By Species (including street trees)

Species Name	Common Name	Number of Trees
*Eucalyptus saligna***	**Sydney Blue Gum**	4
Liquidambar styraciflua	**Liquidambar**	3
*Angophora costata***	**Smooth-barked Apple**	2
Lophostemon confertus	**Brush Box**	2
Cedrus deodara	**Himalayan Cedar**	1
Cupressus cashmeriana	**Kashmir Cypress**	1
Quercus palustris	**Pin Oak**	1
	TOTAL	**14**

** Locally Endemic Native Species

Table 3 – Species Distribution – Top Five Species by Prevalence (including street and neighbouring trees)

Species Name	Common Name	Number of Trees	% Total Population
Eleocarpus eumundii	**Blueberry Ash**	21	19%
Liquidambar styraciflua	**Liquidambar**	17	16%
Gordonia axillaris	**Fried Egg Tree**	11	10%
Pyrus calleryana cv.	**Callery Pear**	10	9%
Magnolia grandiflora	**American Bull Bay Magnolia**	5	4%

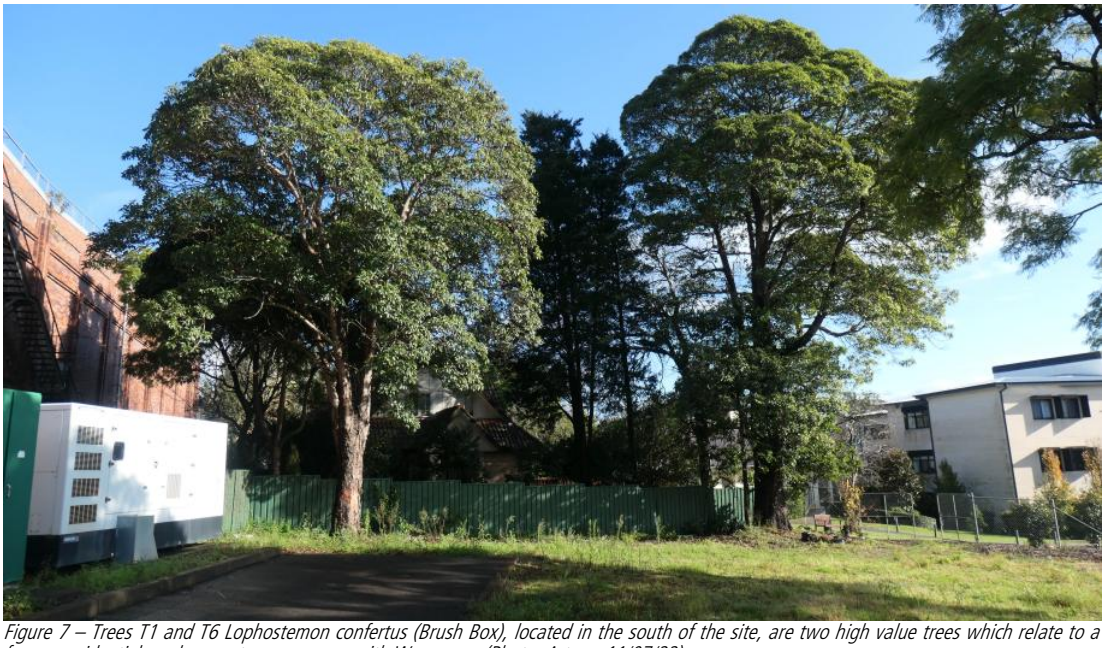


Figure 7 – Trees T1 and T6 Lophostemon confertus (Brush Box), located in the south of the site, are two high value trees which relate to a former residential garden, contemporaneous with Woonona. (Photo: Arterra 11/07/22)

Figure 8 – Tree T63 Cupressus cashmeriana (Kashmir Cypress), seen on the right of the image, is assessed as having high significance for its contribution to the setting of Woonona Cottage, representing the only remaining tree in the former 'front' lawn and garden. T1, discussed in the previous figure, can be seen here contributing to the setting of Woonona and forming a backdrop for the historic house when viewed from Woonona's garden – at the western end of the proposed pedestrian access route. (Photo: Arterra 11/07/22)

2.3 Outline History of the Site and its Trees

The Darramuragal or Darug people are the earliest inhabitants of the place known as Ku-ring- gai. There are few traditional stories remaining about the sites and landscapes of Ku-ring-gai, however evidence of Aboriginal occupation remains in scattered rock art and archaeological deposits.

The first Europeans to live in the Wahroonga area were associated with timber-getting. They undertook extensive clearing of land, which was later established as orchards. Development of the district was limited until the railway between Hornsby and Milsons Point was completed in 1893. The Federation period brought a sharper increase in urban development which was almost entirely residential and took the form of grand houses and small weatherboard cottages (http://dictionaryofsydney.org/entry/wahroonga).

Review of the earliest available aerial imagery from 1930, shows a pattern of development along Woonona Road of grand residences set in large, landscaped grounds with some remnant patches of dense forest. On the subject site, Woonona Cottage dating from the early 1900s, is set within a generous garden, including an open lawn and a large group of mature trees. The building is sited at the southern part of the property with its primary façade addressing the garden to the north. The remainder of the subject site is occupied by other, similar residential

blocks to the north and east of Woonona Cottage, including "Neringah" house (formerly "The Haining"). In the far northeast of the site is what appears to be the dense canopy of remnant forest, which was progressively cleared through the 1950s to 60s.

Further reduction of Woonona's gardens is evident in the 1961 aerial, where the substantial group of trees to the northwest has been replaced by a new residence, which in turn was replaced by the present Wahroonga Residential Aged Care building. Woonona Cottage has become disconnected from its former generous grounds, and its present-day curtilage is reduced to the immediate surrounds of the house. By 1961, the garden setting of "Neringah" house had also been largely replaced by 'hospital' buildings.

Figure 9 – 1930 – Aerial image showing Woonona Cottage and other large residences, to the north and east, including "Neringah" house. At the furthest northeast part of the site, a dense mass of remnant forest is visible. (Photo: NSW SpatialServices)

Figure 10 – 1943 – This aerial image clearly depicts Woonona Cottage set in a garden with lawn area and many trees, some of which may be remnants of the endemic forest. A similar garden setting surrounds the residence at the south-eastern part of the site. The two present-day Lophostemon confertus (Brush Box) trees in this part of the site, may well relate to this former residential garden. "Neringah" house is clearly visible, with its eastern lawn and garden, and new buildings introduced to its south and west. The north-eastern part of the subject site still retained a dense forest covering. By this time, the substantial water reservoir had been constructed. (Photo: NSW SpatialServices)

Figure 11 – 1951 – The pattern of shadows cast by the trees at the north-eastern part of the site suggest they are indeed tall trees and supports the idea they are remnants of the Blue Gum High Forest endemic to the site. The area of the carpark in the north-east part of the site has been cleared of trees, however there is evidence of what appears to be trees T32, T46, T47 and T48 (which are identified as remnant trees to be retained). A tree visible at the north-west corner of Woonona Cottage may be the present-day Cupressus cashmeriana (Kashmir Cypress). (Photo: NSW SpatialServices)

Figure 12 – 1961 – The current Neringah Hospital building has been constructed and "Neringah" house has been surrounded on three sides. By this time the local area is showing more intensive development and there is no remaining dense tree cover on the site. The dense group of trees at the northern end of Woonona's garden is largely gone, having been replaced by a new building. (Photo: NSW SpatialServices)

Figure 13 – 1978 – The site retained its 1960s configuration for many years until the HammondCare Stage 1 development took place, transforming the site to its current arrangement. (Photo: NearMap)

Figure 14 – 2002 – The site retained its 1960s configuration with a notable change being the demolition of the residence in the south-east. The small group of trees remaining in this part of the site relate to the former residence. The group of trees on the east of "Neringah" house are not visible in the 1961 aerial and would seem not to relate to the residential phase of the house. (Photo: NearMap)

Figure 15 – Early 2014 – The start of demolition for the HammondCare Stage 1 development is seen in the top right of the image. (Photo: NearMap)

Figure 16 – Late 2014 – Note the continued demolition for Stage 1. (Photo: NearMap)

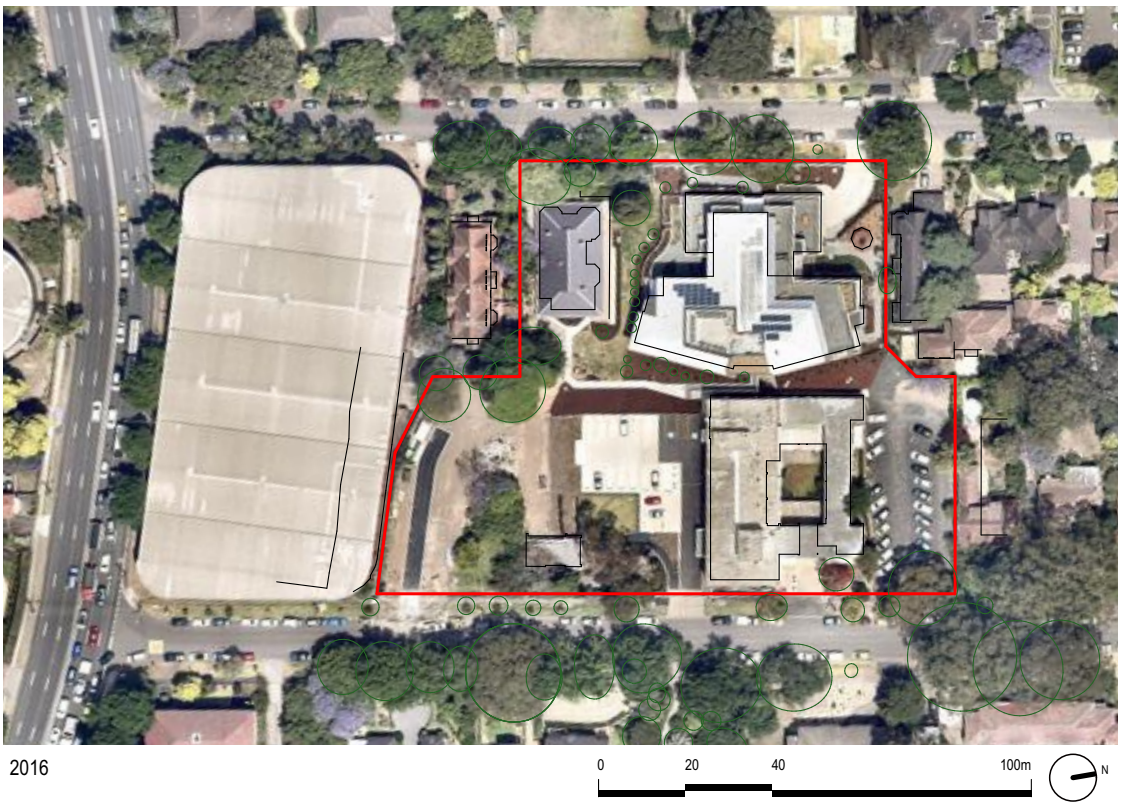


Figure 17– Late 2016 – The site - Stage 1 development is now completed and "Neringah" house has been demolished. Services infrastructure and an access road have been added in the south-east of the site. (Photo: NearMap)

2.4 Climate and Microclimate

Wahroonga is an upper north shore suburb of Sydney. As part of a temperate climate, it enjoys moderate temperatures and good rainfall. The site is approximately 8km from the Bureau of Meteorology weather station at Terry Hills, from where the following climate data is sourced (CSIRO, Bureau of Meteorology).

This area of Sydney has a mean annual rainfall of 1102mm, most falling during late Summer, with the highest rainfall period being during March with mean rainfall of 190.2mm. The driest month is May with mean rainfall of 54.5mm. Maximum average daily temperatures range from 26.8ºC in January to 16.3ºC in July. The minimum average daily temperatures range from a high of 18.5ºC in January down to 7.8ºC in July. The strongest winds (>40km/hr) are experienced during summer afternoons and are generally from the east. Winter winds are predominantly from the west (north-west to south-west) and strongest during the morning.

The site has a north-easterly aspect. This combined with the substantial and solid bulk of the Wahroonga water reservoir provides some buffer from cold and stronger south-westerly winds in winter. There are no other significant microclimatic influences over the site.

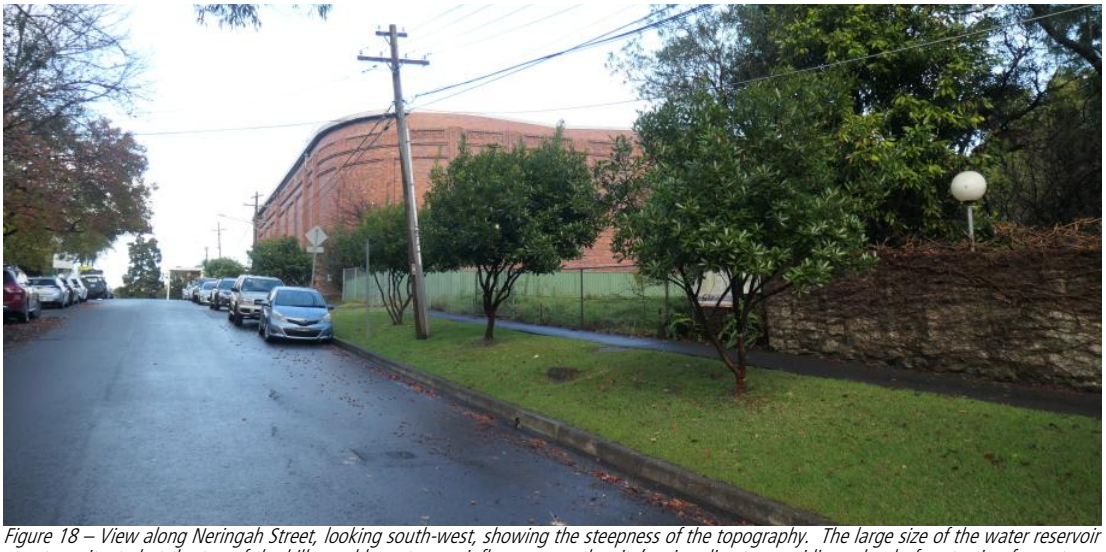


Figure 18 – View along Neringah Street, looking south-west, showing the steepness of the topography. The large size of the water reservoir structure situated at the top of the hill, would exert some influence over the site's microclimate, providing a level of protection from strong winds blowing from the south. (Source: Arterra 11/07/2022)

2.5 Landform, Natural Soils and Vegetation

The site falls within the mapping of the Glenorie Soil Landscape Association which occurs extensively around Wahroonga and Turramurra and typically occurs on the adjacent broad plateaus and ridge tops associated with much of Ku-ring-gai, Hornsby and Ryde. These soils are often related to the remnants of highly weathered shales of the Wianamatta Shale Group.

Typically, these soils are moderately deep Red or Brown Podzolic Soils, where the boundary the between topsoil and subsoils is relatively clear. They are friable loamy soils, with generally low fertility and are usually acidic. Due to their higher clay content these soils can have good capacity for nutrient and water-holding. A key concern is that both topsoil and subsoil can become very hard setting and subject to severe compaction, particularly if trafficked when moist. They may also be subject to localised waterlogging and their acidity can lead to some aluminium toxicity issues for plants.

Figure 19 – Soil sample, showing a relatively deep topsoil layer to 600mm, and an underlying subsoil of heavy clay. (Source: Arterra 11/07/2022)

Figure 20 – Eucalyptus saligna (Sydney Blue Gum) street trees on Neringah Avenue South are identified as remnants of the Blue Gum High Forest that the site was formerly vegetated with. (Source: Arterra 11/07/2022)

A representative soil sample was taken in the field immediately adjacent to tree T32, the large *Angophora costata* (Smooth-barked Apple) which is a focus for retention and protection due to its ecological significance. The results this sample indicated a deep podzolic soil with extensive topsoil layer down to 600mm. The auger experienced refusal at 600mm, assumed to be due to the presence of underlying tree roots.

A sample of the topsoil, taken at a 150-200mm depth, showed a soil structure that was moderately pedal with fine to medium sub angular blocky peds. The soil texture was between a clay loam to sandy clay with the colour being very dark brown. The soil was pH weakly acidic with a pH of 5.5-6.0. There was change from the A to B horizons at around 350-400mm depth. The subsoil from a depth of 600mm was also sampled. The subsoil structure was strongly pedal with medium to coarse sub angular blocky peds. The soil texture was a heavy clay, and its colour was deep orange/brown. The soil pH was very strongly acidic at 5.0-5.5. This sample was highly reflective of the naturally occurring soils.

The natural vegetation that characterised the Glenorie Soil Landscape Association was dominated by the following representative species:

- *Eucalyptus saligna* (Sydney Blue Gum)
- *Eucalyptus pilularis* (Blackbutt)
- *Eucalyptus paniculata* (Grey Ironbark)
- *Syncarpia glomulifera* (Turpentine)
- *Eucalyptus globoidea* (White Stringybark)
- *Angophora floribunda* (Rough-barked Apple)

This vegetation is part of a tall open forest community known as Blue Gum High Forest. It has now been extensively cleared in the local area and is identified as a critically Endangered Ecological Community (EEC). A single tree on the subject site is identified as a remnant of the critically endangered Blue Gum High Forest.

2.6 Tree Biology and Tree Care Basics

Trees are dynamic living organisms and can be susceptible to damage, stress and declining rapidly if overly impacted by construction. Trees take decades to grow but can be injured and killed in a very short time frame. This is particularly due to the irreparable damage to the often shallow, extensive and unseen root systems. It is rarely possible to repair a stressed or damaged tree, after the damage has occurred. Proper protection is the key to minimising construction related impacts. Severing of roots within the Structural Root Zone (SRZ) can also lead to potentially unsafe instability of the tree as a structure.

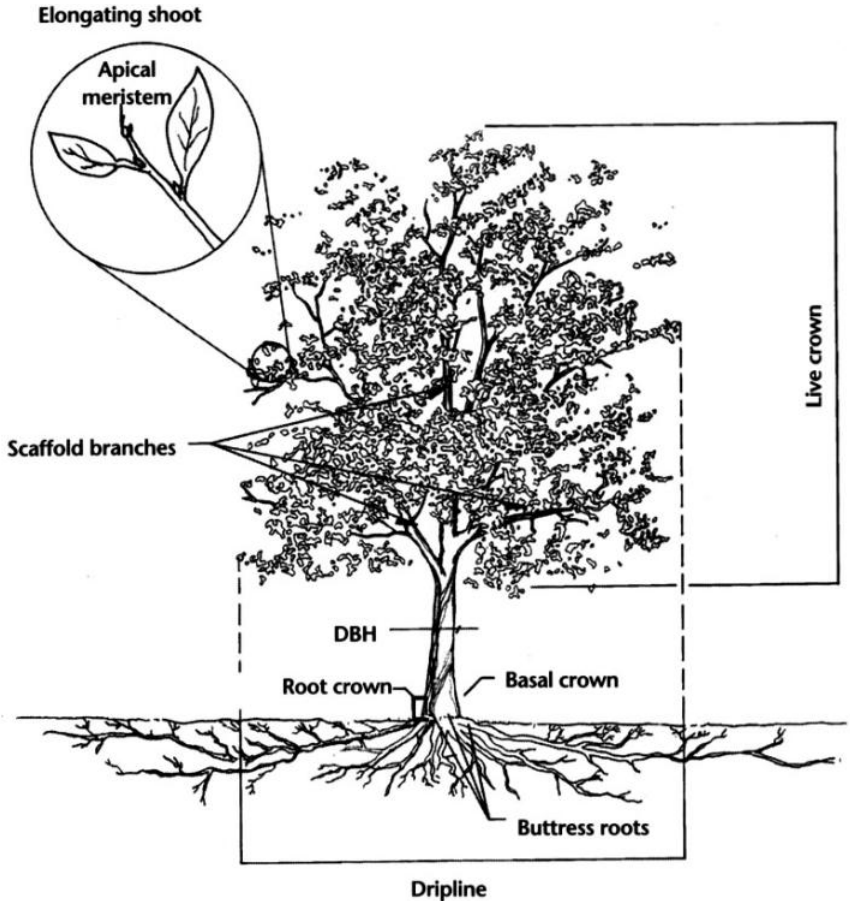


Figure 21 – Diagram of a tree illustrating the typical form, location and extent of root growth (Source: Matheny and Clark, 1998)

Basic Tree Needs

As a living organism a tree remains alive by photosynthesising its own 'food' or energy needs. The process is defined by the following chemical reaction:

Carbon Dioxide and water in combination with chlorophyll and light is converted to Glucose and Oxygen [CO_2 + H_2O + light = sugar (CH_2O [Glucose]) + O_2].

The process ultimately leads to the plant cells 'respiring' and producing energy for survival, a natural requirement for all living cells. Anything that affects a plant's photosynthesis and then cellular respiration will affect the overall plant health. The limiting factors of photosynthesis and respiration will typically be the availability of oxygen, water and nutrients for the chemical reactions that make up the important molecules.

Trees therefore have five basic requirements to survive and flourish:

1. Oxygen (and particularly oxygen within the soil);
2. Water (a cellular necessity primarily taken up by the tree roots);
3. Light & Sufficient Foliage (in order to photosynthesise and create the resources needed for cellular survival);
4. Soil (for physical anchorage and critical chemical nutrients); and
5. Physical Space (both above and below ground to grow).

Importantly, a minimum of 15% soil oxygen is required for active root growth and nutrient uptake. Less than 10% available soil oxygen starts to restrict root extension and growth and a minimum of 3% soil oxygen is required to just maintain root existence. Less than this will result in root death (Harris 1999).

The most insidious effects of construction on trees result from soil compaction or covering of root zones with impervious surfaces, which:

- Reduces infiltration rates of surface water;
- Reduces the availability of water to the roots as they cannot naturally extract remaining moisture when soil becomes too dry;
- Reduces air to roots (roots cease to function properly and die without oxygen);
- Increases soil strength by compaction which means that roots need more energy to growth through it or are unable to physically penetrate the soil;
- Physically breaks or crushes roots resulting in increased potential for fungal and pathogen attack. (Harris 1999).

Tree Tolerance

Older and larger trees are typically less tolerant of construction impacts. Different species also have different tolerance of injury and disturbance. Importantly, a tree does not "heal" from injury as animals do. Typically, any injury results in the tree expending considerable energy reserves to create new growth that "seals" and surrounds a wound and then attempting to compensate structurally and physically for any losses. Impacts to trees are therefore cumulative and a series of otherwise small and unrelated impacts can easily result in the death of a tree.

A tree that is already compromised or showing signs of stress is far less likely to tolerate construction impacts due to its lower levels of energy reserves and already weakened state. Therefore, a tree that is only in a fair condition or poor condition is less likely to tolerate construction impacts than a young tree in good or excellent condition. Weakened or stressed trees are also far less able to combat the myriad of normal environmental stresses and pathogens that are naturally imposed against them such as drought, decay, fungi, bacteria and insect pests.

2.7 Tree Impact and Removal Assessment

2.7.1 General

Arterra has been providing arboricultural advice during the design development phase of the project, ensuring that the proposal would accommodate retention of trees of High retention value and the largest possible number of Moderate retention value tree for the site and locality. Further, proactive tree management practices are recommended that allow all those trees identified for retention to remain viable throughout the construction process and continue to thrive as part of a future landscape setting for the HammondCare facility and Woonona Cottage.

The Tree Plans in Appendix 4.1 illustrate the trees to be retained and those that are proposed to be removed as part of the HammondCare Stage 2 development proposal with **81** of the total number of trees surveyed to be retained and **32** are proposed for removal. This report calculates the incursions into the root zones and canopies of retained trees and evaluates the likely impact from proposed works. A listing of incursions and likely impacts of the proposed development are set out in the Tree Impact Assessment Schedule (Appendix 4.2) and illustrated

in the Tree Plans (Appendix 4.1). The following discussion provides an analysis of tree impact data and an assessment of tree impacts, which are summarised in Table 5.

- **14** trees of **High** retention value, on or near the site, are being retained and protected as part of the proposal. These trees are distinguished by values that range from their fine form/condition, ecological value, or relationship to historic cottage on the site.
- **48** trees of **Moderate** retention value (ie 87% of Moderate value trees) are being retained and protected.
- **25** trees of **Low** and **Very Low** retention value are suggested for removal. The low/very low retention value of these trees generally relates to their poor condition or form. This includes **7** street trees on Neringah Avenue South that are proposed to be replaced with healthier and more suitable street trees.

The table below provides a summary of retention and removal of trees, tabulated in relation to their assessed retention value.

Table 4 – Summary of Retention/Removal of Trees

Tree Retention Values	Trees Retained	Trees Removed	Total Trees
High	14	-	14
Moderate	48	7	55
Low	18	20	38
Very Low/Should Remove	1	5	6
TOTAL	**81**	**32**	**113**

2.7.2 Trees to be Retained

Of the **81** trees that are to be retained and protected:

- **60** trees have no or minimal foreseeable impact from construction related activity. These trees are not discussed further.
- **2** trees **(T1) and (T6)** have a 'major encroachment' (17% and 12% respectively) into their nominal TPZs. The location of this incursion is in an area previously impacted by a building structure that has since been demolished and for previous construction site access. Other areas contiguous with the TPZ are remaining undisturbed and can compensate for the loss. The species is also known to be reasonably tolerant of root disturbances. Therefore, the incursion is considered acceptable and unlikely to adversely impact the long term condition of the tree.
- **4** trees **(T22, T28, T32, T98)** have a 'minor encroachment' (less than or equal to10%) into their nominal TPZs, as defined by AS4970-2009 – Protection of Trees on Development Sites. These encroachments are shown shaded on the Tree Protection and Removal Plan (T-03, Appendix 4.1) and noted in the schedule. The minor incursions are all considered acceptable and unlikely to adversely impact the long term condition of the trees. They are discussed in further detail below.
- A row planting of 18 small trees **(T100)** in a neighbouring property has 12 of the 18 trees with a notional TPZ encroachment that is greater than 10%. The configuration and topography of the growing area suggests that there are unlikely to be roots in this part of the nominal TPZ. This group is discussed in further detail below.
- **1** tree **(T63)** will require minor surface impacts to be managed during demolition and construction. The area of potential surface impact is shown shaded on the Tree Retention and Removal Plan (T-02) and noted in the schedule. Management of this tree is discussed below.

The following table summarises the likely impacts on trees to be retained and protected.

Table 5 – TPZ Incursions (AS4970-2009) & Surface Impacts

Tree ID	Species	Common Name	Potential TPZ incursion
T1	*Lophostemon confertus*	**Brushbox**	17%
T6	*Lophostemon confertus*	**Brushbox**	9%
T22	*Ulmus minor?*	**Field Elm?**	9%
T28	*Brachychiton acerifolius*	**Illawarra Flame tree**	9%
T32	*Angophora costata*	**Smooth-barked Apple**	8%
T98	*Quercus palustris*	**Pin Oak**	8%
T100	*18 x Elaeocarpus eumundi*	**Eumundi Quandong**	Only roots less than 40mmø expected to be encountered
T63	*Cupressus cashmeriana*	**Kashmir Cypress**	Surface impacts from path construction only

T1 and T6 *Lophostemon confertus* (Brushbox)
The two *Lophostemon confertus* (Brushbox) trees relate to the garden of a former residence at the south-eastern corner of the site. The residence was contemporaneous with Woonona and its trees reflect Federation period plantings that complement the present day setting of Woonona. The trees will be retained and protected and the incursion into the TPZ will be managed in accordance with the specifications in this report.

T1 has a 'major encroachment' (17%) into its nominal TPZ and T6 has an encroachment of 9%. The location of this incursion is in an area previously impacted by a building structure, that has since been demolished, and for previous construction site access. Other areas contiguous with the TPZ are remaining undisturbed and can compensate for the potential loss. The species is also known to be reasonably tolerant of root disturbances. Therefore, the incursion is considered acceptable and unlikely to adversely impact the long term condition of the tree.

These trees have been a focus for retention and design modifications undertaken to accommodate this. While the incursion into the nominal TPZ is calculated as greater than 10%, for the reasons discussed above it is the authors' view that the trees can be successfully retained. The following additional measures will ensure the least disturbance from construction.

- Install trunk protection as specified in the Tree Plans and the Tree Protection Specifications
- A piled basement construction method will be used to ensure there is no excavation or major re-grading beyond the piled wall.
- Excavation for first floor (Level 1) balcony near T01 and T06, will be undertaken as vertical cuts, and temporary shoring provided while the 1m height balcony wall/balustrade is constructed.
- In the area of the cantilevered building works, the underside of the slab will not be filled. Instead, natural grades will be retained under the structure over, beyond the basement walls. The portion of the structure that overhangs the T01 TPA areas, may be suspended on piles where neceesary.
- Proposed new perdestrian paving will generally be at, or above existing grades. Imported garden soil and mulch will be applied to feather out over the existing area.
- Paved areas to be constructed as a low impact, flexible brick pavement. This will be bricks laid on free-draining fill material (such a sand) and the edges retained with low impact sandstone 'log' edging, thereby avoiding the need for footings and any excessive excavation.
- TPA fencing to remain in place during major building works and may only be removed to undertake final landscape works. It is possible that part of the TPA may be outside of the TPA fencing but care shall be taken in areas designated as TPAs.

T22 *Ulmus minor?* (Field Elm?)
Neighbouring tree, at 1 Woonona Avenue, of Moderate retention value, that overhangs the site. The minor encroachment of works into the TPZ is unlikely to compromise the tree's viability, especially as it is likely for more significant roots to be located on the higher, 'tension' side of the root plate, located in the neighbouring property. Insertion of a garden in this area with additional topsoil and mulch will improve growing conditions for the tree.

T28 *Brachychiton acerifolius* (Illawarra Flame Tree)
This is a native tree of Moderate contribution. The minor encroachment of works into the TPZ is unlikely to compromise the tree's viability. Insertion of a garden in this area with additional topsoil and mulch will improve growing conditions for the tree. Protection of the future garden area against construction impacts will provide a generous root protection area.

T32 *Angophora costata* (Smooth-barked Apple)
This a locally endemic tree, and this *Angophora* has been identified for its biodiversity value, as a remnant of the critically Endangered Ecological Community (EEC) – Sydney Blue Gum High Forest. The tree also relates to the three sizeable and nearby *Eucalyptus saligna* (Sydney Blue Gum) street trees that are also part of the identified community.

This tree has been a focus for retention and suitable setbacks established in the building form to accommodate this. While there is a minor incursion of 8% in the nominal TPZ, the following specific measures for T32 will ensure that the tree is successfully retained during construction.

- A generous compensatory area of TPZ will be applied, for the extent of a large, future garden in this area. Furthermore, the garden is to be planted with species sympathetic to the Sydney Blue Gum High Forest EEC.
- No re-grading or excavation is to occur along the existing driveway for a setback distance of 9m from the street.
- The proposed driveway is to be retained largely at its current width.
- Tree sensitive construction methods and materials are to be used for the new driveway which will be maintained at or above existing levels.

- No major services such a stormwater, are to run from the building or along the northern boundary and out to the street, in the vicinity of the tree. Any services that are required shall be hand dug through the TPA, and existing roots retained and protected.

T98 *Quercus palustris* (Pin Oak)
This tree is located at 14-18 Coonanbarra Road, Wahroonga, adjacent to the Archdale Walk, opposite the Wahroonga Post Office Shop. This is a large and prominent tree situated on a surrounding ground level that is approximately 300-500mm above the existing level of the Archdale Walk pedestrian path. There is also an existing timber sleeper retaining wall beneath the adjoining residential fence which is expected to have directed surface roots to run preferentially along the sleeper rather than under the existing path. Although the tree's nominal TPZ extends across the area of proposed regrading of the path, it is less likely for roots to be found in this area due to the conditions discussed above.

Minor re-grading of Archdale Walk is proposed to be undertaken for accessibility requirements under the Site Compatibility Certificate. Only minor excavation would be required, and most of the new concrete path will be laid on the pre-existing grades. The 8% incursion into the nominal TPZ is considered to be acceptable and any potential impacts would be close to the existing ground surface, and only involve relatively small roots. Where the re-grading feathers out to meet the existing gradient impacts are even less likely. It is unlikely that there will be significant root loss from the proposed pathworks.

The following specific recommendations for T98 will mitigate potential impacts:

- The new concrete footpath is to be designed **without** a drop down edge footing, so that depth of excavation below existing levels can be minimised.
- Demolition of existing path and excavation associated with re-grading, is to be undertaken with small scale equipment and a Consulting Arborist is to be present during the excavations to monitor works and assess any roots that are found. Smaller roots (<50mmø) may be cleanly cut to facilitate the path construction. Larger roots may need to be worked around.

T100 *18 x Eleocarpus eumundi* (Eumundi Quandong)
Row planting of 18 young trees forming a hedge. They are located at 14-18 Coonanbarra Road, Wahroonga, adjacent to Archdale Walk, opposite the Wahroonga Post Shop. Approximately 12 of these trees are located adjacent to the area proposed for actual re-grading.

As with T98 on the same property, the surrounding ground level of the hedge is situated above the existing level of the footpath and the existing timber sleeper retaining wall beneath the adjacent fence is likely to have deterred roots from growing under the existing path. The *Eleocarpus eumundi* are relatively young, with a very small trunk diameter and correspondingly small TPZ. It is not anticipated that any significant roots of the row planting will be found beneath the existing asphalt of Archdale Walk.

The recommendations set out above for T98 will apply for these trees and will ensure that any potential impacts are minimised.

T63 *Cupressus cashmeriana* (Kashmir Cypress)
This tree is growing on the eastern part of the site. It is outside of the immediate development area however is located within the proposed Pedestrian link. This is a tree of high significance, associated with the garden setting of Woonona Cottage. It will be retained and protected during construction works. Works within the TPA involve construction of a new concrete footpath for a public connection between Woonona Avenue, through to Neringah Avenue South, and beyond the site to Archdale Park.

Some minor surface impacts are expected during the construction of a new concrete footpath. The following specific recommendations for T63 will minimise potential impacts:

- The new footpath is to be constructed at or above existing levels and surface impacts are to be managed.
- Install trunk protection as specified in the Tree Plans and the Tree Protection Specifications.
- TPA fencing to remain in place during major building works and may only be removed to undertake final landscape and path works.
- The area around the tree is not to be excavated and shall be retained at existing levels.
- Removal of any existing paths shall be undertaken manually, under the supervision of the project consulting arborist.

2.7.3 Trees to be Removed
Of the 32 trees proposed for removal, 23 trees are located within the footprint of the proposed works and cannot be retained if the project is to proceed. 19 of the 23 trees are rated as having low landscape retention value or

are identified as weeds while the remaining four trees are identified as having Moderate significance. The four trees of Moderate significance, suggested for removal, are:

- T7 *Jacaranda mimosifolia* (Jacaranda)
- T8 *Acer buergerianum* (Trident Maple)
- T14 *Jacaranda mimosifolia* (Jacaranda)
- T17 a young *Buckinghamia celsissima* (Ivory Curl)

These 4 trees make a moderate contribution to the landscape and their removal represents only a minor loss in the context of the whole site. A further 9 trees, outside of the building footprint, are proposed for removal due to their poor condition, inappropriate siting or weed potential. This group includes 7 street trees on Neringah Avenue South. Loss of canopy cover resulting from tree removal will be more than compensated by the addition of new young and healthy, medium-sized trees in the proposed new landscape. It is estimated, on maturity, the new landscape proposal will raise the percentage canopy cover from its current 15.5% **to 25% cover**.

2.8 Potential Tree Related Impacts to be Managed During Construction

The main potential impacts from the proposed construction activity can be summarised as tree damage and 'reduced life expectancy' caused by the following.

- Root loss and disturbance due to inappropriate excavation for the building and services.
- Compaction of the root zone from storage or stockpiling of materials.
- Contamination of the soil from; the preparation of chemicals, wash down/ cleaning of equipment, refuelling of vehicles and dumping of waste.
- Compaction of the root zones from haul roads and the parking or use of vehicles/ plant equipment.
- Root disturbances from unauthorised cut and fill and soil level changes.
- Physical damage to the tree trunks and branches from passing machinery.
- Damage to the tree roots from landscaping and pedestrian pathway construction.

The following Section of this report provides the recommendations and proposed measures that will aim to avoid, minimise or mitigate these impacts as far as is practicably possible.

3.0 EXISTING TREE MANAGEMENT RECOMMENDATIONS

3.1 Key Recommendations to Reduce Tree Impacts

The following recommendations are made to potentially reduce the negative construction impacts on the existing trees identified to be retained.

- Ensure that all work within the identified TPAs is carried out with appropriate skill and care to limit surface impacts. If roots greater than 50mm Ø are encountered, works shall cease, and direction sought from the project arborist before proceeding further.
- Appropriately fence all TPAs outside of the already noted incursions for the duration of all major site construction work. See Appendix 4.1 Tree Plans, for locations and extent.
- Carefully control and fence access to and from the construction areas so that movement does not occur through any TPAs other than for the already identified building incursions.
- Ensure all the new above and below ground services are excluded from running through any TPAs beyond any already noted incursions.
- Minimise the re-grading of the ground surface within the identified TPAs, beyond the noted building incursions, in order to meet and match proposed pathways and other building levels. Where it is required, limit it to a maximum depth of 300mm above existing ground levels and ensure it is only quality sandy manufactured organic garden mix or other suitable site topsoils. No excavation below existing levels shall typically be allowed.
- Mulching of the entire TPAs as specified in Tree Plans. This will aid tree health with moisture retention, limit possible compaction from pedestrian traffic, and improve soil conditions within the TPAs.
- Avoid digging into existing root zones for the installation of any proposed landscaping around the trees and the installation sizes of new plants to be 5L or less to ensure that excavations are less than 200mm in depth. It is recommended to build up soil levels for any new planting areas to a maximum of 200mm to enable the new planting to occur without disturbing existing tree roots.
- Do not allow storage or stockpiling of any materials or site sheds within established TPAs unless it can be demonstrated that this will not impact tree retention, and it is specifically approved in writing by the Project Consulting Arborist.

3.2 Canopy Pruning and Methodology

3.2.1 Extent of Pruning

Some minor canopy pruning may be required to provide building clearance and pedestrian access under the trees to be retained. The following section provides a suitable canopy pruning methodology which:

- Ensures suitably qualified personnel undertake pruning works.
- Defines the supervision required for the pruning.
- Defines the work standards that are to be applied.
- Outlines the minimum standards for machinery and pedestrian access and safety protocols to be applied.

All pruning works are to be completed according to AS4373 Pruning of Amenity Trees and under the direction of the project consulting arborist.

3.2.2 Pruning Expertise

A suitably qualified Tree Contractor/Utility Arborist shall be employed to undertake the pruning and they shall be a member of Arboriculture Australia or equivalent body. They are to be employed, instructed and directly supervised in their activities by an Arborist with a minimum AQF level 4 qualification in arboriculture. The intention is to limit the pruning of the existing trees, while still allowing the appropriate provisions for construction access and future regrowth of the trees and foliage.

The Head Contractor/Development Manager is to submit to the Project Consulting Arborist the name(s), relevant qualifications, trade certificates, first aid and memberships, licenses and experience of the chosen utility arborist personnel. Where possible, and reasonable, the same Utility Arborist shall be used for all the tree pruning work on the site.

3.2.3 Canopy Pruning – Generally & Standards

The Tree Contractor shall prune only the selected branches of the protected tree and only as directed by the Project Consulting Arborist. Pruning is only to be undertaken by a suitably experienced and qualified Utility Arborist, as noted above. Work is to be in strict accordance with to AS4373 Pruning of Amenity Trees. Do not treat the resulting pruning wounds.

The Tree Contractor shall minimise the size and number of wounds resulting from all pruning and ensure the remaining canopy is balanced with appropriate foliage weight and crown distribution. They shall use only clean,

sharp pruning implements for all pruning work, ensuring that cuts are made without damage, tearing or bruising to remaining vascular tissue.

Selective and Reduction Pruning
Remove any identified branches and branchlets for the necessary pedestrian and building clearance requirements. These should be removed to a suitable internal lateral branch at least 1/3 the diameter of the branch removed or to the branch collar at the nearest stem or trunk. Also remove any dead, broken, damaged and defective branches as required. Remove any nearby crossing and rubbing branches and branches with included bark at their junction to ensure proper form and branching habit as required, but only if appropriate.

3.2.4 Pruning Access, Traffic and Pedestrian Management

Typically, all pruning work shall be undertaken from within the proposed construction site. Access to the foliage shall be from the ground using equipment with suitable reach to access the required canopy.

If required, pedestrian and vehicular access shall be redirected via alternative site entries during the course of tree work. Where tree work will result in a danger to the public, suitable signage and barricades and 'spotter' personnel shall be placed to ensure the work is undertaken safely, while pruning is occurring overhead.

The Contractor shall minimise the effect of the works on the normal access to the site and nearby properties and minimise the disruption to the normal commercial or residential activities of those properties. The Tree Contractor shall comply with all directions, in this regard, provided by the Head Contractor/ Development Manager.

3.2.5 Disposal of Pruned Tree Material

All branches and foliage that is pruned is to be chipped and removed from the site. All chipping activities shall be undertaken within the site boundaries, where feasible.

3.2.6 Monitoring and Oversight

Pruning has a direct impact on the health, structure, and viability of a tree. All pruning of live tissue results in a wound to the tree, which the tree has to attempt to seal and compartmentalise. Incorrect pruning techniques can lead to increased risk of decay and disease within the tree, much the same as a wound in animals can lead to disease and infection. Pruning of the canopy also has the consequence of removing valuable foliage, which in-turn removes an essential source of energy production from the tree. The tree will then also spend considerable reserves of energy in trying to regrow the lost foliage. Branches and trunks are also important transport and storage tissues within the tree. To limit the impacts of the required pruning:

- Only specified 'selective pruning' is to be undertaken, as specified by the project arborist. Work shall be done 'incrementally' until the appropriate pedestrian clearance is achieved.
- All pruning is to follow AS4373-2007 Pruning of Amenity Trees.

3.3 Proposed Tree Protection & Construction Activity Sequencing

The following sequence of activities should be followed for this project: -

1. A Tree Protection Specification & Plan is to be prepared and issued as part of the construction contract prior to any construction work.
2. The Project Consulting Arborist, Landscape Architect, Civil and Structural Engineers, Client and Contractor Site Foreman are to meet prior to beginning any work on the site to discuss and review all work procedures, construction access routes, stockpiling and tree protection measures (ie: fence types and locations, access, cranage points, piling methods etc.).
3. Contractors to discuss locations and type of any sediment and erosion controls (if any) and install them with minimal tree impact when within or passing through the TPA.
4. Existing pathways, fences, driveways, furniture and shrubs are to be carefully removed from within the TPA.
5. Existing surrounding trees are to be removed. Stumps are to be ground when near remaining trees to avoid the use of excavators and the like from grubbing out stumps, which may lead to damage of any intertwined roots.
6. Designated TPAs are to be mulched with 75mm of recycled hardwood woodchip mulch to improve soil conditions around tree and remain in place until future final landscaping.
7. Trunk protection to be placed on trees to be retained, where shown on Tree Protection and Removal Plans.
8. A utility Arborist is to undertake selective pruning of canopy or branches to facilitate construction of the building and provide pedestrian access clearances without accidental damage to the tree canopy. Pruning to be done in accordance with AS4373 - Pruning of Amenity Trees and performed by staff with appropriate qualifications and equipment.
9. The Construction Phase TPA is to be clearly defined and fenced off with a 1.8m high metal or plywood temporary fence prior to any further work within the vicinity of the trees as shown on the Tree Protection and Removal Plans. Any required rumble boards shall be installed to protect TPA areas where construction access is required.

10. Piling and excavation work is to be undertaken and Contractor to minimise the extent of any temporary battering when near any TPA.
11. Excavation for the balconies that occur on Level 1 that are below existing ground surfaces near T06 are to be carefully excavated using a vertical cut and temporary shoring to minimise disturbances to trees.
12. Plywood (or similar) is to be placed under any scaffolds or pedestrian works paths when they are running through any identified TPAs.
13. Building works to be completed (external).
14. Contractor to remove the TPA fencing and only then install final pathways and landscaping within the TPAs and under the trees, but only after construction of the main building exterior and all civil works are completed.

3.4 Demolition Work Near Trees or within TPAs

Demolition of paths and other structures required within a TPA shall be done with small-tracked equipment or by hand, with care to limit surface damage and disturbance of the root zone. All such work within TPAs shall be supervised and overseen by a qualified Consulting Arborist.

3.5 Tree Protection Fencing & Definition of TPAs

Establish a clearly defined tree protection zone as indicated in Appendix 4.1 Tree Plans. Install a 1.8m high temporary fence with either plywood hoarding or temporary steel mesh or chain wire fencing with adequate lateral bracing. Fencing shall comply with the requirements of AS 4687-2007 Temporary fencing and hoardings. These areas around the trees shall be delineated as a "Tree Protection Zone" during the remaining construction process, via appropriate weatherproof signage at not more than 30m spacing. Access will typically be excluded from these zones and the levels will be left largely at the existing levels with the exception of the installation of the 75mm of mulch. No stockpiling, excavation, trenching, re-fuelling or material storage should be allowed in this area.

3.6 Ground Protection within TPAs

Vehicular movement and access shall typically not be required or approved through the TPAs. If it is unavoidable and it is proposed to create any access or haul road, or similar, within the TPA of a retained tree, the Contractor shall install rumble strips / boards over the designated TPA ground surface. No excavation shall be allowed. Contractor shall first place a suitable permeable geotextile to the extent required and then a 100mm thick layer of wood chip mulch or coarse no-fines gravel over the extent to be covered with the rumble strip / boards. Then place hardwood boards (minimum 3600 x 200 x 75mm) on their flat edge, side by side, with a 30 - 50mm gap to form a rumble strip. These boards are to be held together with three galvanised metal bracing straps nailed to each board. The two outer straps are to be approximately 200mm in from the ends of the boards. The third strap is to be along the centre line of the boards.

Figure 22 – Example of acceptable Tree Protection Area ground protection (Photo: Arterra)

3.7 Trunk and Lower Branch Protection

A trunk barrier is to be erected around the circumference of the tree trunk and root buttress where shown. This barrier will consist of two to three 'rings' of 50mm diameter, socked agricultural line (ag-line) wrapped around tree trunk or branch and the ends cable tied to secure in place. A layer of battens is to be placed over and tight to the ag-lines. The battens are to have a maximum spacing of 50mm. The height of the battens is to be at least 2.4 metres or to the height of the first branches. Lower large branches may require the same protection if likely to be damaged by passing vehicles or equipment. Secure battens in place with galvanised steel bracing straps. Do

not nail or screw into or otherwise injure the trunk or bark. Battens may be made from any suitable waste timber of similar sizes and depths. All sharp or protruding edges are to be properly covered with tape or similar padding.

Figure 23 – Example of acceptable Trunk Protection batten installation. (Photo: Arterra)

3.8 Provision of Temporary Irrigation

At the sole discretion of the Project Consulting Arborist, a temporary and automated (battery powered timer is sufficient) watering system may need to be placed within the TPAs to maintain adequate water to the retained trees and help maintain their healthy condition. This can be a surface mounted 'residential-style' soaker hose and/or surface sprinkler systems. The temporary watering system is to be visible on the ground surface and water is to be delivered by spray, so that its operation can be easily sighted and verified. It should be on a designated supply line, separate from other construction related water supplies to minimise its likelihood of being disconnected.

Typically, during spring and summer months it should be set to run for a minimum of 30 minutes every day, in the early morning. During, autumn and winter months it should be set to run for 1 hour once every week. The operation can be suspended temporarily in periods of extensive and/or prolonged rain.

The system is to remain in place for the duration of construction, or until the Project Consulting Arborist approves its removal. It may be removed to allow the final landscape treatments to proceed. If accidentally disturbed or damaged by construction activities, it is to be reinstated as soon as practicable.

3.9 Final Landscaping within TPZs

Once final levels are set by the finished structural elements. The final trimming and landscaping shall be judiciously undertaken. The final pedestrian pavements shall be installed without undue excavation or compaction to the soil and all soft landscaping within the tree protection zone will be installed with care to avoid root disturbance via irrigation trenching, lighting installation and the planting of larger plants. The installation of 100-200mm of new garden mix topsoil over the pre-existing soil will provide a suitable medium in which to plant new plants without damage to existing tree roots. Permanent irrigation (if used) shall be installed as spray heads located outside of TPAs and spraying inwards. All other services such as electrical services shall also be designed and installed to avoid any excavation or trenching around the trees.

3.10 Final Building and Pedestrian Clearance Pruning

Once the final levels and finishes are in place the Project Consulting Arborist shall direct and supervise any remaining selective pruning of any lower peripheral branches to the retained trees to achieve any clearances for final pedestrian or building access. This shall be minimised as much as possible. It is anticipated that the final pruning of any of the retained trees will be less than 5% of the existing canopy and will not have any serious impact to the trees' health or habit.

The branches of the tree shall only be pruned as specifically needed and directed by the Project Consulting Arborist. Work is to be in strictly accordance with to AS4373 - Pruning of Amenity Trees. Do not treat wounds. Only clean, sharp pruning implements shall be used for all pruning work, ensuring that cuts are made without damage, tearing or bruising of the vascular tissue.

3.11 Other Tree Protection Measures to be Implemented

The following is a summary of the main measures that will be required during construction. These should be adopted for the Construction Contract and conditioned by Council.

Controlled Construction Access & Parking

Construction access points and stockpiling and storage areas shall be clearly identified and fenced where appropriate. Uncontrolled access points and parking of vehicles outside of designated areas is to be avoided. If temporary access is required through a tree protection zone, ground protection shall be employed to limit soil compaction and root damage and disturbance.

Clearing and Removal of Trees to be Removed

Removal and clearing of existing trees should be done by qualified arboricultural staff with care not to impact or damage other surrounding trees throughout the process. Existing stumps should be grubbed out or ground in a controlled fashion to remove wood that may decay and promote unwanted pathogens.

Communication - Tool Box Meetings and Construction Inductions

All contractors and subcontractors shall be inducted prior to working on the site. All inductions shall include description and identification of the Tree Protection Zones and the restriction on work and activities with regard to trees. The site foreman shall ensure that all new staff and contractors are appropriately inducted and that brief "tool box" meetings are conducted regularly to ensure Tree Protection is maintained at the forefront of all construction workers minds.

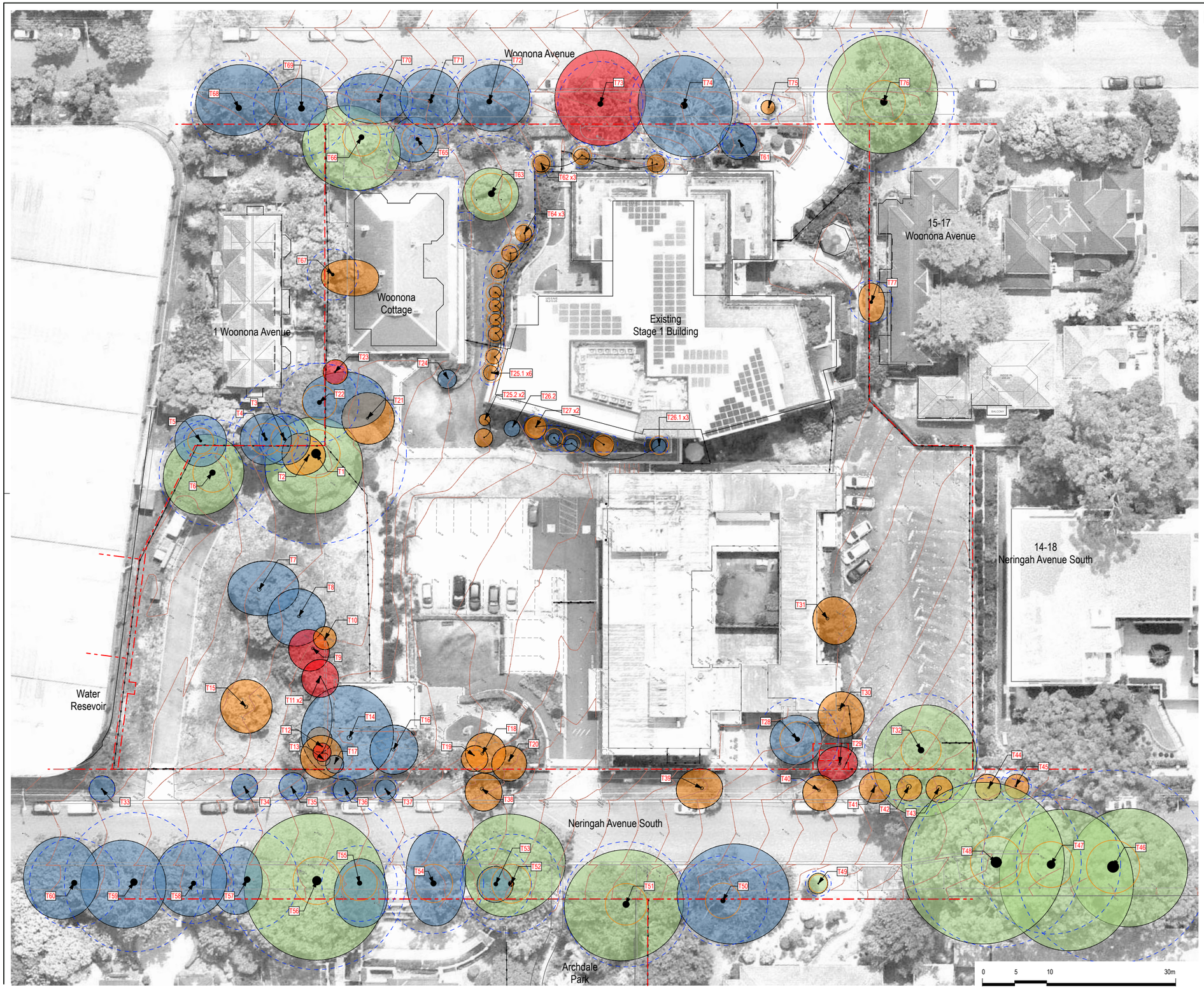
3.12 References

- CSIRO, Bureau of Meteorology, Climate statistics for Australian locations, available on http://www.bom.gov.au/climate/averages/tables/cw_066059.shtml (accessed 28 September 2022).
- Harris, R.W, Clark, J.R & Matheny, Nelda P, 1999*, Arboriculture: Integrated management of landscape trees, shrubs and vines*. 3rd Ed. Prentice Hall. New Jersey, US
- Matheny, Nelda P and Clark J.R, 1998, *Trees and development - a technical guide to preservation of trees during land development*, International Society of Arboriculture, Illinois, US.
- Roberts, J. Jackson, N. and Smith, M. 2006. *Tree roots in the built environment. No.8* Research for Amenity Trees, Dept. for Communities and Local Government, London.
- Standards Australia, 2007, *AS 4373-2007 Pruning of amenity trees*. Standards Australia, Sydney.
- Standards Australia, 2009, *AS 4970-2009 Protection of Trees on Development Sites*. Standards Australia, Sydney.
- Standards Australia, 2007, AS 4687-2007 *Temporary fencing and hoardings*. Standards Australia, Sydney.

- End of report.

4.0 APPENDICES

4.1 Tree Plans



HammondCare - Stage 2, Wahroonga - Tree Assessment Schedule

Tree ID	Trees in Group	Tree Species	Common Name	Trunk Diameter Breast Height (dbh) (m)	Trunk Diameter at base (dgl) (m)	Nominal TPZ radius (m) 12xdbh (AS 4970)	Nominal SRZ radius (m) (AS 4970)	Retention Value	Recommendation
1	1	*Lophostemon confertus*	**Brush Box**	1.17	1.34	14.04	3.74	High	Retain
2	1	*Brachychiton acerifolius*	**Illawarra Flame Tree**	0.20	0.24	2.40	1.82	Low	Remove
3	1	*Callitris glaucophylla?*	**White Cypress?**	0.30	0.35	3.60	2.13	Moderate	Retain
4	1	*Callitris glaucophylla?*	**White Cypress?**	0.42	0.50	5.04	2.47	Moderate	Retain
5	1	*Polyscias elegans*	**Celery Wood**	0.22	0.30	2.64	2.00	Moderate	Retain
6	1	*Lophostemon confertus*	**Brush Box**	0.69	0.81	8.28	3.03	High	Retain
7	1	*Jacaranda mimosifolia*	**Jacaranda**	0.54	0.57	6.48	2.61	Moderate	Remove
8	1	*Acer buergerianum*	**Trident Maple**	0.38	0.43	4.56	2.32	Moderate	Remove
9	1	*Acer palmatum*	**Japanese Maple**	0.42	0.39	5.04	2.23	Nil / Remove	Remove
10	1	*Pittosporum undulatum*	**Sweet Pittosporum**	0.18	0.27	2.16	1.91	Low	Remove
11	2	*Ligustrum lucidum*	**Broadleaf Privet**	0.20	0.25	2.40	1.85	Nil / Remove	Remove
12	1	*Acer buergerianum*	**Trident Maple**	0.15	0.20	2.00	1.68	Low	Remove
13	1	*Nerium oleander*	**Oleander**	0.65	2.00	7.80	4.43	Low	Remove
14	1	*Jacaranda mimosifolia*	**Jacaranda**	0.46	0.75	5.52	2.93	Moderate	Remove
15	1	*Gordonia axillaris*	**Fried Egg Tree**	0.32	0.52	3.84	2.51	Low	Remove
16	1	*Brachychiton acerifolius*	**Illawarra Flame Tree**	0.44	0.50	5.28	2.47	Moderate	Remove
17	1	*Buckinghamia celsissima*	**Ivory Curl Tree**	0.11	0.14	2.00	1.45	Moderate	Remove
18	1	*Sapium sebiferum (syn. Triadica sebifera)*	**Chinese Tallow Tree**	0.33	0.43	3.96	2.32	Low	Remove
19	1	*Syzygium australe*	**Brush Cherry**	0.10	0.16	2.00	1.53	Low	Remove
20	1	*Syzygium australe*	**Brush Cherry**	0.20	0.28	2.40	1.94	Low	Remove
21	1	*Acer buergerianum*	**Trident Maple**	0.22	0.34	2.64	2.10	Low	Remove
22	1	*Ulmus minor?*	**Field Elm?**	0.51	0.60	6.12	2.67	Moderate	Retain
23	1	*Ligustrum lucidum*	**Broadleaf Privet**	0.18	0.25	2.16	1.85	Nil / Remove	Remove
24	1	*Magnolia grandiflora*	**American Bull Bay Magnolia**	0.10	0.15	2.00	1.49	Moderate	Remove
25.1	6	*Pyrus calleryana cv.*	**Callery Pear**	0.14	0.15	2.00	1.49	Low	Retain
25.2	2	*Pyrus calleryana cv.*	**Callery Pear**	0.14	0.15	2.00	1.49	Low	Remove
26.1	3	*Magnolia grandiflora*	**American Bull Bay Magnolia**	0.10	0.14	2.00	1.45	Moderate	Retain
26.2	1	*Magnolia grandiflora*	**American Bull Bay Magnolia**	0.10	0.14	2.00	1.45	Moderate	Remove
27	2	*Pyrus calleryana cv.*	**Callery Pear**	0.11	0.15	2.00	1.49	Low	Retain
28	1	*Brachychiton acerifolius*	**Illawarra Flame Tree**	0.53	0.63	6.36	2.73	Moderate	Retain
29	1	*Cinnamomum camphora*	**Camphor Laurel**	0.23	0.40	2.76	2.25	Nil / Remove	Remove
30	1	*Callistemon viminalis cv.*	**Weeping Bottlebrush**	0.34	0.42	4.08	2.30	Low	Remove
31	1	*Lagerstroemia indica*	**Crepe Myrtle**	0.31	0.45	3.72	2.37	Low	Remove
32	1	*Angophora costata*	**Smooth-barked Apple**	0.73	0.86	8.76	3.11	High	Retain
33	1	*Gordonia axillaris*	**Fried Egg Tree**	0.14	0.15	2.00	1.49	Moderate	Retain
34	1	*Gordonia axillaris*	**Fried Egg Tree**	0.16	0.20	2.00	1.68	Moderate	Retain
35	1	*Gordonia axillaris*	**Fried Egg Tree**	0.14	0.17	2.00	1.57	Moderate	Retain
36	1	*Gordonia axillaris*	**Fried Egg Tree**	0.10	0.12	2.00	1.36	Moderate	Retain
37	1	*Gordonia axillaris*	**Fried Egg Tree**	0.12	0.13	2.00	1.40	Moderate	Retain
38	1	*Gordonia axillaris*	**Fried Egg Tree**	0.40	0.52	4.80	2.51	Low	Remove
39	1	*Gordonia axillaris*	**Fried Egg Tree**	0.35	0.47	4.20	2.41	Low	Remove
40	1	*Gordonia axillaris*	**Fried Egg Tree**	0.30	0.40	3.60	2.25	Low	Remove
41	1	*Gordonia axillaris*	**Fried Egg Tree**	0.28	0.35	3.36	2.13	Low	Remove
42	1	*Nerium oleander*	**Oleander**	0.35	0.75	4.20	2.93	Low	Remove
43	1	*Nerium oleander*	**Oleander**	0.30	0.75	3.60	2.93	Low	Remove
44	1	*Gordonia axillaris*	**Fried Egg Tree**	0.20	0.30	2.40	2.00	Low	Remove
45	1	*Photinia x fraseri 'Robusta'*	**Photinia**	0.20	0.28	2.40	1.94	Low	Retain
46	1	*Eucalyptus saligna*	**Sydney Blue Gum**	1.40	1.68	15.00	4.12	High	Retain
47	1	*Eucalyptus saligna*	**Sydney Blue Gum**	0.90	1.18	10.80	3.55	High	Retain
48	1	*Eucalyptus saligna*	**Sydney Blue Gum**	1.10	1.58	13.20	4.01	High	Retain
49	1	*Eucalyptus saligna?*	**Sydney Blue Gum?**	0.10	0.13	2.00	1.40	High	Retain
50	1	*Ulmus parvifolia*	**Chinese Elm**	0.58	0.63	6.96	2.73	Moderate	Retain
51	1	*Liquidambar styraciflua*	**Liquidambar**	0.81	0.94	9.72	3.22	High	Retain
52	1	*Liquidambar styraciflua*	**Liquidambar**	0.64	0.81	7.68	3.03	High	Retain
53	1	*Populus nigra 'Italica'*	**Lombardy Poplar**	0.46	0.56	5.52	2.59	Moderate	Retain
54	1	*Liquidambar styraciflua*	**Liquidambar**	0.65	0.77	7.80	2.97	Moderate	Retain
55	1	*Liquidambar styraciflua*	**Liquidambar**	0.49	0.63	5.88	2.73	Moderate	Retain
56	1	*Angophora costata*	**Smooth-barked Apple**	1.15	1.30	13.80	3.69	High	Retain
57	1	*Liquidambar styraciflua*	**Liquidambar**	0.66	0.86	7.92	3.11	Moderate	Retain
58	1	*Liquidambar styraciflua*	**Liquidambar**	0.52	0.66	6.24	2.78	Moderate	Retain
59	1	*Liquidambar styraciflua*	**Liquidambar**	0.90	1.00	10.80	3.31	Moderate	Retain
60	1	*Liquidambar styraciflua*	**Liquidambar**	0.58	0.77	6.96	2.97	Moderate	Retain
61	1	*Waterhousea floribunda*	**Weeping Lilly Pilly**	0.22	0.28	2.64	1.94	Moderate	Retain
62	3	*Prunus cerasifera 'Nigra'*	**Purple-leaved Cherry-plum**	0.11	0.14	2.00	1.45	Low	Retain
63	1	*Cupressus cashmeriana*	**Kashmir Cypress**	0.75	0.90	9.00	3.17	High	Retain
64	3	*Elaeocarpus eumundi*	**Eumundi Quandong**	0.10	0.13	2.00	1.40	Low	Retain
65	1	*Nyssa sylvatica*	**Tulepo**	0.40	0.48	4.80	2.43	Moderate	Retain
66	1	*Cedrus deodara*	**Himalayan Cedar**	0.69	0.74	8.28	2.92	High	Retain
67	1	*Radermachera sinica*	**China Doll Tree**	0.33	0.40	3.96	2.25	Low	Retain
68	1	*Liquidambar styraciflua*	**Liquidambar**	0.62	0.82	7.44	3.04	Moderate	Retain
69	1	*Liquidambar styraciflua*	**Liquidambar**	0.62	0.87	7.44	3.12	Moderate	Retain
70	1	*Liquidambar styraciflua*	**Liquidambar**	0.44	0.56	5.28	2.59	Moderate	Retain
71	1	*Liquidambar styraciflua*	**Liquidambar**	0.46	0.61	5.52	2.69	Moderate	Retain
72	1	*Liquidambar styraciflua*	**Liquidambar**	0.58	0.74	6.96	2.92	Moderate	Retain
73	1	*Liquidambar styraciflua*	**Liquidambar**	0.55	0.72	6.60	2.88	Nil / Remove	Retain
74	1	*Liquidambar styraciflua*	**Liquidambar**	0.70	0.96	8.40	3.25	Moderate	Retain
75	1	*Liquidambar styraciflua*	**Liquidambar**	0.10	0.13	2.00	1.40	Low	Retain
76	1	*Liquidambar styraciflua*	**Liquidambar**	0.91	1.01	10.92	3.32	High	Retain
77	1	*Hymenosporum flavum*	**Native Frangipani**	0.28	0.40	3.36	2.25	Low	Retain
98	1	*Quercus palustris*	**Pin Oak**	0.80	0.90	9.60	3.17	High	Retain
99	1	*Cinnamomum camphora*	**Camphor Laurel**	0.75	0.85	9.00	3.09	Moderate	Retain
100	18	*Elaeocarpus eumundi*	**Eumundi Quandong**	0.12	0.15	2.00	1.49	Moderate	Retain

TREE RETENTION VALUE NOTES

The proposed retention value of the trees was determined based on a considered combination of the size, age, condition and suitability of the tree. Each tree was then ranked according to one of 4 retention categories;

1. **"High" Retention Value** — these are trees that are typically in good or very good condition, large and visually prominent, historically or environmentally important. They should represent a serious physical constraint to development and their removal avoided where possible and feasible.
2. **"Moderate" Retention Value** — these are trees that are in good to reasonable condition, with no major structural defects and could be retained where possible and feasible to do so.
3. **"Low" Retention Value** — these are trees that are of poor condition or have structural defects, are particularly small or common place, are not historically, environmentally or socially significant and should not be considered as a constraint to development. They could be retained only if they are not likely to be impacted by or constrain potentially desirable development outcomes.
4. **"Nil" Retention Value** — these are trees that are in very poor health, or poor form, or have serious structural defects, are considered weeds or combination of all these, and therefore should be considered for removal regardless of any development.

Consideration has also been given to the relationship of the trees to one another and their proximity to the likely development areas on the site. For example, trees that are part of a closely spaced group, or are likely to be significantly misshapen or unstable with the removal of surrounding trees and structures are considered with these factors in mind.

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HammondCare

Tree Retention Value Legend

- High Retention value
- Moderate Retention value
- Low Retention value (Note: no TPZ's typically shown for these trees)
- Nil Retention value (should remove) (Note : no TPZ's shown for these trees)
- Nominal Tree Protection Zone (TPZ)
- Nominal Structural Root Zone (SRZ) shown where relevant
- Extent of canopy as verified by site measure and aerial photos
- T26 Tree Identification Number

REVISION	DESCRIPTION	CHKD	DATE
P1	For SSDA Submission	RWS	13/12/22

PROJECT & CLIENT
HammondCare Wahroonga Stage 2
HammondCare

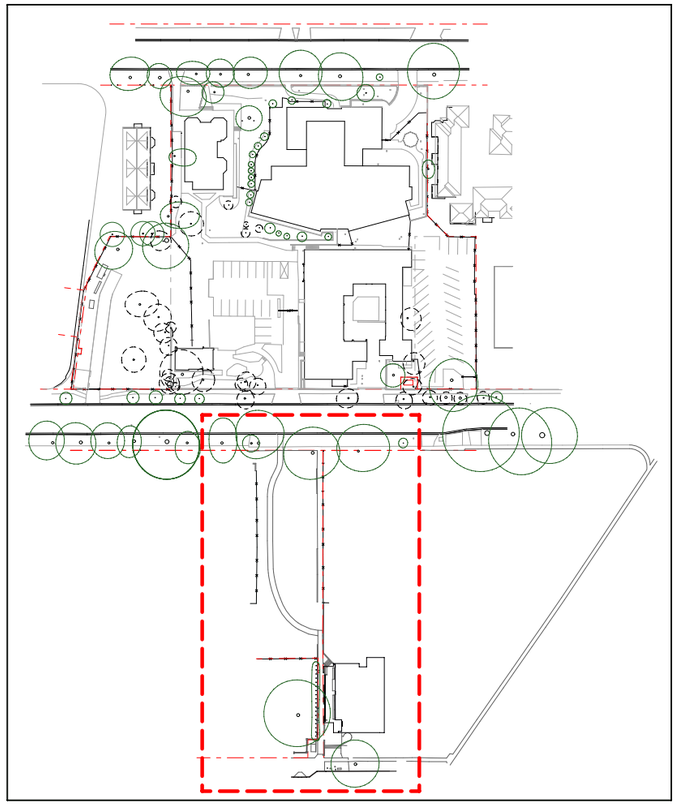
Project No : 22.12
Designed : RWS
Drawn : BT / CKL
Scale : 1:300@A1/1:600@A3
North

DRAWING TITLE
Tree Retention Value Plan

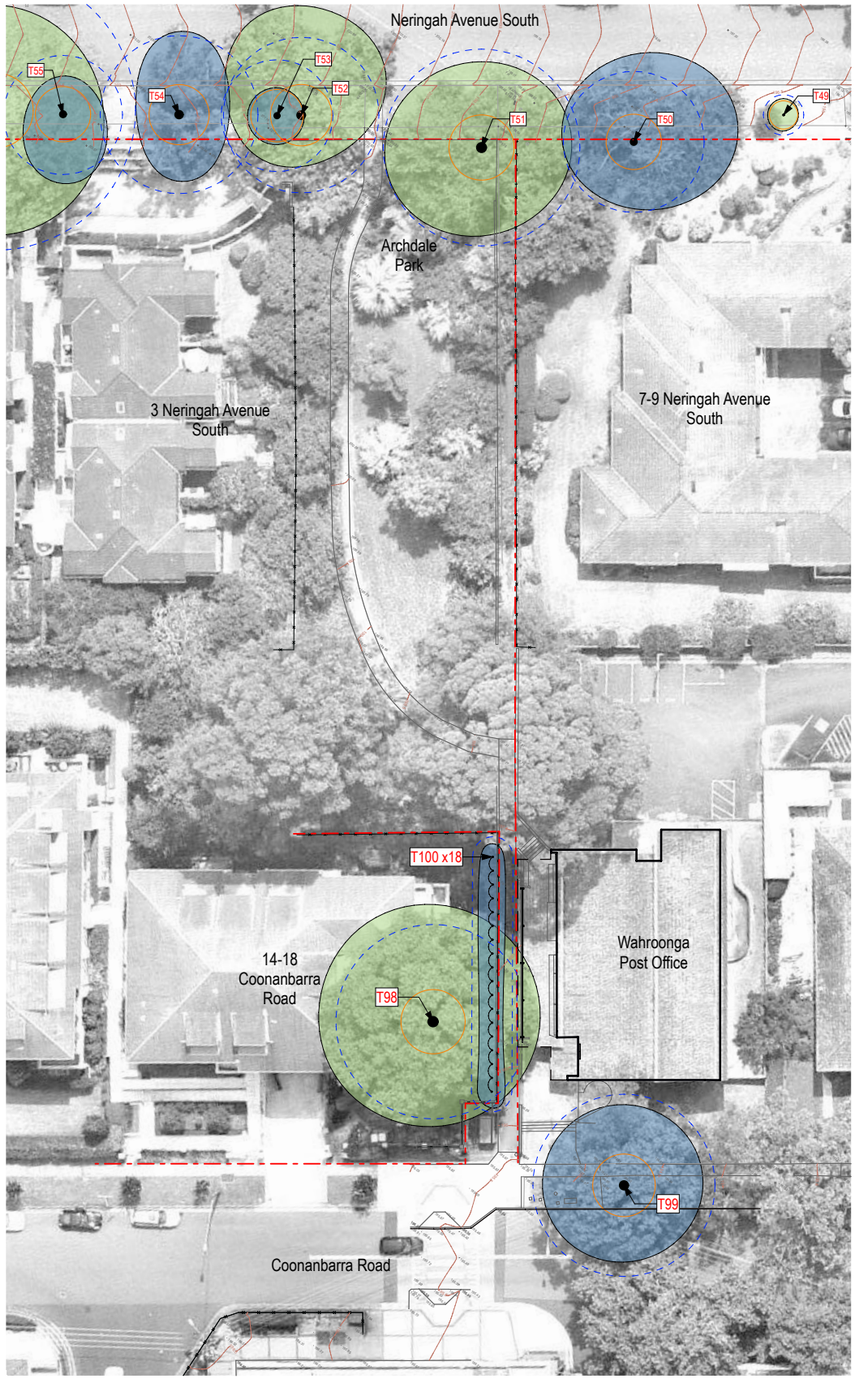
DRAWING NUMBER LT-DG-01-E0

REVISION P1

Plotted at : 6:37 pm 13/12/2022



Key Plan 1:1000



0 5 10 30m

HammondCare - Stage 2, Wahroonga - Tree Assessment Schedule

Tree ID	Trees in Group	Tree Species	Common Name	Trunk Diameter Breast Height (dbh) (m)	Trunk Diameter at base (dgl) (m)	Nominal TPZ radius (m) 12xdbh (AS 4970)	Nominal SRZ radius (m) (AS 4970)	Retention Value	Recommendation
1	1	*Lophostemon confertus*	**Brush Box**	1.17	1.34	14.04	3.74	High	Retain
2	1	*Brachychiton acerifolius*	**Illawarra Flame Tree**	0.20	0.24	2.40	1.82	Low	Remove
3	1	*Callitris gliscophylla?*	**White Cypress?**	0.30	0.35	3.60	2.13	Moderate	Retain
4	1	*Callitris gliscophylla?*	**White Cypress?**	0.42	0.50	5.04	2.47	Moderate	Retain
5	1	*Polyscias elegans*	**Celery Wood**	0.22	0.30	2.64	2.00	Moderate	Retain
6	1	*Lophostemon confertus*	**Brush Box**	0.69	0.81	8.28	3.03	High	Retain
7	1	*Jacaranda mimosifolia*	**Jacaranda**	0.54	0.57	6.48	2.61	Moderate	Remove
8	1	*Acer buergerianum*	**Trident Maple**	0.38	0.43	4.56	2.32	Moderate	Remove
9	1	*Acer palmatum*	**Japanese Maple**	0.42	0.39	5.04	2.23	Nil / Remove	Remove
10	1	*Pittosporum undulatum*	**Sweet Pittosporum**	0.18	0.27	2.16	1.91	Low	Remove
11	2	*Ligustrum lucidum*	**Broadleaf Privet**	0.20	0.25	2.40	1.85	Nil / Remove	Remove
12	1	*Acer buergerianum*	**Trident Maple**	0.15	0.20	2.00	1.68	Low	Remove
13	1	*Nerium oleander*	**Oleander**	0.65	2.00	7.80	4.43	Low	Remove
14	1	*Jacaranda mimosifolia*	**Jacaranda**	0.46	0.75	5.52	2.93	Moderate	Remove
15	1	*Gordonia axillaris*	**Fried Egg Tree**	0.32	0.52	3.84	2.51	Low	Remove
16	1	*Brachychiton acerifolius*	**Illawarra Flame Tree**	0.44	0.50	5.28	2.47	Moderate	Remove
17	1	*Buckinghamia celsissima*	**Ivory Curl Tree**	0.11	0.14	2.00	1.45	Moderate	Remove
18	1	*Sapium sebiferum (syn. Triadica sebifera)*	**Chinese Tallow Tree**	0.33	0.43	3.96	2.32	Low	Remove
19	1	*Syzygium australe*	**Brush Cherry**	0.10	0.16	2.00	1.53	Low	Remove
20	1	*Syzygium australe*	**Brush Cherry**	0.20	0.28	2.40	1.94	Low	Remove
21	1	*Acer buergerianum*	**Trident Maple**	0.22	0.34	2.64	2.10	Low	Remove
22	1	*Ulmus minor?*	**Field Elm?**	0.51	0.60	6.12	2.67	Moderate	Retain
23	1	*Ligustrum lucidum*	**Broadleaf Privet**	0.18	0.25	2.16	1.85	Nil / Remove	Remove
24	1	*Magnolia grandiflora*	**American Bull Bay Magnolia**	0.10	0.15	2.00	1.49	Moderate	Remove
25.1	6	*Pyrus calleryana cv.*	**Callery Pear**	0.14	0.15	2.00	1.49	Low	Retain
25.2	2	*Pyrus calleryana cv.*	**Callery Pear**	0.14	0.15	2.00	1.49	Low	Remove
26.1	3	*Magnolia grandiflora*	**American Bull Bay Magnolia**	0.10	0.14	2.00	1.45	Moderate	Retain
26.2	1	*Magnolia grandiflora*	**American Bull Bay Magnolia**	0.10	0.14	2.00	1.45	Moderate	Remove
27	2	*Pyrus calleryana cv.*	**Callery Pear**	0.11	0.15	2.00	1.49	Low	Retain
28	1	*Brachychiton acerifolius*	**Illawarra Flame Tree**	0.53	0.63	6.36	2.73	Moderate	Retain
29	1	*Cinnamomum camphora*	**Camphor Laurel**	0.23	0.40	2.76	2.25	Nil / Remove	Remove
30	1	*Callistemon viminalis cv.*	**Weeping Bottlebrush**	0.34	0.42	4.08	2.30	Low	Remove
31	1	*Lagerstroemia indica*	**Crepe Myrtle**	0.31	0.45	3.72	2.37	Low	Remove
32	1	*Angophora costata*	**Smooth-barked Apple**	0.73	0.86	8.76	3.11	High	Retain
33	1	*Gordonia axillaris*	**Fried Egg Tree**	0.14	0.15	2.00	1.49	Moderate	Retain
34	1	*Gordonia axillaris*	**Fried Egg Tree**	0.16	0.20	2.00	1.68	Moderate	Retain
35	1	*Gordonia axillaris*	**Fried Egg Tree**	0.14	0.17	2.00	1.57	Moderate	Retain
36	1	*Gordonia axillaris*	**Fried Egg Tree**	0.10	0.12	2.00	1.36	Moderate	Retain
37	1	*Gordonia axillaris*	**Fried Egg Tree**	0.12	0.13	2.00	1.40	Moderate	Retain
38	1	*Gordonia axillaris*	**Fried Egg Tree**	0.40	0.52	4.80	2.51	Low	Remove
39	1	*Gordonia axillaris*	**Fried Egg Tree**	0.35	0.47	4.20	2.41	Low	Remove
40	1	*Gordonia axillaris*	**Fried Egg Tree**	0.30	0.40	3.60	2.25	Low	Remove
41	1	*Gordonia axillaris*	**Fried Egg Tree**	0.28	0.35	3.36	2.13	Low	Remove
42	1	*Nerium oleander*	**Oleander**	0.35	0.75	4.20	2.93	Low	Remove
43	1	*Nerium oleander*	**Oleander**	0.30	0.75	3.60	2.93	Low	Remove
44	1	*Gordonia axillaris*	**Fried Egg Tree**	0.20	0.30	2.40	2.00	Low	Remove
45	1	*Photinia x fraseri 'Robusta'*	**Photinia**	0.20	0.28	2.40	1.94	Low	Retain
46	1	*Eucalyptus saligna*	**Sydney Blue Gum**	1.40	1.68	15.00	4.12	High	Retain
47	1	*Eucalyptus saligna*	**Sydney Blue Gum**	0.90	1.18	10.80	3.55	High	Retain
48	1	*Eucalyptus saligna*	**Sydney Blue Gum**	1.10	1.58	13.20	4.01	High	Retain
49	1	*Eucalyptus saligna?*	**Sydney Blue Gum?**	0.10	0.13	2.00	1.40	High	Retain
50	1	*Ulmus parvifolia*	**Chinese Elm**	0.58	0.63	6.96	2.73	Moderate	Retain
51	1	*Liquidambar styraciflua*	**Liquidambar**	0.81	0.94	9.72	3.22	High	Retain
52	1	*Liquidambar styraciflua*	**Liquidambar**	0.64	0.81	7.68	3.03	High	Retain
53	1	*Populus nigra 'Italica'*	**Lombardy Poplar**	0.46	0.56	5.52	2.59	Moderate	Retain
54	1	*Liquidambar styraciflua*	**Liquidambar**	0.65	0.77	7.80	2.97	Moderate	Retain
55	1	*Liquidambar styraciflua*	**Liquidambar**	0.49	0.63	5.88	2.73	Moderate	Retain
56	1	*Angophora costata*	**Smooth-barked Apple**	1.15	1.30	13.80	3.69	High	Retain
57	1	*Liquidambar styraciflua*	**Liquidambar**	0.66	0.86	7.92	3.11	Moderate	Retain
58	1	*Liquidambar styraciflua*	**Liquidambar**	0.52	0.66	6.24	2.78	Moderate	Retain
59	1	*Liquidambar styraciflua*	**Liquidambar**	0.90	1.00	10.80	3.31	Moderate	Retain
60	1	*Liquidambar styraciflua*	**Liquidambar**	0.58	0.77	6.96	2.97	Moderate	Retain
61	1	*Waterhousea floribunda*	**Weeping Lilly Pilly**	0.22	0.28	2.64	1.94	Moderate	Retain
62	3	*Prunus cerasifera 'Nigra'*	**Purple-leaved Cherry-plum**	0.11	0.14	2.00	1.45	Low	Retain
63	1	*Cupressus cashmeriana*	**Kashmir Cypress**	0.75	0.90	9.00	3.17	High	Retain
64	3	*Elaeocarpus eumundi*	**Eumundi Quandong**	0.10	0.13	2.00	1.40	Low	Retain
65	1	*Nyssa sylvatica*	**Tulepo**	0.40	0.48	4.80	2.43	Moderate	Retain
66	1	*Cedrus deodara*	**Himalayan Cedar**	0.69	0.74	8.28	2.92	High	Retain
67	1	*Radermachera sinica*	**China Doll Tree**	0.33	0.40	3.96	2.25	Low	Retain
68	1	*Liquidambar styraciflua*	**Liquidambar**	0.62	0.82	7.44	3.04	Moderate	Retain
69	1	*Liquidambar styraciflua*	**Liquidambar**	0.62	0.87	7.44	3.12	Moderate	Retain
70	1	*Liquidambar styraciflua*	**Liquidambar**	0.44	0.56	5.28	2.59	Moderate	Retain
71	1	*Liquidambar styraciflua*	**Liquidambar**	0.46	0.61	5.52	2.69	Moderate	Retain
72	1	*Liquidambar styraciflua*	**Liquidambar**	0.58	0.74	6.96	2.92	Moderate	Retain
73	1	*Liquidambar styraciflua*	**Liquidambar**	0.55	0.72	6.60	2.88	Nil / Remove	Retain
74	1	*Liquidambar styraciflua*	**Liquidambar**	0.70	0.96	8.40	3.25	Moderate	Retain
75	1	*Liquidambar styraciflua*	**Liquidambar**	0.10	0.13	2.00	1.40	Low	Retain
76	1	*Liquidambar styraciflua*	**Liquidambar**	0.91	1.01	10.92	3.32	High	Retain
77	1	*Hymenosporum flavum*	**Native Frangipani**	0.28	0.40	3.36	2.25	Low	Retain
98	1	*Quercus palustris*	**Pin Oak**	0.80	0.90	9.60	3.17	High	Retain
99	1	*Cinnamomum camphora*	**Camphor Laurel**	0.75	0.85	9.00	3.09	Moderate	Retain
100	18	*Elaeocarpus eumundi*	**Eumundi Quandong**	0.12	0.15	2.00	1.49	Moderate	Retain

TREE RETENTION VALUE NOTES

The proposed retention value of the trees was determined based on a considered combination of the size, age, condition and suitability of the tree. Each tree was then ranked according to one of 4 retention categories;

1. **"High" Retention Value** — these are trees that are typically in good or very good condition, large and visually prominent, historically or environmentally important. They should represent a serious physical constraint to development and their removal avoided where possible and feasible.
2. **"Moderate" Retention Value** — these are trees that are in good to reasonable condition, with no major structural defects and could be retained where possible and feasible to do so.
3. **"Low" Retention Value** — these are trees that are of poor condition or have structural defects, are particularly small or common place, are not historically, environmentally or socially significant and should not be considered as a constraint to development. They could be retained only if they are not likely to be impacted by or constrain potentially desirable development outcomes.
4. **"Nil" Retention Value** — these are trees that are in very poor health, or poor form, or have serious structural defects, are considered weeds or combination of all these, and therefore should be considered for removal regardless of any development.

Consideration has also been given to the relationship of the trees to one another and their proximity to the likely development areas on the site. For example, trees that are part of a closely spaced group, or are likely to be significantly misshapen or unstable with the removal of surrounding trees and structures are considered with these factors in mind.

Tree Retention Value Legend

- High Retention value
- Moderate Retention value
- Low Retention value (Note: no TPZ's typically shown for these trees)
- Nil Retention value (should remove) (Note : no TPZ's shown for these trees)
- Nominal Tree Protection Zone (TPZ)
- Nominal Structural Root Zone (SRZ) shown where relevant
- Extent of canopy as verified by site measure and aerial photos
- T26 Tree Identification Number

REVISION	DESCRIPTION	CHKD	DATE
P1	For SSDA Submission	RWS	13/12/22

arterra

ARTERRA DESIGN PTY LTD ABN 40 069 552 610
SUITE 602 / 51 RAWSON STREET, EPPING, NSW 2121
P 02 9957 2466 **F** 02 9957 3977 **W** ARTERRA.COM.AU

HammondCare

PROJECT & CLIENT
HammondCare Wahroonga Stage 2
HammondCare

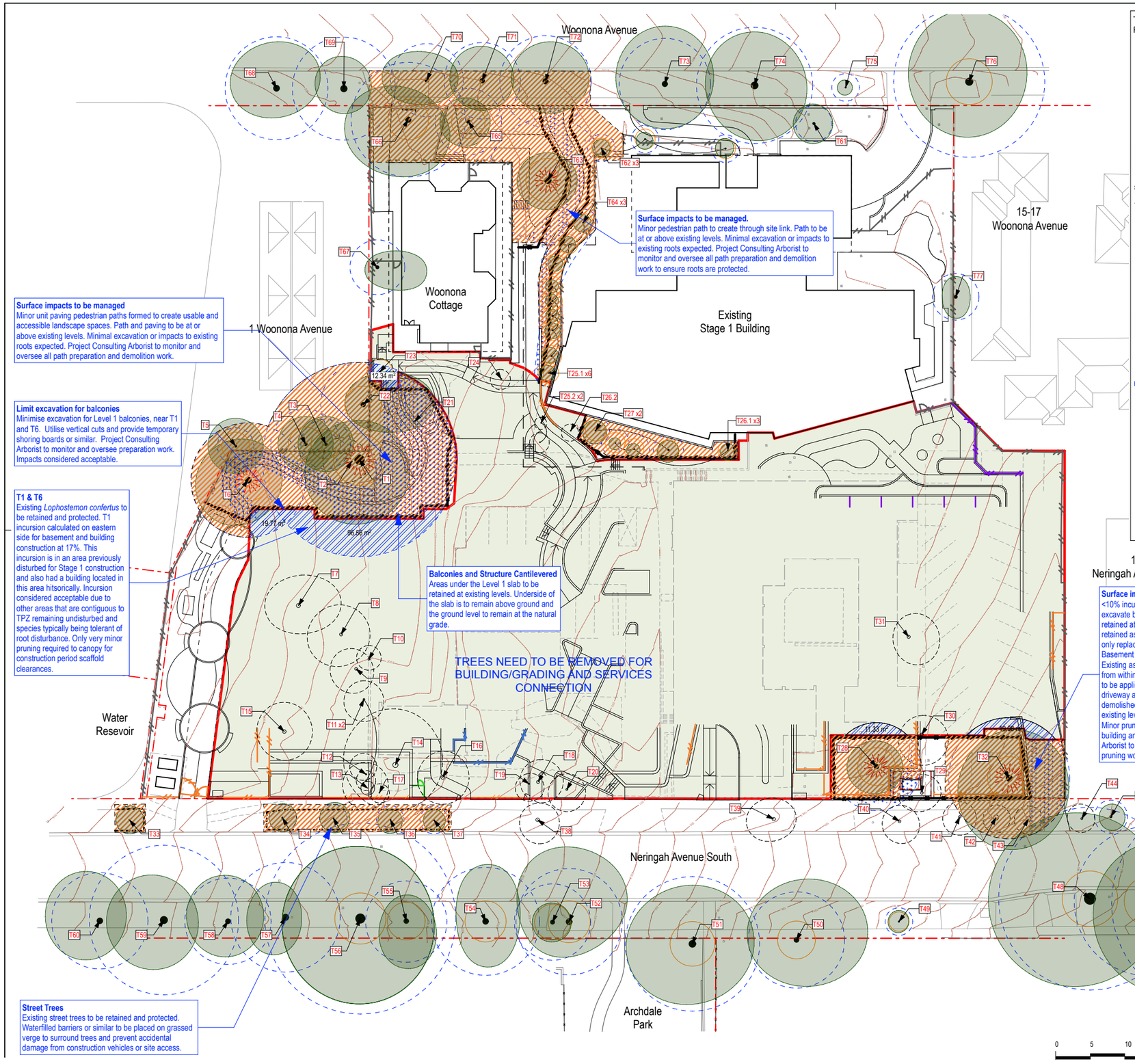
Project No : 22.12
Designed : RWS
Drawn : BT / CKL
Scale : 1:300@A1/1:600@A3
North

DRAWING TITLE
Tree Retention Value Plan - Archdale Walk

DRAWING NUMBER
LT-DG-02-A0

REVISION
P1

Plotted at : 6:37 pm 13/12/2022



Tree Impact and Protection Plan Legend

- Existing Tree Retained — Extent of canopy as verified by site measure and aerial photos
- Existing Tree Removed (Note: no TPZs shown for these trees)
- T26 — Tree Identification Number
- Construction Period Tree Protection Area - consolidated area
- Tree Protection Area Temporary Fencing
- Trunk Protection Battens to be installed
- Ground Protection- Rumble Boards to be installed
- Expected loss of roots due to excavation or trenching
- Surface impact to be managed - minimal root loss expected
- Nominal Tree Protection Zone Radius (TPZ)
- Nominal Structural Root Zone (SRZ) shown where relevant
- Proposed Future Building
- Existing building and structure to be demolished
- Extent of ground modification and disturbance

HammondCare - Stage 2, Wahroonga - Tree Assessment Schedule

Tree ID	Trees in Group	Tree Species	Common Name	Trunk Diameter Breast Height (dbh) (m)	Trunk Diameter at base (dgl) (m)	Nominal TPZ radius (m) 12xdbh (AS 4970)	Nominal SRZ radius (m) (AS 4970)	Retention Value	Recommendation
1	1	*Lophostemon confertus*	**Brush Box**	1.17	1.34	14.04	3.74	High	Retain
2	1	*Brachychiton acerifolius*	**Illawarra Flame Tree**	0.20	0.24	2.40	1.82	Low	Remove
3	1	*Callitris glaucophylla?*	**White Cypress?**	0.30	0.35	3.60	2.13	Moderate	Retain
4	1	*Callitris glaucophylla?*	**White Cypress?**	0.42	0.50	5.04	2.47	Moderate	Retain
5	1	*Polyscias elegans*	**Celery Wood**	0.22	0.30	2.64	2.00	Moderate	Retain
6	1	*Lophostemon confertus*	**Brush Box**	0.69	0.81	8.28	3.03	High	Retain
7	1	*Jacaranda mimosifolia*	**Jacaranda**	0.54	0.57	6.48	2.61	Moderate	Remove
8	1	*Acer buergerianum*	**Trident Maple**	0.38	0.43	4.56	2.32	Moderate	Remove
9	1	*Acer palmatum*	**Japanese Maple**	0.42	0.39	5.04	2.23	Nil / Remove	Remove
10	1	*Pittosporum undulatum*	**Sweet Pittosporum**	0.18	0.27	2.16	1.91	Low	Remove
11	2	*Ligustrum lucidum*	**Broadleaf Privet**	0.20	0.25	2.40	1.85	Nil / Remove	Remove
12	1	*Acer buergerianum*	**Trident Maple**	0.15	0.20	2.00	1.68	Low	Remove
13	1	*Nerium oleander*	**Oleander**	0.65	2.00	7.80	4.43	Low	Remove
14	1	*Jacaranda mimosifolia*	**Jacaranda**	0.46	0.75	5.52	2.93	Moderate	Remove
15	1	*Gordonia axillaris*	**Fried Egg Tree**	0.32	0.52	3.84	2.51	Low	Remove
16	1	*Brachychiton acerifolius*	**Illawarra Flame Tree**	0.44	0.50	5.28	2.47	Moderate	Remove
17	1	*Buckinghamia celsissima*	**Ivory Curl Tree**	0.11	0.14	2.00	1.45	Moderate	Remove
18	1	*Sapium sebiferum (syn. Triadica sebifera)*	**Chinese Tallow Tree**	0.33	0.43	3.96	2.32	Low	Remove
19	1	*Syzygium australe*	**Brush Cherry**	0.10	0.16	2.00	1.53	Low	Remove
20	1	*Syzygium australe*	**Brush Cherry**	0.20	0.28	2.40	1.94	Low	Remove
21	1	*Acer buergerianum*	**Trident Maple**	0.22	0.34	2.64	2.10	Low	Remove
22	1	*Ulmus minor?*	**Field Elm?**	0.51	0.60	6.12	2.67	Moderate	Retain
23	1	*Ligustrum lucidum*	**Broadleaf Privet**	0.18	0.25	2.16	1.85	Nil / Remove	Remove
24	1	*Magnolia grandiflora*	**American Bull Bay Magnolia**	0.10	0.15	2.00	1.49	Moderate	Remove
25.1	6	*Pyrus calleryana cv.*	**Callery Pear**	0.14	0.15	2.00	1.49	Low	Retain
25.2	2	*Pyrus calleryana cv.*	**Callery Pear**	0.14	0.15	2.00	1.49	Low	Remove
26.1	3	*Magnolia grandiflora*	**American Bull Bay Magnolia**	0.10	0.14	2.00	1.45	Moderate	Retain
26.2	1	*Magnolia grandiflora*	**American Bull Bay Magnolia**	0.10	0.14	2.00	1.45	Moderate	Remove
27	2	*Pyrus calleryana cv.*	**Callery Pear**	0.11	0.15	2.00	1.49	Low	Retain
28	1	*Brachychiton acerifolius*	**Illawarra Flame Tree**	0.53	0.63	6.36	2.73	Moderate	Retain
29	1	*Cinnamomum camphora*	**Camphor Laurel**	0.23	0.40	2.76	2.25	Nil / Remove	Remove
30	1	*Callistemon viminalis cv.*	**Weeping Bottlebrush**	0.34	0.42	4.08	2.30	Low	Remove
31	1	*Lagerstroemia indica*	**Crepe Myrtle**	0.31	0.45	3.72	2.37	Low	Remove
32	1	*Angophora costata*	**Smooth-barked Apple**	0.73	0.86	8.76	3.11	High	Retain
33	1	*Gordonia axillaris*	**Fried Egg Tree**	0.14	0.15	2.00	1.49	Moderate	Retain
34	1	*Gordonia axillaris*	**Fried Egg Tree**	0.16	0.20	2.00	1.68	Moderate	Retain
35	1	*Gordonia axillaris*	**Fried Egg Tree**	0.14	0.17	2.00	1.57	Moderate	Retain
36	1	*Gordonia axillaris*	**Fried Egg Tree**	0.10	0.12	2.00	1.36	Moderate	Retain
37	1	*Gordonia axillaris*	**Fried Egg Tree**	0.12	0.13	2.00	1.40	Moderate	Retain
38	1	*Gordonia axillaris*	**Fried Egg Tree**	0.40	0.52	4.80	2.51	Low	Remove
39	1	*Gordonia axillaris*	**Fried Egg Tree**	0.35	0.47	4.20	2.41	Low	Remove
40	1	*Gordonia axillaris*	**Fried Egg Tree**	0.30	0.40	3.60	2.25	Low	Remove
41	1	*Gordonia axillaris*	**Fried Egg Tree**	0.28	0.35	3.36	2.13	Low	Remove
42	1	*Nerium oleander*	**Oleander**	0.35	0.75	4.20	2.93	Low	Remove
43	1	*Nerium oleander*	**Oleander**	0.30	0.75	3.60	2.93	Low	Remove
44	1	*Gordonia axillaris*	**Fried Egg Tree**	0.20	0.30	2.40	2.00	Low	Remove
45	1	*Photinia x fraseri 'Robusta'*	**Photinia**	0.20	0.28	2.40	1.94	Low	Retain
46	1	*Eucalyptus saligna*	**Sydney Blue Gum**	1.40	1.68	15.00	4.12	High	Retain
47	1	*Eucalyptus saligna*	**Sydney Blue Gum**	0.90	1.18	10.80	3.55	High	Retain
48	1	*Eucalyptus saligna*	**Sydney Blue Gum**	1.10	1.58	13.20	4.01	High	Retain
49	1	*Eucalyptus saligna?*	**Sydney Blue Gum?**	0.10	0.13	2.00	1.40	High	Retain
50	1	*Ulmus parvifolia*	**Chinese Elm**	0.58	0.63	6.96	2.73	Moderate	Retain
51	1	*Liquidambar styaciflua*	**Liquidambar**	0.81	0.94	9.72	3.22	High	Retain
52	1	*Liquidambar styaciflua*	**Liquidambar**	0.64	0.81	7.68	3.03	High	Retain
53	1	*Populus nigra 'Italica'*	**Lombardy Poplar**	0.46	0.56	5.52	2.59	Moderate	Retain
54	1	*Liquidambar styaciflua*	**Liquidambar**	0.65	0.77	7.80	2.97	Moderate	Retain
55	1	*Liquidambar styaciflua*	**Liquidambar**	0.49	0.63	5.88	2.73	Moderate	Retain
56	1	*Angophora costata*	**Smooth-barked Apple**	1.15	1.30	13.80	3.69	High	Retain
57	1	*Liquidambar styaciflua*	**Liquidambar**	0.66	0.86	7.92	3.11	Moderate	Retain
58	1	*Liquidambar styaciflua*	**Liquidambar**	0.52	0.66	6.24	2.78	Moderate	Retain
59	1	*Liquidambar styaciflua*	**Liquidambar**	0.90	1.00	10.80	3.31	Moderate	Retain
60	1	*Liquidambar styaciflua*	**Liquidambar**	0.58	0.77	6.96	2.97	Moderate	Retain
61	1	*Waterhousea floribunda*	**Weeping Lilly Pilly**	0.22	0.28	2.64	1.94	Moderate	Retain
62	3	*Prunus cerasifera 'Nigra'*	**Purple-leaved Cherry-plum**	0.11	0.14	2.00	1.45	Low	Retain
63	1	*Cupressus cashmeriana*	**Kashmir Cypress**	0.75	0.90	9.00	3.17	High	Retain
64	3	*Elaeocarpus eumundi*	**Eumundi Quandong**	0.10	0.13	2.00	1.40	Low	Retain
65	1	*Nyssa sylvatica*	**Tulepo**	0.40	0.48	4.80	2.43	Moderate	Retain
66	1	*Cedrus deodara*	**Himalayan Cedar**	0.69	0.74	8.28	2.92	High	Retain
67	1	*Radermachera sinica*	**China Doll Tree**	0.33	0.40	3.96	2.25	Low	Retain
68	1	*Liquidambar styaciflua*	**Liquidambar**	0.62	0.82	7.44	3.04	Moderate	Retain
69	1	*Liquidambar styaciflua*	**Liquidambar**	0.62	0.87	7.44	3.12	Moderate	Retain
70	1	*Liquidambar styaciflua*	**Liquidambar**	0.44	0.56	5.28	2.59	Moderate	Retain
71	1	*Liquidambar styaciflua*	**Liquidambar**	0.46	0.61	5.52	2.69	Moderate	Retain
72	1	*Liquidambar styaciflua*	**Liquidambar**	0.58	0.74	6.96	2.92	Moderate	Retain
73	1	*Liquidambar styaciflua*	**Liquidambar**	0.55	0.72	6.60	2.88	Nil / Remove	Retain
74	1	*Liquidambar styaciflua*	**Liquidambar**	0.70	0.96	8.40	3.25	Moderate	Retain
75	1	*Liquidambar styaciflua*	**Liquidambar**	0.10	0.13	2.00	1.40	Low	Retain
76	1	*Liquidambar styaciflua*	**Liquidambar**	0.91	1.01	10.92	3.32	High	Retain
77	1	*Hymenosporum flavum*	**Native Frangipani**	0.28	0.40	3.36	2.25	Low	Retain
98	1	*Quercus palustris*	**Pin Oak**	0.80	0.90	9.60	3.17	High	Retain
99	1	*Cinnamomum camphora*	**Camphor Laurel**	0.75	0.85	9.00	3.09	Moderate	Retain
100	18	*Elaeocarpus eumundi*	**Eumundi Quandong**	0.12	0.15	2.00	1.49	Moderate	Retain

NOTE
Refer to the accompanying Arboricultural Impact Assessment Report for full description of trees, measurements and methods used to assess the trees, and proposed tree protection measures.

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HammondCare

REVISION	DESCRIPTION	CHKD	DATE
P1	For SSDA Submission	RWS	13/12/22

PROJECT & CLIENT
HammondCare Wahroonga Stage 2
HammondCare

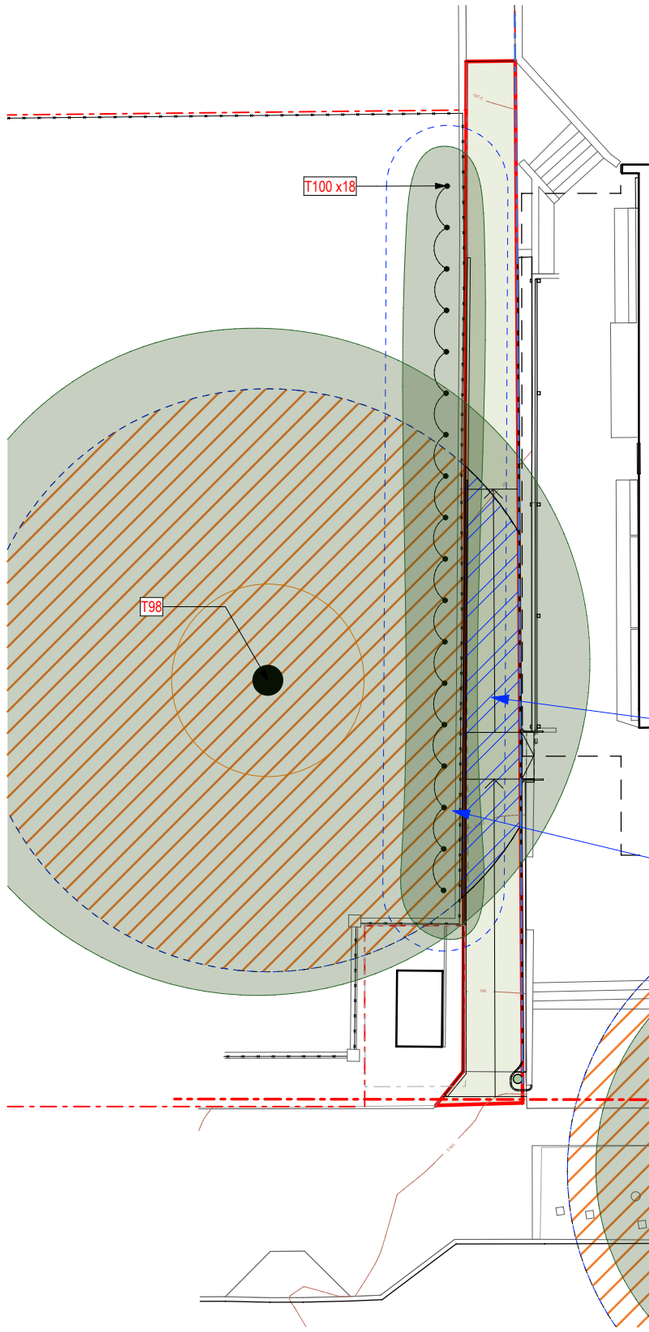
Project No : 22.12
Designed : RWS
Drawn : BT / CKL
Scale : 1:300@A1/1:600@A3
North

DRAWING TITLE
Tree Protection and Removal Plan

DRAWING NUMBER
LT-DG-03-E0

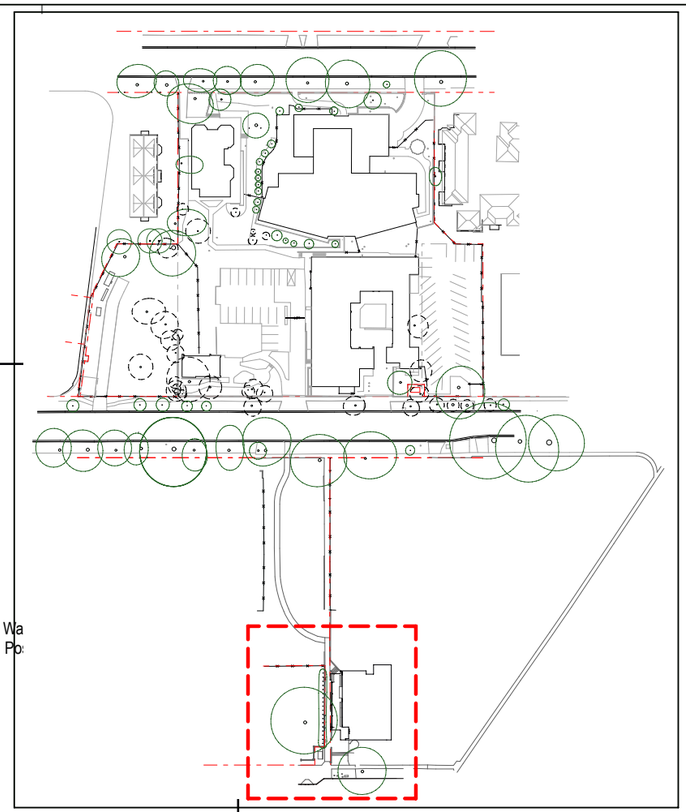
REVISION
P1

Plotted at : 6:38 pm 13/12/2022



Tree Impact and Protection Plan Legend

- Existing Tree Retained — Extent of canopy as verified by site measure and aerial photos
- Existing Tree Removed (Note: no TPZ's shown for these trees)
- T26 — Tree Identification Number
- Construction Period Tree Protection Area - consolidated area
- Tree Protection Area Temporary Fencing
- Trunk Protection Battens to be installed
- Ground Protection- Rumble Boards to be installed
- Expected loss of roots due to excavation or trenching
- Surface impact to be managed - minimal root loss expected
- Nominal Tree Protection Zone Radius (TPZ)
- Nominal Structural Root Zone (SRZ) shown where relevant
- Proposed Future Building
- Existing building and structure to be demolished
- Extent of ground modification and disturbance



Key Plan 1:1000

Surface impacts to be managed.
<10% incursion into nominal TPZ on northern side of T98 for minor regarding of path. Remaining area around tree to be unaltered. Project Consulting Arborist to monitor and oversee all demolition and any root pruning work.

Impacts to Young Row of Elaeocarpus eumundi (T100)
Incursion into nominal TPZ on northern side of young trees for minor regarding of path. Remaining area around tree to be unaltered. Trees very young with trunks less than 100mm diam. Garden area with trees separated from path with low timber sleeper wall. Roots likely to favour existing garden areas to south of path. Any roots encountered are likely to be less than 40mm ø and therefore considered acceptable to prune if required. Project Consulting Arborist to monitor and oversee all demolition and root pruning work.

0 2 4 10m

HammondCare - Stage 2, Wahroonga - Tree Assessment Schedule

Tree ID	Trees in Group	Tree Species	Common Name	Trunk Diameter Breast Height (dbh) (m)	Trunk Diameter at base (dgl) (m)	Nominal TPZ radius (m) 12xdbh (AS 4970)	Nominal SRZ radius (m) (AS 4970)	Retention Value	Recommendation
1	1	*Lophostemon confertus*	**Brush Box**	1.17	1.34	14.04	3.74	High	Retain
2	1	*Brachychiton acerifolius*	**Illawarra Flame Tree**	0.20	0.24	2.40	1.82	Low	Remove
3	1	*Callitris gliscophylla?*	**White Cypress?**	0.30	0.35	3.60	2.13	Moderate	Retain
4	1	*Callitris gliscophylla?*	**White Cypress?**	0.42	0.50	5.04	2.47	Moderate	Retain
5	1	*Polyscias elegans*	**Celery Wood**	0.22	0.30	2.64	2.00	Moderate	Retain
6	1	*Lophostemon confertus*	**Brush Box**	0.69	0.81	8.28	3.03	High	Retain
7	1	*Jacaranda mimosifolia*	**Jacaranda**	0.54	0.57	6.48	2.61	Moderate	Remove
8	1	*Acer buergerianum*	**Trident Maple**	0.38	0.43	4.56	2.32	Moderate	Remove
9	1	*Acer palmatum*	**Japanese Maple**	0.42	0.39	5.04	2.23	Nil / Remove	Remove
10	1	*Pittosporum undulatum*	**Sweet Pittosporum**	0.18	0.27	2.16	1.91	Low	Remove
11	2	*Ligustrum lucidum*	**Broadleaf Privet**	0.20	0.25	2.40	1.85	Nil / Remove	Remove
12	1	*Acer buergerianum*	**Trident Maple**	0.15	0.20	2.00	1.68	Low	Remove
13	1	*Nerium oleander*	**Oleander**	0.65	2.00	7.80	4.43	Low	Remove
14	1	*Jacaranda mimosifolia*	**Jacaranda**	0.46	0.75	5.52	2.93	Moderate	Remove
15	1	*Gordonia axillaris*	**Fried Egg Tree**	0.32	0.52	3.84	2.51	Low	Remove
16	1	*Brachychiton acerifolius*	**Illawarra Flame Tree**	0.44	0.50	5.28	2.47	Moderate	Remove
17	1	*Buckinghamia celsissima*	**Ivory Curl Tree**	0.11	0.14	2.00	1.45	Moderate	Remove
18	1	*Sapium sebiferum (syn. Triadica sebifera)*	**Chinese Tallow Tree**	0.33	0.43	3.96	2.32	Low	Remove
19	1	*Syzygium australe*	**Brush Cherry**	0.10	0.16	2.00	1.53	Low	Remove
20	1	*Syzygium australe*	**Brush Cherry**	0.20	0.28	2.40	1.94	Low	Remove
21	1	*Acer buergerianum*	**Trident Maple**	0.22	0.34	2.64	2.10	Low	Remove
22	1	*Ulmus minor?*	**Field Elm?**	0.51	0.60	6.12	2.67	Moderate	Retain
23	1	*Ligustrum lucidum*	**Broadleaf Privet**	0.18	0.25	2.16	1.85	Nil / Remove	Remove
24	1	*Magnolia grandiflora*	**American Bull Bay Magnolia**	0.10	0.15	2.00	1.49	Moderate	Remove
25.1	6	*Pyrus calleryana cv.*	**Callery Pear**	0.14	0.15	2.00	1.49	Low	Retain
25.2	2	*Pyrus calleryana cv.*	**Callery Pear**	0.14	0.15	2.00	1.49	Low	Remove
26.1	3	*Magnolia grandiflora*	**American Bull Bay Magnolia**	0.10	0.14	2.00	1.45	Moderate	Retain
26.2	1	*Magnolia grandiflora*	**American Bull Bay Magnolia**	0.10	0.14	2.00	1.45	Moderate	Remove
27	2	*Pyrus calleryana cv.*	**Callery Pear**	0.11	0.15	2.00	1.49	Low	Retain
28	1	*Brachychiton acerifolius*	**Illawarra Flame Tree**	0.53	0.63	6.36	2.73	Moderate	Retain
29	1	*Cinnamomum camphora*	**Camphor Laurel**	0.23	0.40	2.76	2.25	Nil / Remove	Remove
30	1	*Callistemon viminalis cv.*	**Weeping Bottlebrush**	0.34	0.42	4.08	2.30	Low	Remove
31	1	*Lagerstroemia indica*	**Crepe Myrtle**	0.31	0.45	3.72	2.37	Low	Remove
32	1	*Angophora costata*	**Smooth-barked Apple**	0.73	0.86	8.76	3.11	High	Retain
33	1	*Gordonia axillaris*	**Fried Egg Tree**	0.14	0.15	2.00	1.49	Moderate	Retain
34	1	*Gordonia axillaris*	**Fried Egg Tree**	0.16	0.20	2.00	1.68	Moderate	Retain
35	1	*Gordonia axillaris*	**Fried Egg Tree**	0.14	0.17	2.00	1.57	Moderate	Retain
36	1	*Gordonia axillaris*	**Fried Egg Tree**	0.10	0.12	2.00	1.36	Moderate	Retain
37	1	*Gordonia axillaris*	**Fried Egg Tree**	0.12	0.13	2.00	1.40	Moderate	Retain
38	1	*Gordonia axillaris*	**Fried Egg Tree**	0.40	0.52	4.80	2.51	Low	Remove
39	1	*Gordonia axillaris*	**Fried Egg Tree**	0.35	0.47	4.20	2.41	Low	Remove
40	1	*Gordonia axillaris*	**Fried Egg Tree**	0.30	0.40	3.60	2.25	Low	Remove
41	1	*Gordonia axillaris*	**Fried Egg Tree**	0.28	0.35	3.36	2.13	Low	Remove
42	1	*Nerium oleander*	**Oleander**	0.35	0.75	4.20	2.93	Low	Remove
43	1	*Nerium oleander*	**Oleander**	0.30	0.75	3.60	2.93	Low	Remove
44	1	*Gordonia axillaris*	**Fried Egg Tree**	0.20	0.30	2.40	2.00	Low	Remove
45	1	*Photinia x fraseri 'Robusta'*	**Photinia**	0.20	0.28	2.40	1.94	Low	Retain
46	1	*Eucalyptus saligna*	**Sydney Blue Gum**	1.40	1.68	15.00	4.12	High	Retain
47	1	*Eucalyptus saligna*	**Sydney Blue Gum**	0.90	1.18	10.80	3.55	High	Retain
48	1	*Eucalyptus saligna*	**Sydney Blue Gum**	1.10	1.58	13.20	4.01	High	Retain
49	1	*Eucalyptus saligna?*	**Sydney Blue Gum?**	0.10	0.13	2.00	1.40	High	Retain
50	1	*Ulmus parvifolia*	**Chinese Elm**	0.58	0.63	6.96	2.73	Moderate	Retain
51	1	*Liquidambar styraciflua*	**Liquidambar**	0.81	0.94	9.72	3.22	High	Retain
52	1	*Liquidambar styraciflua*	**Liquidambar**	0.64	0.81	7.68	3.03	High	Retain
53	1	*Populus nigra 'Italica'*	**Lombardy Poplar**	0.46	0.56	5.52	2.59	Moderate	Retain
54	1	*Liquidambar styraciflua*	**Liquidambar**	0.65	0.77	7.80	2.97	Moderate	Retain
55	1	*Liquidambar styraciflua*	**Liquidambar**	0.49	0.63	5.88	2.73	Moderate	Retain
56	1	*Angophora costata*	**Smooth-barked Apple**	1.15	1.30	13.80	3.69	High	Retain
57	1	*Liquidambar styraciflua*	**Liquidambar**	0.66	0.86	7.92	3.11	Moderate	Retain
58	1	*Liquidambar styraciflua*	**Liquidambar**	0.52	0.66	6.24	2.78	Moderate	Retain
59	1	*Liquidambar styraciflua*	**Liquidambar**	0.90	1.00	10.80	3.31	Moderate	Retain
60	1	*Liquidambar styraciflua*	**Liquidambar**	0.58	0.77	6.96	2.97	Moderate	Retain
61	1	*Waterhousea floribunda*	**Weeping Lilly Pilly**	0.22	0.28	2.64	1.94	Moderate	Retain
62	3	*Prunus cerasifera 'Nigra'*	**Purple-leaved Cherry-plum**	0.11	0.14	2.00	1.45	Low	Retain
63	1	*Cupressus cashmeriana*	**Kashmir Cypress**	0.75	0.90	9.00	3.17	High	Retain
64	3	*Elaeocarpus eumundi*	**Eumundi Quandong**	0.10	0.13	2.00	1.40	Low	Retain
65	1	*Nyssa sylvatica*	**Tulepo**	0.40	0.48	4.80	2.43	Moderate	Retain
66	1	*Cedrus deodara*	**Himalayan Cedar**	0.69	0.74	8.28	2.92	High	Retain
67	1	*Radermachera sinica*	**China Doll Tree**	0.33	0.40	3.96	2.25	Low	Retain
68	1	*Liquidambar styraciflua*	**Liquidambar**	0.62	0.82	7.44	3.04	Moderate	Retain
69	1	*Liquidambar styraciflua*	**Liquidambar**	0.62	0.87	7.44	3.12	Moderate	Retain
70	1	*Liquidambar styraciflua*	**Liquidambar**	0.44	0.56	5.28	2.59	Moderate	Retain
71	1	*Liquidambar styraciflua*	**Liquidambar**	0.46	0.61	5.52	2.69	Moderate	Retain
72	1	*Liquidambar styraciflua*	**Liquidambar**	0.58	0.74	6.96	2.92	Moderate	Retain
73	1	*Liquidambar styraciflua*	**Liquidambar**	0.55	0.72	6.60	2.88	Nil / Remove	Retain
74	1	*Liquidambar styraciflua*	**Liquidambar**	0.70	0.96	8.40	3.25	Moderate	Retain
75	1	*Liquidambar styraciflua*	**Liquidambar**	0.10	0.13	2.00	1.40	Low	Retain
76	1	*Liquidambar styraciflua*	**Liquidambar**	0.91	1.01	10.92	3.32	High	Retain
77	1	*Hymenosporum flavum*	**Native Frangipani**	0.28	0.40	3.36	2.25	Low	Retain
98	1	*Quercus palustris*	**Pin Oak**	0.80	0.90	9.60	3.17	High	Retain
99	1	*Cinnamomum camphora*	**Camphor Laurel**	0.75	0.85	9.00	3.09	Moderate	Retain
100	18	*Elaeocarpus eumundi*	**Eumundi Quandong**	0.12	0.15	2.00	1.49	Moderate	Retain

NOTE
Refer to the accompanying Arboricultural Impact Assessment Report for full description of trees, measurements and methods used to assess the trees, and proposed tree protection measures.

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REVISION	DESCRIPTION	CHKD	DATE
P1	For SSDA Submission	RWS	13/12/22

PROJECT & CLIENT
HammondCare Wahroonga Stage 2
HammondCare

Project No : 22.12
Designed : RWS
Drawn : BT / CKL
Scale : 1:100@A1/1:200@A3
North

DRAWING TITLE
Tree Protection and Removal Plan - Archdale Walk

DRAWING NUMBER LT-DG-04-A0

REVISION P1

Plotted at : 6:38 pm 13/12/2022

TREE PROTECTION SPECIFICATIONS

1. Tree Protection Measures and Protocols.
All work around existing trees to be retained shall be in accordance with AS 4970-2009 Protection of trees on development sites with the clear establishment of the required Tree Protection Areas (TPA's). If the scope of work allowed within or the extent of the Tree Protection Areas of existing trees is not clear, please refer to the Contract Manager or Project Consulting Arborist for clarification.

Before any site works commence tree protection zones and other measures must be established and conveyed to those all working on the site. The Contractor shall ensure all subcontractors are inducted prior to working on the site. All inductions shall include description and identification of the Tree Protection Zones and the restriction on work and activities with regard to trees.

Damage to roots or degradation of the soil through compaction and/or excavation within TPA's is likely to cause serious damage to the tree. Any work operations required within TPA's must be carried out with extreme care. All trees, palms and other shrubs within TPA's are to be retained unless shown otherwise on the Tree Protection Plan(s). Trees marked for retention shall not be used to display signage, or as fence or cable supports for any reason. No materials stockpiling, chemicals or washout areas are permitted immediately upslope of or within the Tree Protection Area. The washing down of wheel barrows, paint cans/brushes, acids and the like shall not to be done near existing trees as the runoff is very harmful to tree roots.

No fuel powered pumps or generators or air compressors are to be placed within TPA's. No fuel or chemicals shall be stored and no equipment or vehicles shall be serviced or re-fuelled within a TPA.

2. Controlled Construction Access
Construction access points, stockpiling and storage areas shall be clearly identified on site and fenced off where appropriate. Uncontrolled access and parking of vehicles inside TPA's shall be avoided. If access is required through a tree protection area, the access way shall be treated with ground protection.

3. Tree Protection Fencing & Signage
The Tree Protection Plan(s) shows the extent of areas to be fenced and protected. Protection measures shall be certified as adequate by the Project Consulting Arborist. This fencing may form part of the general construction site fencing, where practical. It shall remain in place as long as possible and typically not be removed until the final landscape installation in those areas begins.

All tree protection fencing shall be 1800mm high galvanised chain wire or welded steel mesh. Fencing must be bolted together and secured with the necessary back stays and bracing.

Star pickets with bunting or danger tape shall not constitute acceptable tree protection fencing.

Suitable signage as defined by AS 4970-2009 Appendix C shall be affixed to the external side of the fencing at a spacing of not less than 1 sign per 20 lineal metres of fence.

If fence locations conflict with the proposed works, contact the Project Consulting Arborist and Contract Manager for resolution. No new services (unless under-bored) shall be located within or through the Tree Protection Area.

4. Trunk and Lower Branch Protection
A trunk barrier is to be erected around the circumference of the tree trunk and root buttress where shown. This barrier will consist of two to three 'rings' of 50mm diameter socked ag-line wrapped around tree trunk or branch and the ends cable tied to secure in place. A layer of battens is to be placed over and tight to the ag-lines. The battens are to have a maximum spacing of 50mm. The height of the battens is to be 2 metres or to the height of the first branches. Lower large branches may require the same protection if likely to be damaged by passing vehicles or equipment. Secure battens in place with galvanised steel bracing straps. Do not nail into or otherwise injure the trunk or bark. Battens may be made from any suitable waste timber of similar sizes and depths. All sharp or protruding edges are to be properly covered with tape or similar padding.

5. Works within the TPA's
All work within the root zone of existing trees shall be undertaken with the utmost care. If by necessity a tree requires removal of branches for building or access, pruning shall be done in strict accordance with accepted arboriculture techniques and AS 4373-2007. No rubbish, spoil or new materials shall be placed on the root zone of any existing tree or against their trunks.

6. Ground Protection
If it is proposed to create any access route, or similar, within the TPA of a retained tree, the Contractor shall install rumble boards over the TPA ground surface. No excavation shall be allowed. Contractor shall first place a suitable permeable geotextile to the extent required and then a 100mm thick layer of wood chip mulch or coarse no-fines gravel over the extent to be covered. Then place hardwood boards (minimum 3600 x 200 x 75mm) on their flat edge, side by side, with a 30 - 50mm gap to form a rumble strip. These boards are to be held together with three galvanised metal bracing straps nailed to each board. The two outer straps are to be approximately 200mm in from the ends of the boards. The third strap is to be along the centre line of the boards.

7. Provision of Temporary Irrigation
No temporary irrigation requirement is anticipated for this project. However if accidental damage or other weather extremes dictate and the Project Consulting Arborist considers one is necessary it shall be installed as per the following. A temporary and automated (battery powered timer is sufficient) watering system to be placed within the specified TPAs of the trees nominated to maintain adequate water to the retained trees and help maintain their healthy condition. This shall be a surface mounted 'residential-style' soaker hose and/or similar surface sprinkler systems. It is to be surface visible and spray delivered so that is operation can be easily visible and verified. It should be on a designated supply line, separate from other construction related water supplies to minimise its likelihood of being disconnected.

Typically, during spring and summer months it should be set to run for a minimum of 30 minutes every day, in the early morning. During, autumn and winter months it should be set to run for 1 hour once every week. The operation can be suspended temporarily in periods of extensive and prolonged rain. The system is to remain in place for the duration of construction, or until the Project Consulting Arborist approves it's removal. It may be removed to allow final landscape treatments to proceed. If accidentally disturbed or damaged by construction activities, it is to be reinstated as soon as practicable.

8. Structural Demolition Within TPA's
Project Consulting Arborist shall be on site during all demolition work within the TPA's to monitor and advise on tree protection. Secateurs and a handsaw shall be available to deal with and cleanly cut any exposed roots that have to be cut. Machines with a long reach may be used if they can work from outside TPA's or from protected areas within TPA's. They shall not encroach onto unprotected soil in TPA's.

Debris to be removed from TPA's must be moved across existing hard surfacing or temporary ground protection in a way that prevents compaction and disturbance of soil. Alternatively, it can be lifted out by machines provided this does not disturb TPA's or damage the canopy. If appropriate, leave below ground structures such as footings and disused pipes in place if their removal will cause excessive root disturbance.

When pulling up existing paving the Contractor shall work backwards, lifting demolished paving back onto the existing paving. Roots may be found growing under the pavement and should not be trafficked. Roots growing into existing sub-base should be left and new surface finishes placed over the top without disturbance.

9. Excavations or Trenching within TPA's
Excavation within TPA's shall not be allowed using mechanical equipment such as excavators or backhoes. Excavation within TPA's shall only be carried out carefully by hand taking care not to damage the bark and wood of any roots. Specialist tools for removing soil around roots using compressed air (air spade), or water vacuum extraction shall be an appropriate alternative to hand digging and is the preferred method.

Exposed roots to be removed shall be cut cleanly with a sharp saw or secateurs at the face of the excavation. Roots temporarily exposed must be protected by appropriate covering with damp hessian or sand. Roots greater than 50mm in diameter are to be retained and shall only be cut in exceptional circumstances and only after consultation with the Project Consulting Arborist. Roots greater than 100mm in diameter shall typically not be allowed to be cut and must be worked around.

10. Soft Landscaping Installation
Final trimming and planting shall be judiciously undertaken around trees. All soft landscaping within the tree protection zones will be installed with care to avoid root disturbance from irrigation trenching, lighting installation and the planting of larger plants. Permanent irrigation (if used) shall be installed as spray heads located outside of TPA's and spraying inwards. All other services such as small-scale electrical services shall also be designed and installed to avoid any excavation or trenching around the trees.

No significant excavation or cultivation, especially by rotary hoes or excavators, shall occur within TPA's. Where new designs require the levels to be increased, good quality and permeable top soil shall be used. It should be firmed into place but not over compacted. All areas close to tree trunks shall be kept at the original ground level. Where turf is to be installed tree trunks shall have mulched rings applied rather than grass laid up to the trunk.

The size of the installed plants shall typically be less than 5L pots so that the maximum depth of the new root balls is less than 200mm. Any planting proposed that is larger than this shall be only installed outside of the SRZ and with care to not injure roots while digging planting holes.

11. Canopy Pruning
The Contractor shall prune branches of protected trees only as directed by the Project Consulting Arborist. Pruning is only to be undertaken by a qualified arborist (under the supervision of a person with AQF Level 4 or above). The Project Consulting Arborist is to be present at all times during the pruning work. Work is to be in strict accordance with AS4373 Pruning of Amenity Trees. Do not treat wounds.

12. Root Pruning
Pruning of roots of protected trees shall only be as directed the Project Consulting Arborist. The Tree Contractor shall use only a qualified arborist (AQF Level 4 or above). The Project Consulting Arborist is to be present at all times during the root pruning.

Roots are not to be cut using normal excavation machinery of any sort. This usually results in splitting and massive disturbance well past the intended line of cut. When required to cut roots, use hand methods and sharp hand tools (e.g. secateurs, hand saw) such that the remaining root systems are preserved intact and undamaged. Roots are to be cut back by hand square to the direction of the root travel (or edge of the excavation). Do not cut any tree roots exceeding 40mm diameter unless permitted. Excavations within root zones should be kept open for as short a period as possible. Any excavated face containing roots is to be temporarily supported, where necessary, to prevent soil loss from around the other retained roots.

13. Accidental Tree Damage
Should a tree be accidentally damaged, the Contractor shall immediately notify the Project Consulting Arborist. Timing can be of the essence, particularly with bark injuries, trunk damage or chemical contaminations.

If a branch has been broken, it shall be removed and the damaged end pruned to a suitable branch collar. If the branch has been torn out of the trunk, assessment shall be made and the damage cleaned up by as much as possible without further damage to the tree.

If roots are accidentally disturbed or excavated, any broken, crushed and torn sections shall be exposed and pruned leaving clean cuts to minimise risk of infection by fungal pathogens and promote good conditions for new root growth.

Example image of acceptable tree protection fencing measures to be applied. (1.8m high rigid metal fencing with appropriate lateral bracing)

Example image of acceptable tree tree protection battens

Example image of acceptable ground protection rumble boards

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HammondCare

REVISION	DESCRIPTION	CHKD	DATE
P1	For SSDA Submission	RWS	13/12/22

PROJECT & CLIENT
HammondCare Wahroonga Stage 2
HammondCare

Project No : 22.12
Designed : RWS
Drawn : BT / CKL
Scale : N/A
North

DRAWING TITLE
Tree Protection Specifications

DRAWING NUMBER
LT-DG-05-E0

REVISION
P1

Plotted at : 6:39 pm 13/12/2022

4.2 Tree Impact Assessment Schedule

HammondCare - Stage 2, Wahroonga - Tree Assessment Schedule

Tree ID	Trees in Group	Tree Species	Common Name	Height (m)	Spread Average (m)	Trunk Diameter Breast Height (dbh) (m)	Trunk Diameter at base (dgl) (m)	Nominal TPZ radius (m) 12xdbh (AS 4970)	Nominal SRZ radius (m) (AS 4970)	Age Class	Current Vigour	Current Form	Tree Origin	Noted Defects	SULE Rating	Retention Value	General Comments and Notes	Incursion and Impact	Recommendation
1	1	*Lophostemon confertus*	**Brush Box**	18.0	15.0	1.17	1.34	14.04	3.74	Mature	Good	Average	Native		Long (>40 years)	**High**	Very large and prominent tree.	17% incursion into TPZ. Species is tolerant of root disturbance and excavation to be monitored by Arborist. Other areas contiguous to TPZ left undisturbed. Previous building and other works have occurred in main area proposed to be disturbed. Impacts considered acceptable.	Retain
2	1	*Brachychiton acerifolius*	**Illawarra Flame Tree**	6.0	3.0	0.20	0.24	2.40	1.82	Mature	Fair	Suppressed	Native	Pest/Disease	Long (>40 years)	**Low**	Small tree over-topped and growing under adjoining T1. Ideally should be removed for the betterment of T1.	Small tree beneath more significant tree. Recommend removal.	Remove
3	1	*Callitris glaucophylla?*	**White Cypress?**	10.0	3.0	0.30	0.35	3.60	2.13	Mature	Fair	Suppressed	Native		Long (>40 years)	**Moderate**	Neighbouring property tree.	Outside works area. Nil impact expected.	Retain
4	1	*Callitris glaucophylla?*	**White Cypress?**	14.0	8.0	0.42	0.50	5.04	2.47	Mature	Fair	Average	Native	Co-dominant Stems, Inclusions	Long (>40 years)	**Moderate**	Neighbouring property tree.	Outside works area. Nil impact expected.	Retain
5	1	*Polyscias elegans*	**Celery Wood**	8.5	6.0	0.22	0.30	2.64	2.00	Mature	Excellent	Excellent	Native		Medium (15-40 years)	**Moderate**	Neighbouring property tree. Very close to boundary.	Outside works area. Nil impact expected.	Retain
6	1	*Lophostemon confertus*	**Brush Box**	14.0	10.0	0.69	0.81	8.28	3.03	Mature	Good	Average	Native		Long (>40 years)	**High**	Tree provides useful screening and softening of adjoining reservoir.	Incursion of 9% into TPZ; Species is tolerant of root disturbance and excavation to be monitored by Arborist. Impacts considered acceptable.	Retain
7	1	*Jacaranda mimosifolia*	**Jacaranda**	10.0	11.0	0.54	0.57	6.48	2.61	Mature	Good	Average	Exotic		Long (>40 years)	**Moderate**		Within footprint of buillding and regrading.	Remove
8	1	*Acer buergerianum*	**Trident Maple**	9.0	9.0	0.38	0.43	4.56	2.32	Mature	Fair	Average	Exotic	Co-dominant Stems	Medium (15-40 years)	**Moderate**		Within footprint of buillding and regrading.	Remove
9	1	*Acer palmatum*	**Japanese Maple**	8.0	8.0	0.42	0.39	5.04	2.23	Mature	Fair	Average	Exotic	Branch Tearouts, Decay-Major, Cavity, Major Wounding, Co-dominant Stems	Medium (15-40 years)	**Nil / Remove**	Major defects and decay.	Within footprint of buillding and regrading.	Remove
10	1	*Pittosporum undulatum*	**Sweet Pittosporum**	7.0	4.0	0.18	0.27	2.16	1.91	Mature	Fair	Average	Endemic		Medium (15-40 years)	**Low**	Self sown specimen growing within base of adjoining wall.	Within footprint of buillding and regrading.	Remove
11	2	*Ligustrum lucidum*	**Broadleaf Privet**	6.0	4.0	0.20	0.25	2.40	1.85	Mature	Fair	Average	Weed		Long (>40 years)	**Nil / Remove**	Invasive weed. Should be removed.	Within footprint of buillding and regrading.	Remove
12	1	*Acer buergerianum*	**Trident Maple**	10.0	4.0	0.15	0.20	2.00	1.68	Mature	Fair	Suppressed	Exotic		Medium (15-40 years)	**Low**	Very poor and suppressed form intergrowing with large Oleander.	Within footprint of buillding and regrading.	Remove
13	1	*Nerium oleander*	**Oleander**	7.0	8.0	0.65	2.00	7.80	4.43	Over-mature	Fair	Average	Exotic		Long (>40 years)	**Low**	Numerous privet saplings surrounding base. Significantly multi-trunked. DBH estimated only. Only in fair condition.	Within footprint of buillding and regrading.	Remove
14	1	*Jacaranda mimosifolia*	**Jacaranda**	12.5	10.0	0.46	0.75	5.52	2.93	Mature	Good	Average	Exotic		Long (>40 years)	**Moderate**	Tridominant stems.	Within footprint of buillding and regrading.	Remove
15	1	*Gordonia axillaris*	**Fried Egg Tree**	6.0	7.0	0.32	0.52	3.84	2.51	Over-mature	Poor	Average	Exotic	Co-dominant Stems, Tip Dieback, Deadwood-Minor	Short (5-15 years)	**Low**	Quite poor condition. Significant dieback and dead wood. Very low branching.	Within footprint of buillding and regrading.	Remove
16	1	*Brachychiton acerifolius*	**Illawarra Flame Tree**	12.0	6.0	0.44	0.50	5.28	2.47	Mature	Fair	Average	Native	Tip Dieback, Pest/Disease, Deadwood-Minor	Medium (15-40 years)	**Moderate**	Tip dieback and misshapen leaves.	Within footprint of buillding and regrading.	Remove
17	1	*Buckinghamia celsissima*	**Ivory Curl Tree**	8.0	3.0	0.11	0.14	2.00	1.45	Mature	Good	Average	Native	Very Asymmetric Form	Long (>40 years)	**Moderate**		Within footprint of buillding and regrading.	Remove
18	1	*Sapium sebiferum (syn. Triadica sebifera)*	**Chinese Tallow Tree**	11.0	7.0	0.33	0.43	3.96	2.32	Mature	Good	Average	Exotic	Co-dominant Stems	Long (>40 years)	**Low**		Within footprint of buillding and regrading.	Remove
19	1	*Syzygium australe*	**Brush Cherry**	6.0	3.0	0.10	0.16	2.00	1.53	Semi-mature	Fair	Average	Native	Lean-Minor, Very Asymmetric Form	Replaceable (Small/Young)	**Low**	Minor lean and asymmetric to the south.	Within footprint of buillding and regrading.	Remove
20	1	*Syzygium australe*	**Brush Cherry**	8.0	5.0	0.20	0.28	2.40	1.94	Mature	Good	Average	Native		Medium (15-40 years)	**Low**	Relatively small tree.	Within footprint of buillding and regrading.	Remove
21	1	*Acer buergerianum*	**Trident Maple**	8.0	7.0	0.22	0.34	2.64	2.10	Mature	Fair	Average	Exotic	Very Asymmetric Form, Co-dominant Stems	Medium (15-40 years)	**Low**	Overtopped by larger neighbouring property tree.	Removed to facilitate regrading of area.	Remove
22	1	*Ulmus minor?*	**Field Elm?**	13.0	12.0	0.51	0.60	6.12	2.67	Mature	Fair	Average	Exotic	Very Asymmetric Form	Medium (15-40 years)	**Moderate**	Neighbouring property tree. No leaves or fruit present at time of inspection. Most of canopy biased towards north and west. Substantial branch leaning over the site.	Minor incursion of <10% into TPZ. Considered acceptable.	Retain
23	1	*Ligustrum lucidum*	**Broadleaf Privet**	6.0	6.0	0.18	0.25	2.16	1.85	Mature	Good	Average	Weed		Long (>40 years)	**Nil / Remove**	Invasive weed species. Should be removed.	Invasive species. Remove.	Remove
24	1	*Magnolia grandiflora*	**American Bull Bay Magnolia**	6.0	3.0	0.10	0.15	2.00	1.49	Semi-mature	Excellent	Excellent	Exotic		Long (>40 years)	**Moderate**		Within footprint of pedestrian path, re-grading.	Remove
25.1	6	*Pyrus calleryana cv.*	**Callery Pear**	6.0	2.0	0.14	0.15	2.00	1.49	Young	Good	Average	Exotic		Long (>40 years)	**Low**	Row planting adjoining Stage 1 development fenceline.	Surface impacts to be managed.	Retain
25.2	2	*Pyrus calleryana cv.*	**Callery Pear**	6.0	2.0	0.14	0.15	2.00	1.49	Young	Good	Average	Exotic		Long (>40 years)	**Low**	Row planting adjoining Stage 1 development fenceline.	Within footprint of essential circulation junction.	Remove
26.1	3	*Magnolia grandiflora*	**American Bull Bay Magnolia**	6.0	3.0	0.10	0.14	2.00	1.45	Semi-mature	Good	Excellent	Exotic		Long (>40 years)	**Moderate**	Relatively recent planting adjoining Stage 1 building.	Surface impacts to be managed.	Retain
26.2	1	*Magnolia grandiflora*	**American Bull Bay Magnolia**	6.0	3.0	0.10	0.14	2.00	1.45	Semi-mature	Good	Excellent	Exotic		Long (>40 years)	**Moderate**	Relatively recent planting adjoining Stage 1 building.	Within footprint of essential circulation junction.	Remove
27	2	*Pyrus calleryana cv.*	**Callery Pear**	7.0	4.0	0.11	0.15	2.00	1.49	Mature	Good	Average	Exotic		Long (>40 years)	**Low**	Relatively recent planting adjoining Stage 1 building.	Outside works area. Nil impact expected.	Retain
28	1	*Brachychiton acerifolius*	**Illawarra Flame Tree**	12.0	8.0	0.53	0.63	6.36	2.73	Mature	Fair	Average	Native	Pest/Disease, Tip Dieback	Long (>40 years)	**Moderate**	Some tipe dieback and disfigurred and misshappen leaves	Minor incursion of <10% into TPZ. Considered acceptable.	Retain
29	1	*Cinnamomum camphora*	**Camphor Laurel**	7.5	4.0	0.23	0.40	2.76	2.25	Mature	Fair	Average	Invasive	Co-dominant Stems	Long (>40 years)	**Nil / Remove**	Invasive species self sown at base of boundary wall. Should remove.	Invasive species. Remove.	Remove
30	1	*Callistemon viminalis cv.*	**Weeping Bottlebrush**	10.0	8.0	0.34	0.42	4.08	2.30	Mature	Fair	Average	Native	Co-dominant Stems, Inclusions, Very Asymmetric Form	Medium (15-40 years)	**Low**		Within footprint of buillding and regrading.	Remove
31	1	*Lagerstroemia indica*	**Crepe Myrtle**	10.5	7.0	0.31	0.45	3.72	2.37	Mature	Fair	Average	Exotic	Co-dominant Stems, Very Asymmetric Form	Long (>40 years)	**Low**	Very close to existing building.	Within footprint of buillding and regrading.	Remove
32	1	*Angophora costata*	**Smooth-barked Apple**	17.5	14.0	0.73	0.86	8.76	3.11	Mature	Fair	Average	Endemic	Lean-Minor, Deadwood-Major	Long (>40 years)	**High**	Fused branches at 6-7m. Minor deadwood throughout. Slight lean to east. Recommend removal of deadwood, otherwise important to retain and protect.	8% incursion into TPZ due to building basement to west. Minor surface impacts elsewhere. Considered acceptable.	Retain
33	1	*Gordonia axillaris*	**Fried Egg Tree**	4.0	4.0	0.14	0.15	2.00	1.49	Mature	Good	Average	Exotic	Co-dominant Stems	Medium (15-40 years)	**Moderate**	Street tree under wires along Neringah Ave Sth.	Outside works area. Nil impact expected.	Retain
34	1	*Gordonia axillaris*	**Fried Egg Tree**	3.5	3.0	0.16	0.20	2.00	1.68	Mature	Good	Average	Exotic	Co-dominant Stems	Medium (15-40 years)	**Moderate**	Street tree under wires along Neringah Ave Sth.	Outside works area. Nil impact expected.	Retain
35	1	*Gordonia axillaris*	**Fried Egg Tree**	3.5	3.0	0.14	0.17	2.00	1.57	Mature	Good	Average	Exotic	Co-dominant Stems	Medium (15-40 years)	**Moderate**	Street tree under wires along Neringah Ave Sth.	Outside works area. Nil impact expected.	Retain
36	1	*Gordonia axillaris*	**Fried Egg Tree**	3.0	2.0	0.10	0.12	2.00	1.36	Mature	Good	Average	Exotic	Co-dominant Stems	Medium (15-40 years)	**Moderate**	Street tree under wires along Neringah Ave Sth.	Outside works area. Nil impact expected.	Retain

37	1	*Gordonia axillaris*	**Fried Egg Tree**	3.0	2.0	0.12	0.13	2.00	1.40	Mature	Good	Average	Exotic	Co-dominant Stems	Medium (15-40 years)	**Moderate**	Street tree under wires along Neringah Ave Sth.	Outside works area. Nil impact expected.	Retain
38	1	*Gordonia axillaris*	**Fried Egg Tree**	4.5	6.0	0.40	0.52	4.80	2.51	Mature	Poor	Average	Exotic	Tip Dieback, Co-dominant Stems, Deadwood-Major	Medium (15-40 years)	**Low**	Street tree under wires along Neringah Ave Sth. Extensive dieback to western side.	Poor quality tree - recommend removal	Remove
39	1	*Gordonia axillaris*	**Fried Egg Tree**	3.5	7.0	0.35	0.47	4.20	2.41	Mature	Poor	Average	Exotic	Tip Dieback, Deadwood-Minor	Medium (15-40 years)	**Low**	Street tree under wires along Neringah Ave Sth. Extensive dieback and chlorotic foliage.	Poor quality tree - recommend removal	Remove
40	1	*Gordonia axillaris*	**Fried Egg Tree**	5.0	6.0	0.30	0.40	3.60	2.25	Mature	Poor	Average	Exotic	Tip Dieback, Co-dominant Stems, Deadwood-Minor	Medium (15-40 years)	**Low**	Street tree under wires along Neringah Ave Sth. Extensive dieback to western side of tree and chlorotic foliage.	Poor quality tree - recommend removal	Remove
41	1	*Gordonia axillaris*	**Fried Egg Tree**	6.0	6.0	0.28	0.35	3.36	2.13	Mature	Fair	Average	Exotic	Tip Dieback, Co-dominant Stems	Medium (15-40 years)	**Low**	Street tree under wires along Neringah Ave Sth. Extensive dieback to and chlorotic foliage.	Poor quality tree - recommend removal	Remove
42	1	*Nerium oleander*	**Oleander**	6.0	4.0	0.35	0.75	4.20	2.93	Mature	Fair	Average	Exotic		Long (>40 years)	**Low**	Very multi-trunked shrub. DBH estimated. Street tree under wires along Neringah Ave Sth.	Poor quality tree - recommend removal	Remove
43	1	*Nerium oleander*	**Oleander**	3.0	2.0	0.30	0.75	3.60	2.93	Mature	Poor	Poor	Exotic		Medium (15-40 years)	**Low**	Street tree under wires along Neringah Ave Sth. Quite poor form and condition.	Poor quality tree - recommend removal	Remove
44	1	*Gordonia axillaris*	**Fried Egg Tree**	1.5	1.5	0.20	0.30	2.40	2.00	Mature	Fair	Poor	Exotic	Epicormic Growth	Medium (15-40 years)	**Low**	Street tree under wires along Neringah Ave Sth. Very poor form. Previously lopped with epicormic regrowth.	Poor quality tree - recommend removal	Remove
45	1	*Photinia x fraseri 'Robusta'*	**Photinia**	2.0	1.5	0.20	0.28	2.40	1.94	Mature	Poor	Poor	Exotic	Cavity, Decay-Minor, Major Wounding, Epicormic Growth	Medium (15-40 years)	**Low**	Street tree under wires along Neringah Ave Sth. Very poor form. Previously lopped with epicormic regrowth.	Outside works area. Nil impact expected.	Retain
46	1	*Eucalyptus saligna*	**Sydney Blue Gum**	29.0	16.0	1.40	1.68	15.00	4.12	Mature	Good	Excellent	Endemic		Long (>40 years)	**High**	Street tree along Neringah Ave Sth. Very large and prominent endemic tree.	Outside works area. Nil impact expected.	Retain
47	1	*Eucalyptus saligna*	**Sydney Blue Gum**	28.0	16.0	0.90	1.18	10.80	3.55	Mature	Fair	Excellent	Endemic		Long (>40 years)	**High**	Street tree along Neringah Ave Sth. Very large and prominent endemic tree.	Outside works area. Nil impact expected.	Retain
48	1	*Eucalyptus saligna*	**Sydney Blue Gum**	28.0	17.0	1.10	1.58	13.20	4.01	Mature	Fair	Average	Endemic		Long (>40 years)	**High**	Street tree along Neringah Ave Sth. Very large and prominent endemic tree.	Outside works area. Nil impact expected.	Retain
49	1	*Eucalyptus saligna?*	**Sydney Blue Gum?**	6.0	3.0	0.10	0.13	2.00	1.40	Young	Good	Average	Endemic		Long (>40 years)	**High**	Street tree along Neringah Ave Sth. Assumed to be Euc. saligna	Outside works area. Nil impact expected.	Retain
50	1	*Ulmus parvifolia*	**Chinese Elm**	8.5	16.0	0.58	0.63	6.96	2.73	Mature	Fair	Average	Exotic		Medium (15-40 years)	**Moderate**	Very broad spreading canopy. Growing just on edge of path and boundary.	Outside works area. Nil impact expected.	Retain
51	1	*Liquidambar styraciflua*	**Liquidambar**	22.0	18.0	0.81	0.94	9.72	3.22	Mature	Good	Average	Exotic	Branch Tearouts	Long (>40 years)	**High**	Very broad spreading canopy. Growing just on edge of path and boundary. Canopy pruned for overhead power line clearances.	Outside works area. Nil impact expected.	Retain
52	1	*Liquidambar styraciflua*	**Liquidambar**	22.0	12.0	0.64	0.81	7.68	3.03	Mature	Good	Average	Exotic		Long (>40 years)	**High**	Street tree along Neringah Ave Sth.	Outside works area. Nil impact expected.	Retain
53	1	*Populus nigra 'Italica'*	**Lombardy Poplar**	23.0	5.0	0.46	0.56	5.52	2.59	Mature	Poor	Average	Exotic		Short (5-15 years)	**Moderate**	Street tree along Neringah Ave Sth.	Outside works area. Nil impact expected.	Retain
54	1	*Liquidambar styraciflua*	**Liquidambar**	18.0	10.0	0.65	0.77	7.80	2.97	Mature	Fair	Average	Exotic	Epicormic Growth	Long (>40 years)	**Moderate**	Street tree along Neringah Ave Sth.	Outside works area. Nil impact expected.	Retain
55	1	*Liquidambar styraciflua*	**Liquidambar**	18.0	8.0	0.49	0.63	5.88	2.73	Mature	Fair	Average	Exotic		Long (>40 years)	**Moderate**	Street tree along Neringah Ave Sth.	Outside works area. Nil impact expected.	Retain
56	1	*Angophora costata*	**Smooth-barked Apple**	19.0	18.0	1.15	1.30	13.80	3.69	Mature	Good	Average	Endemic	Deadwood-Minor	Long (>40 years)	**High**	Street tree along Neringah Ave Sth. Very large and prominent endemic tree.	Outside works area. Nil impact expected.	Retain
57	1	*Liquidambar styraciflua*	**Liquidambar**	22.0	9.0	0.66	0.86	7.92	3.11	Mature	Fair	Average	Exotic	Root Impacts, Very Asymmetric Form	Long (>40 years)	**Moderate**	Street tree along Neringah Ave Sth. Asymmetric to south.	Outside works area. Nil impact expected.	Retain
58	1	*Liquidambar styraciflua*	**Liquidambar**	12.5	10.0	0.52	0.66	6.24	2.78	Mature	Fair	Average	Exotic		Long (>40 years)	**Moderate**	Street tree along Neringah Ave Sth.	Outside works area. Nil impact expected.	Retain
59	1	*Liquidambar styraciflua*	**Liquidambar**	18.0	14.0	0.90	1.00	10.80	3.31	Mature	Good	Average	Exotic	Co-dominant Stems	Long (>40 years)	**Moderate**	Street tree along Neringah Ave Sth.	Outside works area. Nil impact expected.	Retain
60	1	*Liquidambar styraciflua*	**Liquidambar**	10.5	10.0	0.58	0.77	6.96	2.97	Mature	Good	Average	Exotic		Long (>40 years)	**Moderate**	Street tree along Neringah Ave Sth.	Outside works area. Nil impact expected.	Retain
61	1	*Waterhousea floribunda*	**Weeping Lilly Pilly**	6.0	5.0	0.22	0.28	2.64	1.94	Semi-mature	Good	Average	Native	Co-dominant Stems, Root Impacts	Long (>40 years)	**Moderate**	Relatively young tree. Planted between two large SW pits.	Outside works area. Nil impact expected.	Retain
62	3	*Prunus cerasifera 'Nigra'*	**Purple-leaved Cherry-plum**	6.0	2.0	0.11	0.14	2.00	1.45	Semi-mature	Fair	Average	Exotic		Medium (15-40 years)	**Low**	Recently planted feature trees along entry pathway to Stage 1.	Outside works area. Nil impact expected.	Retain
63	1	*Cupressus cashmeriana*	**Kashmir Cypress**	16.0	8.0	0.75	0.90	9.00	3.17	Mature	Fair	Average	Exotic	Co-dominant Stems	Long (>40 years)	**High**	Some minor dieback, mid canopy to north.	Outside works area. Nil impact expected.	Retain
64	3	*Elaeocarpus eumundi*	**Eumundi Quandong**	6.0	1.5	0.10	0.13	2.00	1.40	Young	Good	Excellent	Native		Replaceable (Small/Young)	**Low**	Small recently planted trees as partrt of Stage1 works.	Outside works area. Nil impact expected.	Retain
65	1	*Nyssa sylvatica*	**Tulepo**	14.0	9.0	0.40	0.48	4.80	2.43	Mature	Good	Average	Exotic		Long (>40 years)	**Moderate**		Outside works area. Nil impact expected.	Retain
66	1	*Cedrus deodara*	**Himalayan Cedar**	12.0	10.0	0.69	0.74	8.28	2.92	Mature	Good	Excellent	Exotic		Long (>40 years)	**High**	Prominent tree associated with historic house.	Outside works area. Nil impact expected.	Retain
67	1	*Radermachera sinica*	**China Doll Tree**	9.0	9.0	0.33	0.40	3.96	2.25	Mature	Fair	Poor	Exotic	Co-dominant Stems, Very Asymmetric Form, Lean-Minor	Medium (15-40 years)	**Low**		Outside works area. Nil impact expected.	Retain
68	1	*Liquidambar styraciflua*	**Liquidambar**	16.0	9.0	0.62	0.82	7.44	3.04	Mature	Fair	Average	Exotic		Long (>40 years)	**Moderate**	Street tree along Woonona Ave.	Outside works area. Nil impact expected.	Retain
69	1	*Liquidambar styraciflua*	**Liquidambar**	15.0	9.0	0.62	0.87	7.44	3.12	Mature	Fair	Average	Exotic		Long (>40 years)	**Moderate**	Street tree along Woonona Ave.	Outside works area. Nil impact expected.	Retain
70	1	*Liquidambar styraciflua*	**Liquidambar**	17.5	9.0	0.44	0.56	5.28	2.59	Mature	Good	Average	Exotic		Long (>40 years)	**Moderate**	Street tree along Woonona Ave.	Outside works area. Nil impact expected.	Retain
71	1	*Liquidambar styraciflua*	**Liquidambar**	15.0	9.0	0.46	0.61	5.52	2.69	Mature	Fair	Poor	Exotic	Branch Tearouts, Decay-Minor	Long (>40 years)	**Moderate**	Street tree along Woonona Ave. Top leader broken out at 8.0m	Outside works area. Nil impact expected.	Retain
72	1	*Liquidambar styraciflua*	**Liquidambar**	16.5	8.0	0.58	0.74	6.96	2.92	Mature	Fair	Average	Exotic		Long (>40 years)	**Moderate**	Street tree along Woonona Ave.	Outside works area. Nil impact expected.	Retain
73	1	*Liquidambar styraciflua*	**Liquidambar**	9.5	12.0	0.55	0.72	6.60	2.88	Mature	Fair	Poor	Exotic	Decay-Major,Co-dominant Stems	Long (>40 years)	**Nil / Remove**	Street tree along Woonona Ave. Central leader pruned out at 1.0m above ground. Major decay in base.	Outside works area. Nil impact expected.	Retain
74	1	*Liquidambar styraciflua*	**Liquidambar**	11.0	10.0	0.70	0.96	8.40	3.25	Mature	Fair	Average	Exotic		Long (>40 years)	**Moderate**	Street tree along Woonona Ave.	Outside works area. Nil impact expected.	Retain
75	1	*Liquidambar styraciflua*	**Liquidambar**	6.0	2.0	0.10	0.13	2.00	1.40	Young	Fair	Average	Exotic		Long (>40 years)	**Low**	Street tree along Woonona Ave. Young recently planted.	Outside works area. Nil impact expected.	Retain
76	1	*Liquidambar styraciflua*	**Liquidambar**	14.5	12.0	0.91	1.01	10.92	3.32	Mature	Excellent	Excellent	Exotic	Root Impacts	Long (>40 years)	**High**	Street tree along Woonona Ave.	Outside works area. Nil impact expected.	Retain
77	1	*Hymenosporum flavum*	**Native Frangipani**	9.5	4.0	0.28	0.40	3.36	2.25	Mature	Poor	Average	Native		Short (5-15 years)	**Low**	Neighbouring property tree.	Outside works area. Nil impact expected.	Retain
98	1	*Quercus palustris*	**Pin Oak**	14.5	12.0	0.80	0.90	9.60	3.17	Mature	Good	Average	Exotic		Long (>40 years)	**High**	Large and prominent tree in adjoining private property.	8% TPZ incursion, largely surface impacts associated with re-grading of path. Significant root loss is unlikely.	Retain
99	1	*Cinnamomum camphora*	**Camphor Laurel**	16.0	10.0	0.75	0.85	9.00	3.09	Mature	Good	Average	Invasive		Long (>40 years)	**Moderate**	Street tree along Coonanbarra Rd in front of Post Office.	Outside works area. Nil impact expected.	Retain
100	18	*Elaeocarpus eumundi*	**Eumundi Quandong**	7.0	2.0	0.12	0.15	2.00	1.49	Mature	Excellent	Average	Native		Long (>40 years)	**Moderate**	Row planting adjacent boundary with Archdale Park pathway, in adjoining property.	12/18 trees with nominal TPZ encroachment, associated with re-grading of path. See Section 2.7.7 discussion on the low potential for roots in this area, and tree management.	Retain

4.3 Tree Data Summary Sheets

ID # 01

Species: *Lophostemon confertus*

Common: Brush Box

Height (m): 18.0
DBH (m): 1.17 DGL (m): 1.34
TPZ (m): 14.04 SRZ (m): 3.74

Current Form: Average
Current Vigour: Good
Age Class: Mature
SULE: Long (>40 years)

Retention Value: High

ID # 02

Species: *Brachychiton acerifolius*

Common: Illawarra Flame Tree

Height (m): 6.0
DBH (m): 0.20 DGL (m): 0.24
TPZ (m): 2.4 SRZ (m): 1.82

Current Form: Suppressed
Current Vigour: Fair
Age Class: Mature
SULE: Long (>40 years)

Retention Value: Low

ID # 03

Species: *Callitris glaucophylla?*

Common: White Cypress?

Height (m): 10.0
DBH (m): 0.30 DGL (m): 0.35
TPZ (m): 3.6 SRZ (m): 2.13

Current Form: Suppressed
Current Vigour: Fair
Age Class: Mature
SULE: Long (>40 years)

Retention Value: Moderate

ID # 04

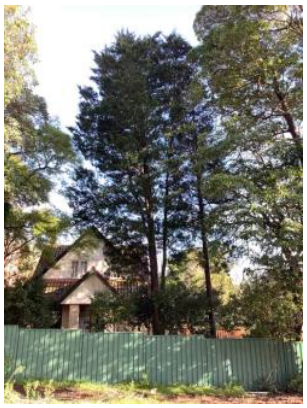
Species: *Callitris glaucophylla?*

Common: White Cypress?

Height (m): 14.0
DBH (m): 0.42 DGL (m): 0.50
TPZ (m): 5.04 SRZ (m): 2.47

Current Form: Average
Current Vigour: Fair
Age Class: Mature
SULE: Long (>40 years)

Retention Value: Moderate



ID # 05

Species: *Polyscias elegans*

Common: Celery Wood

Height (m): 8.5
DBH (m): 0.22 DGL (m): 0.30
TPZ (m): 2.64 SRZ (m): 2

Current Form: Excellent
Current Vigour: Excellent
Age Class: Mature
SULE: Medium (15-40 years)

Retention Value: Moderate

ID # 06

Species: *Lophostemon confertus*

Common: Brush Box

Height (m): 14.0
DBH (m): 0.69 DGL (m): 0.81
TPZ (m): 8.28 SRZ (m): 3.03

Current Form: Average
Current Vigour: Good
Age Class: Mature
SULE: Long (>40 years)

Retention Value: Moderate

ID # 07

Species: *Jacaranda mimosifolia*

Common: Jacaranda

Height (m): 10.0
DBH (m): 0.54 DGL (m): 0.57
TPZ (m): 6.48 SRZ (m): 2.61

Current Form: Average
Current Vigour: Good
Age Class: Mature
SULE: Long (>40 years)

Retention Value: Moderate

ID # 08

Species: *Acer buergerianum*

Common: Trident Maple

Height (m): 9.0
DBH (m): 0.38 DGL (m): 0.43
TPZ (m): 4.56 SRZ (m): 2.32

Current Form: Average
Current Vigour: Fair
Age Class: Mature
SULE: Medium (15-40 years)

Retention Value: Moderate

ID # 09

Species: *Acer palmatum*

Common: Japanese Maple

Height (m): 8.0
DBH (m): 0.42 DGL (m): 0.39
TPZ (m): 5.04 SRZ (m): 2.23

Current Form: Average
Current Vigour: Fair
Age Class: Mature
SULE: Medium (15-40 years)

Retention Value: Nil / Remove

ID # 10

Species: *Pittosporum undulatum*

Common: Sweet Pittosporum

Height (m): 7.0
DBH (m): 0.18 DGL (m): 0.27
TPZ (m): 2.16 SRZ (m): 1.91

Current Form: Average
Current Vigour: Fair
Age Class: Mature
SULE: Medium (15-40 years)

Retention Value: Low

ID # 11

Species: *Ligustrum lucidum*

Common: Broadleaf Privet

Height (m): 6.0
DBH (m): 0.20 DGL (m): 0.25
TPZ (m): 2.4 SRZ (m): 1.85

Current Form: Average
Current Vigour: Fair
Age Class: Mature
SULE: Long (>40 years)

Retention Value: Nil / Remove

ID # 12

Species: *Acer buergerianum*

Common: Trident Maple

Height (m): 10.0
DBH (m): 0.15 DGL (m): 0.20
TPZ (m): 2 SRZ (m): 1.68

Current Form: Suppressed
Current Vigour: Fair
Age Class: Mature
SULE: Medium (15-40 years)

Retention Value: Low

ID # 13

Species: *Nerium oleander*

Common: Oleander

Height (m): 7.0
DBH (m): 0.65 DGL (m): 2.00
TPZ (m): 7.8 SRZ (m): 4.43

Current Form: Average
Current Vigour: Fair
Age Class: Over-mature
SULE: Long (>40 years)

Retention Value: Low

ID # 14

Species: *Jacaranda mimosifolia*

Common: Jacaranda

Height (m): 12.5
DBH (m): 0.46 DGL (m): 0.75
TPZ (m): 5.52 SRZ (m): 2.93

Current Form: Average
Current Vigour: Good
Age Class: Mature
SULE: Long (>40 years)

Retention Value: Moderate

ID # 15

Species: *Gordonia axillaris*

Common: Fried Egg Tree

Height (m): 6.0
DBH (m): 0.32 DGL (m): 0.52
TPZ (m): 3.84 SRZ (m): 2.51

Current Form: Average
Current Vigour: Poor
Age Class: Over-mature
SULE: Short (5-15 years)

Retention Value: Low

ID # 16

Species: *Brachychiton acerifolius*

Common: Illawarra Flame Tree

Height (m): 12.0
DBH (m): 0.44 DGL (m): 0.50
TPZ (m): 5.28 SRZ (m): 2.47

Current Form: Average
Current Vigour: Fair
Age Class: Mature
SULE: Medium (15-40 years)

Retention Value: Moderate

ID # 17

Species: *Buckinghamia celsissima*

Common: Ivory Curl Tree

Height (m): 8.0
DBH (m): 0.11 DGL (m): 0.14
TPZ (m): 2 SRZ (m): 1.5

Current Form: Average
Current Vigour: Good
Age Class: Mature
SULE: Long (>40 years)

Retention Value: Moderate

ID # 18

Species: *Sapium sebiferum (syn. Triadica sebifera)*

Common: Chinese Tallow Tree

Height (m): 11.0
DBH (m): 0.33 DGL (m): 0.43
TPZ (m): 3.96 SRZ (m): 2.32

Current Form: Average
Current Vigour: Good
Age Class: Mature
SULE: Long (>40 years)

Retention Value: Low

ID # 19

Species: *Syzygium australe*

Common: Brush Cherry

Height (m): 6.0
DBH (m): 0.10 DGL (m): 0.16
TPZ (m): 2 SRZ (m): 1.53

Current Form: Average
Current Vigour: Fair
Age Class: Semi-mature
SULE: Replaceable

Retention Value: Low

ID # 20

Species: *Syzygium australe*

Common: Brush Cherry

Height (m): 8.0
DBH (m): 0.20 DGL (m): 0.28
TPZ (m): 2.4 SRZ (m): 1.94

Current Form: Average
Current Vigour: Good
Age Class: Mature
SULE: Medium (15-40 years)

Retention Value: Low

ID # 21

Species: *Acer buergerianum*

Common: Trident Maple

Height (m): 8.0
DBH (m): 0.22 DGL (m): 0.34
TPZ (m): 2.64 SRZ (m): 2.1

Current Form: Average
Current Vigour: Fair
Age Class: Mature
SULE: Medium (15-40 years)

Retention Value: Low

ID # 22

Species: *Ulmus minor?*

Common: Field Elm?

Height (m): 13.0
DBH (m): 0.51 DGL (m): 0.60
TPZ (m): 6.12 SRZ (m): 2.67

Current Form: Average
Current Vigour: Fair
Age Class: Mature
SULE: Medium (15-40 years)

Retention Value: Moderate

ID # 23

Species: *Ligustrum lucidum*

Common: Broadleaf Privet

Height (m): 6.0
DBH (m): 0.18 DGL (m): 0.25
TPZ (m): 2.16 SRZ (m): 1.85

Current Form: Average
Current Vigour: Good
Age Class: Mature
SULE: Long (>40 years)

Retention Value: Nil / Remove

ID # 24

Species: *Magnolia grandiflora*

Common: American Bull Bay Magnolia

Height (m): 6.0
DBH (m): 0.10 DGL (m): 0.15
TPZ (m): 2 SRZ (m): 1.5

Current Form: Excellent
Current Vigour: Excellent
Age Class: Semi-mature
SULE: Long (>40 years)

Retention Value: Moderate

ID # 25

Species: *Pyrus calleryana cv.*

Common: Callery Pear

Height (m): 6.0
DBH (m): 0.14 DGL (m): 0.15
TPZ (m): 2 SRZ (m): 1.5

Current Form: Average
Current Vigour: Good
Age Class: Young
SULE: Long (>40 years)

Retention Value: Low

ID # 26

Species: *Magnolia grandiflora*

Common: American Bull Bay Magnolia

Height (m): 6.0
DBH (m): 0.10 DGL (m): 0.14
TPZ (m): 2 SRZ (m): 1.5

Current Form: Excellent
Current Vigour: Good
Age Class: Semi-mature
SULE: Long (>40 years)

Retention Value: Moderate

ID # 27

Species: *Pyrus calleryana cv.*

Common: Callery Pear

Height (m): 7.0
DBH (m): 0.11 DGL (m): 0.15
TPZ (m): 2 SRZ (m): 1.5

Current Form: Average
Current Vigour: Good
Age Class: Mature
SULE: Long (>40 years)

Retention Value: Low

ID # 28

Species: *Brachychiton acerifolius*

Common: Illawarra Flame Tree

Height (m): 12.0
DBH (m): 0.53 DGL (m): 0.63
TPZ (m): 6.36 SRZ (m): 2.73

Current Form: Average
Current Vigour: Fair
Age Class: Mature
SULE: Long (>40 years)

Retention Value: Moderate

ID # 29

Species: *Cinnamomum camphora*

Common: Camphor Laurel

Height (m): 7.5
DBH (m): 0.23 DGL (m): 0.40
TPZ (m): 2.76 SRZ (m): 2.25

Current Form: Average
Current Vigour: Fair
Age Class: Mature
SULE: Long (>40 years)

Retention Value: Nil / Remove

ID # 30

Species: *Callistemon viminalis cv.*

Common: Weeping Bottlebrush

Height (m): 10.0
DBH (m): 0.34 DGL (m): 0.42
TPZ (m): 4.08 SRZ (m): 2.3

Current Form: Average
Current Vigour: Fair
Age Class: Mature
SULE: Medium (15-40 years)

Retention Value: Low

ID # 31

Species: *Lagerstroemia indica*

Common: Crepe Myrtle

Height (m): 10.5
DBH (m): 0.31 DGL (m): 0.45
TPZ (m): 3.72 SRZ (m): 2.37

Current Form: Average
Current Vigour: Fair
Age Class: Mature
SULE: Long (>40 years)

Retention Value: Low

ID # 32

Species: *Angophora costata*

Common: Smooth-barked Apple

Height (m): 17.5
DBH (m): 0.73 DGL (m): 0.86
TPZ (m): 8.76 SRZ (m): 3.11

Current Form: Average
Current Vigour: Fair
Age Class: Mature
SULE: Long (>40 years)

Retention Value: High

ID # 33

Species: *Gordonia axillaris*

Common: Fried Egg Tree

Height (m): 4.0
DBH (m): 0.14 DGL (m): 0.15
TPZ (m): 2 SRZ (m): 1.5

Current Form: Average
Current Vigour: Good
Age Class: Mature
SULE: Medium (15-40 years)

Retention Value: Moderate

ID # 34

Species: *Gordonia axillaris*

Common: Fried Egg Tree

Height (m): 3.5
DBH (m): 0.16 DGL (m): 0.20
TPZ (m): 2 SRZ (m): 1.68

Current Form: Average
Current Vigour: Good
Age Class: Mature
SULE: Medium (15-40 years)

Retention Value: Moderate

ID # 35

Species: *Gordonia axillaris*

Common: Fried Egg Tree

Height (m): 3.5
DBH (m): 0.14 DGL (m): 0.17
TPZ (m): 2 SRZ (m): 1.57

Current Form: Average
Current Vigour: Good
Age Class: Mature
SULE: Medium (15-40 years)

Retention Value: Moderate

ID # 36

Species: *Gordonia axillaris*

Common: Fried Egg Tree

Height (m): 3.0
DBH (m): 0.10 DGL (m): 0.12
TPZ (m): 2 SRZ (m): 1.5

Current Form: Average
Current Vigour: Good
Age Class: Mature
SULE: Medium (15-40 years)

Retention Value: Moderate

ID # 37

Species: *Gordonia axillaris*

Common: Fried Egg Tree

Height (m): 3.0
DBH (m): 0.12 DGL (m): 0.13
TPZ (m): 2 SRZ (m): 1.5

Current Form: Average
Current Vigour: Good
Age Class: Mature
SULE: Medium (15-40 years)

Retention Value: Moderate

ID # 38

Species: *Gordonia axillaris*

Common: Fried Egg Tree

Height (m): 4.50
DBH (m): 0.40 DGL (m): 0.52
TPZ (m): 4.8 SRZ (m): 2.51

Current Form: Average
Current Vigour: Poor
Age Class: Mature
SULE: Medium (15-40 years)

Retention Value: Low

ID # 39

Species: *Gordonia axillaris*

Common: Fried Egg Tree

Height (m): 3.50
DBH (m): 0.35 DGL (m): 0.47
TPZ (m): 4.2 SRZ (m): 2.41

Current Form: Average
Current Vigour: Poor
Age Class: Mature
SULE: Medium (15-40 years)

Retention Value: Low

ID # 40

Species: *Gordonia axillaris*

Common: Fried Egg Tree

Height (m): 5.0
DBH (m): 0.30 DGL (m): 0.40
TPZ (m): 3.6 SRZ (m): 2.25

Current Form: Average
Current Vigour: Poor
Age Class: Mature
SULE: Medium (15-40 years)

Retention Value: Low

ID # 41

Species: *Gordonia axillaris*

Common: Fried Egg Tree

Height (m): 6.0
DBH (m): 0.28 DGL (m): 0.35
TPZ (m): 3.36 SRZ (m): 2.13

Current Form: Average
Current Vigour: Fair
Age Class: Mature
SULE: Medium (15-40 years)

Retention Value: Low

ID # 42

Species: *Nerium oleander*

Common: Oleander

Height (m): 6.0
DBH (m): 0.35 DGL (m): 0.75
TPZ (m): 4.2 SRZ (m): 2.93

Current Form: Average
Current Vigour: Fair
Age Class: Mature
SULE: Long (>40 years)

Retention Value: Low

ID # 43

Species: *Nerium oleander*

Common: Oleander

Height (m): 3.0
DBH (m): 0.30 DGL (m): 0.75
TPZ (m): 3.6 SRZ (m): 2.93

Current Form: Poor
Current Vigour: Poor
Age Class: Mature
SULE: Medium (15-40 years)

Retention Value: Low

ID # 44

Species: *Gordonia axillaris*

Common: Fried Egg Tree

Height (m): 1.50
DBH (m): 0.20 DGL (m): 0.30
TPZ (m): 2.4 SRZ (m): 2

Current Form: Poor
Current Vigour: Fair
Age Class: Mature
SULE: Medium (15-40 years)

Retention Value: Low

ID # 45

Species: *Photinia x fraseri 'Robusta'*

Common: Photinia

Height (m): 2.0
DBH (m): 0.20 DGL (m): 0.28
TPZ (m): 2.4 SRZ (m): 1.94

Current Form: Poor
Current Vigour: Poor
Age Class: Mature
SULE: Medium (15-40 years)

Retention Value: Low

ID # 46

Species: *Eucalyptus saligna*

Common: Sydney Blue Gum

Height (m): 29.0
DBH (m): 1.40 DGL (m): 1.68
TPZ (m): 15 SRZ (m): 4.12

Current Form: Excellent
Current Vigour: Good
Age Class: Mature
SULE: Long (>40 years)

Retention Value: High

ID # 47

Species: *Eucalyptus saligna*

Common: Sydney Blue Gum

Height (m): 28.0
DBH (m): 0.90 DGL (m): 1.18
TPZ (m): 10.8 SRZ (m): 3.55

Current Form: Excellent
Current Vigour: Fair
Age Class: Mature
SULE: Long (>40 years)

Retention Value: High

ID # 48

Species: *Eucalyptus saligna*

Common: Sydney Blue Gum

Height (m): 28.0
DBH (m): 1.10 DGL (m): 1.58
TPZ (m): 13.2 SRZ (m): 4.01

Current Form: Average
Current Vigour: Fair
Age Class: Mature
SULE: Long (>40 years)

Retention Value: High

ID # 49

Species: *Eucalyptus saligna?*

Common: Sydney Blue Gum?

Height (m): 6.0
DBH (m): 0.10 DGL (m): 0.13
TPZ (m): 2 SRZ (m): 1.5

Current Form: Average
Current Vigour: Good
Age Class: Young
SULE: Long (>40 years)

Retention Value: High

ID # 50

Species: *Ulmus parvifolia*

Common: Chinese Elm

Height (m): 8.5
DBH (m): 0.58 DGL (m): 0.63
TPZ (m): 6.96 SRZ (m): 2.73

Current Form: Average
Current Vigour: Fair
Age Class: Mature
SULE: Medium (15-40 years)

Retention Value: Moderate

ID # 51

Species: *Liquidambar styraciflua*

Common: Liquidambar

Height (m): 22.0
DBH (m): 0.81 DGL (m): 0.94
TPZ (m): 9.72 SRZ (m): 3.22

Current Form: Average
Current Vigour: Good
Age Class: Mature
SULE: Long (>40 years)

Retention Value: High

ID # 52

Species: *Liquidambar styraciflua*

Common: Liquidambar

Height (m): 22.0
DBH (m): 0.64 DGL (m): 0.81
TPZ (m): 7.68 SRZ (m): 3.03

Current Form: Average
Current Vigour: Good
Age Class: Mature
SULE: Long (>40 years)

Retention Value: High

ID # 53

Species: *Populus nigra 'Italica'*

Common: Lombardy Poplar

Height (m): 23.0
DBH (m): 0.46 DGL (m): 0.56
TPZ (m): 5.52 SRZ (m): 2.59

Current Form: Average
Current Vigour: Poor
Age Class: Mature
SULE: Short (5-15 years)

Retention Value: Moderate

ID # 54

Species: *Liquidambar styraciflua*

Common: Liquidambar

Height (m): 18.0
DBH (m): 0.65 DGL (m): 0.77
TPZ (m): 7.8 SRZ (m): 2.97

Current Form: Average
Current Vigour: Fair
Age Class: Mature
SULE: Long (>40 years)

Retention Value: Moderate

ID # 55

Species: *Liquidambar styraciflua*

Common: Liquidambar

Height (m): 18.0
DBH (m): 0.49 DGL (m): 0.63
TPZ (m): 5.88 SRZ (m): 2.73

Current Form: Average
Current Vigour: Fair
Age Class: Mature
SULE: Long (>40 years)

Retention Value: Moderate

ID # 56

Species: *Angophora costata*

Common: Smooth-barked Apple

Height (m): 19.0
DBH (m): 1.15 DGL (m): 1.30
TPZ (m): 13.8 SRZ (m): 3.69

Current Form: Average
Current Vigour: Good
Age Class: Mature
SULE: Long (>40 years)

Retention Value: High

ID # 57

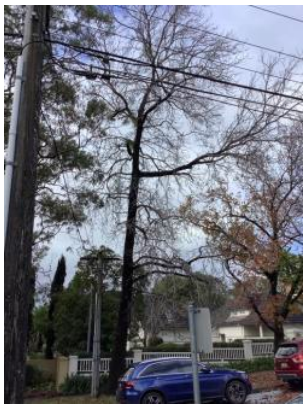
Species: *Liquidambar styraciflua*

Common: Liquidambar

Height (m): 22.0
DBH (m): 0.66 DGL (m): 0.86
TPZ (m): 7.92 SRZ (m): 3.11

Current Form: Average
Current Vigour: Fair
Age Class: Mature
SULE: Long (>40 years)

Retention Value: Moderate



ID # 58

Species: *Liquidambar styraciflua*

Common: Liquidambar

Height (m): 12.50
DBH (m): 0.52 DGL (m): 0.66
TPZ (m): 6.24 SRZ (m): 2.78

Current Form: Average
Current Vigour: Fair
Age Class: Mature
SULE: Long (>40 years)

Retention Value: Moderate

ID # 59

Species: *Liquidambar styraciflua*

Common: Liquidambar

Height (m): 18.0
DBH (m): 0.90 DGL (m): 1.00
TPZ (m): 10.8 SRZ (m): 3.31

Current Form: Average
Current Vigour: Good
Age Class: Mature
SULE: Long (>40 years)

Retention Value: Moderate

ID # 60

Species: *Liquidambar styraciflua*

Common: Liquidambar

Height (m): 10.50
DBH (m): 0.58 DGL (m): 0.77
TPZ (m): 6.96 SRZ (m): 2.97

Current Form: Average
Current Vigour: Good
Age Class: Mature
SULE: Long (>40 years)

Retention Value: Moderate

ID # 61

Species: *Waterhousea floribunda*

Common: Weeping Lilly Pilly

Height (m): 6.0
DBH (m): 0.22 DGL (m): 0.28
TPZ (m): 2.64 SRZ (m): 1.94

Current Form: Average
Current Vigour: Good
Age Class: Semi-mature
SULE: Long (>40 years)

Retention Value: Moderate

ID # 62

Species: *Prunus cerasifera 'Nigra'*

Common: Purple-leaved Cherry-plum

Height (m): 6.0
DBH (m): 0.11 DGL (m): 0.14
TPZ (m): 2 SRZ (m): 1.5

Current Form: Average
Current Vigour: Fair
Age Class: Semi-mature
SULE: Medium (15-40 years)

Retention Value: Low

ID # 63

Species: *Cupressus cashmeriana*

Common: Kashmir Cypress

Height (m): 16.0
DBH (m): 0.75 DGL (m): 0.90
TPZ (m): 9 SRZ (m): 3.17

Current Form: Average
Current Vigour: Fair
Age Class: Mature
SULE: Long (>40 years)

Retention Value: High

ID # 64

Species: *Elaeocarpus eumundi*

Common: Eumundi Quandong

Height (m): 6.0
DBH (m): 0.10 DGL (m): 0.13
TPZ (m): 2 SRZ (m): 1.5

Current Form: Excellent
Current Vigour: Good
Age Class: Young
SULE: Replaceable

Retention Value: Low

ID # 65

Species: *Nyssa sylvatica*

Common: Tupelo

Height (m): 14.0
DBH (m): 0.40 DGL (m): 0.48
TPZ (m): 4.8 SRZ (m): 2.43

Current Form: Average
Current Vigour: Good
Age Class: Mature
SULE: Long (>40 years)

Retention Value: Moderate

ID # 66

Species: *Cedrus deodara*

Common: Himilayan Cedar

Height (m): 12.0
DBH (m): 0.69 DGL (m): 0.74
TPZ (m): 8.28 SRZ (m): 2.92

Current Form: Excellent
Current Vigour: Good
Age Class: Mature
SULE: Long (>40 years)

Retention Value: High

ID # 67

Species: *Radermachera sinica*

Common: China Doll Tree

Height (m): 9.0
DBH (m): 0.33 DGL (m): 0.40
TPZ (m): 3.96 SRZ (m): 2.25

Current Form: Poor
Current Vigour: Fair
Age Class: Mature
SULE: Medium (15-40 years)

Retention Value: Low

ID # 68

Species: *Liquidambar styraciflua*

Common: Liquidambar

Height (m): 16.0
DBH (m): 0.62 DGL (m): 0.82
TPZ (m): 7.44 SRZ (m): 3.04

Current Form: Average
Current Vigour: Fair
Age Class: Mature
SULE: Long (>40 years)

Retention Value: Moderate

ID # 69

Species: *Liquidambar styraciflua*

Common: Liquidambar

Height (m): 15.0
DBH (m): 0.62 DGL (m): 0.87
TPZ (m): 7.44 SRZ (m): 3.12

Current Form: Average
Current Vigour: Fair
Age Class: Mature
SULE: Long (>40 years)

Retention Value: Moderate

ID # 70

Species: *Liquidambar styraciflua*

Common: Liquidambar

Height (m): 17.50
DBH (m): 0.44 DGL (m): 0.56
TPZ (m): 5.28 SRZ (m): 2.59

Current Form: Average
Current Vigour: Good
Age Class: Mature
SULE: Long (>40 years)

Retention Value: Moderate

ID # 71

Species: *Liquidambar styraciflua*

Common: Liquidambar

Height (m): 15.0
DBH (m): 0.46 DGL (m): 0.61
TPZ (m): 5.52 SRZ (m): 2.69

Current Form: Poor
Current Vigour: Fair
Age Class: Mature
SULE: Long (>40 years)

Retention Value: Moderate

ID # 72

Species: *Liquidambar styraciflua*

Common: Liquidambar

Height (m): 16.50
DBH (m): 0.58 DGL (m): 0.74
TPZ (m): 6.96 SRZ (m): 2.92

Current Form: Average
Current Vigour: Fair
Age Class: Mature
SULE: Long (>40 years)

Retention Value: Moderate

ID # 73

Species: *Liquidambar styraciflua*

Common: Liquidambar

Height (m): 9.50
DBH (m): 0.55 DGL (m): 0.72
TPZ (m): 6.6 SRZ (m): 2.88

Current Form: Poor
Current Vigour: Fair
Age Class: Mature
SULE: Long (>40 years)

Retention Value: Nil / Remove

ID # 74

Species: *Liquidambar styraciflua*

Common: Liquidambar

Height (m): 11.0
DBH (m): 0.70 DGL (m): 0.96
TPZ (m): 8.4 SRZ (m): 3.25

Current Form: Average
Current Vigour: Fair
Age Class: Mature
SULE: Long (>40 years)

Retention Value: Moderate

ID # 75

Species: *Liquidambar styraciflua*

Common: Liquidambar

Height (m): 6.0
DBH (m): 0.10 DGL (m): 0.13
TPZ (m): 2 SRZ (m): 1.5

Current Form: Average
Current Vigour: Fair
Age Class: Young
SULE: Long (>40 years)

Retention Value: Low

ID # 76

Species: *Liquidambar styraciflua*

Common: Liquidambar

Height (m): 14.50
DBH (m): 0.91 DGL (m): 1.01
TPZ (m): 10.92 SRZ (m): 3.32

Current Form: Excellent
Current Vigour: Excellent
Age Class: Mature
SULE: Long (>40 years)

Retention Value: High

ID # 77

Species: *Hymenosporum flavum*

Common: Native Frangipani

Height (m): 9.50
DBH (m): 0.28 DGL (m): 0.40
TPZ (m): 3.36 SRZ (m): 2.25

Current Form: Average
Current Vigour: Poor
Age Class: Mature
SULE: Short (5-15 years)

Retention Value: Low

ID # 78

Species: *Callistemon viminalis cv.*

Common: Weeping Bottlebrush

Height (m): 9.0
DBH (m): 0.30 DGL (m): 0.40
TPZ (m): 3.6 SRZ (m): 2.25

Current Form: Poor
Current Vigour: Poor
Age Class: Mature
SULE: Short (5-15 years)

Retention Value: Low

ID # 79

Species: *Livistona australis*

Common: Cabbage Palm

Height (m): 6.0
DBH (m): 0.35 DGL (m): 0.45
TPZ (m): 4.2 SRZ (m): 2.37

Current Form: Average
Current Vigour: Good
Age Class: Mature
SULE: Long (>40 years)

Retention Value: High

ID # 80

Species: *Camellia sasanqua*

Common: Camellia

Height (m): 7.0
DBH (m): 0.30 DGL (m): 0.35
TPZ (m): 3.6 SRZ (m): 2.13

Current Form: Average
Current Vigour: Fair
Age Class: Mature
SULE: Long (>40 years)

Retention Value: Moderate

ID # 81

Species: *Acer palmatum*

Common: Japanese Maple

Height (m): 8.0
DBH (m): 0.45 DGL (m): 0.50
TPZ (m): 5.4 SRZ (m): 2.47

Current Form: Average
Current Vigour: Fair
Age Class: Mature
SULE: Medium (15-40 years)

Retention Value: Moderate

ID # 82

Species: *Sapium sebiferum (syn. Triadica sebifera)*

Common: Chinese Tallow Tree

Height (m): 9.0
DBH (m): 0.40 DGL (m): 0.45
TPZ (m): 4.8 SRZ (m): 2.37

Current Form: Average
Current Vigour: Good
Age Class: Mature
SULE: Long (>40 years)

Retention Value: Moderate

ID # 83

Species: *Acer palmatum*

Common: Japanese Maple

Height (m): 9.50
DBH (m): 0.50 DGL (m): 0.55
TPZ (m): 6 SRZ (m): 2.57

Current Form: Average
Current Vigour: Good
Age Class: Mature
SULE: Medium (15-40 years)

Retention Value: Moderate

ID # 84

Species: *Eucalyptus dunnii?*

Common: Dunn's White Gum?

Height (m): 21.0
DBH (m): 0.70 DGL (m): 0.80
TPZ (m): 8.4 SRZ (m): 3.01

Current Form: Average
Current Vigour: Excellent
Age Class: Mature
SULE: Long (>40 years)

Retention Value: High

ID # 85

Species: *Butia capitata*

Common: Jelly Palm

Height (m): 3.0
DBH (m): 0.40 DGL (m): 0.40
TPZ (m): 4.8 SRZ (m): 2.25

Current Form: Average
Current Vigour: Fair
Age Class: Mature
SULE: Long (>40 years)

Retention Value: Moderate

ID # 86

Species: *Lagerstroemia indica*

Common: Crepe Myrtle

Height (m): 9.0
DBH (m): 0.30 DGL (m): 0.40
TPZ (m): 3.6 SRZ (m): 2.25

Current Form: Poor
Current Vigour: Fair
Age Class: Mature
SULE: Long (>40 years)

Retention Value: Moderate

ID # 87

Species: *Eucalyptus saligna*

Common: Sydney Blue Gum

Height (m): 24.0
DBH (m): 0.95 DGL (m): 1.10
TPZ (m): 11.4 SRZ (m): 3.44

Current Form: Average
Current Vigour: Good
Age Class: Mature
SULE: Long (>40 years)

Retention Value: High

ID # 88

Species: *Eucalyptus dunnii?*

Common: Dunn's White Gum?

Height (m): 16.0
DBH (m): 0.45 DGL (m): 0.55
TPZ (m): 5.4 SRZ (m): 2.57

Current Form: Excellent
Current Vigour: Excellent
Age Class: Mature
SULE: Long (>40 years)

Retention Value: High

ID # 89

Species: *Liriodendron tulipifera?*

Common: Tulip Tree?

Height (m): 10.0
DBH (m): 0.15 DGL (m): 0.20
TPZ (m): 2 SRZ (m): 1.68

Current Form: Average
Current Vigour: Good
Age Class: Mature
SULE: Long (>40 years)

Retention Value: Moderate

ID # 90

Species: *Brachychiton acerifolius*

Common: Illawarra Flame Tree

Height (m): 10.0
DBH (m): 0.35 DGL (m): 0.45
TPZ (m): 4.2 SRZ (m): 2.37

Current Form: Excellent
Current Vigour: Good
Age Class: Mature
SULE: Long (>40 years)

Retention Value: High

ID # 91

Species: *Camellia sasanqua*

Common: Camellia

Height (m): 7.0
DBH (m): 0.40 DGL (m): 0.50
TPZ (m): 4.8 SRZ (m): 2.47

Current Form: Average
Current Vigour: Poor
Age Class: Mature
SULE: Long (>40 years)

Retention Value: Low

ID # 92

Species: *Lagerstroemia indica*

Common: Crepe Myrtle

Height (m): 9.0
DBH (m): 0.30 DGL (m): 0.35
TPZ (m): 3.6 SRZ (m): 2.13

Current Form: Average
Current Vigour: Good
Age Class: Mature
SULE: Long (>40 years)

Retention Value: Moderate

ID # 93

Species: *Lagerstroemia indica*

Common: Crepe Myrtle

Height (m): 7.0
DBH (m): 0.20 DGL (m): 0.25
TPZ (m): 2.4 SRZ (m): 1.85

Current Form: Poor
Current Vigour: Fair
Age Class: Mature
SULE: Long (>40 years)

Retention Value: Low

ID # 94

Species: *Acer palmatum*

Common: Japanese Maple

Height (m): 9.0
DBH (m): 0.40 DGL (m): 0.55
TPZ (m): 4.8 SRZ (m): 2.57

Current Form: Poor
Current Vigour: Fair
Age Class: Mature
SULE: Short (5-15 years)

Retention Value: Low

ID # 95

Species: *Livistona australis*

Common: Cabbage Palm

Height (m): 6.0
DBH (m): 0.25 DGL (m): 0.35
TPZ (m): 3 SRZ (m): 2.13

Current Form: Average
Current Vigour: Good
Age Class: Mature
SULE: Long (>40 years)

Retention Value: High

ID # 96

Species: *Butia capitata*

Common: Jelly Palm

Height (m): 3.0
DBH (m): 0.50 DGL (m): 0.55
TPZ (m): 6 SRZ (m): 2.57

Current Form: Average
Current Vigour: Fair
Age Class: Mature
SULE: Long (>40 years)

Retention Value: Moderate

ID # 97

Species: *Elaeocarpus reticulatus*

Common: Blueberry Ash

Height (m): 6.0
DBH (m): 0.15 DGL (m): 0.20
TPZ (m): 2 SRZ (m): 1.68

Current Form: Average
Current Vigour: Poor
Age Class: Mature
SULE: Medium (15-40 years)

Retention Value: Moderate

ID # 98

Species: *Quercus palustris*

Common: Pin Oak

Height (m): 14.50
DBH (m): 0.80 DGL (m): 0.90
TPZ (m): 9.6 SRZ (m): 3.17

Current Form: Average
Current Vigour: Good
Age Class: Mature
SULE: Long (>40 years)

Retention Value: High

ID # 99

Species: *Cinnamomum camphora*

Common: Camphor Laurel

Height (m): 16.0
DBH (m): 0.75 DGL (m): 0.85
TPZ (m): 9 SRZ (m): 3.09

Current Form: Average
Current Vigour: Good
Age Class: Mature
SULE: Long (>40 years)

Retention Value: Moderate

ID # 100

Species: *Elaeocarpus eumundi*

Common: Eumundi Quandong

Height (m): 7.0
DBH (m): 0.12 DGL (m): 0.15
TPZ (m): 2 SRZ (m): 1.5

Current Form: Average
Current Vigour: Excellent
Age Class: Mature
SULE: Long (>40 years)

Retention Value: Moderate