



Project No: 2B/WES/16 Report No: 2B/WES/AIA/D

ARBORICULTURAL IMPACT ASSESSMENT TREE PROTECTION SPECIFICATION

Catholic Healthcare Lewisham
2B West Street
Lewisham

Prepared for: CATHOLIC HEALTHCARE

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Revision D

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1.0 INTRODUCTION

1.1 Background

- 1.1.1 This Arboricultural Impact Assessment Report and Tree Protection Specification was prepared for Catholic Healthcare Limited (CHL) regarding a seniors living development at 2B West Street, Lewisham. The purpose of this Report is to determine the impact of the proposed works on the trees, and where appropriate, recommend the use of tree sensitive methods and tree protection methods to minimise adverse impacts. This Revision D Report is based on updated Landscape Plans.
- 1.1.2 The site is currently used for aged care and seniors living facilities for ninety-six (96) residents. CHL is seeking to secure approval for alterations, additions and associated conservation works to the heritage-listed Anne Walsh and Novitiate buildings on site and redevelopment on the southern part of the site for the purposes of one hundred and nineteen (119) Independent Living Units (ILUs) and one hundred and forty-four (144) Residential Aged Care Facilities (RACF) beds.
- 1.1.3 For consistency, the tree numbers used within this Report correlate with the Preliminary Arboricultural Report (Report No: 2B/WES/PAR/A) prepared by TreeiQ in May 2016. This Arboricultural Impact Assessment and Tree Protection Specification should be read in conjunction with the aforementioned treeiQ Arboricultural Report.
- 1.1.4 In preparing this report, author is aware of and has considered the objectives of *State Environmental Planning Policy Vegetation in Non-Rural Areas (2017)*, *Marrickville DCP (2.20 Generic Provisions - Tree Management)*, *Australian Standard 4970 Protection of Trees on Development Sites (2009)*, *Australian Standard 4373 Pruning of Amenity Trees (2007)*, *Australian Standard 2303 Tree Stock for Landscape Use (2015)* and *Safe Work Australia Guide for Managing Risks of Tree Trimming and Removal Work (2016)*.

Refer to Methodology (**Appendix 1**)

- 1.1.5 This impact assessment is based on an assessment of the following supplied documentation/plans only:
- Landscape Package, prepared by Arcadia, dated July 2020
 - Architectural Package (Rev F), prepared by Jackson Teece

Refer to Plans (**Appendix 2**)

2.0 RESULTS

2.1 The Site

- 2.1.1 The site is located at 2B West Street, Lewisham and is within the Inner West Local Government Area. The site is legally described as Lot 1 DP 1116995. It is irregular in shape and is approximately 12,065m² in area.
- 2.1.2 The site was formerly part of Lewisham Hospital and is currently occupied by Lewisham Aged Care which is owned by CHL and is a stand-alone facility. The site incorporates a complex of buildings including:

- Anne Walsh Building: a 3-storey building to the north of the site which is currently unoccupied and was a former outpatient building;
- Former Novitiate Building: a 5-storey square building with a central courtyard in the centre of the site which is used as an aged care facility with 46 standard rooms and 5 shared rooms with common bathroom facilities;
- Aged care hostel: located in the southern part of the site and incorporates a series of 2 storey buildings which offer low care accommodation for 40 residents.

2.1.3 The site is heritage-listed as an item of local significance for the ‘former Lewisham Hospital, Convent and grounds, including interiors,’ and is adjacent to the local Petersham North Heritage Conservation Area to the east, opposite West Street.¹

2.2 The Proposal

2.2.1 The DA seeks approval for the following:

- Site preparation works and excavation;
- Retention of the Anne Walsh Building with alterations and additions to create accommodation for ILUs and ancillary uses;
- Retention of the Novitiate Building with alterations and additions to create accommodation for ILUs and ancillary uses;
- Demolition of the existing aged care hostel on the southern part of the site;
- Construction of 12-storey building with two basement levels for car parking;
- Internal vehicle access driveway with connection points to West Street and Charles O’Niell Way, and drop off zone;
- New cycleway/access path along rail corridor; and
- Landscaping works, including ground level landscaping and public facilities for the creation of a communal open space area for future residents.

Refer to Plans (**Appendix 2**)

2.3 The Trees

2.3.1 An assessment of the trees was undertaken in preparation of the Preliminary Arboricultural Report (Report No: 2B/WES/PAR/A) prepared by TreeiQ in May 2016. Information relating to individual tree assessment is contained within the Tree Assessment Schedule (**Appendix 3**).

¹ Marrickville Council (2011)

- 2.3.2 Ninety-nine (99) trees (and group trees) were addressed within this Report and include a mix of locally indigenous, Australian native and exotic species. Several trees are likely to be self-seeded specimens. In total, thirty-three (33) species are represented. Of the ninety-nine (99) trees, seven (7) trees are located on the West Street road reserve and a full VTA of these trees was not undertaken. The species and trunk diameter measurement were recorded for the purposes of determining Tree Protection Zone (TPZ) calculations only. These trees have been identified alphabetically.
- 2.3.3 Tree 42 is dead and Trees 2, 33, 44A, 55, 82, 85, 86 and 87 have been removed since the original Visual Tree Assessment in May 2016. These trees have not been included in Section 3.0 Arboricultural Impact Assessment below.
- 2.3.4 As required by Clause 2.3.2 of *Australian Standard 4970 (2009) Protection of Trees on Development Sites (AS-4970)*, each tree assessed has been allocated a Retention Value. The Retention Value is based on Useful Life Expectancy and Landscape Significance with consideration to tree health, structural condition and site suitability. The Retention Values do not consider the proposed development works and are not a schedule for tree retention or removal. The trees have been allocated one of the following Retention Values:
- Priority for Retention
 - Consider for Retention
 - Consider for Removal
 - Priority for Removal
- 2.3.5 In general, the trees are of low to moderate quality and value due to either a reduced health and/or presence of structural defects, or low Landscape Significance. In this regard, fifty-two (52) trees (58% approx.) were allocated a Retention Value of either *Priority for Removal* or *Consider for Removal*. Whilst some landscape structures and remnants of a prior landscape setting remain, it is unlikely that any of the existing trees within the site would be considered culturally significant specimens. The heritage significance of the trees has not been assessed and is beyond the scope of this Report.
- 2.3.6 Tree 30 *Eucalyptus saligna* (Sydney Blue Gum) meets the criteria to be allocated a Retention Value of *Priority for Retention*. However, it has been assessed as being in a poor structural condition due to the presence of a large trunk wound with fungal brackets. These fungal brackets have been visually identified as *Phellinus* sp.²
- 2.3.7 *Phellinus* sp. are basidiomycete fungi that cause white rot of wood in a range of woody perennial species and are widely distributed within Australia.³ *Phellinus* species degrade the lignin components of the wood more rapidly than the cellulose leading to reduced wood strength. Overtime this wood decay pathogen has the potential to reduce the residual wall thickness of healthy tissue to the extent that structural failure may occur. However, internal diagnostic testing (i.e. Resistograph) is required to establish the actual extent of decay/sound wood and implications on the tree's structural integrity. Pathology testing (i.e DNA testing) should also be undertaken to confirm the causal agent of decay.
- 2.3.8 A search of the BioNet Atlas of NSW Wildlife Database was undertaken in September 2018. No individual threatened tree species listed within this database for the area were identified during the current field investigations of the site.⁴ The ecological significance and habitat value of the trees has not been assessed and is beyond the scope of this Report.

² International Mycological Association (2015)

³ Riffle & Conway (1986); Schwarze, Engels & Mattheck (2000)

⁴ NSW Office of Environment and Heritage (2011)

3.0 ARBORICULTURAL IMPACT ASSESSMENT

3.1 Tree Removal

3.1.1 The supplied plans show that fifty-six (56) trees will need to be removed to accommodate the proposed development. This includes twenty-three (23) trees with a Retention Value of *Consider for Retention*, twenty-nine (29) trees with a Retention Value of *Consider for Removal* and four (4) trees with a Retention Value of *Priority for Removal*.

3.1.2 Table 1: Trees to be removed

Priority for Retention	Consider for Retention	Consider for Removal	Priority for Removal
n/a	9, 17, 19, 20, 21, 25, 26, 27, 59, 60, 67, 68, 72, 73, 74, 76, 90, 94, 95, 96, 97, 98 & 99	1, 3, 4, 5, 6, 7, 8, 10, 11, 12, 13, 14, 15, 16, 18, 22, 23, 24, 36, 37, 56, 57, 61, 69, 70, 88, 89, 91 & 92	41, 71, 75 & 93

3.2 Tree Retention

3.2.1 The supplied plans show that thirty-six (36) trees are to be retained as part of the proposed development. This includes one (1) tree with a Retention Value of *Priority for Retention*, fourteen (14) trees with a Retention Value of *Consider for Retention*, twenty (20) trees with a Retention Value of *Consider for Removal* and one (1) tree a Retention Value of *Priority for Removal*.

3.2.2 Table 2: Trees to be retained

Priority for Retention	Consider for Retention	Consider for Removal	Priority for Removal
30	29, 32, 35, 38, 39, 48, 49, 52, 64, 66, 77, 78, 79 & 80	28, 31, 34, 40, 43, 44, 45, 46, 47, 51, 53, 54, 58, 62, 63, 65, 81, 83, 84 & 100	50

3.2.3 An additional seven (7) are also to be retained. These are Trees A-G which are located within the West Street road reserve.

3.2.4 Works are proposed within the Tree Protection Zone (TPZ) areas of twenty-nine (29) trees as discussed below.

3.3 Minor Encroachment

3.3.1 The supplied plans show that works are proposed within the TPZ areas of Trees 29, 30, 32, 77 and C. As the encroachment into the individual TPZ is less than 10% and outside of the Structural Root Zone (SRZ), the extent of work represents *Minor Encroachments* as defined by *Australian Standard 4970-2009 Protection of Trees on Development Sites (AS-4970)*. A *Minor Encroachment* is considered acceptable by AS-4970 when it is compensated for elsewhere and contiguous within the TPZ. The encroachments into TPZ areas should be compensated for by extending the TPZ in areas not subject to encroachment.

3.3.2 No over-excavation, battering or benching should be undertaken beyond the basement footprint. Tree sensitive excavation (hand, hydrovac, airspade etc to a depth of 700mm along the line of the basement footprint within the TPZ) and root pruning should be undertaken prior to the bulk excavation and piling works to prevent tearing and shattering damage to the roots. Provision should be made when designing and specifying the excavation and piling methods/machinery for basement construction so that additional pruning works beyond those detailed in this Report are not required for temporary construction access.

- 3.3.3 Tree 29 will need to be pruned to facilitate basement construction and provide clearance from the proposed building. The extent of pruning required represents approximately 15-20% of the tree's total crown volume. The pruning will alter the tree's form on the southern and eastern sides of the crown although this will be less evident when the trees are viewed from outside the site. Refer Section 3.6 Pruning.

3.4 Major Encroachment

- 3.4.1 The supplied plans show that works are proposed within the TPZ areas of 35, 38-40, 43-54, 58, 62, 63, 77-81, 83 and 84. As the encroachment into the individual TPZ is greater than 10% and/or inside the SRZ, the extent of work represents *Major Encroachments* as defined by AS-4970. Extensive information has been published relating to the use of tree sensitive design and construction methods which can be used to minimise impacts of development on tree health and reduce conflict between trees and built structures. Much of this information has been incorporated into best practice guidelines and standards (i.e. *British Standard 5837 Trees in Relation to Design, Demolition and Construction 2012* & *Australian Standard 4970-2009 Protection of Trees on Development Sites*). Specifically, Clause 3.3.4 of AS-4970, notes that design factors and tree sensitive methods can be used to minimise the impact of the encroachment. These methods should be confirmed as feasible by the relevant project consultants (i.e. architect, landscape, engineer etc) and may require flexibility at the time of construction.

3.4.2 Tree 35

The supplied plans show that new paving is proposed within the TPZ of Tree 35 *Phoenix canariensis* (Canary Island Date Palm). The tree is currently located in a dilapidated, narrow raised garden bed of approximately 400mm in height. The raised garden bed should be rebuilt and incorporated in the proposed new pavement area. Excavation should not be undertaken within the existing raised garden bed.

3.4.3 Tree 38

The supplied plans show that a ramp is proposed within the TPZ of Tree 38 *Pittosporum undulatum* (Sweet Pittosporum). The ramp should be installed above existing grade (including sub-base layers) and designed as to eliminate the need for high levels of compaction of the underlying soil profile. Where possible, existing sub-base materials should be left in situ and reused. Excavation may be required within the north-eastern section of the TPZ where the ramp meets the deck. The excavation should be limited to less than 10% of the TPZ and be outside of the SRZ. Excavation works should be undertaken using tree sensitive methods (hand/hydrovac/airspade etc) and root pruning undertaken by the Project Arborist only.

- 3.4.4 In addition, a new pergola structure is proposed within the TPZ of Tree 38. This structure should be designed to accommodate the tree's crown without the need for pruning. The existing footings should be utilised where retaining walls are to be rebuilt/repared. No excavation of the soil profile to the rear of the existing retaining walls should be undertaken.

- 3.4.5 Where the existing footings cannot be reused, the wall should be supported on isolated piers with all other parts of the structure located above existing grade within the TPZ. Pier locations should be determined by preliminary hand excavation to enable the retention and protection of roots (>25mmØ) as required by the Project Arborist.

- 3.4.6 The existing wall capping which forms the back of a masonry seat built into the retaining wall has been pushed out of alignment by the expansion of the tree's trunk. This wall should be carefully demolished using tree sensitive methods as outlined in Section 3.5.1. It should be noted that Tree 38 is not a particularly good example of the species and is considered a low value specimen. Tree removal and replacement with a better-quality specimen should be considered in the medium-term.

3.4.7 Trees 39, 40, 43, 45-50, 52, 58-60 & 78-80

The supplied plans show that footpaths are to be upgraded within the TPZ of Trees 39, 40, 43, 45-50, 52, 58-60 and 78-80. Trees 39 and 45 *Phoenix* sp. (Date Palm species), Trees 43, 44, 46, 47, 50, 51, 53 and 58 *Howea forsteriana* (Kentia Palm) and Tree 54 *Washingtonia robusta* (Mexican Fan Palm) are arborescent monocots which have an adventitious root system comprised of numerous fibrous roots. Palm species are more tolerant of root disturbance than tree species which produce a woody root system. With the implementation of best practice tree protection measure, the proposed works should not impact these trees.

3.4.8 Tree sensitive methods for the footpath upgrades should be used within the TPZ areas of Trees 40, 48, 49, 52 and 78-80. Where possible, existing sub-base materials should be left in situ and reused. Where this is not possible, sub-base layers should be removed using hand tools and roots (>25mmØ) protected. New sub-base layers should either be thinned, or finished pavement levels modified as required to enable the retention of roots (>25mmØ) as required by the Project Arborist. New sub-base materials should be lightly compacted above and around roots using hand tools only.

3.4.9 The supplied plans show that a new fence is proposed within the TPZ areas of the Trees 47-50 and 52. The location of fence posts should be determined by preliminary hand excavation to a depth of 600mm to enable the retention of roots (>25mmØ) as required by the Project Arborist.

3.4.10 The supplied plans show the repair/modification of the existing retaining wall and ground level footpath, and construction of stairs and balcony are proposed within the TPZ of Tree 58. The stairs are to be installed at existing grade and extend over the existing, sunken ground level footpath. The stairs should be installed on a piered footing with all part of the stairs constructed above existing grade as detailed in Section 3.4.5.

3.4.11 No over excavation to the rear of the existing or proposed wall within the TPZ of Tree 58 should be undertaken. Drainage to the rear of the wall should utilise a slimline drain-cell type product. The lowering of the ground level footpath levels by approximately 500mm to the east of the trees should not have an adverse impact as the base of the trees sit approximately 1.8m above the existing footpath level.

3.4.12 Tree 62

The supplied plans show that Tree 62 *Phoenix canariensis* (Canary Island Date Palm species) is proposed for transplanting as part of the landscape treatment for the site. Palms species generally transplant successfully due to their fibrous root system and its relocation should not significantly impact the tree. Transplanting works should be undertaken by an experienced Tree Transplanting Contractor with a minimum qualification equivalent (using the Australian Qualifications Framework) of Level 3 or above, in Arboriculture or its recognised equivalent.

3.4.13 Tree 63

The supplied plans show that a deck and pavements are proposed within the TPZ of Tree 63 *Cupressus* sp. (Cypress species). The deck should be setback to provide trunk clearance and allow for future tree growth. The deck (including sub-frame) should be installed above existing grade and supported on piers or posts as outlined within Section 3.4.5. The southern side of the trunk of Tree 63 is in contact with the adjacent brick wall. This wall should be carefully demolished using tree sensitive methods as outlined in Section 3.5.1.

3.4.14 It is understood that finished pavement levels are to remain as existing. Where possible, existing sub-base materials should be left in situ and reused. Where this is not possible, sub-base layers should be removed using hand tools as outlined in Section 3.4.8.

3.4.15 Tree 63 will need to be pruned to provide additional vertical clearance for the proposed deck. The extent of pruning required represents less than 10% of the tree's total crown volume and can be undertaken without significantly impacting the aesthetic value or Useful Life Expectancy of the tree. Refer Section 3.6 Pruning.

3.4.16 Tree 77

It is understood a substation and wall/fence is proposed within the TPZ of Tree 77 *Jacaranda mimosifolia* (Jacaranda). The substation footprint represents a *Minor Encroachment* however the installation of conduits/cables connecting to the substation within the TPZ should be installed using tree sensitive methods (hand/hydrovac/airspade etc) with the services located around/below roots (>25mmØ) as required by the Project Arborist. Refer to Section 3.5.2. The fence/wall should be supported on isolated piers or posts as outlined within Section 3.4.5.

3.4.17 Trees 81, 83 & 84

The supplied plans show that a new palisade fence to the east of the trees is to replace the existing brick wall. The lower section of the wall is to be retained and the new fence installed on top therefore the works should not impact the trees.

3.5 Other Works within TPZ Areas

3.5.1 Demolition Works

Demolition works within TPZ areas should be supervised by the Project Arborist and utilise tree sensitive methods. Structures should be demolished in small sections ensuring demolition machinery/equipment does not contact with any part of the tree. A number of structures to be demolished are located SRZ of trees to be retained. Structures within an SRZ can contribute to tree stability by providing ballast to the rootplate or acting as a stop to the overturning of the rootball. If possible, existing underground structures and sub-base materials should be left in situ and reused. However, it should be noted that in exceptional circumstances (even with the retention of in ground structures) the demolition of structures within the SRZ may compromise tree stability and tree removal may be required.

3.5.2 Underground Services

Underground services should be located outside of the TPZ areas. Where this is not possible, services should be installed using tree sensitive excavation (hand/hydrovac etc) methods with the services located around/below roots (>25mmØ) as deemed necessary by the Project Arborist. Excavation using compact machinery fitted with a flat bladed bucket is permissible where approved by the Project Arborist. Excavation using compact machinery should be undertaken in small increments, guided by a spotter who is to look for and prevent damage to roots (>25mmØ).

3.5.3 Alternatively, boring methods may be used for underground service installation where the obvert level (highest interior level of pipe) is greater than 1200mm below existing grade. Excavations for starting and receiving pits for boring equipment should be located outside of the TPZ areas or located to avoid roots (>25mmØ) as deemed necessary by the Project Arborist. OSD tanks (where required) should be located outside of the TPZ areas.

3.5.4 Landscape Fixtures

Posts/piers locations for landscape fixtures should be determined by preliminary hand excavation to enable the retention and protection of roots (>25mmØ) as required by the Project Arborist.

3.5.5 Landscape Planting & Turf

The installation of plants/turf within the TPZ should be undertaken using hand tools and roots (>25mmØ) should be protected. No mechanical cultivation/ripping of soils should be undertaken within TPZ areas. Soil conditioners and turf underlay may be installed however should not increase existing soil levels within the TPZ by greater than 100mm and must not raise levels within 1m of the base of any tree.

3.6 Pruning

- 3.6.1 The supplied plans show that Tree 29 *Corymbia citriodora* (Lemon Scented Gum) will need to be pruned for additional clearance for high-sided vehicles accessing the site. Tree 63 *Cupressus* sp. (Cypress) will also need to be pruned to provide clearance above the deck. Refer to Tables 3-5.
- 3.6.2 It should be noted that the assessment of pruning requirements was made from ground level with no set-out of the proposed building footprint provided. During the construction phase of a project some additional minor pruning works may be required to provide building clearances.
- 3.6.3 A two-stage approach is recommended to reduce the potential for unnecessary over pruning in the early stages of a project. Stage one pruning addresses the main branches where conflict will occur followed by a second, minor prune around the time of erection of scaffolding to address any (generally smaller) conflicting branches which could not be accurately identified during the initial ground level assessment.
- 3.6.4 Provision should be made within the scaffolding design so that additional pruning is not required. Where additional clearance is required, branches may be temporarily pushed or tied back. Where branches cannot be pushed or tied back without damage, scaffolding/hoarding should be modified and constructed around branches (with appropriate branch protection installed as required). Deadwood greater 30mmØ should be removed from the crowns of the trees.

3.6.5 Table 3: Tree 29 *Corymbia citriodora* (Lemon Scented Gum)

Branch Orientation	Order of Branch	Branch Diameter	Height Above Grade	Comments	Plate No.
E	2nd	125mm	5.5m	Reduction Prune to 50mmØ lateral for building/piling rig clearance	13
E	2nd	100mm	6.0m	Reduction Prune to 40mmØ lateral for building/piling rig clearance	13
E	2nd	75mm	9.0m	Prune for building/piling rig clearance	14
E	Higher order branches	<50mm	10-18m	Prune for building/piling rig clearance	15
SE	2nd	150mm	6.0m	Prune for building clearance	16
SE	3rd	100mm	8.0m	Prune for building clearance	16
SE	2nd	125mm	9.0m	Reduction Prune to 50mmØ lateral for building clearance	16
Note: For piling rig clearance small diameter branches should be temporarily tied back in preference to pruning					

3.6.6 Table 4: Tree 63 *Cupressus* sp. (Cypress species)

Branch Orientation	Order of Branch	Branch Diameter	Height Above Grade	Comments	Plate No.
N	Higher order branches	<75mm	2-3m	Crown Lift for vertical clearance over deck	17

3.6.7 Pruning works should be carried out by a Practising Arborist. The Practising Arborist should hold a minimum qualification equivalent (using the Australian Qualifications Framework) of Level 3 or above, in Arboriculture or its recognised equivalent. The Practising Arborist should have a minimum of 3 years' experience in practical Arboriculture. Pruning work should be undertaken in accordance with *Australian Standard 4373: Pruning of Amenity Trees (2007)*, *Safe Work Australia Guide for Managing Risks of Tree Trimming and Removal Work (2016)* and other applicable legislation and codes.

3.8 Replacement Planting

3.8.1 The proposed development includes the provision of new tree planting across the site. This tree planting would help to diversify the age structure of trees on site and help off-set the loss of canopy cover and amenity resultant from the tree removal. Replacement planting should be supplied in accordance with *Australian Standard 2303 (2015) Tree Stock for Landscape Use*.

3.8.2 The Landscape Details and Specification Plan (Issue I) shows the soil profile for new tree planting on slab comprising of two horizons with the upper 'A' horizon being 300mm in depth. This conforms to current industry best practice. A lightweight planter box mix is specified for the underlying 'B' horizon however the Specification Notes outline that imported soils shall contain 30% compost but does not differentiate between 'A' and 'B' horizons. It is essential that a low organic matter 'B' horizon soil mix is used below 300mm in depth to prevent slumping of soils and the development of anaerobic soil conditions which is likely to prevent the successful establishment of new trees.

4 CONCLUSION

4.1.1 Ninety-nine (99) trees (and group trees) were addressed within this Report and include a mix of locally indigenous, Australian native and exotic species. Several trees are likely to be self-seeded specimens. In general, the trees are of low to moderate quality and value due either a reduced health and/or presence of structural defects, or low Landscape Significance. It is unlikely that any of the existing trees within the site would be considered culturally significant specimens.

4.1.2 The proposal includes the demolition of several existing buildings and the construction of a seniors living development.

4.1.3 The supplied plans show that fifty-six (56) trees will need to be removed to accommodate the proposed development. These include Trees 1, 3-27, 36, 37, 41, 56, 57, 59-61, 67-76 and 88-99.

4.1.4 The supplied plans show that forty-three (43) trees are to be retained as part of the proposed development. These are Trees 28-32, 34, 35, 38-40, 43-54, 58, 62-66, 77-81, 83, 84, 100 and A-G. Of these, the supplied plans show that works are proposed within the TPZ areas Trees 35, 38-40, 43-54, 58, 62, 63, 77-81, 83 and 84 with the extent of work representing *Major Encroachments* as defined by AS-4970. Tree sensitive design and construction methods as outlined within Sections 3.4 and 3.5 should be utilised to minimise the impact of the works on the trees. These methods should be confirmed as feasible by the relevant project consultants (i.e architect, landscape architect, engineer etc) and may require flexibility at the time of construction. The trees to be retained should be protected in accordance with Tree Protection Specification (**Appendix 5**).

4.1.5 The supplied plans show that Trees 29 and 63 will need to be pruned for building, construction and vehicular access. Pruning work should be undertaken in accordance with *Australian Standard 4373: Pruning of Amenity Trees (2007)*, *Safe Work Australia Guide for Managing Risks of Tree Trimming and Removal Work (2016)* and other applicable legislation and codes.

- 4.1.6 The supplied plans show that Tree 62 *Phoenix canariensis* (Canary Island Date Palm) is to be transplanted as part of the proposed development. The tree should not be relocated into the TPZ areas of the trees to be retained. Transplanting works should be undertaken by an experienced Tree Transplanting Contractor.
- 4.1.7 An updated Arboricultural Impact Assessment and Tree Protection Plan should be prepared upon completion of detailed construction plans to examine the potential impact of the proposal on the trees to be retained. The Report should detail the design and construction methods, and tree protection measures required to minimise impacts on trees to be retained. An updated site survey should be provided to show the locations of all trees.

5.0 LIMITATIONS & DISCLAIMER

TreeiQ takes care to obtain information from reliable sources. However, TreeiQ can neither guarantee nor be responsible for the accuracy of information provided by others. Plans, diagrams, graphs and photographs in this Arboricultural Report are visual aids only and are not necessarily to scale. This Report provides recommendations relating to tree management only. Advice should be sought from appropriately qualified consultants regarding design/construction/ecological/heritage etc issues.

This Report has been prepared for exclusive use by the client. This Report shall not be used by others or for any other reason outside its intended target or without the prior written consent of TreeiQ. Unauthorised alteration or separate use of any section of the Report invalidates the Report.

Many factors may contribute to tree failure and cannot always be predicted. TreeiQ takes care to accurately assess tree health and structural condition. However, a tree's internal structural condition may not always correlate to visible external indicators. There is no warranty or guarantee, expressed or implied that problems or deficiencies regarding the trees or site may not arise in the future. Information contained in this report covers only the trees assessed and reflects the condition of the trees at the time of inspection. Additional information regarding the methodology used in the preparation of this Report is attached as Appendix 1. A comprehensive tree risk assessment and management plan for the trees is beyond the scope of this Report.

Reference should be made to any relevant legislation including Tree Management Controls. All recommendations contained within this Report are subject to approval from the relevant Consent Authority.

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Appendix 1: Methodology

- 1.1 Site Inspection:** This report was determined as a result of a comprehensive site inspection during April 2016. A follow up site inspection was undertaken in October 2018.
- 1.2 Visual Tree Assessment (VTA):** The subject tree(s) was assessed using the Visual Tree Assessment criteria and notes as described in *The Body Language of Trees – A Handbook for Failure Analysis*.⁵ The inspection was limited to a visual examination of the subject tree(s) from ground level only. The inspection was limited to a visual examination of the subject tree(s) from ground level only. No internal diagnostic or tissue testing was undertaken as part of this assessment. Trees outside the subject site were assessed from the property boundaries only.
- 1.3 Tree Dimensions:** The dimensions of the subject tree(s) are approximate only.
- 1.4 Tree Locations:** The location of the subject tree(s) was determined from the supplied plans. Trees not shown on the supplied plans have been plotted in their **approximate location only**.
- 1.5 Trees & Development:** Tree Protection Zones, Tree Protection Measures and Sensitive Construction Methods for the subject tree were based on methods outlined in *Australian Standard 4970-2009 Protection of Trees on Development Sites*.

The *Tree Protection Zone* (TPZ) is described in AS-4970 as a combination of the root area and crown area requiring protection. It is an area isolated from construction disturbance, so that the tree remains viable.

The *Structural Root Zone* (SRZ) is described in AS-4970 as the area around the base of a tree required for the tree's stability in the ground. Severance of structural roots within the SRZ is not recommended as it may lead to the destabilisation and/or demise of the tree.

In some cases it may be possible to encroach into or make variations to the theoretical TPZ. A *Minor Encroachment* is less than 10% of the area of the TPZ and is outside the SRZ. The area lost to this encroachment should be compensated for elsewhere and contiguous with the TPZ. A *Major Encroachment* is greater than 10% of the TPZ or inside the SRZ. In this situation the Project Arborist must demonstrate that the tree would remain viable. This may require root investigation by non-destructive methods or the use of sensitive construction methods.

- 1.6 Tree Health:** The health of the subject tree(s) was determined by assessing:

- I. Foliage size and colour
- II. Pest and disease infestation
- III. Extension growth
- IV. Crown density
- V. Deadwood size and volume
- VI. Presence of epicormic growth

- 1.7 Tree Structural Condition:** The structural condition of the subject tree(s) was assessed by:

- I. Assessment of branching structure
(i.e co-dominant/bark inclusions, crossing branches, branch taper, terminal loading, previous branch failures)
- II. Visible evidence of structural defects or instability
(i.e root plate movement, wounds, decay, cavities, fungal brackets, adaptive growth)
- III. Evidence of previous pruning or physical damage
(root severance/damage, lopping, flush-cutting, lions tailing, mechanical damage)

- 1.8 Useful Life Expectancy (ULE):** The ULE is an estimate of the longevity of the subject tree(s) in its growing environment. The ULE is modified where necessary to take in consideration tree(s) health, structural condition and site suitability. The tree(s) has been allocated one of the following ULE categories (Modified from Barrell, 2001):

- I. 40 years +
- II. 15-40 years
- III. 5-15 years
- IV. Less than 5 years

⁵ Mattheck & Breloer (2003)

- 1.9 Landscape Significance:** Landscape Significance was determined by assessing the combination of the cultural, environmental and aesthetic values of the subject tree(s). Whilst these values are subjective, a rating of high, moderate, low or insignificant has been allocated to the tree(s). This provides a relative value of the tree's Landscape Significance which may aid in determining its Retention Value. If the tree(s) can be categorized into more than one value, the higher value has been allocated.

Landscape Significance	Description
Very High	The subject tree is listed as a Heritage Item under the <i>Local Environmental Plan</i> with a local or state level of significance.
	The subject tree is listed on Council's Significant Tree Register or is considered to meet the criteria for significance assessment of trees and/or landscapes by a suitably qualified professional. The criteria are based on general principles outlines in the Burra Charter and on criteria from the Register of the National Estate.
	The subject tree is a remnant tree.
High	The subject tree creates a 'sense of place' or is considered 'landmark' tree.
	The subject tree is of local, cultural or historical importance or is widely known.
	The subject tree has been identified by a suitably qualified professional as a species scheduled as a Threatened or Vulnerable Species or forms part of an Endangered Ecological Community associated with the subject site, as defined under the provisions of the <i>Threatened Species Conservation Act 1995 (NSW)</i> or the <i>Environmental Protection and Biodiversity Conservation Act 1999</i> .
	The subject tree is known to provide habitat to a threatened species.
	The subject tree is an excellent representative of the species in terms of aesthetic value.
	The subject tree is of significant size, scale or makes a significant contribution to the canopy cover of the locality.
	The subject tree forms part of the curtilage of a heritage item with a known or documented association with that item.
Moderate	The subject tree makes a positive contribution to the visual character or amenity of the area.
	The subject tree provides a specific function such as screening or minimising the scale of a building.
	The subject tree has a known habitat value.
	The subject tree is a good representative of the species in terms of aesthetic value.
Low	The subject tree is an environmental pest species or is exempt under the provisions of the local Council's Tree Management Controls
	The subject tree makes little or no contribution to the amenity of the locality.
	The subject tree is a poor representative of the species in terms of aesthetic value.
Insignificant	The subject tree is declared a Noxious Weed under the Noxious Weeds Act

- 1.10 Retention Value:** Retention Value was based on the subject tree's Useful Life Expectancy and Landscape Significance. The Retention Value was modified where necessary to take in consideration the subject tree's health, structural condition and site suitability. The subject tree(s) has been allocated one of the following Retention Values:

- I. Priority for Retention
- II. Consider for Retention
- III. Consider for Removal
- IV. Priority for Removal

ULE		Landscape Significance			
	Very High	High	Moderate	Low	Insignificant
40 years +	Priority for Retention	Priority for Retention		Consider for Removal	Priority for Removal
15-40 years		Priority for Retention	Consider for Retention		
5-15 years		Consider for Retention			
Less than 5 years	Consider for Removal	Priority for Removal			

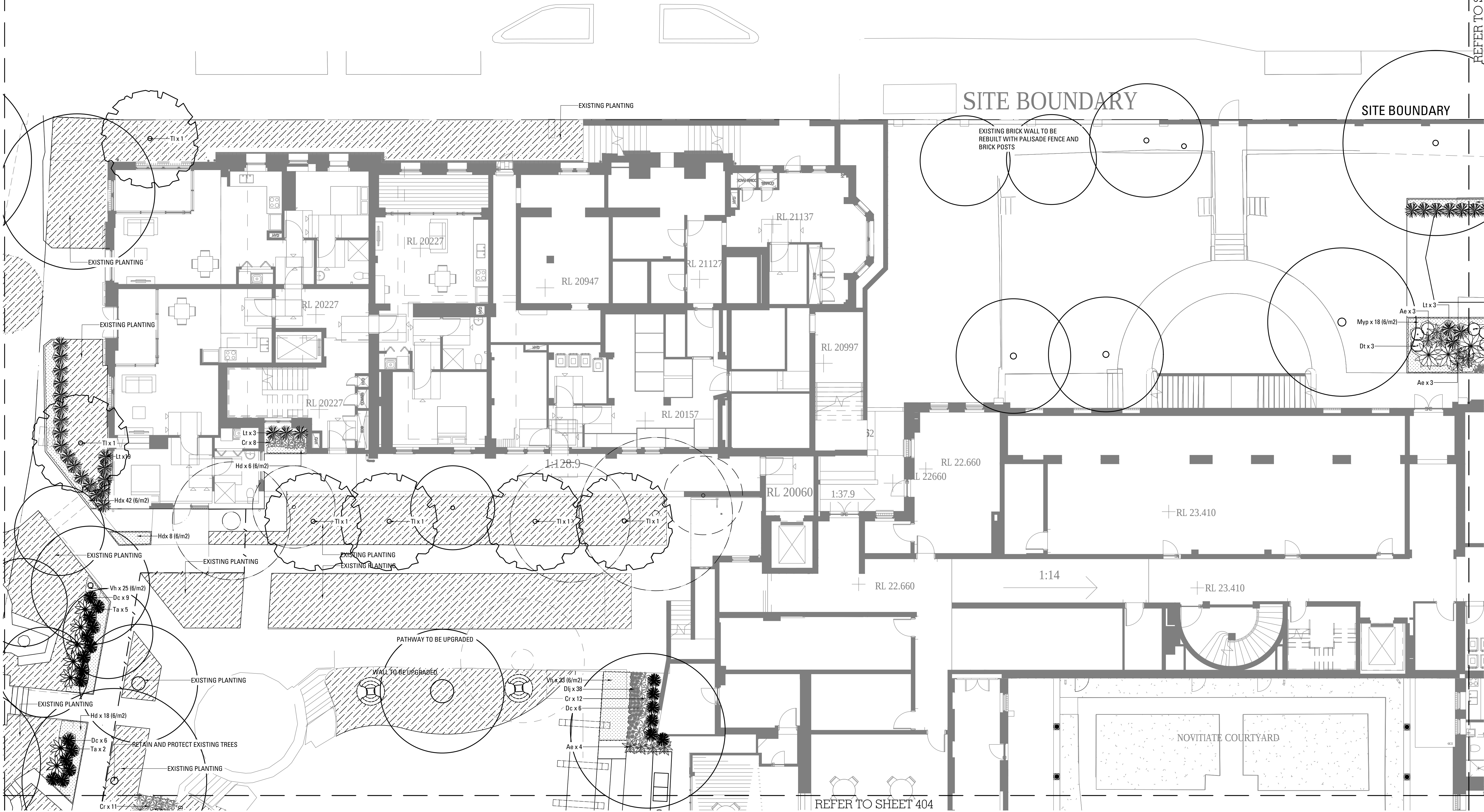
The above table has been modified from the Footprint Green Tree Significance and Retention Value Matrix.

LANDSCAPE DESIGN VEGETATION MANAGEMENT PLAN



Note:
The survey and landscape use typical sized tree canopies.
The tree canopies are approximate and not perfectly accurate to reflect the mature size of each species

E S T R E E T



REFER TO SHEET 404

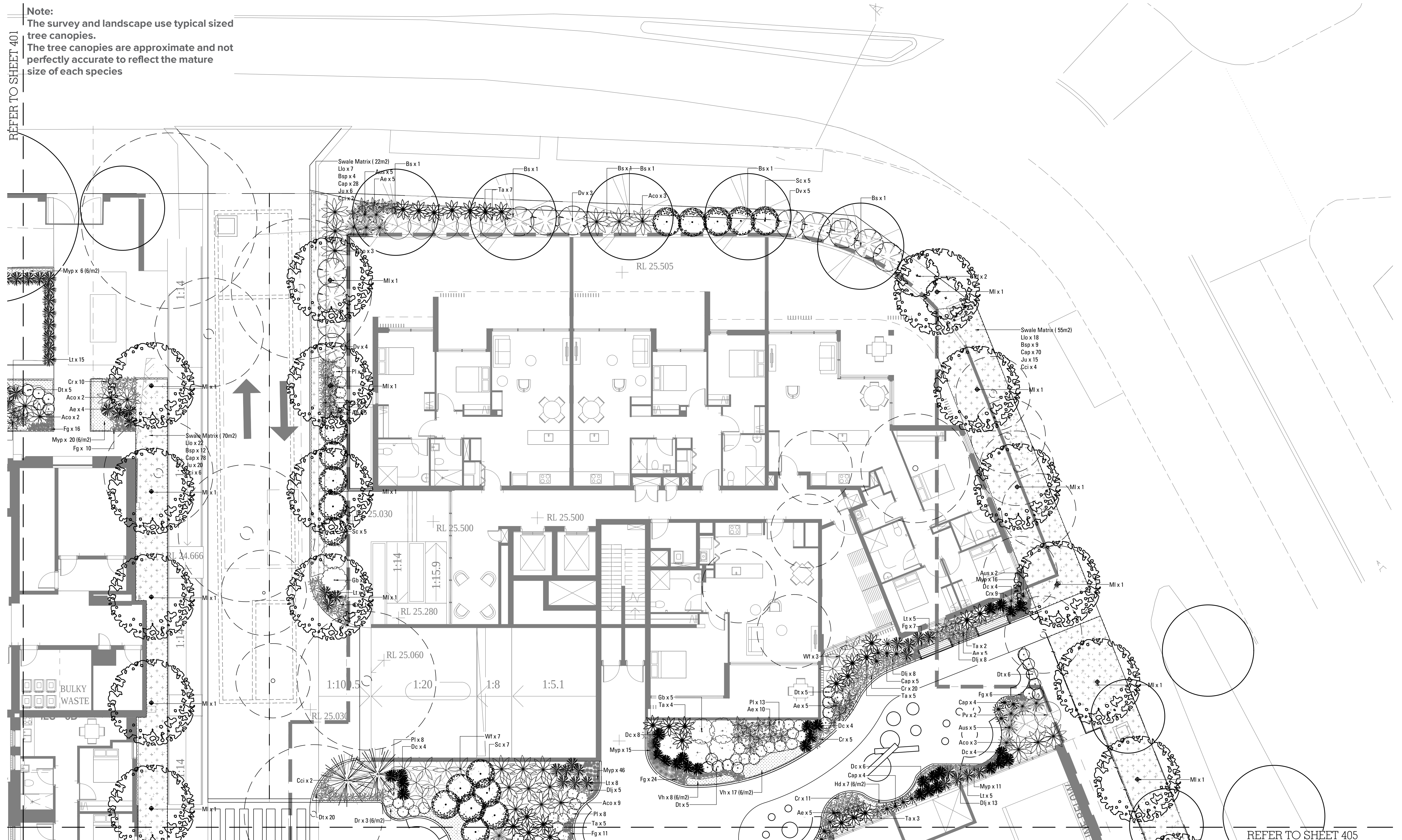
REFER TO SHEET 402



Note:

The survey and landscape use typical sized tree canopies.
The tree canopies are approximate and not perfectly accurate to reflect the mature size of each species

REFER TO SHEET 401



REFER TO SHEET 405

ARCADIA

LANDSCAPE ARCHITECTURE

CATHOLIC HEALTHCARE LEWISHAM

DEVELOPMENT APPLICATION



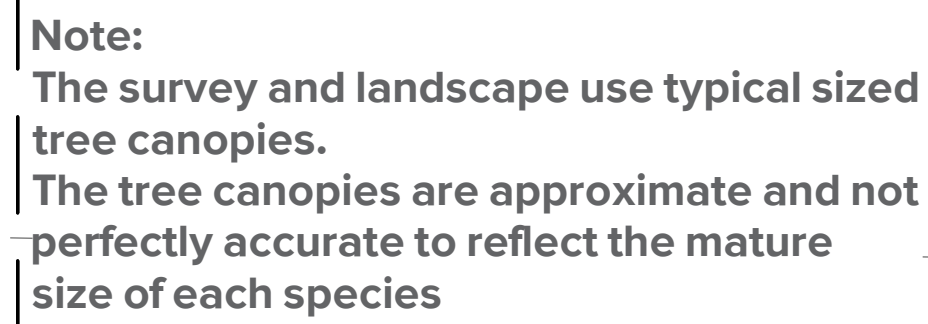
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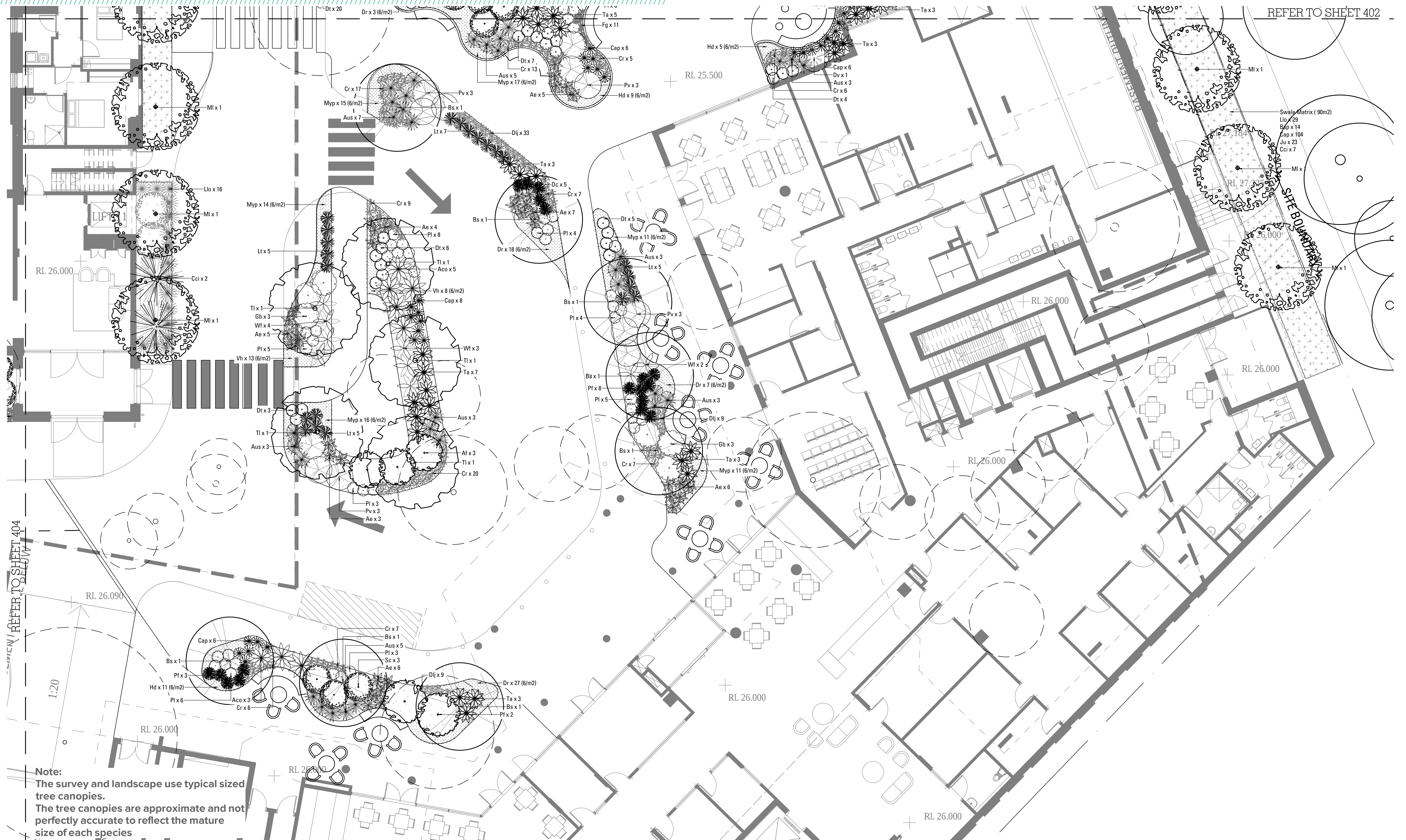
DATE JULY 2020
SCALE 1:100 @ A1
ISSUE K

Copyright remains the property of **Arcadia Landscape Architecture Pty Ltd**. Use only figured dimensions. Any other required dimensions are to be referred to and supplied by the landscape architect. All discrepancies to be referred to the project manager and Arcadia Landscape Architecture Pty Ltd prior to construction. Ensure compliance with the Building Code of Australia and all relevant Australian Standards and Authorities

Note:
The survey and landscape use typical sized tree canopies.
The tree canopies are approximate and not perfectly accurate to reflect the mature size of each species







Appendix 3: Tree Assessment Schedule

Tree No.	Species	DBH (mm)	Height (m)	Radial Crown Spread (m)	Health Rating	Structural Rating	Comments	ULE (years)	L/Significance	Retention Value	Radial TPZ (m)	Radial SRZ (m)	Implication
1	<i>Jacaranda mimosifolia</i> (Jacaranda)	250 250	5	4	Fair	Good	Crown density 50-75%. Small (<25mm) diameter deadwood. Medium (25-75mm) diameter deadwood in moderate volumes.	5-15	Low	Consider for Removal	4.2	2.2	Remove. Building/basement footprint.
2	Removed												
3	<i>Jacaranda mimosifolia</i> (Jacaranda)	150 150	4	3	Fair	Good	Crown density 50-75%. Small (<25mm) diameter deadwood. Medium (25-75mm) diameter deadwood in moderate volumes.	5-15	Low	Consider for Removal	2.4	1.7	Remove. Building/basement footprint.
4	<i>Jacaranda mimosifolia</i> (Jacaranda)	150 150	4	3	Fair	Good	Crown density 50-75%. Small (<25mm) & medium (25-75mm) diameter deadwood in moderate volumes.	5-15	Low	Consider for Removal	2.4	1.7	Remove. Building/basement footprint.
5	<i>Jacaranda mimosifolia</i> (Jacaranda)	100 150	5	3	Fair	Good	Crown density 75-100%. Small (<25mm) diameter deadwood in low volumes.	15-40	Low	Consider for Removal	2.4	1.7	Remove. Building/basement footprint.
6	<i>Jacaranda mimosifolia</i> (Jacaranda)	150	5	3	Good	Good	Partially suppressed.	15-40	Low	Consider for Removal	2	1.5	Remove. Building/basement footprint.
7	<i>Jacaranda mimosifolia</i> (Jacaranda)	100 100 50 50	4	4	Good	Good		15-40	Low	Consider for Removal	2	1.5	Remove. Building/basement footprint.
8	<i>Jacaranda mimosifolia</i> (Jacaranda)	200	5	3	Fair	Good	Crown density 75-100%. Small (<25mm) diameter deadwood in low volumes.	15-40	Low	Consider for Removal	2.4	1.7	Remove. Building/basement footprint.

Tree No.	Species	DBH (mm)	Height (m)	Radial Crown Spread (m)	Health Rating	Structural Rating	Comments	ULE (years)	L/Significance	Retention Value	Radial TPZ (m)	Radial SRZ (m)	Implication
9	<i>Jacaranda mimosifolia</i> (Jacaranda)	250	5	4	Good	Good	Phototropic lean, moderate.	15-40	Moderate	Consider for Retention	3	1.9	Remove. Building/basement footprint.
10	<i>Jacaranda mimosifolia</i> (Jacaranda)	150	4	2	Good	Good	Partially suppressed. Phototropic lean, slight.	15-40	Low	Consider for Removal	2	1.5	Remove. Pavement.
11	<i>Jacaranda mimosifolia</i> (Jacaranda)	150	4	2	Good	Good	Partially suppressed. Phototropic lean, slight.	15-40	Low	Consider for Removal	2	1.5	Remove. Pavement.
12	<i>Jacaranda mimosifolia</i> (Jacaranda)	150	4	2	Good	Good	Partially suppressed. Phototropic lean, slight.	15-40	Low	Consider for Removal	2	1.5	Remove. Pavement.
13	<i>Jacaranda mimosifolia</i> (Jacaranda)	150 150 150	5	5	Fair	Fair	Crown density 75-100%. Lopped. Medium (25-75mm) diameter epicormic growth in high volumes.	5-15	Low	Consider for Removal	3.6	2	Remove. Pavement.
14	<i>Jacaranda mimosifolia</i> (Jacaranda)	150 150 150 150	5	5	Fair	Fair	Crown density 75-100%. Lopped. Medium (25-75mm) diameter epicormic growth in high volumes.	5-15	Low	Consider for Removal	3.6	2	Remove. Pavement.
15	<i>Platanus xacerifolia</i> (London Plane)	200 75x5	6	3	Good	Good		15-40	Low	Consider for Removal	3	1.9	Remove. Pavement.
16	<i>Albizia julibrissin</i> (Silk Tree)	150 100	4	3	Good	Fair	Partially suppressed. Wound/s, advanced stages of decay.	5-15	Low	Consider for Removal	2.4	1.7	Remove. Landscape treatment.
17	<i>Cupressus torulosa</i> (Bhutan Cypress)	350	15	2	Good	Good	Partially suppressed.	15-40	Moderate	Consider for Retention	4.2	2.2	Remove. Pavement.

Tree No.	Species	DBH (mm)	Height (m)	Radial Crown Spread (m)	Health Rating	Structural Rating	Comments	ULE (years)	L/Significance	Retention Value	Radial TPZ (m)	Radial SRZ (m)	Implication
18	<i>Cupressus torulosa</i> (Bhutan Cypress)	250	9	2	Good	Good	Partially suppressed with poor form.	5-15	Low	Consider for Removal	3	1.9	Remove. Pavement.
19	<i>Cupressus sempervirens</i> (Mediterranean Cypress)	250	9	2	Good	Fair	Trunk contact with wall. Adaptive growth.	5-15	Moderate	Consider for Retention	3	1.9	Remove. Pavement.
20	<i>Cupressus sempervirens</i> (Mediterranean Cypress)	250	9	2	Good	Fair	Trunk contact with wall. Adaptive growth.	5-15	Moderate	Consider for Retention	3	1.9	Remove. Pavement.
21	<i>Cupressus sempervirens</i> (Mediterranean Cypress)	300	10	2	Good	Good		15-40	Moderate	Consider for Retention	3.6	2	Remove. Pavement.
22	<i>Phoenix dactylifera</i> (Date Palm)	600	6	3	Good	Good	Limited building clearance.	15-40	Low	Consider for Removal	4	n/a	Remove. Landscape treatment.
23	<i>Jacaranda mimosifolia</i> (Jacaranda)	350	5	5	Good	Good	Medium (25-75mm) diameter deadwood in low volumes.	15-40	Low	Consider for Removal	4.2	2.2	Remove. Building/basement footprint.
24	<i>Jacaranda mimosifolia</i> (Jacaranda)	250	5	3	Good	Good	Mechanical damage to exposed roots.	15-40	Low	Consider for Removal	3	1.9	Remove. Building/basement footprint.
25	<i>Ficus benjamina</i> (Weeping Fig)	350 350 250	6	6	Good	Fair	Co-dominant inclusion. Mechanical damage to exposed roots.	15-40	Moderate	Consider for Retention	6.6	2.6	Remove. Building/basement footprint.
26	<i>Corymbia citriodora</i> (Lemon Scented Gum)	400	9	6	Good	Good	No access to base of trunk. Medium (25-75mm) diameter deadwood in low volumes.	15-40	Moderate	Consider for Retention	4.8	2.3	Remove. Major encroachment, building/basement footprint.

Tree No.	Species	DBH (mm)	Height (m)	Radial Crown Spread (m)	Health Rating	Structural Rating	Comments	ULE (years)	L/Significance	Retention Value	Radial TPZ (m)	Radial SRZ (m)	Implication
27	<i>Corymbia citriodora</i> (Lemon Scented Gum)	400	12	7	Good	Good	Small (<25mm) diameter deadwood in low volumes. Phototropic lean, slight. Limited clearance from steel post.	15-40	Moderate	Consider for Retention	4.8	2.3	Remove. Major encroachment, building/basement footprint.
28	<i>Phoenix canariensis</i> (Canary Island Date Palm)	800	4	3	Good	Good		15-40	Low	Consider for Removal	4	n/a	Retain. No works within TPZ.
29	<i>Corymbia citriodora</i> (Lemon Scented Gum)	650	18	5	Good	Good	Medium (25-75mm) diameter deadwood in low volumes. Rubble piled round base of trunk.	15-40	Moderate	Consider for Retention	7.8	2.8	Retain. Minor encroachment, building/basement footprint. Prune for construction clearance. Tree owners permission required.
30	<i>Eucalyptus saligna</i> (Sydney Blue Gum)	1100	20	7	Good	Poor	Large (>75mm) diameter deadwood in low volumes. Large trunk wound with fungal bracket. Internal diagnostic testing required.	15-40	High	Priority for Retention	13.2	3.5	Retain. Minor encroachment, building/basement footprint.
31	<i>Acacia parramattensis</i> (Parramatta Green Wattle)	150	6	3	Fair	Good	Crown density 50-75%. Small (<25mm) diameter deadwood in high volumes.	5-15	Low	Consider for Removal	2	1.5	Retain. No works within TPZ.
32	<i>Eucalyptus tereticornis</i> (Forest Red Gum)	300 300	12	4	Good	Fair	Co-dominant inclusion.	15-40	Moderate	Consider for Retention	5.4	2.4	Retain. Minor encroachment, building/basement footprint.
33	Removed												
34	<i>Acer negundo</i> (Box Elder)	250	5	5	Good	Good		15-40	Low	Consider for Removal	3	1.9	Retain. No works within TPZ.

Tree No.	Species	DBH (mm)	Height (m)	Radial Crown Spread (m)	Health Rating	Structural Rating	Comments	ULE (years)	L/Significance	Retention Value	Radial TPZ (m)	Radial SRZ (m)	Implication
35	<i>Phoenix canariensis</i> (Canary Island Date Palm)	550	8	3	Good	Good		15-40	Moderate	Consider for Retention	4	n/a	Retain. Major encroachment, landscape treatment. Use tree sensitive methods.
36	<i>Rothmannia globosa</i> (Tree Gardenia)	300	5	3	Good	Fair	Crown density 75-100%. Lopped. Small (<25mm) epicormic growth in moderate volumes.	5-15	Low	Consider for Removal	3.6	2	Remove. Major encroachment, landscape treatment.
37	<i>Pittosporum undulatum</i> (Sweet Pittosporum)	250	8	3	Good	Fair	Trunk contact with wall. Adaptive growth. Partially suppressed. Climber in crown.	5-15	Low	Consider for Removal	3	1.9	Remove. Major encroachment, landscape treatment.
38	<i>Pittosporum undulatum</i> (Sweet Pittosporum)	300 150	9	4	Good	Good		15-40	Moderate	Consider for Retention	4.2	2.2	Retain. Major encroachment, landscape treatment. Use tree sensitive methods.
39	<i>Phoenix canariensis</i> (Canary Island Date Palm)	700	8	3	Good	Good		15-40	Moderate	Consider for Retention	4	n/a	Retain. Major encroachment, landscape treatment. Use tree sensitive methods.
40	<i>Pittosporum undulatum</i> (Sweet Pittosporum)	200	5	3	Good	Good		15-40	Low	Consider for Removal	2.4	1.7	Retain. Major encroachment, landscape treatment. Use tree sensitive methods.
41	<i>Acacia baileyana</i> (Cootamundra Wattle)	300	8	5	Fair	Poor	90% dead. Wound/s with fungal bracket.	<5	Low	Priority for Removal	3.6	2	Remove. Tree not viable for retention.
42	DEAD												
43	<i>Howea forsteriana</i> (Kentia Palm)	150	7	2	Good	Fair	Group of 5. Wound/s, early stages of decay.	5-15	Low	Consider for Removal	3	n/a	Retain. Major encroachment, landscape treatment. Use tree sensitive methods.

Tree No.	Species	DBH (mm)	Height (m)	Radial Crown Spread (m)	Health Rating	Structural Rating	Comments	ULE (years)	L/Significance	Retention Value	Radial TPZ (m)	Radial SRZ (m)	Implication
44	<i>Howea forsteriana</i> (Kentia Palm)	150	7	2	Good	Fair	Wound/s, early stages of decay.	5-15	Low	Consider for Removal	3	n/a	Retain. Major encroachment, landscape treatment. Use tree sensitive methods.
44A	Removed												
45	<i>Phoenix</i> sp. (Date Palm species)	800 @ grade	4	4	Good	Good	Semi mature.	15-40	Low	Consider for Removal	5	n/a	Retain. Major encroachment, landscape treatment. Use tree sensitive methods.
46	<i>Howea forsteriana</i> (Kentia Palm)	200	10	2	Good	Good		5-15	Low	Consider for Removal	3	n/a	Retain. Major encroachment, landscape treatment. Use tree sensitive methods.
47	<i>Howea forsteriana</i> (Kentia Palm)	200	10	2	Good	Good		5-15	Low	Consider for Removal	3	n/a	Retain. Major encroachment, landscape treatment. Use tree sensitive methods.
48	<i>Pittosporum undulatum</i> (Sweet Pittosporum)	350	7	4	Good	Good	Medium (25-75mm) diameter deadwood in low volumes.	15-40	Moderate	Consider for Retention	4.2	2.2	Retain. Major encroachment, landscape treatment. Use tree sensitive methods.
49	<i>Radamachera sinica</i> (China Doll)	300 300 250	8	6	Good	Good	Medium (25-75mm) & large (>75mm) diameter deadwood in low volumes. First order branch contact with adjacent tree.	15-40	Moderate	Consider for Retention	6	2.5	Retain. Major encroachment, landscape treatment. Use tree sensitive methods.
50	<i>Howea forsteriana</i> (Kentia Palm)	150	7	2	Good	Good	Trunk contact with tree 49.	<5	Low	Priority for Removal	3	n/a	Retain. Major encroachment, landscape treatment. Use tree sensitive methods.

Tree No.	Species	DBH (mm)	Height (m)	Radial Crown Spread (m)	Health Rating	Structural Rating	Comments	ULE (years)	L/Significance	Retention Value	Radial TPZ (m)	Radial SRZ (m)	Implication
51	<i>Howea forsteriana</i> (Kentia Palm)	150	7	2	Good	Good		15-40	Low	Consider for Removal	3	n/a	Retain. Major encroachment, landscape treatment. Use tree sensitive methods.
52	<i>Brachyciton acerifolius</i> (Illawarra Flame Tree)	300	7	3	Good	Good	Large (>75mm) diameter deadwood in low volumes. Partially suppressed.	15-40	Moderate	Consider for Retention	3.6	2	Retain. Major encroachment, landscape treatment. Use tree sensitive methods.
53	<i>Howea forsteriana</i> (Kentia Palm)	150	7	2	Good	Good		15-40	Low	Consider for Removal	3	n/a	Retain. Major encroachment, landscape treatment. Use tree sensitive methods.
54	<i>Washingtonia robusta</i> (Mexican Fan Palm)	250	6	2	Good	Good	Partially suppressed.	15-40	Low	Consider for Removal	3	n/a	Retain. Major encroachment, landscape treatment. Use tree sensitive methods.
55	Removed												
56	<i>Phoenix canariensis</i> (Canary Island Date Palm)	700	6	3	Good	Good	Limited building clearance.	5-15	Low	Consider for Removal	4	n/a	Remove. Access way.
57	<i>Howea forsteriana</i> (Kentia Palm)	150	10	2	Good	Good		5-15	Low	Consider for Removal	3	n/a	Remove. Access way.
58	<i>Howea forsteriana</i> (Kentia Palm)	150	10	2	Good	Good		5-15	Low	Consider for Removal	3	n/a	Retain. Major encroachment, landscape treatment. Use tree sensitive methods.

Tree No.	Species	DBH (mm)	Height (m)	Radial Crown Spread (m)	Health Rating	Structural Rating	Comments	ULE (years)	L/Significance	Retention Value	Radial TPZ (m)	Radial SRZ (m)	Implication
59	<i>Eucalyptus botryoides</i> (Southern Mahogany)	300	8	5	Fair	Good	Crown density 50-75%. Small (<25mm) epicormic growth in moderate volumes. Small (<25mm) diameter deadwood in moderate volumes.	5-15	Moderate	Consider for Retention	3.6	2	Remove. Access way.
60	<i>Pittosporum undulatum</i> (Sweet Pittosporum)	400	9	4	Good	Good	Wound/s, early stages of decay.	15-40	Moderate	Consider for Retention	4.8	2.3	Remove. Access way.
61	<i>Howea forsteriana</i> (Kentia Palm)	100	10	2	Good	Good		5-15	Low	Consider for Removal	3	n/a	Remove. Landscape treatment.
62	<i>Phoenix canariensis</i> (Canary Island Date Palm)	800	5	3	Good	Good		15-40	Low	Consider for Removal	4	n/a	Transplant.
63	<i>Cupressus</i> sp. (Cypress)	550	11	2	Good	Good	Trunk contact with wall causing significant structural damage. Roots lifting pavement.	5-15	Moderate	Consider for Removal	6.6	2.6	Retain. Major encroachment, landscape treatment. Use tree sensitive methods. Prune for vertical clearance.
64	<i>Lagerstroemia indica</i> (Crepe Myrtle)	250 250 250 100x4	6	5	Good	Good	Group of 2.	15-40	Moderate	Consider for Retention	6	2.5	Retain. No works within TPZ.
65	<i>Viburnus odoratissimum</i> (Sweet Viburnum)	250 250 150 150	6	4	Good	Good		5-15	Low	Consider for Removal	4.8	2.3	Retain. No works within TPZ.
66	<i>Cinnamomum camphora</i> (Camphor Laurel)	600 600 600 600	10	8	Fair	Fair	Lopped at 2m. Crown consists of mature epicormic growth. Crown density 75-100%. Small (<25mm) & medium (25-75mm) diameter deadwood in moderate volumes. Wound/s, advanced stages of decay. Small (<25mm) epicormic growth in low volumes.	5-15	Moderate	Consider for Retention	14.4	3.6	Retain. No works within TPZ.

Tree No.	Species	DBH (mm)	Height (m)	Radial Crown Spread (m)	Health Rating	Structural Rating	Comments	ULE (years)	L/Significance	Retention Value	Radial TPZ (m)	Radial SRZ (m)	Implication
67	<i>Jacaranda mimosifolia</i> (Jacaranda)	350	9	5	Good	Good	Lopped at 4m. Crown comprises of mature epicormic growth. Medium (25-75mm) diameter deadwood in low volumes. Wound/s, early stages of decay.	15-40	Moderate	Consider for Retention	4.2	2.2	Remove. Pavement.
68	<i>Jacaranda mimosifolia</i> (Jacaranda)	300 250x4	10	7	Good	Fair	Lopped at 4m. Crown comprises of mature epicormic growth. Branch inclusion/s, minor.	15-40	Moderate	Consider for Retention	7.2	2.7	Remove. Building/basement footprint.
69	<i>Homalanthus populifolius</i> (Bleeding Heart)	150 100	5	2	Fair	Good	Crown density 50-75%. Small (<25mm) diameter deadwood in high volumes. Phototropic lean, moderate.	5-15	Low	Consider for Removal	2.4	1.7	Remove. Pavement.
70	<i>Koelreuteria paniculata</i> (Golden Rain Tree)	200	6	3	Good	Good		15-40	Low	Consider for Removal	2.4	1.7	Remove. Pavement.
71	<i>Grevillea robusta</i> (Silky Oak)	700	22	7	Poor	Fair	Crown density 0-25%. Small (<25mm) diameter deadwood. Medium (25-75mm) & large (>75mm) diameter deadwood in high volumes.	<5	Moderate	Priority for Removal	8.4	2.9	Remove. Pavement.
72	<i>Phoenix canariensis</i> (Canary Island Date Palm)	650	7	3	Good	Good	Limited building clearance.	15-40	Moderate	Consider for Retention	4	n/a	Remove. Pavement.
73	<i>Phoenix canariensis</i> (Canary Island Date Palm)	650	7	3	Good	Good		15-40	Moderate	Consider for Retention	4	n/a	Remove. Pavement.
74	<i>Liquidambar styraciflua</i> (Liquidambar)	550	18	5	Good	Good	Previous branch failure/s. Wound/s, early stages of decay.	15-40	Moderate	Consider for Retention	6.6	2.6	Remove. Pavement.
75	<i>Acacia baileyana</i> (Cootamundra Wattle)	300	9	6	Fair	Fair	Crown density 75-100%. Co-dominant inclusion. Phototropic lean, moderate. Small (<25mm) & medium (25-75mm) diameter deadwood in moderate volumes.	<5	Low	Priority for Removal	3.6	2	Remove. Pavement.

Tree No.	Species	DBH (mm)	Height (m)	Radial Crown Spread (m)	Health Rating	Structural Rating	Comments	ULE (years)	L/Significance	Retention Value	Radial TPZ (m)	Radial SRZ (m)	Implication
76	<i>Jacaranda mimosifolia</i> (Jacaranda)	300	9	9	Good	Good	Partially suppressed. Phototropic lean, moderate. Medium (25-75mm) diameter deadwood. in low volumes.	15-40	Moderate	Consider for Retention	3.6	2	Remove. Pavement.
77	<i>Jacaranda mimosifolia</i> (Jacaranda)	400	7	5	Good	Good	Phototropic lean, moderate. Wound/s, early stages of decay. Small (<25mm) diameter deadwood in low volumes.	15-40	Moderate	Consider for Retention	4.8	2.3	Retain. Major encroachment, landscape treatment. Minor Encroachment, sub-station. Use tree sensitive methods.
78	<i>Koelreuteria paniculata</i> (Golden Rain Tree)	200 200	6	3	Good	Good		15-40	Moderate	Consider for Retention	2.4	1.7	Retain. Major encroachment, landscape treatment. Use tree sensitive methods.
79	<i>Koelreuteria paniculata</i> (Golden Rain Tree)	200 150	6	3	Good	Good		15-40	Moderate	Consider for Retention	2.4	1.7	Retain. Major encroachment, landscape treatment. Use tree sensitive methods.
80	<i>Koelreuteria paniculata</i> (Golden Rain Tree)	250	6	3	Good	Good		15-40	Moderate	Consider for Retention	3	1.9	Retain. Major encroachment, landscape treatment. Use tree sensitive methods.
81	<i>Plumeria acutifolia</i> (Frangipani)	200 200	4	3	Good	Good	Partially suppressed. Phototropic lean, moderate.	15-40	Low	Consider for Removal	3.6	2	Retain. Major encroachment, landscape treatment. Use tree sensitive methods.
82	Removed												
83	<i>Lagerstroemia indica</i> (Crepe Myrtle)	150 100	6	3	Good	Good	Partially suppressed.	15-40	Low	Consider for Removal	2.4	1.7	Retain. Major encroachment, landscape treatment. Use tree sensitive methods.

Tree No.	Species	DBH (mm)	Height (m)	Radial Crown Spread (m)	Health Rating	Structural Rating	Comments	ULE (years)	L/Significance	Retention Value	Radial TPZ (m)	Radial SRZ (m)	Implication
84	<i>Pittosporum undulatum</i> (Sweet Pittosporum)	250	5	3	Poor	Fair	Crown density 50-75%. Chlorotic foliage. Wound/s, early stages of decay.	5-15	Low	Consider for Removal	3	1.9	Retain. Major encroachment, landscape treatment. Use tree sensitive methods.
85	Removed												
86	Removed												
87	Removed												
88	<i>Hymenosporum flavum</i> (Native Frangipani)	100	6	2	Fair	Good	Crown density 50-75%. Small (<25mm) diameter deadwood in low volumes.	5-15	Low	Consider for Removal	2	1.5	Remove. Building/basement footprint.
89	<i>Hymenosporum flavum</i> (Native Frangipani)	100	6	2	Fair	Good	Crown density 50-75%. Small (<25mm) diameter deadwood in low volumes.	5-15	Low	Consider for Removal	2	1.5	Remove. Building/basement footprint.
90	<i>Grevillea robusta</i> (Silky Oak)	300	14	4	Fair	Good	Crown density 75-100%. Partially suppressed.	15-40	Moderate	Consider for Retention	3.6	2	Remove. Building/basement footprint.
91	<i>Liquidambar styraciflua</i> (Liquidambar)	100 75	5	2	Good	Fair	Partially suppressed. Co-dominant inclusion. Limited building clearance.	5-15	Low	Consider for Removal	2	1.5	Remove. Building/basement footprint.
92	<i>Liquidambar styraciflua</i> (Liquidambar)	150	5	2	Good	Good	Partially suppressed. Limited building clearance.	5-15	Low	Consider for Removal	2	1.5	Remove. Building/basement footprint.

Tree No.	Species	DBH (mm)	Height (m)	Radial Crown Spread (m)	Health Rating	Structural Rating	Comments	ULE (years)	L/Significance	Retention Value	Radial TPZ (m)	Radial SRZ (m)	Implication
93	<i>Grevillea robusta</i> (Silky Oak)	300	6	4	Poor	Good	Crown density 50-75%. Small (<25mm) & medium (25-75mm) diameter deadwood in moderate volumes.	<5	Low	Priority for Removal	3.6	2	Remove. Building/basement footprint.
94	<i>Cupressus torulosa</i> (Bhutan Cypress)	400	12	2	Good	Good	Component of hedge/screen planting. Partially suppressed. Branch inclusion/s, minor. Small (<25mm) diameter deadwood in low volumes.	15-40	Moderate	Consider for Retention	4.8	2.3	Remove. Major encroachment, building/basement footprint.
95	<i>Cupressus torulosa</i> (Bhutan Cypress)	300 100	12	2	Good	Good	Component of hedge/screen planting. Partially suppressed. Branch inclusion/s, minor. Small (<25mm) diameter deadwood. in low volumes.	15-40	Moderate	Consider for Retention	3.6	2	Remove. Major encroachment, building/basement footprint.
96	<i>Cupressus torulosa</i> (Bhutan Cypress)	350	12	2	Good	Good	Component of hedge/screen planting. Partially suppressed. Branch inclusion/s, minor. Small (<25mm) diameter deadwood in low volumes.	15-40	Moderate	Consider for Retention	4.2	2.2	Remove. Major encroachment, building/basement footprint.
97	<i>Cupressus torulosa</i> (Bhutan Cypress)	350	12	2	Good	Good	Component of hedge/screen planting. Partially suppressed. Branch inclusion/s, minor. Small (<25mm) diameter deadwood in low volumes.	15-40	Moderate	Consider for Retention	4.2	2.2	Remove. Major encroachment, building/basement footprint.
98	<i>Cupressus torulosa</i> (Bhutan Cypress)	300 150 150	12	2	Good	Good	Component of hedge/screen planting. Partially suppressed. Branch inclusion/s, minor. Small (<25mm) diameter deadwood in low volumes.	15-40	Moderate	Consider for Retention	4.2	2.2	Remove. Major encroachment, building/basement footprint.
99	<i>Cupressus torulosa</i> (Bhutan Cypress)	450	12	2	Good	Good	Component of hedge/screen planting. Partially suppressed. Branch inclusion/s, minor. Small (<25mm) diameter deadwood in low volumes.	15-40	Moderate	Consider for Retention	5.4	2.4	Remove. Landscape treatment.
100	<i>Callistemon viminalis</i> (Weeping Bottle Brush)	200 75	5	2	Good	Fair	Major trunk wound, early stages of decay.	5-15	Low	Consider for Removal	2.4	1.7	Retain. No works within TPZ.

Tree No.	Species	DBH (mm)	Height (m)	Radial Crown Spread (m)	Health Rating	Structural Rating	Comments	ULE (years)	L/Significance	Retention Value	Radial TPZ (m)	Radial SRZ (m)	Implication
A	<i>Lagerstroemia indica</i> (Crepe Myrtle)	150									2	1.5	Retain. No works within TPZ.
B	<i>Plumeria acutifolia</i> (Frangipani)	250									3	1.9	Retain. No works within TPZ.
C	<i>Casuarina cunninghamiana</i> (River Sheoak)	450									5.4	2.4	Retain. Minor encroachment, landscape treatment.
D	<i>Cupaniopsis anacardiodes</i> (Tuckeroo)	250									3	1.9	Retain. No works within TPZ.
E	<i>Cupaniopsis anacardiodes</i> (Tuckeroo)	200									2.4	1.7	Retain. No works within TPZ.
F	<i>Cupaniopsis anacardiodes</i> (Tuckeroo)	300									3.6	2	Retain. No works within TPZ.
G	<i>Jacaranda mimosifolia</i> (Jacaranda)	400									4.8	2.3	Retain. No works within TPZ.

Appendix 4: Plates



Plate 1: Showing Trees 1 (left of image) and 2 (right of image)



Plate 2: Showing Tree 15



Plate 3: Showing Trees 17-21



Plate 4: Showing Tree 25



Plate 5: Showing Trees 26-30 (left to right of image)



Plate 6: Showing Trunk wound with fungal fruiting bodies on Tree 30



Plate 7: Showing Tree 35



Plate 8: Showing Trees 21 (centre left) and 22 (centre right)



Plate 9: Showing Trees 38 (left) and 39 (right)



Plate 10: Showing Trees located in the northern section of the North Garden



Plate 11: Showing Trees 40 (left) and 41 (right)



Plate 12: Showing Trees 79 (left) and 80 (right)



Plate 13: Showing pruning Trees 29

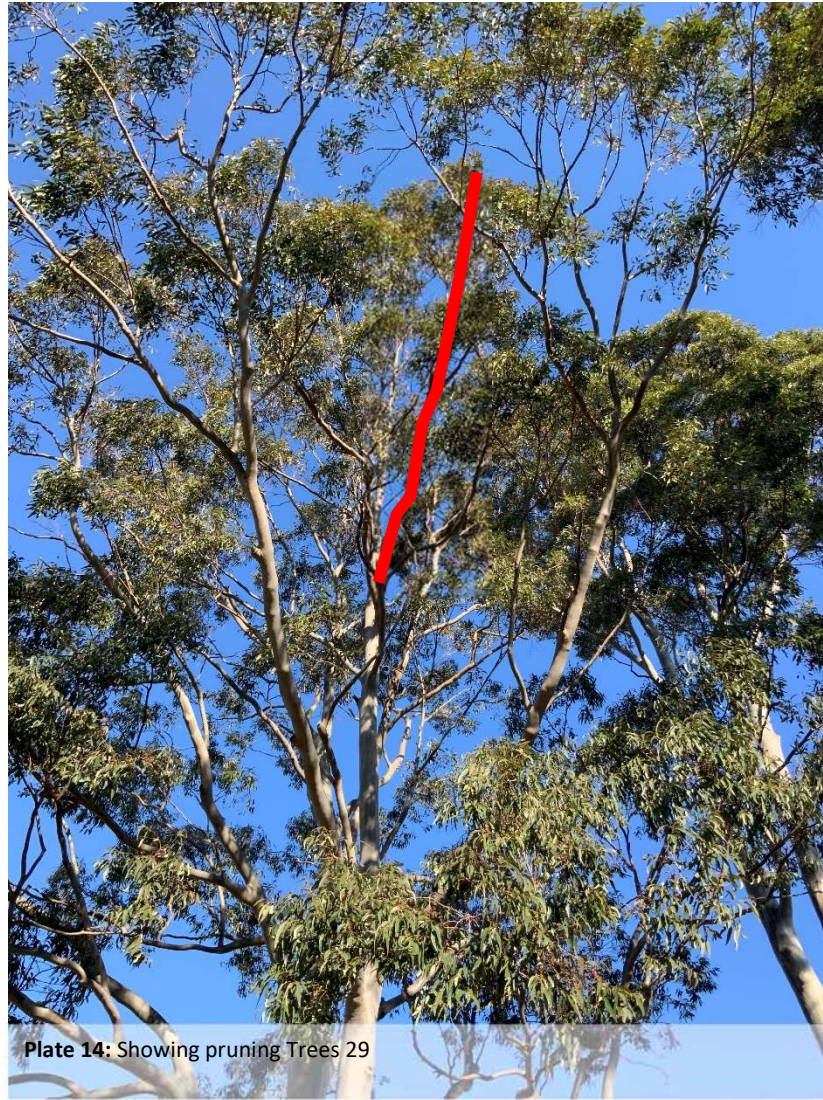


Plate 14: Showing pruning Trees 29



Plate 15: Showing pruning Trees 29



Plate 16: Showing pruning Trees 29



Plate 17: Showing Pruning Tree 63

Appendix 5: Tree Protection Specification

1.0 Appointment of Project Arborist

A Project Arborist shall be engaged prior the commencement of work on-site and monitor compliance with the protection measures. The Project Arborist shall inspect the tree protection measures and Compliance Certification shall be prepared by the Project Arborist for review by the Principal Certifying Authority prior to the release of the Compliance Certificate.

The Project Arborist shall have a minimum qualification equivalent (using the Australian Qualifications Framework) of NSW TAFE Certificate Level 5 or above in Arboriculture.

The site-specific requirement for mulching, irrigation, the location of tree protection fencing and temporary access, and other specific tree protection measures shall be confirmed through consultation between the Head Contractor/Project Manager and the Project Arborist prior to the commencement of works.

1.1 Compliance

Contractors and site workers shall receive a copy of these specifications a minimum of 3 working days prior to commencing work on-site. Contractors and site workers undertaking works within the Tree Protection Zone shall sign the site log confirming they have read and understand these specifications, prior to undertaking works on-site.

1.2 Tree Protection Zone

The tree to be retained shall be protected prior and during construction from activities that may result in an adverse effect on their health or structural condition. The area within the Tree Protection Zone (TPZ) shall exclude the following activities, unless otherwise stated:

- Modification of existing soil levels, excavations and trenching
- Mechanical removal of vegetation
- Movement of natural rock
- Storage of materials, plant or equipment or erection of site sheds
- Affixing of signage or hoarding to the trees
- Preparation of building materials, refueling or disposal of waste materials and chemicals
- Lighting fires
- Movement of pedestrian or vehicular traffic
- Temporary or permanent location of services, or the works required for their installation
- Any other activities that may cause damage to the tree

NOTE: If access, encroachment or incursion into the TPZ is deemed essential, prior authorisation is required by the Project Arborist.

1.3 Tree Protection Fencing

TPZ fencing shall be located at perimeter of the TPZ. Refer to Tree Assessment Schedule (**Appendix 3**). The exact location of the fencing shall be confirmed through consultation between the Head Contractor/Project Manager and the Project Arborist prior to the commencement of works. Fencing may be setback to allow for demolition/construction access and for the installation of pavements only where appropriate ground protection is installed and approved by the Project Arborist.

As a minimum, the Tree Protection Fence shall consist of 1.8m high wire mesh panels supported by concrete feet. Panels shall be fastened together and supported to prevent sideways movement. The tree shall not be damaged during the installation of the Tree Protection Fencing. Refer to Typical Tree Protection Details (3) (**Appendix 6**).

1.4 Signage

Signs identifying the TPZ should be placed around the edge of the TPZ and be visible from within the development site. The lettering on the sign should comply with *Australian Standard - 1319 (1994) Safety signs for the occupational environment*. The signage shall be installed prior to the commencement of works on-site and shall be maintained in good condition for the duration of the development period.

1.5 Site Management

Materials, waste storage, and temporary services shall not be located within the TPZ.

1.6 Scaffolding

Where possible, scaffolding shall not be located within the TPZ. Scaffolding shall not be in contact with the tree. As necessary, this shall be achieved by erecting scaffolding around branches. Branches shall be tied back and protected as deemed necessary by the Project Arborist. Refer to Typical Tree Protection Details (5) (**Appendix 6**).

1.7 Ground Protection

Ground protection shall be installed to any unfenced areas of the TPZ. Where possible, areas of existing pavement shall be retained as ground protection. Pedestrian, vehicular and machinery access within a TPZ shall be restricted solely to areas where ground protection has been installed. Refer to Typical Tree Protection Details (3) (**Appendix 6**).

1.8 Works within the Tree Protection Zones

In some cases works within the TPZ may be authorized by the determining authority. **These works shall be supervised by the Project Arborist.** When undertaking works within the TPZ, care should be taken to avoid damage to the tree's root system, trunks and lower branches.

If roots (>25mm ϕ) are encountered during the demolition, excavation and construction works, these roots must be retained in an undamaged condition and advice sought from the Project Arborist. Adjustment of final levels and design shall remain flexible to enable the retention of roots (>25mm ϕ) where deemed necessary by the Project Arborist.

1.9 Tree & Vegetation Removal

Tree removal works shall be undertaken in accordance with the *Safe Work Australia Guide for Managing Risks of Tree Trimming and Removal Work (2016)* and other applicable codes and legislation.

Tree removal shall not damage the trees to be retained. Other vegetation to be removed within a TPZ shall be carefully lifted by hand/hand tools to avoid damaging roots (>25mm ϕ) within the surrounding soil profile.

1.10 Structure & Pavement Demolition

Demolition of existing structures/pavement within the TPZ shall be supervised by the Project Arborist. Machinery is to be excluded from the TPZ unless operating from the existing slabs, pavements or areas of ground protection (refer to Section 1.7). Machinery shall work in conjunction with a spotter to guide the machinery operator and ensure that the ground surface/tree roots beneath the structure/pavement are not disturbed/damaged by demolition works. Machinery should not contact the tree's roots, trunk, branches and crown. Wherever possible, footings or elements below grade shall be retained to minimise disturbance to roots.

Small structures to be demolished within a TPZ shall be carefully broken up in small sections using a hand-operated pneumatic/electric breaker and waste material removed by hand/hand tools. Large structures to be demolished within the TPZ shall be undertaken within the footprint of the existing structure ('top down, pull back') and away from the trees.

When removing slab/pavement sections within TPZ, machinery shall work backwards out of the TPZ to ensure machinery remains on un-demolished sections of slab at all times. Existing sub-base materials within a TPZ shall remain in-situ and (and reused) where possible. If the existing sub-base is to be removed, these works shall be undertaken by hand/hand tools ensuring that tree roots are retained and protected.

If roots (>25mm ϕ) are encountered during the demolition works, these roots must be retained in an undamaged condition and advice sought from the Project Arborist. Exposed roots shall be protected from direct sunlight, drying out and extremes of temperature by covering with a 10mm thick jute geotextile fabric. The geotextile fabric shall be kept in a damp condition at all times. Where the Project Arborist determines that the tree is using underground elements (i.e footings, pipes, rocks etc.) for support, these elements shall be left in-situ.

1.11 Underground Services

The installation of underground services shall be located outside of the TPZ. Where this is not possible, they shall be installed using tree sensitive excavation methods (hand/hydrovac/airspade) with the services installed around/below roots (>25mm ϕ , or as determined by the Project Arborist). Excavation using compact machinery fitted with a flat bladed bucket is permissible where approved by the Project Arborist. Excavation using compact machinery should be undertaken in small increments, guided by a spotter who is to look for and prevent damage to roots (>25mm ϕ).

Alternatively, boring methods may be used for underground service installation where the obvert level (highest interior level of pipe) is greater than 1200mm below existing grade. Excavations for starting and receiving pits for boring equipment shall be located outside of the TPZ areas or located to avoid roots (>25mmØ) as deemed necessary by the Project Arborist.

1.12 Pavement Installation

New pavements (including sub-base materials) within TPZ areas shall be installed above or at existing grade and utilise existing sub-base layers where possible. Pavement sub-base layers shall be either, thinned or finished pavement levels amended as required to enable the retention of significant roots (as determined by the Project Arborist).

1.13 Decking, Walls/Fences & Landscape Fixtures

Decking, wall/fence and landscape fixtures within TPZ areas shall be supervised by the Project Arborist. Other than for the isolated piers/posts, all other parts of the structures shall be installed above grade. The locations of piers/posts within the TPZ shall be determined by preliminary hand excavation (refer to Section 1.16). In excavated areas where roots (>25mmØ) are present and are to be retained, the location of the pier shall be adjusted. The piers within the TPZ shall be sheathed to prevent encapsulation of roots by concrete.

Drilling/piling machinery shall be excluded from the TPZ unless operating from an area where ground protection has been installed (refer to Section 1.7) or from the existing slabs or pavements. Drilling/piling machinery shall be of a suitable size to not damage the trees' roots, trunk, branches and crown. No clearance pruning is permitted to allow for machinery access. Machinery shall work in conjunction with an observer to ensure that adequate clearance from trees is maintained at all times

1.14 Plant/Turf Installation

Plant installation within TPZ areas shall be undertaken using hand tools and roots (>25mmØ) shall be protected. No mechanical cultivation/ripping of soils shall be undertaken within TPZ areas.

Landscape planting shall be completed in the final stage of the development works and tree protection fencing and trunk protection shall remain in place until these works are due to commence.

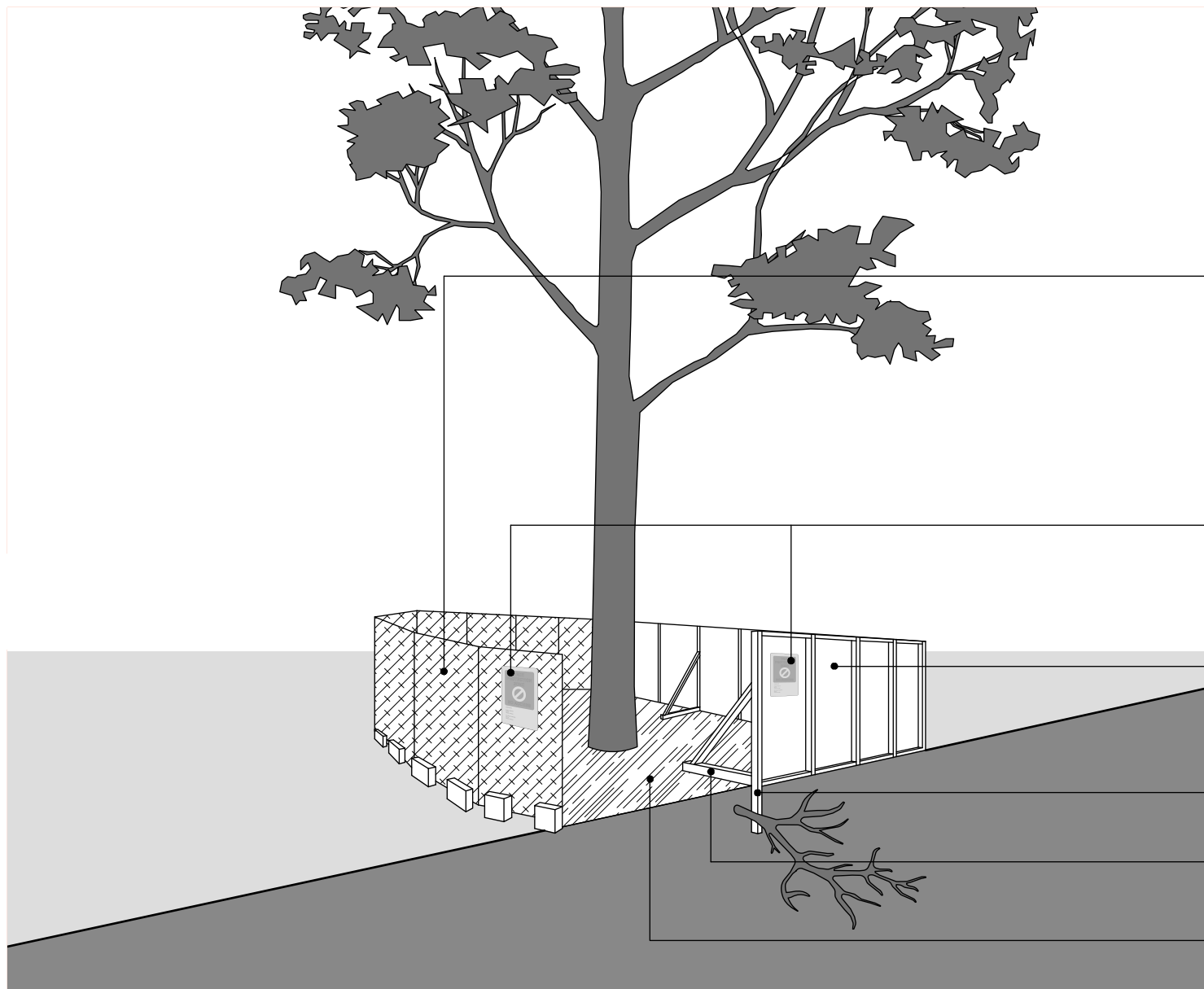
1.15 Excavations, Root Protection & Root Pruning

All excavation works (including root investigations) within TPZ areas shall supervised by the Project Arborist and utilise tree sensitive methods. These methods include hand, airspade or hydrovac excavation. Where approved by the Project Arborist, excavation using compact machinery fitted with a flat bladed bucket is permissible. Unless specified otherwise, excavation using compact machinery shall be undertaken in small increments, guided by a spotter who is to look for and prevent damage to roots (>25mmØ).

Exposed roots shall be protected from direct sunlight, drying out and extremes of temperature by covering with a 10mm thick jute mat, followed by a layer of plastic membrane. Coverings shall be weighted to secure them in place. The mat shall be kept in a damp condition at all times.

No over-excavation, battering or benching shall be undertaken beyond the footprint of any structure unless approved by the Project Arborist. Hand excavation and root pruning shall be undertaken along the excavation line prior to the commencement of mechanical excavation to prevent tearing and shattering damage to the roots from excavation equipment.

Roots (>25mmØ) shall be pruned by the Project Arborist only. Roots (<25mmØ) may be pruned by the Principal Contractor. Root pruning shall be undertaken with clean, sharp secateurs or a pruning saw to ensure a smooth wound face, free from tears. Damaged roots shall be pruned behind the damaged tissues with the final cut made to an undamaged part of the root.



Note:

No excavation, construction activity, grade changes, surface treatment or storage of materials of any kind is permitted within the TPZ.

Option 1 - Fencing

1.8m high chain wire mesh panels with shade cloth attached (if required), held in place with concrete feet.

Tree Protection Zone (TPZ) sign

Option 2 - Fencing

Plywood or wooden panel paling fence. This type of fencing material also prevents building materials or soil entering the TPZ.

Installation of supports should avoid damaging roots.

Bracing is permissible within the TPZ.

Maximum 100mm and minimum 50mm depth mulch or aggregate layer installed across surface of TPZ.

