ARBORICULTURAL IMPACT ASSESSMENT REPORT

BOTANY AQUATIC CENTRE

FOR

Bayside Council
Serving Our Community

PREPARED BY

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CONSULTING ARBORISTS
Suite 91, 330 Wattle Street, ULTIMO NSW 2007

26th MARCH 2021
PROJECT: 2027

CONTENTS

1.0 INTRODUCTION

Sturt Noble Arboricultural Consulting was engaged by Co.Op Studio to assess the trees on the site of a proposed redevelopment of Botany Aquatic Centre at the corner of Myrtle St and Jasmine St, Botany. We were also engaged to provide an Arboricultural Assessment Report, including management of any trees proposed to be retained, to assist Co.Op in preparing a Development Application to Bayside Council.

The Development Application for Stage 1 seeks consent for the construction of a new change room and plant building, slides and an aqua play area.

Arborist Guy Sturt inspected sixteen (16) trees (Denoted as trees 35, 36, 38, 40, 41, 47 - 52, 60 – 63 and 65) on 21st, 22nd and 28th of May 2020 located within and around the area of the proposed development.

In addition; the removal of the toddlers pool and shade structure is in the vicinity of approximately 17 trees. Even though we do not calculate any encroachments from this demolition activity the removal of these structures should be carried out with care to the surrounding trees and with the tree protection measure put in place for the duration of the works as specified in this report.

Consulting Arborist Guy Sturt; in this report considers the likely impacts of works proposed and makes recommendations for tree removal, retention and protection.

The aims of this report are:

- To assess and review the condition of existing trees by undertaking a Visual Tree Assessment
- Assess each individual tree's suitability to be retained as a sustainable part of the proposed development in the long term, considering the likely impacts of works proposed.
- Provide recommendations for tree removal, retention and protection.
- Provide recommendations where appropriate to enable trees to be retained or have better long term health outcomes and minimize potentials for hazard.
- To provide information on appropriate tree protection measures, appropriate setbacks, constraints and tree management procedures during site works.

The trees were assessed using the Visual Tree Assessment (VTA) method. (Mattheck & Breloer,1994). All of the trees were assessed by viewing from the ground. No aerial inspection or diagnostic testing was undertaken as part of this assessment.

Of the 16 trees that were assessed, none of them are listed as Threatened or Vulnerable species or form part of Bushland or an Endangered Ecological Community.

Seven (7) of the existing trees on site will require removal (Tree numbers 36, 41, 48, 49, 50, 60 & 65) as they are affected by the new works or are in poor condition.

Seven trees around the periphery of the site (Tree number 35, 40, 47, 52, 61, 62 & 63) may be affected by the new works. With the implementation of the tree protection measures it will be possible to retain these trees on the developed site. Two trees (trees 38 and 51) require further investigation to establish if retention is possible.

Application for the removal of the seven (7) trees noted above is sought as part of the Stage 1 Development Application.

2.0 METHODOLOGY

2.1 Site Inspection

This report, its comments and recommendations have been prepared based on the information gathered during the detailed site inspections carried out on the on the 21st, 22nd and 28th of May 2020. This assessment is summarised in Appendix 1.

2.2 Tree Locations

The location of the subject trees are based on the site survey; *B04710-DETAIL,* Prepared by Project Surveyors on the 27/04/2020.

2.3 Visual Tree Assessment

The trees were assessed from the ground by the Visual Tree Assessment (VTA) method as described in Mattheck & Breloer (1994), using non-invasive tools such as binoculars and acoustic mallet. No digging or exposing of the root zones occurred in this inspection and no aerial inspection by climbing was performed. No aerial inspection or diagnostic testing was undertaken as part of this assessment.

The following data was collected for each tree:

- Botanical and common name.
- Tree dimensions (approximate only).
- Canopy density (approximate only).
- Overall health and vitality, including epicormic growth, deadwood and predation by pests and diseases.
- Structural condition including evident faults such as Bark Inclusions or poor branch attachments, decay, cavities and mechanical or biological damage.
- Stability of the tree including excessive trunk lean, stability of the soil, soil cracking, soil heaving, exposed roots and root damage.

2.4 Retention Value

Each tree has been given a Sustainable Retention Index Value (SRIV) according to the rating system set out in the Sustainable Retention Index Value Matrix (refer to Appendix 3). The SRIV for each tree is based on its health, vigour, structure and age class as established in the Visual Tree Assessment. The SRIV does not take into account the impact of the proposed development.

2.5 Tree Protection Zones (TPZ) and Structural Root Zones (SRZ)

The intention of the TPZ is to ensure protection of the root system and canopy from the potential damage from construction works and ensure the long-term health and stability of each tree to be retained.

The Structural Root Zone (SRZ) is located within the TPZ around the base of a tree and provides the bulk of mechanical support and anchorage for a tree.

The Tree Protection Zones (TPZ) and Structural Root Zones (SRZ) have been arrived at using methods as detailed in Australian Standard AS 4970– 2009. Specific site factors are also considered that may influence the location of the TPZ and/or structural tree roots.

2.6 Encroachment and Development Impacts

Encroachments and development impacts to tree TPZ's and SRZ's include;

- Excavation
- Filling
- Changes to existing soil levels
- Placing items and elements within the zones even if only temporarily
- Soil disturbance
- Any other physical damage to the trunk or root system or any other activity likely to cause damage to the tree.

Under AS 4970:2009 Protection of trees on development sites, a minor encroachment of up to 10% of the area of the TPZ is considered acceptable, provided that there is no encroachment to the SRZ. The area lost to this encroachment should be compensated for elsewhere in a contiguous area to the TPZ.

Major encroachments are greater than 10% of the area of the TPZ and the Project Arborist must determine and demonstrate that the tree would remain viable. More detailed investigations, such as exploratory excavations and root investigation to enable an informed evaluation of the potential impact of the proposed works may be required.

Encroachments into the SRZ are not likely to be supported unless the Project Arborist has undertaken exploratory investigation and can demonstrate that there will be minimal impact to the tree.

3.0 OBSERVATIONS

3.1 The Site

The site is located along the northern boundary of the Botany Aquatic Centre and to the east of the existing outdoor pools. The extent of works is shown below in Figure 1.

Tree specimens on site generally receive full sun exposure.

Figure 1: Location Plan

3.2 Soils

The site is underlain by layers of marine quartz sands and sections of fill. Before settlement this area would have consisted of gently undulating coastal dunefields, however the site has been highly disturbed by human activity. It is likely that the sandy soils have been disturbed and areas could consist of fill covered by a layer of sand or clay.

3.3 Vegetation Community

The site is highly disturbed and modified. It would appear all the locally-indigenous vegetation has been cleared for the Aquatic centre. As noted by Doug Benson & Jocelyn Howell in “Taken for Granted” the original vegetation of this area consisted of Low Swamp Woodland & Eastern Suburbs Banksia Scrub, with dominant locally-indigenous tree species including *Angophora costata* (Sydney Red Gum), *Eucalyptus piperita* (Sydney Peppermint) and *Banksia aemula* (Wallum Banksia) on higher areas and *Eucalyptus robusta* (Swamp Mahogany) and *Melaleuca quinquenervia* (Broadleaved Paperbark) occurring in low lying areas.

Booralee Park was proclaimed a Reserve on 17 September 1886. Botany Council cleared, grassed and planted trees in the park and in 1965 an Olympic pool was constructed at the site.

Although there are large stands of the endemic *Melaleuca quinquenervia* (Broadleaved Paperbark) existing and also specimens of *Angophora costata* (Sydney Red Gum), *Eucalyptus robusta* (Swamp Mahogany) and *Eucalyptus botryoides (*Bangalay*);* given the

estimated age of these trees and the planting layout they would appear to have been planted and not remnant.

The existing tree plantings within the Botany Aquatic Centre consist of a range of both exotic and non-local native species. The trees that have been assessed as part of this project are predominantly native species and have all been identified by number in Figure 2.

None of the trees identified on the site are listed as Threatened or Vulnerable species or form part of Bushland or an Endangered Ecological Community.

3.4 Tree Health and Condition

The Retention Values for all trees on site have been assessed and are included in the Tree Assessment in Appendix 1. These values have been determined on the basis of the estimated longevity of the trees and their landscape significance rating.

A complete tree assessment schedule for the trees is included in Appendix 1. This includes the following: a tree number, botanical name, common name, height, canopy spread, canopy density, defects, pests & diseases and a SRIV rating (IACA 2010).

Botany Bay Development Control Plan 2013 Part 3L Landscaping and Tree management states that "*tree works requiring Council approval are actions affecting the health, form, habitat or canopy of a tree or vegetation community and includes modification to the tree crown (all types of pruning work, crown thinning and crown lifting – refer to AS4373-2007), root pruning and tree removal."*

The removal, lopping, topping, ring barking, injuring or willful destruction of the following trees and vegetation without Council approval is prohibited:

(i) Any tree works that are not considered to be exempt (refer to Part 3L. 4.3 – Exempt Tree Works);

(ii) Any tree, palm or vegetation on private land (other than an exempt species listed in Table 3L.1) at least 3 metres in height or with a diameter at breast height (DBH) equal to or greater than 200mm or 600mm circumference for a multi trunked tree;

(iii) Any tree or plant identified as a heritage item, located on a heritage listed property; and

(iv) Any vegetation within an area identified as an Endangered Ecological Community under the Threatened Species Conservation Act 1995 or protected by any other State or Federal legislation(Environment Protection and Biodiversity Conservation Act 1999) irrespective of size.

Part 3L. 4.3: Exempt Tree Works

The following tree removal or pruning works do not require Council approval:

(i) Any tree works that do not require approval under Section 3L.4.2 – Tree Works Requiring Council Approval;

(ii) Tree works to exempt species identified in Table 3L.1;
(iii) Trees that meet criteria under SEPP (Exempt & Complying Development Codes) 2008 (Clause 3.6A and Clause 5A.3);

(iv) Removal of noxious weed species in the Botany Bay Local Government Area under the Noxious Weeds Act 1993 (as listed in Part 10 – Landscape Technical Guidelines for Development Sites);

(v) Pruning near domestic power or telecommunications lines to maintain line distance clearance where the work is a maximum distance clearance of 500mm of branches up to 50mm diameter at the nearest branch collar (Branch collar is the point of attachment to another branch/trunk). Work must be carried out by an experienced Arborist or Tree Surgeon AQF Level 5 in accordance with AS4373-2007;

(vi) Minor pruning work at a maximum distance clearance of 2 metres measured from the surface of the structural component (wall/ roof) of the building's edge and of branches up to 50mm in diameter at the nearest branch collar. (Branch collar is the point of attachment to another branch/trunk for branches overhanging the roof only);

(vii) Tree works authorised under the Electricity Supply Act 1995 or the Roads Act 1993;

(viii) Emergency work carried out by Council, State Emergency Services, Fire Services or a public authority;

(ix) Removal or pruning works undertaken by Council or a contractor acting on behalf of Council on Council owned or controlled land; and

(x) Where Council is satisfied the tree is dying or dead or poses a risk to human health or safety.

3.5 Construction Methodology

The site plans provided by Co-Op Architects in Appendix 2 have been reviewed and after careful assessment we propose the removal of seven (7) trees, tree numbers 36, 41, 48, 49, 50, 60 & 65 for location and health reasons. Refer to Figure 3.

Trees 35, 38, 40, 47, 51, 52, 61, 62 & 63 may potentially be impacted by construction of the proposed slide and aqua play area and will require careful management of demolition works and construction activities within their Tree Protection Zones.

In addition; the removal of the toddlers pool and shade structure is in the vicinity of approximately 17 trees. Even though we do not calculate any encroachments from this demolition activity the removal of these structures should be carried out with care to the surrounding trees and with the tree protection measure put in place for the duration of the works as specified in this report.

3.6 Construction Impacts

Foreseeable impacts to note from the proposed construction type and anticipated methodology include:

- Demolition Activities
- Excavations for Foundations, paved areas and access paths.
- Excavations for crossovers and driveways.
- Excavations and trenching for underground services.
- Soil level changes including the placement to make up grades
- Laying impermeable paving to paths and slabs.
- Movement and storage of plant, equipment & vehicles;
- Erection of site sheds;
- Storage of building materials, waste and waste receptacles;

Figure 2: Existing Trees and Proposed Development

LEGEND

- EXTENT OF WORKS
- EXISTING TREE TRUNK
  Refer to Tree Impact Assessment Schedule
- EXISTING TREE CANOPY
  Refer to Tree Impact Assessment Schedule
- HIGH VALUE TREES TO BE RETAINED
  Refer to Tree Impact Assessment Schedule
- MEDIUM - LOW VALUE TREES
  Retain or remove if required. Refer to Tree Impact Assessment Schedule.
- TREES OUTSIDE OF SITE
  No encroachment. Retain and protect. Refer to Tree Impact Assessment Schedule.
- TREES THAT HAVE THE POTENTIAL TO BE TRANSPLANTED
  Refer to Tree Impact Assessment Schedule.
- TREES TO BE REMOVED OR INVESTIGATED FOR POTENTIAL HAZARD AND REMOVE IF REQUIRED
  Refer to Tree Impact Assessment Schedule
- PROPOSED TREE
  TREE PROTECTION ZONE

ISSUE	DESCRIPTION	DATE
B	REVISED ISSUE FOR IMPACT ASSESSMENT	26.03.2021
A	ISSUE FOR TENDER / REVIEW	03.02.2021

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CNR MYRTLE ST & JASMINE ST, BOTANY

CLIENT

BAYSIDE COUNCIL

DRAWING

STAGE 1 - EXISTING TREE PLAN

DRAWING NUMBER	ISSUE
ARB-2027-103	B

SCALE	DRAWN	CHECKED	DIRECTOR
1:200 @ A1 1:400 @ A3	jc	gs	gs

0 2 4 10 m

ACN: 164 245 514 ABN: 99 164 245 514

Figure 3: Proposed Tree Removal and Retention Plan

LEGEND

- EXTENT OF WORKS
- EXISTING TREE TRUNK
  Refer to Tree Impact Assessment Schedule
- EXISTING TREE CANOPY
  Refer to Tree Impact Assessment Schedule
- TREES TO BE REMOVED OR INVESTIGATED FOR POTENTIAL HAZARD AND REMOVE IF REQUIRED
  Refer to Tree Impact Assessment Schedule
- PROPOSED TREE
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STAGE 1 - DEVELOPMENT AND RETENTION PLAN

DRAWING NUMBER	ISSUE
ARB-2027-103B	B

SCALE	DRAWN	CHECKED	DIRECTOR
1:200 @ A1 1:400 @ A3	jc	gs	gs

0 2 4 10 m

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4.0 DISCUSSION

4.1 Tree Retention

16 trees were assessed. The impacts of the construction of the proposed slide area and new outdoor aqua play area are critical with regard to seven (7) of the existing trees on site which will require removal, tree numbers 36, 41, 48, 49, 50, 60 & 65.

Seven trees around the periphery of the proposed works, tree number 35, 40, 47, 52, 61, 62 & 63, may be affected by the new works. With the implementation of tree protection measures and careful construction methods it will be possible to retain these trees.

Two trees, trees 38 and 51, require further investigation to establish if retention is possible.

Proposed site design and construction methods of the proposed development and associated infrastructure/ facilities should consider the Tree Protection Zones as discussed in the following sections to minimise any adverse impact.

The extent of the canopy (canopy dripline) should also be considered, particularly in relation to construction activities, the erection of tall structures and along access points. Significant pruning of trees to accommodate machinery is not acceptable.

4.2 Tree Protection Zones (TPZ)

The intention of the TPZ is to ensure protection of the root system from potential damage from construction works and ensure the long-term health and stability of each tree to be retained. Suitable protective devices, such as temporary fencing, trunk protection boards or ground protection (where appropriate) must be installed to ensure adequate protection of a tree from construction activity and avoid disturbance within the TPZ.

The indicative TPZ areas have been calculated as specified in Section 3.2 of *AS 4970:2009 Protection of trees on development sites*.

Additionally the report considers and addresses specific site factors that may influence the location of the TPZ and/or structural tree roots. Examples of factors to be considered are (but not limited to) the location of existing footings, paths, kerbs and roadways, other vegetation and soil types. The indicative TPZ may require adjustment accordingly.

AS 4970:2009 Protection of trees on development sites prohibits the following activities within specified Tree Protection Zones:

a. excavations and trenching (with exception of the approved foundations and underground services);
b. ripping or cultivation of soil;
c. mechanical removal of vegetation (using an excavator or similar);
d. soil disturbance or movement of natural rock;
e. soil level changes including the placement of fill material (excluding any suspended floor or slab);
f. movement and storage of plant, equipment & vehicles;
g. erection of site sheds;
h. affixing of signage or hoardings to trees;
i. storage of building materials, waste and waste receptacles;
j. storage of bulk materials such as sand, gravel, soil, spoil or similar materials;
k. disposal of waste materials and chemicals including paint, solvents, cement slurry, fuel, oil and other toxic liquids; and
l. any other physical damage to the trunk or root system or any other activity likely to cause

damage to the tree.

4.3 Impact Assessment

The plan in Figure 4 indicates the impacts of the proposed slide area and new outdoor aqua play area on the trees to be retained, and the table in Appendix 1 indicates encroachment vales per tree.

In summary, trees 35, 40, 47, 52, 61, 62 & 63 will suffer a low encroachment of 1% - 10% when excavation for the proposed slide area and new outdoor aqua play area is carried out.

Trees 38 and 51 will suffer 19% and 21% encroachment respectively and it is therefore recommended that further investigation and root mapping is used to determine possible retention.

Trees on the site are mostly mature specimens adapted to the existing conditions. In general any proposed new developments shall optimally provide for the long term health of those existing trees which are recommended for retention.

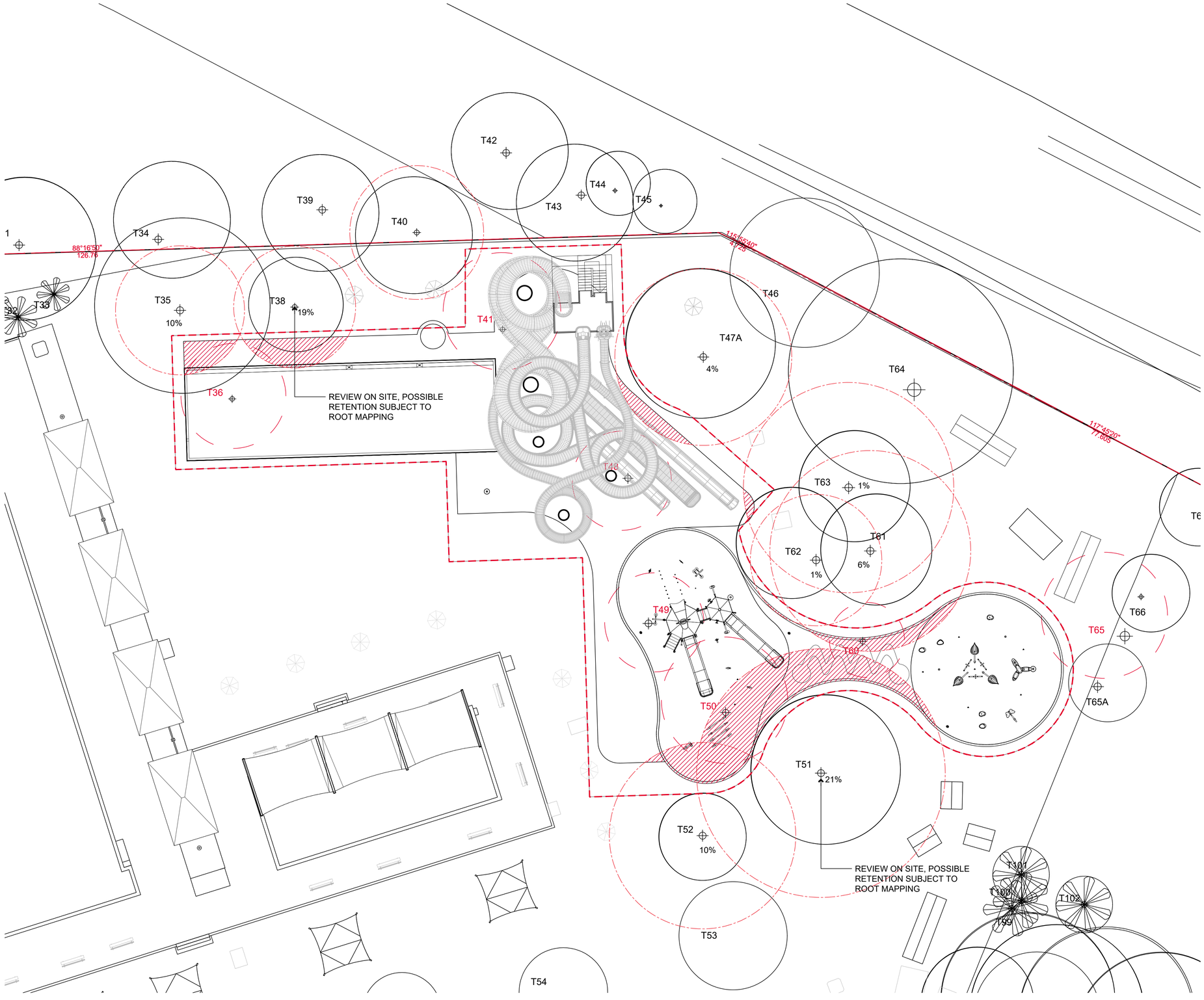
Excavation on the site will require that close attention be paid to management of the trees being retained (Trees No. 35, 38 40, 47, 51, 52, 61, 62 & 63). Any disturbance to soil structure could destabilise the trees. Should any changes to soil within the TPZ/ SRZ be proposed further discussion and assessment must be undertaken.

The Arborist requested further construction information regarding the proposed slide area and new outdoor aqua play area. Appendix 2: General Arrangement Plan (Drawing DA201) to confirm that the impacts of both demolition and construction will be acceptable and within the low encroachment of maximum 10% excavation to the TPZ.

In addition; the removal of the toddlers pool and shade structure is in the vicinity of approximately 17 trees. Even though we do not calculate any encroachments from this demolition activity the removal of these structures should be carried out with care to the surrounding trees and with the tree protection measure put in place for the duration of the works as specified in this report.

We can consider the impacts of the Development acceptable with regard to potential impacts on the tree subject to adherence to the following tree protection measures in Section 6.0.

Figure 4: Impact Assessment Plan



LEGEND

- EXTENT OF WORKS
- EXISTING TREE TRUNK
  Refer to Tree Impact Assessment Schedule
- EXISTING TREE CANOPY
  Refer to Tree Impact Assessment Schedule
- PROPOSED TREE
  TREE PROTECTION ZONE
- TPZ INCURSION. MINIMUM EXCAVATION TO BE ALLOWED WITH OVERVIEW BY ARBORIST

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0 2 4 10 m

ACN: 164 245 514 ABN: 99 164 245 514

5.0 CONCLUSIONS

16 trees have been considered as part of this report and are discussed with regard to their retention and management in relation to the future works proposed. The proposed development consists of a new change room and plant building, slides and an aqua play area.

16 trees were assessed. None of the trees identified on the development site are listed as Threatened or Vulnerable species or form part of Bushland or an Endangered Ecological Community.

Seven (7) of the existing trees on site will require removal due to their location in relation to the proposed work and existing health. Application for the removal of trees 36, 41, 48, 49, 50, 60 & 65 are sought as part of the Development Application.

Seven (7) trees around the periphery of the site, tree number 35, 40, 47, 52, 61, 62 & 63, may be affected by the new works. With the implementation of the tree protection measures it will be possible to retain these trees on the developed site.

Two (2) trees, trees 38 and 51, require further investigation to establish if retention is possible.

In addition; the removal of the toddlers pool and shade structure is in the vicinity of approximately 17 trees. Even though we do not calculate any encroachments from this demolition activity the removal of these structures should be carried out with care to the surrounding trees and with the tree protection measure put in place for the duration of the works as specified in this report.

Trees on site to be retained and adjacent to the construction zone must be protected from potential damage caused by demolition and construction activities. Tree Protection can include fencing, trunk/branch protection and ground protection. Refer to Section 6.0 for detailed requirements and for activities prohibited within any Tree Protection Zones.

Where recommended work processes and tree protection measures cannot be adhered to further advice should be sought from the Project Arborist.

6.0 TREE PROTECTION RECOMMENDATIONS

6.1 Tree Protection Measures

It is recommended that a site specific Tree Protection Plan (TPP) is prepared to guide the construction process to ensure all trees designated for retention remain as a sustainable part of the landscape in the long term.

The plan shall be prepared by a consulting arborist (AQF Level 5) and should at a minimum include a detailed plan of the locations of, and specifications for, tree protection measures.

The TPP shall include a monitoring schedule relating to critical points during the works (hold points) where the Project Arborist is required to visit the site and confirm that works are being undertaken as conditioned by Council/as required.

The following tree protection measures shall be implemented prior to the commencement of any site works, and shall remain in place for the duration of the development.

6.2 Tree Protection Zones

The Tree Protection Zones recommended for all trees within the site are to be retained and shall be equivalent to the Tree Protection Zone as specified in this report. This is a radial distance measured from the centre of the trunk of the subject trees.

The following activities are prohibited within the specified Tree Protection Zones:-

- Excavations and trenching (with exception of the approved foundations and underground services);
- Ripping or cultivation of soil;
- Mechanical removal of vegetation;
- Soil disturbance or movement of natural rock;
- Soil level changes including the placement of fill material (excluding any suspended floor or slab);
- Movement and storage of plant, equipment & vehicles;
- Erection of site sheds;
- Affixing of signage or hoardings to trees;
- Storage of building materials, waste and waste receptacles;
- Disposal of waste materials and chemicals including paint, solvents, cement slurry, fuel, oil and other toxic liquids;
- Other physical damage to the trunk or root system; and
- Any other activity likely to cause damage to the tree.

Place a 50-75mm layer of coarse organic mulch over the entire surface of the TPZ. Where the TPZ is adjacent to construction activities first lay down geotextile fabric beneath the mulch to facilitate easy removal of the mulch at completion and any accidental spillage of construction materials.

Install drip irrigation around the root zone if required by the Project Arborist.

6.3 Tree Protection Fencing

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

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

Appropriate signage shall be installed on the fencing to prevent unauthorised movement of plant and equipment or entry to the Tree Protection Zone.

Refer to **Appendix 4** for examples of protective fencing and signage.

6.4 Trunk, Branch & Ground Protection

Where provision of tree protection fencing is in impractical due to its proximity to the proposed building envelope, trunk protection shall be erected around the tree to avoid accidental damage. As a minimum, the trunk protection shall consist of two metre (2m) lengths of hardwood timbers (100 x 50mm) spaced at 100-150mm centres secured together with 2mm galvanised wire. These shall be strapped around the trunk (not fixed in any way) to avoid mechanical injury or damage. Trunk protection should be installed prior to any site works and maintained in good condition for the duration of the construction period.

Pavements should be avoided within the Tree Protection Zone of trees to be retained where possible. Proposed paved areas within the Tree Protection Zone of trees to be retained should be placed above grade to minimise excavations within the root zone and avoid root severance and damage.

Placement of fill material within the Tree Protection Zone of trees to be retained should be avoided where possible. Where placement of fill cannot be avoided, the material should be a coarse, gap-graded material such as 20 – 50mm crushed basalt (Blue Metal) or equivalent to provide some aeration to the root zone. Note that Roadbase or crushed sandstone or other material containing a high percentage of fines is unacceptable for this purpose. The fill material should be consolidated with a non-vibrating roller to minimise compaction of the underlying soil. A permeable geotextile may be used beneath the sub-base to prevent migration of the stone into the sub-grade. No fill material should be placed in direct contact with the trunk.

Refer to **Appendix 4** for examples of trunk, branch and ground protection.

6.5 Demolition Works within Tree Protection Zones

Where demolition of structures and pavements is required within the Tree Protection Zones of trees to be retained it is to be carried out to avoid disturbance to existing soils, damage to existing roots or potential root growth.

Machinery shall work within the footprint of existing pavements where possible to avoid compaction of the adjacent soil and Tree Protection Zones.

When removing hard surfaces it shall be stripped-off in thick layers using a small rubber tracked excavator or alternative approved method to avoid damage to underlying roots and

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

If any concentrations of roots or roots with diameters equal to or greater than 50mm are encountered they must be retained in an undamaged condition for assessment by the Project Arborist. If the Project Arborist deems surrounding underground elements such as footing and pipes are providing support, these elements shall be left in-situ.

6.6 Excavations within Tree Protection Zones

The excavator shall work within the footprint of existing pavements where possible to avoid compaction of the adjacent soil and Tree Protection Zones.

6.7 Underground Services

All proposed underground services should be located as far away as practicable from existing trees to be retained to avoid excavation within the Tree Protection Zone.

For underground services, where the incursion to the Root Zone is less than 10% of the total TPZ (i.e. beyond the Minimum Setback Distance), a chain trenching device may be used. A backhoe or skid steer loader (bobcat) is unacceptable due to the potential for excessive compaction and root damage. Where large woody roots (greater than 50mm in diameter) are encountered during excavation or trenching, these shall be retained intact wherever possible (eg by sub-surface boring beneath roots or re-routing the service etc).

Excavations required for underground services within the Structural Root Zone of any tree to be retained should only be undertaken by sub-surface boring. The Invert Level of the pipe, plus the pipe diameter, must be lower than the estimated root zone depth as specified at a minimum depth of 600mm. This will depend on the soil conditions at the site. Where this is not practical and root pruning is the only alternative, proposed root pruning should be assessed by the Project Arborist to determine continued health and stability of the subject tree.

6.8 Canopy pruning

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

All pruning works shall be directed by the Project Arborist and shall be carried out by an AQF Level 3 Arborist. All pruning works shall be in accordance with the Australian Standard *(AS) 4373:2007 Pruning of amenity trees.* This standard outlines appropriate pruning practices and procedures that reduce the risk of damage and injury to trees. Correct pruning practices respect the natural form and branching habit of a tree and work with the trees natural defence mechanisms against disease to avoid damage and injury to trees.

Pruning should always be limited to the minimum amount necessary to achieve the desired aim. Significant loss of foliage created by excessive pruning may weaken the tree, leading to premature decline or predisposition to branch failure or disease, creating potential hazards.

Council consent will be required prior to commencement of the work. Pruning must be performed in accordance with *Australian Standard (AS) 4373:2007 Pruning of amenity trees* (Standards Australia 2007).

6.9 Root Investigation

Exploratory excavation may be required where the proposed excavation created by the development works exceeds 10% of the Tree Protection Zone of any Prescribed Tree; or service trenches are required within the TPZ; to determine the impact of the development on the tree. The purpose of the investigation is to verify the quantity, size, type, depth and orientation of tree roots along the perimeter of the proposed encroachment in order to make an informed judgement in relation to the potential impact on the tree.

Exploratory excavation shall only be carried out using non-destructive or non-injurious techniques, such as careful digging using hand held implements, using compressed air (Airspade®), water pressure, or suction (vacuum device) or a combination of these techniques, to carefully remove soil without damaging roots. The work shall be undertaken by an arborist with a minimum qualification of AQF Level 3. Once roots are exposed, a visual examination can be carried out with the Project Arborist to evaluate the potential impact of the proposed root loss on the health and stability of the tree.

The results of the root investigation together with the Development Impact Assessment must be documented in the report and submitted together with the DA. The report shall contain information that demonstrates that the trees will remain viable in conjunction with the works.

6.10 Root Pruning

Where root pruning is required, roots shall be severed with sterile, clean, sharp pruning implements resulting in a clean cut. Any excavated root zones shall be retained in a moist condition during the construction phase using Hessian material or mulch where practical. Trees that have roots removed shall have drip irrigation installed around the root zone to ensure they receive an adequate supply of water.

6.11 Tree Damage/ Decline

If trees show signs of stress or deterioration, remedial action shall be taken to improve the health and vigour of the subject tree(s) in accordance with best practice arboricultural principles. Advice must be sought from the Project Arborist.

In the event of any tree becoming damaged for any reason during the construction period the Project Arborist must be engaged to inspect and provide advice on any remedial action to minimise any adverse impact. Such remedial action shall be implemented as soon as practicable and certified by the arborist.

7.0 DISCLAIMER

The author and Sturt Noble Arboricultural Consulting take no responsibility for actions taken and their consequences, contrary to those expert and professional instructions given as recommendations.

This is not a hazard assessment report and it should be noted that trees are always inherently dangerous. This assessment was carried out from the ground, and covers what was reasonably able to be assessed and available to the assessor at the time of inspection. No aerial or subterranean inspections were carried out and structural weakness may exist within roots, trunk or branches.

Any protection or preservation methods recommended are not a guarantee of tree survival or safety but are designed to improve vigour and reduce risk. Timely inspections and reports are necessary to monitor the trees' condition. No responsibility is accepted for damage or injury caused by the trees and no responsibility is accepted if the recommendations in this report are not followed.

Limitations on the use of this report:
Trees are dynamic living structures, growing and adapting to conditions around them. Tree condition will change and vary over time depending on weather, environmental factors and mechanical or human interaction.

This report is to be utilised in its entirety only. Any written or verbal submission, report or presentation that includes statements taken from the findings, discussions, conclusions or recommendations made in this report, may only be used where the whole of the original report (or a copy) is referenced in, and directly attached to that submission, report or presentation.

Assumptions
Care has been taken to obtain information from reliable resources. All data have been verified insofar as possible; however, Sturt Noble Arboricultural Consulting can neither guarantee nor be responsible for the accuracy of information provided by others.

Unless stated otherwise:
Information contained in this report covers only the trees that were examined and reflects the condition of the trees at the time of inspection.

Assessment is limited to the conditions at the time of the inspection and only trees discussed in the report have been assessed.

Where access to the base of the tree is limited, such as difficult site access due to site conditions, only general comments can be made. Assessment of tree health and structure is limited to that visible from the site of proposed works and may not reflect the true condition of the tree. Assessment of tree health and structure is limited to that visible from the site of proposed works and may not reflect the true condition of the tree.

Plans used to assess likely impact are those appended/ referenced.

Ongoing monitoring of all trees is advised and where significant changes are observed, further advice should be requested.

Unusual developments or sudden changes in a tree's condition should be addressed immediately.

8.0 REFERENCES

Botany Bay Development Control Plan 2013 Part 3L Landscaping and Tree Management

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IACA, 2010, Sustainable Retention Index Value Matrix (SRIV) Version 4, A visual method of objectively rating the viability of urban trees for development sites and management, based on general tree and landscape assessment criteria, Institute of Australian Consulting Arborculturists, Australia.

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Mattheck, Dr. Claus, Breloer Helge (1994) Sixth Edition (2001), *The Body Language of Trees – A handbook for failure analysis*. Research for Amenity Trees No 4. Pub. The Stationary Office London.

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Standards Australia (2007) Australian Standard AS4373-2007 *Pruning of Amenity Trees,* Pub. Standards Australia, Sydney.

Standards Australia (2009) Australian Standard AS4970-2009 *Protection of Trees on Development Sites*, Pub. Standards Australia, Sydney.

9.0 APPENDICES

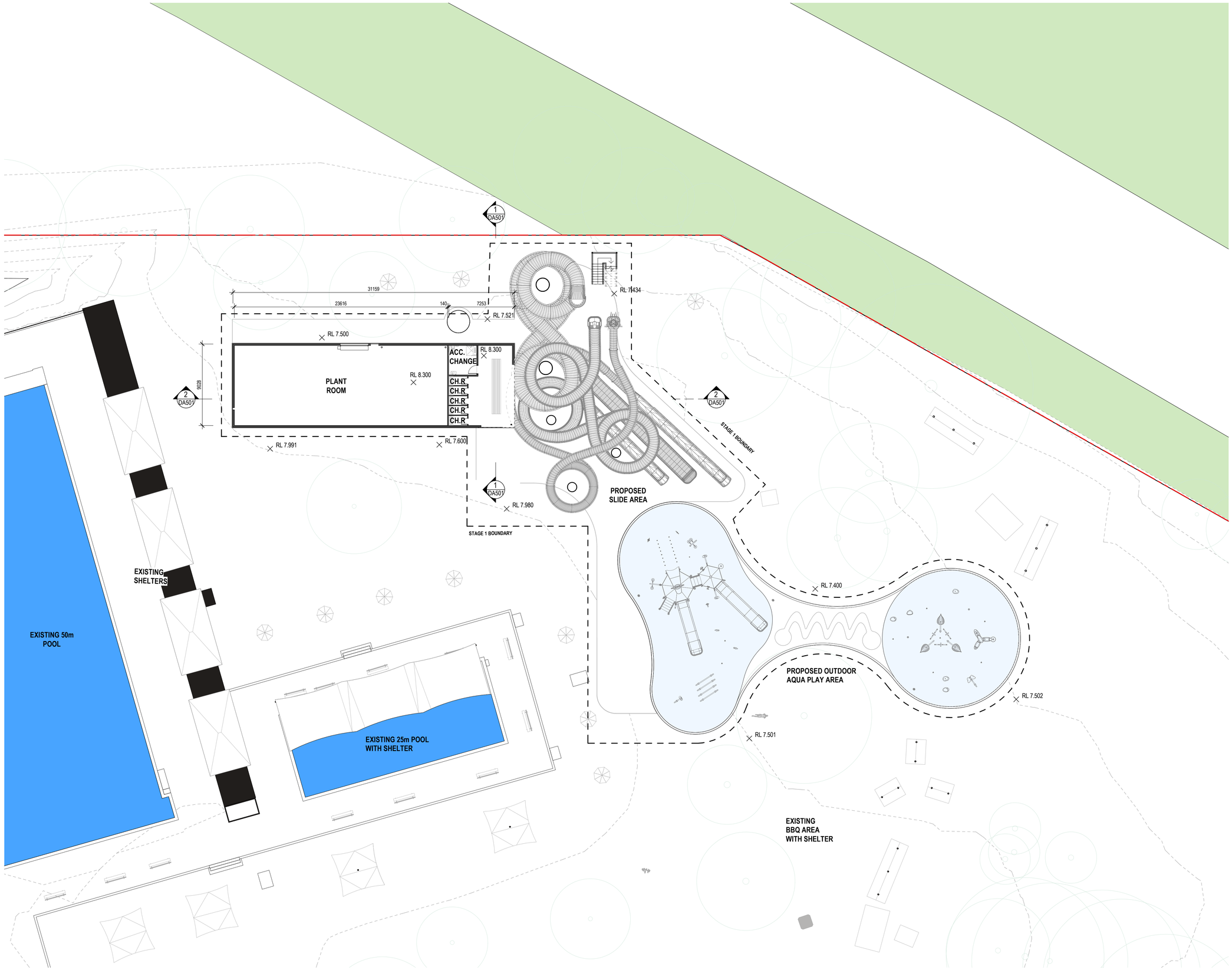
9.1 ***Appendix 1*** *Tree Assessment Sheet*

Tree Assessment Sheet

Location:	Cnr Myrtle St and Jasmine St, Botany
Client:	Bayside Council
Date:	24.02.2021

Tree No.	Botanical Name / **Common Name**	Dimentions								Health				Vigour				Structure					Age Class					**Retention Value SRIV**	**Retain / Remove**	Comments
		TPZ radius (m)	DBH (m)	SRZ radius (m)	DAB (m)	Height (m)	Spread EW (m)	Spread NS (m)	Encroachment (%)	Deadwood	Dieback	Pests	Diseases	Canopy density %	Foliage size	Foliage colour	Extension growth	Inclusions	Fractures	Wounds	Cavities	Decay	Senescent	Mature	Semi Mature	Young	New planting			
35	*Angophora costata* **Smooth-barked Apple**	6.48	0.54	2.67	0.60	14	A.S.	A.S.	10%				85	85	G	G	●							●				**MGVG-10**	**Retain**	
36	*Eucalyptus robusta* **Swamp Mahogany**	5.88	0.49	2.71	0.62	18	A.S.	A.S.	-					90	G	G	●							●				**MGVG-10**	**Remove**	
38	*Melaleuca quinquenervia* **Broad-leaved Paperbark**	6.12	0.51	2.69	0.61	10	A.S.	A.S.	19%					70	G	G												**OLVF-2**	**Retain**	Roots exposed and damaged to a large extent. Multi-trunk. 21% maximum sybject to detail design review
40	*Eucalyptus microcorys* **Tallowwood**	6.72	0.56	2.93	0.75	22	A.S.	A.S.	-	●				75						●								**MGVF-9**	**Retain**	Underpruned.
41	*Corymbia maculata* **Spotted Gum**	7.08	0.59	2.88	0.72	14	A.S.	A.S.	-					80	G	G		●										**MLGV-5**	**Remove**	Lean to north.
47	*Eucalyptus tereticonis* ***Forest Red Gum*1***	8.88	0.74	3.12	0.87	20	A.S.	A.S.	4%					65	P	G												**MLGV-5**	**Retain**	12% maximum sybject to detail design review
48	*Melaleuca quinquenervia* **Broad-leaved Paperbark**	12.00	1.00	3.75	1.35	17	A.S.	A.S.	-					65	P	P		●			●	●	●					**OLVF-2**	**Remove**	Co-dominant. Inclusion. Roots exposed. Remove?
49	*Melaleuca quinquenervia* **Broad-leaved Paperbark**	8.76	0.73	3.34	1.02	17	A.S.	A.S.	-					50														**OLVF-2**	**Remove**	Remove?
50	*Melaleuca quinquenervia* **Broad-leaved Paperbark**	9.96	0.83	3.40	1.07	15	A.S.	A.S.	-					60				●										**OLVF-2**	**Remove**	Co-dominant. Large inclusion.
51	*Melaleuca quinquenervia* **Broad-leaved Paperbark**	12.48	1.04	4.29	1.85	18	A.S.	A.S.	21%	●	●			50	G	G		●					●					**OLVF-2**	**Retain**	Multi-trunk x 4.
52	*Melaleuca quinquenervia* **Broad-leaved Paperbark**	9.36	0.78	3.31	1.00	20	A.S.	A.S.	10%	●				70									●					**OLVF-2**	**Retain**	Co-dominant. 19% maximum sybject to detail design review
60	*Melaleuca quinquenervia* **Broad-leaved Paperbark**	6.00	0.50	2.81	0.68	15	A.S.	A.S.	-	●				60														**OLVF-2**	**Remove**	
61	*Eucalyptus sp* *1	10.08	0.84	2.92	0.74	22	A.S.	A.S.	6%					75			●				●			●				**MLVG-5**	**Retain**	Exposed/damaged roots.. Fungi fruiting on roots.
62	*Eucalyptus sp* *1	6.60	0.55	2.83	0.69	18	A.S.	A.S.	1%	●	●			50									●					**OLVF-2**	**Retain**	Lean to west. Basal flare/exposed damaged roots.Fungi fruiting on roots.
63	*Melaleuca quinquenervia* **Broad-leaved Paperbark**	10.56	0.88	3.43	1.09	18	A.S.	A.S.	1%					70				●										**OLVF-2**	**Retain**	
65	*Acacia elata* **Cedar Wattle**	9.48	0.79	3.22	0.94	20	A.S.	A.S.	11%					70						●		●	●					**OLVP-0**	**Remove**	Remove.

9.2 ***Appendix 2*** *General Arrangement Plan*



REV	DESCRIPTION	DATE	APP
C	ISSUED FOR COORDINATION	24/03/2021	TB
B	ISSUE FOR COORDINATION	11/02/2021	TB
A	ISSUE FOR DRAFT DA	05/02/2021	TB

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PROJECT

BOTANY AQUATIC CENTRE - STAGE 01

PROJECT NUMBER

100239

DRAWING

GENERAL ARRANGEMENT PLAN - GROUND FLOOR

SCALE 1 : 200 @ A1

FOR APPROVAL
NOT TO BE USED DURING CONSTRUCTION

DRAWING NO. DA201C

REVISION C

DATE PRINTED 25/03/2021 8:17:54 AM

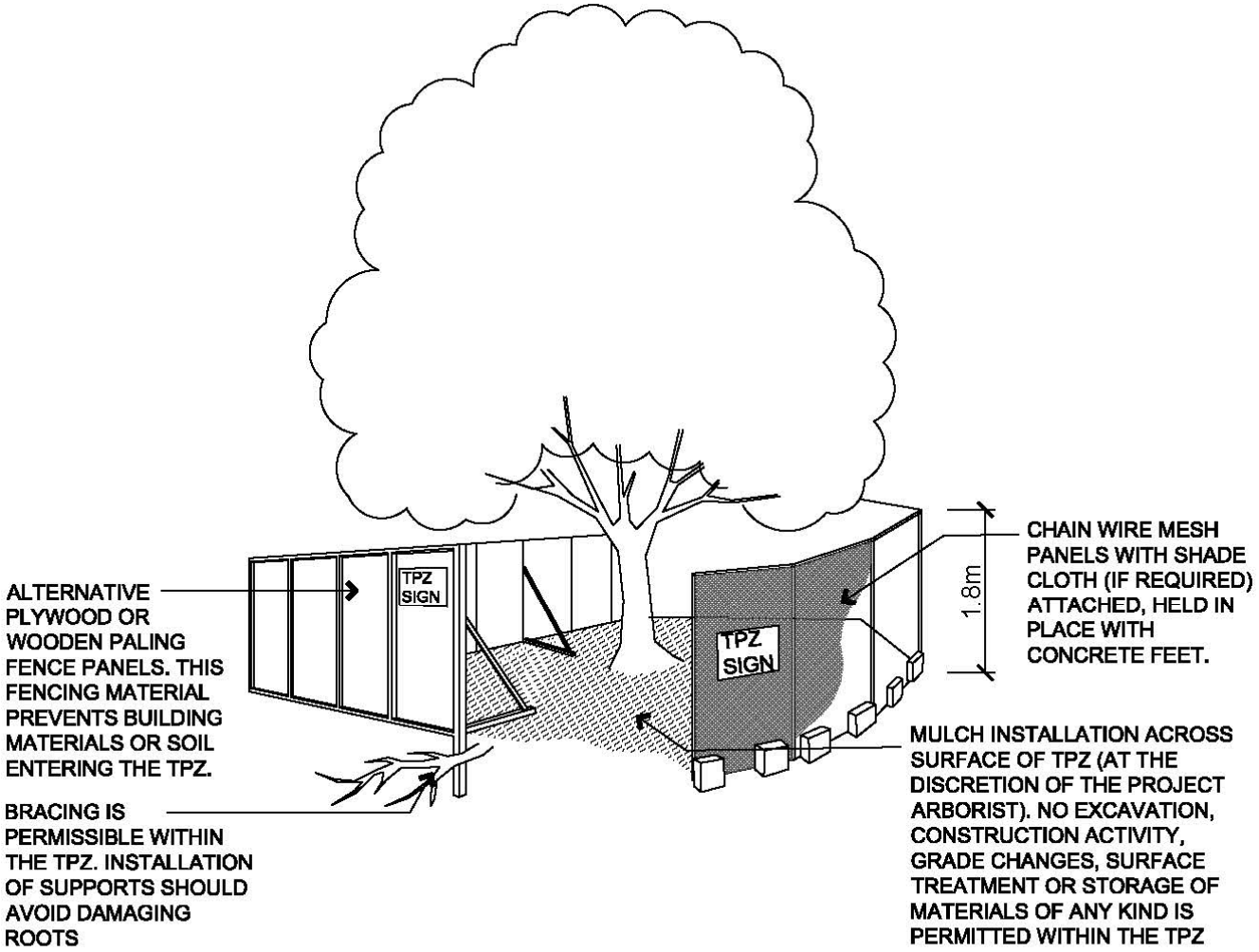
FILE NAME BIM 360:/Botany Aquatic Centre/100239_Botany Aquatic Centre_R19_360.rvt

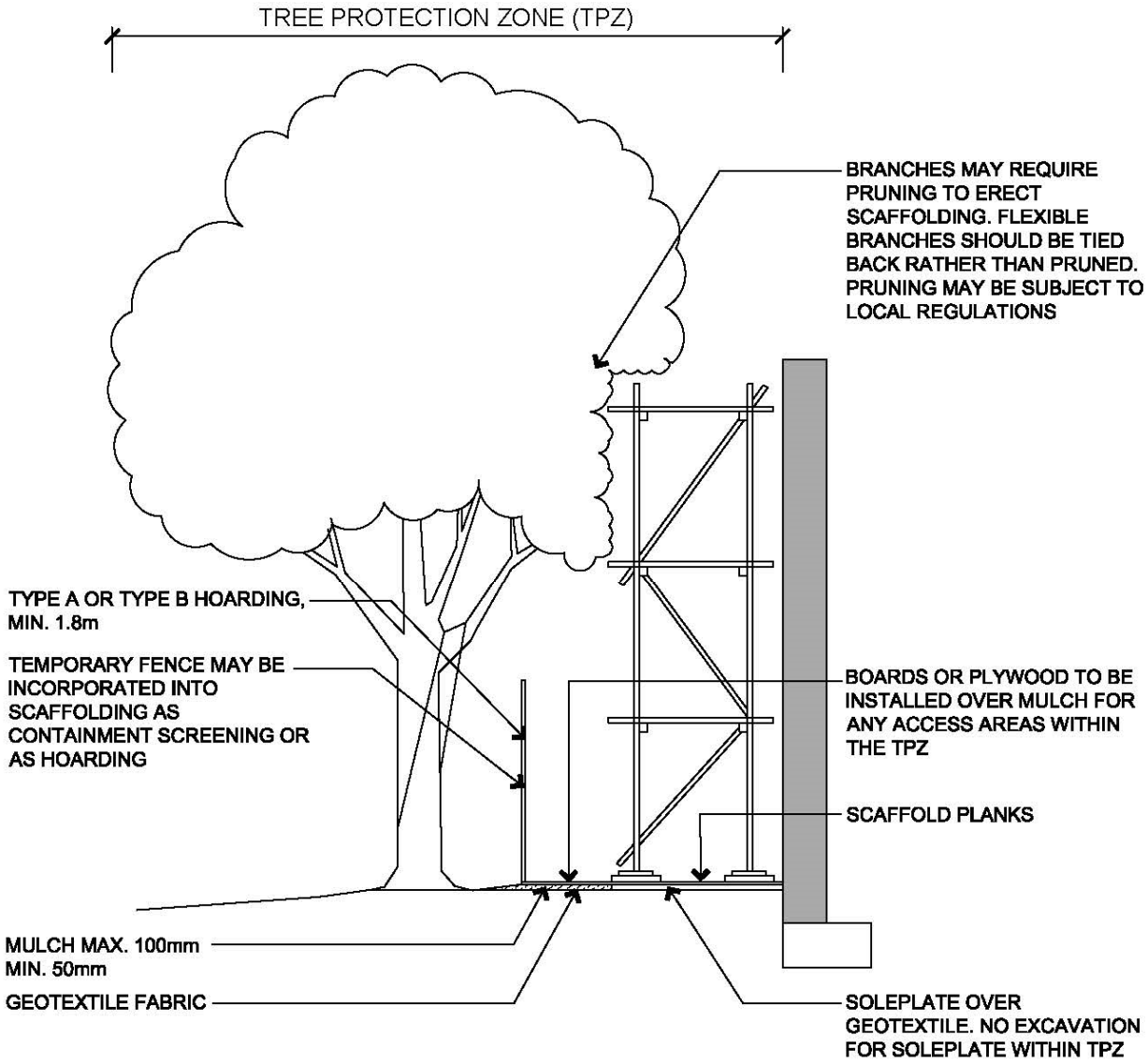
*9.3 **Appendix 3** SRIV Table*

	Vigour Class and Condition Class					
Age Class	Good Vigour & Good Condition (GVG)	Good Vigour & Fair Condition (GVF)	Good Vigour & Poor Condition (GVP)	Low Vigour & Good Condition (LVG)	Low Vigour & Fair Condition (LVF)	Low Vigour & Poor Condition (LVP)
	Able to be retained if sufficient space available above and below ground for future growth. No remedial work or improvement to growing environment required. May be subject to high vigour. Retention potential - Medium - Long Term.	Able to be retained if sufficient space available above and below ground for future growth. Remedial work may be required or improvement to growing environment may assist. Retention potential - Medium Term. Potential for longer with remediation or favourable environmental conditions	Able to be retained if sufficient space available above and below ground for future growth. Remedial work unlikely to assist condition, improvement to growing environment may assist. Retention potential - Short Term. Potential for longer with remediation or favourable environmental conditions.	May be able to be retained if sufficient space available above and below ground for future growth. No remedial work required, but improvement to growing environment may assist vigour. Retention potential - Short Term. Potential for longer with remediation or favourable environmental conditions.	May be able to be retained if sufficient space available above and below ground for future growth. Remedial work or improvement to growing environment may assist condition and vigour. Retention potential - Short Term. Potential for longer with remediation or favourable environmental conditions.	Unlikely to be able to be retained if sufficient space available above and below ground for future growth. Remedial work or improvement to growing environment unlikely to assist condition or vigour. Retention potential - Likely to be removed immediately or retained for Short Term. Potential for longer with remediation or favourable environmental conditions

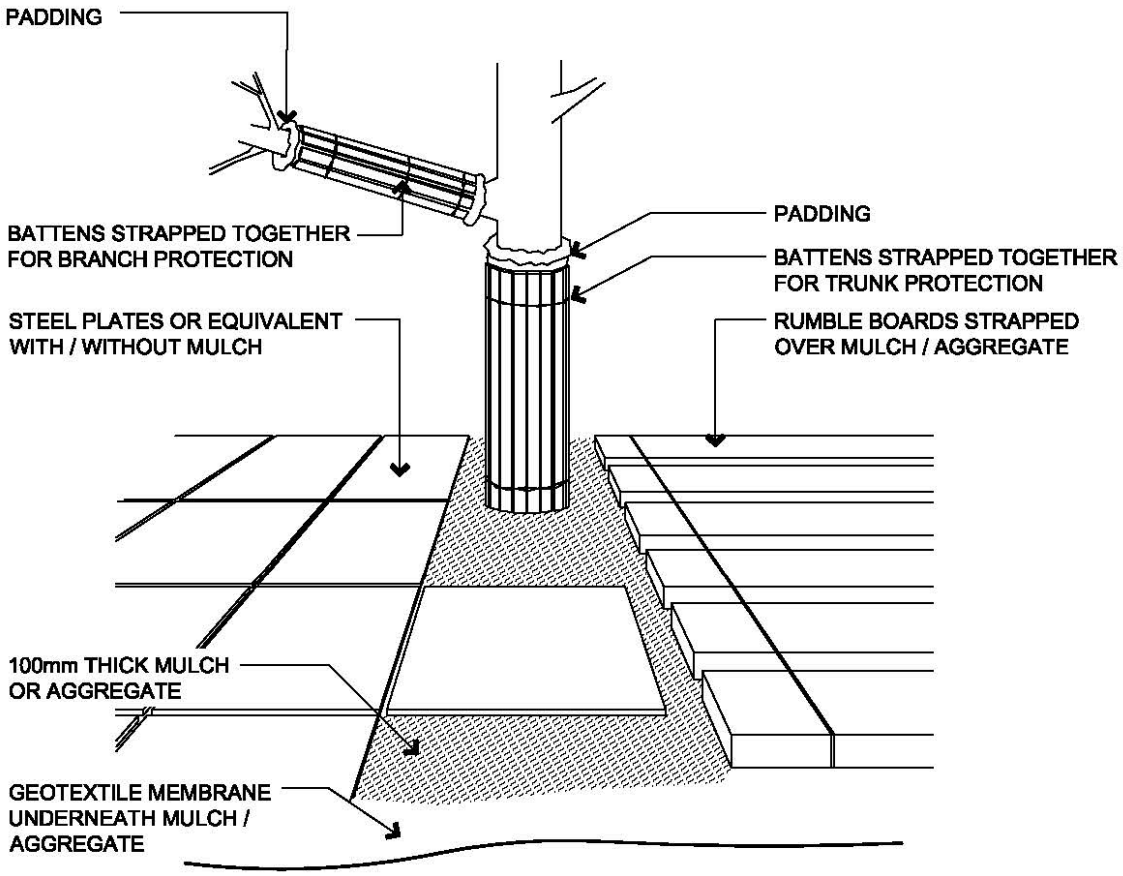
Young (Y)	**YGVG - 9** Index Value 9 Retention potential - Long Term. Likely to provide minimal contribution to local amenity if height Retain, move or replace	**YGVF - 8** Index Value 8 Retention potential - Short - Medium Term. Potential for longer with improved growing conditions. Likely to provide minimal contribution to local amenity if height Medium-high potential for future growth and adaptability. Retain, move or replace.	**YGVP - 5** Index Value 5 Retention potential - Short Term. Potential for longer with improved growing conditions. Likely to provide minimal contribution to local amenity if height Low-medium potential for future growth and adaptability. Retain, move or replace	**YLVG - 4** Index Value 4 Retention potential - Short Term. Potential for longer with improved growing conditions. Likely to provide minimal contribution to local amenity if height Medium potential for future growth and adaptability. Retain, move or replace	**YLVF - 3** Index Value 3 Retention potential - Short Term. Potential for longer with improved growing conditions. Likely to provide minimal contribution to local amenity if height <5m. Low-medium potential for future growth and adaptability. Retain, move or replace	**YLVP - 1** Index Value 1 Retention potential - Likely to be removed immediately or retained for Short Term. Likely to provide minimal contribution to local amenity if height
Mature (M)	**MGVG - 10** Index Value 10 Retention potential - Medium - Long Term	**MGVF - 9** Index Value 9 Retention potential - Medium Term. Potential for longer with improved growing conditions.	**MGVP - 6** Index Value 6 Retention potential - Short Term. Potential for longer with improved growing conditions	**MLVG - 5** Index Value 5 Retention potential - Short Term. Potential for longer with improved growing conditions	**MLVF - 4** Index Value 4 Retention potential - Short Term. Potential for longer with improved growing conditions	**MLVP - 2** Index Value 2 Retention potential - Likely to be removed immediately or retained for Short Term.
Over-mature (O)	**OGVG - 6** Index Value 6 Retention potential - Medium - Long Term.	**OGVF - 5** Index Value 5 Retention potential - Medium Term.	**OGVP - 4** Index Value 4 Retention potential - Short Term.	**OLVG - 3** Index Value 3 Retention potential - Short Term. Potential for longer with improved growing conditions.	**OLVF - 2** Index Value 2 Retention potential - Short Term.	**OLVP - 0** Index Value 0 Retention potential - Likely to be removed immediately or retained for Short Term

9.4 ***Appendix 4*** *Typical Tree Protection Details*





NOTE: Excavation required for the insertion of support posts for tree protection fencing should not involve the severance of any roots greater than 20mm in diameter, without the prior approval of the project arborist.



NOTE:
1. For trunk and branch protection use boards and padding that will prevent damage to bark. Boards are to be strapped to trees, not nailed or screwed.
2. Rumble boards should be of a suitable thickness to prevent soil compaction and root damage.


Tree
Protection
Zone
NO ACCESS
Contact: