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BANKSTOWN NORTH PUBLIC SCHOOL, BANKSTOWN

ARBORICULTURAL IMPACT ASSESSMENT MAIN WORKS

PREPARED FOR:

JDH ARCHITECTS

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Executive Summary

This report was commissioned by JDH Architects to accompany their State Significance Development Application, within the City of Canterbury Bankstown Council area at 322 Hume Highway, Bankstown. The aim of this report is to provide an assessment of the impacts of the proposed main works (construction of Block 2, Block 4, driveway to the Northwest, new games court, demolition of demountable buildings, sport court, library & admin demountable D15886 buildings, and turf and landscape areas) on a hundred and seventy three trees and groups of trees in accordance with AS4970 - 2009.

This report collates and presents information collected by David Prieto & Gorka Ojeda on the 09/10/18. The data collected is located at **7. Tree Survey Table** (page 21) also see **8. Tree Survey Table Notes** (page 34) for notes relating to tree survey table.

Generally the site's vegetation was observed to have a majority native tree canopy, with an exotic shrub midstorey and an exotic turf groundcover layer. The existing surveyed trees are shown at **9. Tree Location Plan** (page 38).

The proposed development main works will involve the construction of two three level buildings (Block 2 & Block 4), new paving to the south of these buildings, landscape works to the north and east of the building and installation of a new driveway to the north.

This will be followed by removal of a number of demountable, demountable library, sport court to the north and admin demountable D15886, with associated installation of some turf & landscape elements, paving and retaining wall. A palisade fence is proposed to be installed to the south of the new driveway and a light weight I perimeter fence along the north boundary. This will involve regrading site levels in some areas through excavation, cutting and filling of the soil on site. The extent of site works is also illustrated at **9. Tree Location Plan** (page 38).

The matrix below gives a brief overview summary of tree significance and level of encroachment from the proposed development of numbered trees.

	ENCROACHMENT WITHIN TPZ Numbering of trees as shown on Tree Location Plan				
TREE LANDSCAPE SIGNIFICANCE		**No Impact**	**Minor Encroachment** (<10% of TPZ)	**Major Encroachment** (>10% of TPZ)	**Within Development Footprint**
	High	19, 31, 35, 49, 50, 58, 63, 63a, 189 & 198	-	20	-
	Medium	13, 16, 17, 30, 33, 38, 43, 44, 47, 60, 64, 67, 74, 78, 79, 117, 119, 122, 126, 133, 139, 140, 142, 148, 169, 170, 173, 174, 175, 177, 186, 194, A1, A2, A3, A4, A5, A6, A7, A8, A9, A12,	A10 & A11	180a	98 & 182

		A13, A14, A15, A16, A17, A18,			
	Low	14, 15, 18, 24(L-M), 25, 26(L-M), 27, 28, 29, 34, 40, 41, 42, 45, 46, 48, 48a, 51, 52, 53(L-M), 54, 55, 56, 57, 61, 62, 70, 72, 75, 83, 87, 115(L-M), 116, 118(L-M), 119a, 121, 123, 124, 129, 131, 132, 137, 138, 144(L-M), 145(L-M), 147, 151, 152(L-M), 160, 162, 163 (L-M), 164, 165, 166, 167(L-M), 171, 185, 187, 188, 190, 191, 192, 195, 196, 197, 199, 202, 214, 219, 220, 221, 222, Group B *(16 trees)*, C2, C3, C4, C5, C6, C7, C8, C9, C10 &C 11	-	89, 90, 97, 99, 101 & 180	11, 88, 95(L-M), 96 & 102
	Total Number of trees	**156**	**2**	**8**	**7**

In consideration of the data collected recommendations are provided for the removal or retention of trees including specific tree protection measures required to reduce the anticipated impacts from the proposed construction on those trees proposed to be retained. This report specifically recommends:

- The removal of Tree No.'s 11, 88, 89, 90, 95, 96, 97, 98, 99, 101, 102 & 182, if the development is approved as there is an unavoidable major encroachment into the tree protection zone.
- The replacement planting of a number of locally native canopy trees shall be installed in 25L pot size to offset the loss of trees on site. Tree species selection to be done in liaison with the ecologist and Council officers.
- The retention of Tree No.'s 13, 14, 15, 16, 17, 18, 19, 24, 25, 26, 27, 28, 29, 30, 31, 33, 34, 35, 38, 40, 41, 42, 43, 44, 45, 46, 47, 48, 48a, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 60, 61, 62, 63, 63a, 64, 67, 70, 72, 74, 75, 78, 79, 83, 87, 121, 122, 123, 124,

126, 129, 131, 132, 133, 137, 138, 139, 140, 142, 144, 145, 147, 148, 151, 152, 160, 162, 163, 164, 165, 166, 167, 169, 170, 171, 173, 174, 175, 177, 185, 186, 187, 188, 189, 190, 191, 192, 194, 195, 196, 197, 198, 199, 202, 214, 219, 220, 221, 222, A1, A2, A3, A4, A5, A6, A7, A8, A9, A12, A13, A14, A15, A16, A17, A18, Group B, C2, C3, C4, C5, C6, C7, C8, C9, C10 &C 11. The construction will not impact these trees.

- The retention of Trees 115, 116, 117, 118 & 119, 119a. The construction will not impact these trees. However, the following should be implemented to protect the trees from the removal of the demountable buildings and concrete footpaths:
  - Existing concrete footpaths to be retained until main works have been completed if possible. Then removed carefully.
  - Existing demountable to be removed/demolished carefully to avoid damage to the trees.
  - The existing levels within the TPZ of the trees should be kept.
  - Mulch the area within the TPZ after building and concrete removal has been completed.
- The retention of Tree No.'s A10 & A11. The construction will provide a minor encroachment into the tree protection zone.
- The retention of Tree No. 180. The construction will provide a major encroachment and sustainable impact into the tree protection zone.
- The retention of Tree No.'s 20. This trees is of high significance. The following should be implemented to minimise impacts from the proposed SSD Main Works:

  1. Existing pavement should be maintained during the entire construction process. This area is to be free of all heavy machinery.
  2. Concrete paving to be installed above existing asphalt paving. Otherwise, detailed construction plans should show proposed levels for the concrete paving to require no excavation, i.e. FFL150-200m above existing levels within the TPZ. Detailed construction plans should show detailed existing and proposed levels.
  3. Tree protection fencing should be installed before construction works and removed following completion.
  4. Consideration to select a porous pavement within the TPZ of the tree.
  5. Crown pruning to be specified by the project arborist.
  6. Garden bed to be mulched and levels to be maintained as existing.
  7. An AQF Level 5 Project Arborist should be appointed to advise on construction design development, and revision and preparation of detailed earthworks and demolition plans and other site works plans relevant to this development. The arborist shall inspect and certify tree protection measures and supervise works near retained trees.
  8. There is to be no excavation outside that outlined above unless the AQF Level 5 Project Arborist has approved detailed drawings.
  9. No stormwater or services drawings have been supplied. Refer to note below regarding trenching within the TPZ.

  See discussion for further information.
- The retention of Tree No. 180a. The following should be implemented to minimise impacts from the proposed SSD Main Works:

  1. Detailed construction plans for the driveway with FFL of 61.23 within the TPZ of the tree should be proposed.

2. Existing pavement should be maintained during the entire construction process. This area is to be free of all heavy machinery.
3. No other elements closer than 5.2m from the tree requiring excavation should be proposed within the TPZ of the tree.

See discussion for further information.

- Excavation works for the proposed palisade & lightweight fence to be along should be carried out minimising the impact to the trees.
  - Post to be installed outside of the SRZ of the trees, i.e. 2m offset for trees with a 300mm DRB or larger and 0.5m offset for small trees.
  - Pruning to be limited to 10% of the crown.
- A tree management plan should be prepared to guide construction methodology and barrier installation as necessary to protect the trees during construction works. The plan should be consistent with Sections 4 & 5, *AS4970(2009)*.
- Constructed landscape elements such as retaining walls, paving and other features; and open trenches for services requiring excavation should be located outside the TPZ of all retained trees.
- This arboricultural assessment should be reviewed upon the preparation of stormwater, landscape or revised architectural plans.
- Hand excavation is required for all works located within the TPZ of all retained trees. These works shall be supervised by the project arborist.
- A minimum AQF Level 5 Project Arborist shall be engaged to certify the tree protection works in accordance with the hold points provided at **6.3. Hold Points** (page19).
- For additional tree protection notes see **10. General Tree Protection Notes** (page 40).

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1. Introduction

This report was commissioned by JDH Architects to accompany their State Significance Development Application, within the City of Canterbury Bankstown Council area at 322 Hume Highway, Bankstown. The aim of this report is to provide an assessment of the impacts of the proposed main works (construction of Block 2, Block 4, driveway to the Northwest, new games court, demolition of demountable buildings, sport court, library & admin demountable D15886 buildings, and turf and landscape areas) on a hundred and seventy three trees and groups of trees in accordance with AS4970 - 2009.

This report collates and presents information collected by David Prieto & Gorka Ojeda on the 09/10/18. The data collected is located at **7. Tree Survey Table** (page 21) also see **8. Tree Survey Table Notes** (page 34) for notes relating to tree survey table.

2. Methodology

2.1. Limitations

Care has been taken to obtain all information from reliable sources. All data has been verified as far as possible. However David Prieto - Consulting Arborist 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 tree/s examined and reflects the health and structure of the tree at the time of inspection. The documented, observations, results, recommendations and conclusions given may vary after the site visit due to environmental conditions. Liability will not be accepted for damage to person or property as a result of natural processes, unforeseeable actions or occurrences.
- Observations recorded for trees located within adjacent properties have been made without entering that property. Deciduous trees inspected during winter and all trees obscured by other vegetation are not able to be properly assessed. As a result measurements for these trees are estimated. Similarly these trees were not subject to a complete visual inspection and defects or abnormalities may be present but not recorded.
- The inspection was limited to visual examination from the base of the subject tree without dissection, excavation, probing or coring (unless specifically noted otherwise).
- There is no warranty or guarantee, expressed or implied, that problems or deficiencies of the subject tree may not arise in the future.

No structural foundation design, stormwater or hydraulic plans have been supplied.

No landscape for RWF works plans have been supplied.

2.2. Site Inspection

A visual inspection of the tree/s was performed from ground level, data collected includes:

- Genus, Species, Common Name;
- Height, Width, DBH (Diameter at Breast Height), DRB (Diameter above Root Buttress);

- Age, Health & Vigour;
- Significance, Amenity and Ecological Value;
- Form and Structural Condition;
- Visible Defects or Evidence of Wounding.

2.3. Measurement

- Tree locations are supplied by client on the survey plan or triangulated using a measuring tape.
- Diameter at breast height (DBH) and Diameter above Root Buttress (DRB) are measured using a diameter tape.
- Height is measured using a clinometer or Nikon *Forestry Pro*.
- Canopy width is estimated using a measured stride paced out on site.
- Structural Root Zone (SRZ) and Tree Protection Zone (TPZ) radii are calculated (in accordance with *AS 4970-2009*).
- Development impact/setback is measured from the nearest face of the trunk to the face of the structure in Auto CAD using the perpendicular distance function.

2.4. Recording Data

Data collected is collated in the tree survey table located at **7. Tree Survey Table** (page 21). The tree survey table contains abbreviations for terms describing the tree's characteristics; explanatory notes pertaining to these are located at **8. Tree Survey Table Notes** (page 34).

The physical data for tree locations, crown width and DRB is schematically described in **9. Tree Location Plan** (page 38).

2.5. Reference Documents

The report was written in coordination with:

- Survey Plan prepared by C.M.S. Surveyors Pty Ltd Revision 1, dated 24/10/19.
- Demolition Plan prepared by JDH Architects Rev 5, dated 17/03/2020.
- Architectural Site for SSD Main Works prepared by JDH Architects Rev 9, dated 17/03/2020.
- Biodiversity Development Assessment Report by SLR, dated March 2020.
- The Australian Standard for the Protection of Trees on Development Sites (AS 4970 – 2009).

2.6. Council Tree Preservation Order

The property is in the recently formed City of Canterbury Bankstown LGA. During the current transition phase, the TPO from former Bankstown Council applies.

In Bankstown Council it is prohibited to ring bark, cut down, top, prune, remove, injure or wilfully destroy trees, without written consent from the Council. There are limited exemptions to the Tree Preservation Order which include:

1. Removal or pruning of any tree under 5 metres in height or any tree growing within 3 metres of the main residential dwelling (measured from the external enclosing wall of the dwelling to the main trunk of the tree).
2. Removal of deadwood or pruning of up to 10% of the foliage of a tree within any 12 month period, with all pruning to be done in accordance with Australian Standards (AS 4373, Pruning of Amenity Trees). Note: reducing the height of a tree by 10% (cutting the top off a tree or crown lopping) is NOT in accordance with these standards.

2.7. Determining a tree's significance

The landscape significance of a tree is an essential criterion to establish the importance that a particular tree may have on a site. When determining a tree's significance within the landscape context, the following questions are asked of each tree. Significance may be expressed in increments of High, Medium or Low. For a High rating the majority (≥4) of the answers will be yes; For a Medium-High rating 3.5 of the answers will be yes; for a Medium rating half (=3) of the answers will be yes; for a Low-Medium rating 2.5 of the answers will be yes; and for the Low rating the minority of answers will be yes (≤2).

1. Is the tree a locally native remnant; an endangered species; a part of an endangered ecological community; or does the tree provide critical habitat for an endangered species?

2. Is the tree of botanical interest; Is it included in a significant tree register or listed as a heritage item under the Federal State or Local Regulations?

3. Is the tree visually prominent in the locality?

4. Is the tree well structured?

5. Is the tree in good health and/or does it display signs of good vigour?

6. Is the tree typically formed for the species?

7. Is the tree currently located in a position that will accommodate future growth?

3. Observations

3.1. Site Description

The site is a Public School located at 322 Hume Highway, Bankstown. It contains a number of buildings and demountable classrooms, driveways, paved areas, paths, turf areas, sport fields and gardens. There was no evidence of recent earthworks on the site or adjoining sites. The site has a general north-westerly aspect.

3.2. Soil Landscape Map

The soils in this area are from the Blacktown soil landscape group [3]. They are generally shallow to moderately deep <100 cm Red and Brown Podzolic Soils on crests, upper slopes and well-drained areas; deep 150-300 cm Yellow Podzolic Soils and Soloths on lower slopes and in areas of poor drainage.

Generally the landscape is characterised by gently undulating rises on Wianamatta Group shales and Hawkesbury shale. There is local relief to 30 m, and slope gradients usually less than 5%. Additionally there are broad rounded crests and ridges with gently inclined slopes [3].

These soils are generally limited by moderately reactive highly plastic subsoil, low soil fertility, and poor soil drainage. The critical soil characteristics of this soil type for trees growing on this site include poor drainage. [3]

3.3. Native Vegetation Map

A Biodiversity Development Assessment Report has been prepared by SLR Consulting. Table 7 on the page 16 of the report shows the vegetation communities found within the 1500m buffer area:

A. Broad-leaved Ironbark - Grey Box - Melaleuca decora grassy open forest on clay/gravel soils of the Cumberland Plain, Sydney Basin Bioregion
B. Broad-leaved Ironbark - Melaleuca decora shrubby open forest on clay soils of the Cumberland Plain, Sydney Basin Bioregion
C. Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion
D. Turpentine - Grey Ironbark open forest on shale in the lower Blue Mountains, Sydney Basin Bioregion

The report indicated that there are small patches of native vegetation present within the site boundary. This is comprised of Grey Box - Forest Red Gum grassy woodland on flats of the Cumberland Plain, Sydney Basin Bioregion. This PCT is associated with *Cumberland Plain Woodland in the Sydney Basin Bioregion*, which is a critically endangered ecological community (CEEC) listed under the BC Act.
Open grassy woodland dominated by a canopy of *Eucalyptus moluccana*, *E. tereticornis* and Ironbarks (*E. crebra*/*E. fibrosa*) and some localised patches of *Corymbia maculata*. Shrub layer is sparse to moderate cover including *Bursaria spinosa* subsp. *spinosa* and a high cover of grasses and forbs.

3.4. Summary of site inspection data

Generally the site's vegetation was observed to have a majority native tree canopy, with an exotic shrub midstorey and an exotic turf groundcover layer. The existing surveyed trees are shown at **9. Tree Location Plan** (page 38).

3.5. Summary of Proposed Development

The proposed development main works will involve the construction of two twin buildings (Block 2 & Block 4), new paving to the south of these buildings, landscape works to the north and east of the building and installation of a new driveway to the north.

This will be followed by removal of a number of demountable, demountable library, sport court to the north and admin demountable D15886, with associated installation of some turf & landscape elements, paving and retaining wall. A palisade fence is proposed to be installed to the south of the new driveway and a light weight l perimeter fence along the north boundary. This will involve regrading site levels in some areas through excavation, cutting and filling of the soil on site. The extent of site works is also illustrated at **9. Tree Location Plan** (page 38).

3.6. Tree significance and encroachment matrix

The matrix below gives a brief overview summary of tree significance and level of encroachment from the proposed development of numbered trees.

	ENCROACHMENT WITHIN TPZ Numbering of trees as shown on Tree Location Plan				
TREE LANDSCAPE SIGNIFICANCE		**No Impact**	**Minor Encroachment** (<10% of TPZ)	**Major Encroachment** (>10% of TPZ)	**Within Development Footprint**
	High	19, 31, 35, 49, 50, 58, 63, 63a, 189 & 198	-	20	-
	Medium	13, 16, 17, 30, 33, 38, 43, 44, 47, 60, 64, 67, 74, 78, 79, 117, 119, 122, 126, 133, 139, 140, 142, 148, 169, 170, 173, 174, 175, 177, 186, 194, A1, A2, A3, A4, A5, A6, A7, A8, A9, A12, A13, A14, A15, A16, A17, A18,	A10 & A11	180a	98 & 182
	Low	14, 15, 18, 24(L-M), 25, 26(L-M), 27, 28, 29, 34, 40, 41, 42, 45, 46, 48, 48a, 51, 52, 53(L-M), 54, 55, 56, 57, 61, 62, 70, 72, 75, 83, 87, 115(L-M), 116, 118(L-M), 119a, 121, 123, 124, 129, 131, 132, 137, 138, 144(L-M), 145(L-M), 147, 151, 152(L-M), 160, 162, 163 (L-M), 164, 165, 166,	-	89, 90, 97, 99, 101 & 180	11, 88, 95(L-M), 96 & 102

		167(L-M), 171, 185, 187, 188, 190, 191, 192, 195, 196, 197, 199, 202, 214, 219, 220, 221, 222, Group B *(16 trees)*, C2, C3, C4, C5, C6, C7, C8, C9, C10 &C 11			
	Total Number of trees	**156**	**2**	**8**	**7**

4. Discussion

4.1. Trees with a Minor TPZ Encroachment

The proposed construction encroaches within the TPZ by 10% or less.

- Trees A10 & A11 are located 3.04m & 2.68m from the proposed pedestrian access concrete paving respectively, providing 1.3% & 4.5% cut encroachment into the TPZ. These trees are considered to be of medium significance, are located within the road reserve and should be retained and protected.

  These encroachments are considered to be a low level of impact and sustainable by the trees. These trees are proposed to be retained.

4.2. Trees with a Major or potential Major TPZ Encroachment

The proposed construction encroaches within the TPZ by more than 10% or is within the SRZ.

- Tree 20 will have several encroachments provided by different elements:

  1. Is located 12.2m from the proposed Building 2 to the north, providing a 1% cut encroachment into the TPZ. This is considered to be a low level of impact and sustainable by the tree as no woody roots are expected to be found within during the excavation works.

  2. It is located 4.65m& 9.65m from the proposed concrete paving to the north and east respectively, providing 29.8% encroachment into the TPZ and marginal encroachment into the SRZ.

     During the inspection it was found that there is an asphaltic paving within most of the TPZ area of the tree, apart from a 4.4m x 5.1m pit at the base of the trunk. The profile of this paving is anticipated to be less than 100mm in depth. As shown on the survey, the existing paving levels in the area vary from RL 65.96 to RL66.25.

The proposed building has a Ground Floor FFL of 66.6. The profile of typical concrete paving is 180-200mm including sub-base preparation.

No detailed levels of the proposed concrete paving have been provided. While this is a major encroachment, this would provide a low to medium level of impact and sustainable by the tree if the profile of the proposed concrete paving is entirely installed above existing levels (fill encroachment) requiring no excavation below the base of the existing asphaltic paving.

3. It is anticipated there will be crown encroachment by the proposed roof located 11m to the north and south corner of Building 2. The tree has an approximate height of 22m with an RL of 66.0 at base. The roof has an approximate RL 78.6 at the nearest side to the tree to south with a void area below and between the Building 2 & Building 4.

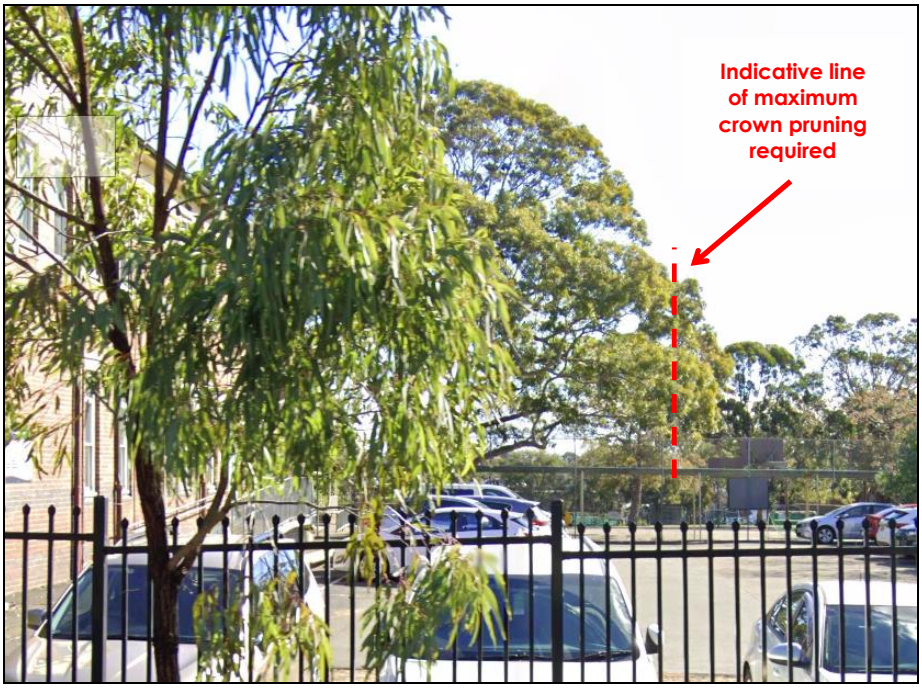


Figure 1 – *View of Tree 20 from East within the School Grounds. Indicative line of crown pruning for installation of proposed 3 Storey Buildings and Scaffold. Final cut locations to comply with AS 4373, Pruning of Amenity trees.*

It is anticipated that minor pruning (pruning of small diameter growth and less than 5% of the crown) will be required to give clearance to scaffolding for construction, the building and roof as indicated above in Figure 1 & Figure 2. This is a low level of crown encroachment and sustainable impact.

This tree is considered to be of high significance, it provides high amenity value to the site and should be retained and protected.

Established trees located in large areas of pavement such as this tree have root systems which have adapted to the site over many years. The area should be disturbed as little as possible in order to retain and protect them.

Therefore, the maximum possible area of pavement should be retained in situ for the maximum possible duration during works. This provides the added

advantage of giving protection from additional soil compaction and root damage from construction activities, provided the pavement can adequately support all personnel and machinery using it. Generally, additional trunk protection should be also given.

The cumulative impact is considered to be sustainable to the tree provided the following measures are implemented within the TPZ as prescribed by the Australian Standard *AS4970-2009 Protection of trees on development sites*. Specifically;

- The existing paved area within the TPZ must be retained as much as possible during all construction works to reduce compaction and root damage within the TPZ.
- Consideration should be given to install the concrete paving above the current asphalt. If not retained, it should be removed carefully and replaced at the end of main works. This area is to be free of all heavy machinery.
- If removed and replaced, detailed construction plans should show proposed levels for the concrete paving to require no excavation, i.e. 150-200m above existing levels within the TPZ.
- Tree protection fencing is to be installed in liaison with the project arborist to protected as much as practicable of the TPZ. These panels should be kept in place until the construction works have been completed.
- Consideration should be given to select a porous pavement where possible (unitary porous pavers, porous asphalt or other) over porous sub-base with no excavation below existing pavement base.
- As the existing paving has been in place for some time, it would appear unnecessary to compact the soil prior to the new surface being installed. The construction plans should be reviewed by a minimum AQF Level 5 Arborist and the impact assessed.
- The location and extent of crown pruning works should be determined by the project arborist following commencement of above ground building works.
- No other elements requiring fill or cut are to be installed within the TPZ.
- A layer of mulch less than 75mm is recommended within the unpaved areas to maximise the gas and water exchange. This is the single most efficient practice to enhance the biological health, structure, texture and nutrient availability of soil to promote root growth and establishment. The mulch should be only applied to the surface of the soil as the Nitrogen used to assist decomposition temporarily depletes Nitrogen available to the tree.
- Final cut of roots should result in a clean cut, using appropriate tools. Severing roots by earthmoving equipment is unacceptable as this results in tearing damage to roots, putting the tree at greater risk of root decay and/or structural instability.

- Tree 89, 90, 97, 99, 101 are located 1.42m, 0.9m, 10.2m, 1.1m, 0.96m & 1m from the proposed driveway respectively , providing 13.2%, 21.8&, 16.2%, 20.2% & 17.4% cut encroachment into the TPZ and encroachment into the SRZ. These trees are considered to be of low significance and should not be considered a constraint on the development.

  They are proposed to be removed.

- Tree 180 is located 1.92m from the proposed driveway, providing a 5.4% cut encroachment into the TPZ and tangential encroachment into the SRZ. This encroachment is considered to be a low level of impact and sustainable by the tree. This is low significance tree is proposed to be retained.

  It is proposed to be retained.

- Tree 180a is located 2.49m from the proposed driveway, providing a 29.2% encroachment into the TPZ. This tree is considered to be of medium significance, it is in good health and vigour and is suitable for retention.

  During the tree inspection, it was found that there is an existing 4m wide concrete strip paving all along the fence and within the TPZ of the tree. The RL levels of the paving are flush with the surrounding soil levels. An existing 100mm concrete slab profile is anticipated. As shown on the survey, the existing paving levels in the area vary from RL 61.04 to RL61.13.

  While this is a major encroachment, this would provide a moderate impact sustainable by the tree if the proposed driveway profile within the TPZ of the tree is entirely installed requiring no excavation or further compaction below the existing concrete paving base. If this was implemented, the cut encroachment would be reduced from 29.2% to 10.8%, being the nearest line of cut at 5.26m to the nearest side of the trunk.

  In accordance with the Australian Standard AS4970-2009 Protection of trees on development sites the following should be provided to retain and protect the tree. Specifically;

  - Detailed construction plans for the driveway with a FFL of 61.23 within the TPZ of the tree should be proposed, if a typical driveway profile of 180-200mm is constructed.
  - The existing paved area within the TPZ must be retained throughout the construction period to reduce compaction and root damage within the TPZ. It should then be removed carefully and replaced.
  - As the existing paving has been in place for some time, it would appear unnecessary to compact the soil prior to the new surface being installed.
  - No other elements closer than 5.2m from the tree requiring excavation should be proposed within the TPZ of the tree.
  - Final cut of roots should result in a clean cut, using appropriate tools. Severing roots by earthmoving equipment is unacceptable as this results in tearing damage to roots, putting the tree at greater risk of root decay and/or structural instability.

  This tree is proposed to be retained.

4.3. Trees within the development footprint

- Trees 11, 88, 95, 96 are located adjacent to or within the proposed driveway and paved areas. These trees are considered to be of low or low to medium significance and should not be considered a constraint on the development.

  They are proposed to be removed.

- Tree 98, 102, 182 are located adjacent to or within the proposed driveway. These trees are considered to be of medium significance are suitable for retention. If a driveway is to be installed to provide vehicular access from and to David Lane to the east, it should be installed as indicated on the plan as any alternative location would impact on a larger number of trees. Extensive redesign of the proposed development would be required to retain these trees. They cannot be retained if the development is approved in its current form.

  They are proposed to be removed and replaced.

4.4. Other Tree Comments

- Trees 13, 14, 15, 16, 17, 18, 19, 24, 25, 26, 27, 28, 29, 30, 31, 33, 34, 35, 38, 40, 41, 42, 43, 44, 45, 46, 47, 48, 48a, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 60, 61, 62, 63, 63a, 64, 67, 70, 72, 74, 75, 78, 79, 83, 87, 121, 122, 123, 124, 126, 129, 131, 132, 133, 137, 138, 139, 140, 142, 144, 145, 147, 148, 151, 152, 160, 162, 163, 164, 165, 166, 167, 169, 170, 171, 173, 174, 175, 177, 185, 186, 187, 188, 189, 190, 191, 192, 194, 195, 196, 197, 198, 199, 202, 214, 219, 220, 221, 222, A1, A2, A3, A4, A5, A6, A7, A8, A9, A12, A13, A14, A15, A16, A17, A18, Group B, C2, C3, C4, C5, C6, C7, C8, C9, C10 &C 11 are located in positions that will allow their retention without impact from the proposed development.

- Trees 115, 116, 117, 118 & 119, 119a are located in positions that will allow their retention without impact from the proposed development. However, a number of demountable buildings are proposed to be removed and associated exiting concrete footpaths are anticipated to be removed. Tree sensitive construction measures must be implemented if works are to proceed within the TPZ as prescribed by the Australian Standard AS4970-2009 Protection of trees on development sites. Specifically;

  - Existing concrete footpaths within the TPZ should be maintained during removal of demountable buildings to reduce compaction on the soil and then removed carefully to avoid root damage.
  - The existing levels within the TPZ of the trees should be kept.
  - Consideration should be given to mulch the TPZ of the trees to a depth of 75mm with an approved organic mulch.

- A number of Trees found on site have not been included in this report as they were proposed to be removed as part of the REF Early Works. Tree details can be found on the **9. Tree Location Plan** (page 38).

- A number of trees shown in the Survey Plan and not assigned numbers were found on site during the inspection and are. They are exempt from protection under the local Tree Preservation regulatory controls. They may be considered for removal irrespective of the proposed development application.

5. Recommendations

In consideration of the data collected recommendations are provided for the removal or retention of trees including specific tree protection measures required to reduce the anticipated impacts from the proposed construction on those trees proposed to be retained. This report specifically recommends:

- The removal of Tree No.'s 11, 88, 89, 90, 95, 96, 97, 98, 99, 101, 102 & 182, if the development is approved as there is an unavoidable major encroachment into the tree protection zone.
- The replacement planting of a number of locally native canopy trees shall be installed in 25L pot size to offset the loss of trees on site. Tree species selection to be done in liaison with the ecologist and Council officers.
- The retention of Tree No.'s 13, 14, 15, 16, 17, 18, 19, 24, 25, 26, 27, 28, 29, 30, 31, 33, 34, 35, 38, 40, 41, 42, 43, 44, 45, 46, 47, 48, 48a, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 60, 61, 62, 63, 63a, 64, 67, 70, 72, 74, 75, 78, 79, 83, 87, 121, 122, 123, 124, 126, 129, 131, 132, 133, 137, 138, 139, 140, 142, 144, 145, 147, 148, 151, 152, 160, 162, 163, 164, 165, 166, 167, 169, 170, 171, 173, 174, 175, 177, 185, 186, 187, 188, 189, 190, 191, 192, 194, 195, 196, 197, 198, 199, 202, 214, 219, 220, 221, 222, A1, A2, A3, A4, A5, A6, A7, A8, A9, A12, A13, A14, A15, A16, A17, A18, Group B, C2, C3, C4, C5, C6, C7, C8, C9, C10 &C 11. The construction will not impact these trees.
- The retention of Trees 115, 116, 117, 118 & 119, 119a. The construction will not impact these trees. However, the following should be implemented to protect the trees from the removal of the demountable buildings and concrete footpaths:
  - Existing concrete footpaths to be retained until main works have been completed if possible. Then removed carefully.
  - Existing demountable to be removed/demolished carefully to avoid damage to the trees.
  - The existing levels within the TPZ of the trees should be kept.
  - Mulch the area within the TPZ after building and concrete removal has been completed.
- The retention of Tree No.'s A10 & A11. The construction will provide a minor encroachment into the tree protection zone.
- The retention of Tree No. 180. The construction will provide a major encroachment and sustainable impact into the tree protection zone.
- The retention of Tree No.'s 20. This trees is of high significance. The following should be implemented to minimise impacts from the proposed SSD Main Works:

  1. Existing pavement should be maintained during the entire construction process. This area is to be free of all heavy machinery.
  2. Concrete paving to be installed above existing asphalt paving. Otherwise, detailed construction plans should show proposed levels for the concrete paving to require no excavation, i.e. FFL150-200m above existing levels within the TPZ. Detailed construction plans should show detailed existing and proposed levels.
  3. Tree protection fencing should be installed before construction works and removed following completion.
  4. Consideration to select a porous pavement within the TPZ of the tree.
  5. Crown pruning to be specified by the project arborist.
  6. Garden bed to be mulched and levels to be maintained as existing.
  7. An AQF Level 5 Project Arborist should be appointed to advise on construction design development, and revision and preparation of detailed earthworks and demolition plans and other site works plans relevant to this development. The arborist shall inspect and certify tree protection measures and supervise works near retained trees.
  8. There is to be no excavation outside that outlined above unless the AQF Level 5 Project Arborist has approved detailed drawings.

9. No stormwater or services drawings have been supplied. Refer to note below regarding trenching within the TPZ.

See discussion for further information.

- The retention of Tree No. 180a. The following should be implemented to minimise impacts from the proposed SSD Main Works:

  1. Detailed construction plans for the driveway with FFL of 61.23 within the TPZ of the tree should be proposed.
  2. Existing pavement should be maintained during the entire construction process. This area is to be free of all heavy machinery.
  3. No other elements closer than 5.2m from the tree requiring excavation should be proposed within the TPZ of the tree.

  See discussion for further information.
- Excavation works for the proposed palisade & lightweight fence to be along should be carried out minimising the impact to the trees.
  - Post to be installed outside of the SRZ of the trees, i.e. 2m offset for trees with a 300mm DRB or larger and 0.5m offset for small trees.
  - Pruning to be limited to 10% of the crown.
- A tree management plan should be prepared to guide construction methodology and barrier installation as necessary to protect the trees during construction works. The plan should be consistent with Sections 4 & 5, *AS4970(2009)*.
- Constructed landscape elements such as retaining walls, paving and other features; and open trenches for services requiring excavation should be located outside the TPZ of all retained trees.
- This arboricultural assessment should be reviewed upon the preparation of stormwater, landscape or revised architectural plans.
- Hand excavation is required for all works located within the TPZ of all retained trees. These works shall be supervised by the project arborist.
- A minimum AQF Level 5 Project Arborist shall be engaged to certify the tree protection works in accordance with the hold points provided at **6.3. Hold Points** (page19).
- For additional tree protection notes see **10. General Tree Protection Notes** (page 40).

6. Tree Management

6.1. Tree Management Objectives

The general tree management objectives include:

- Appointment of a Project Arborist who has a minimum Level 5 AQF Arboriculture qualification and experience in managing trees on construction sites.
- Installation of additional root, trunk and branch protection as required to protect retained trees where minor encroachments within the TPZ are anticipated.
- The installation of a Tree Protection Fence to enclose and protect the TPZ.
- Monitoring, inspection and certification of tree protection as per the below hold points.

6.2. Management Objective Priorities

The prioritisation of the above objectives is integral for the successful management of site trees:

1. Protection of the TPZ of retained trees;
2. Protection of the trunk and branches of retained trees;
3. Reduction of stress related to construction impacts;
4. The ongoing viability of retained trees after practical completion.

6.3. Hold Points, Inspection and Certification

To ensure this plan is implemented hold points (**HP**) have been specified in the schedule of works (below). Once each stage is reached the work will be inspected and certified by the Project Arborist and the next stage may commence.

Alterations to this schedule may be required due to necessity however this shall be through consultation with the Project Arborist only.

6.4. Schedule of Works and Responsibilities

Hold Point	Task	Responsibility	Certification	Timing of Inspection
1	Detailed plans for installation of paving near Tree 20 and driveway paving near tree 180a to be prepared in liaison with the project arborist	Principal Contractor	Project Arborist	Prior to Construction Certificate
2	Mark-up on site the minimum area of asphaltic concrete paving to be retained during SSD Main Works	Principal Contractor	Project Arborist	Prior to demolition and site establishment.
3	Indicate clearly (with spray paint on trunks) trees approved for removal only	Principal Contractor	Project Arborist	Prior to demolition and site establishment.
4	Install TPF and additional root, trunk and/or branch protection	Principal Contractor	Project Arborist	Prior to demolition and site establishment.
5	Supervise all excavation works proposed within the TPZ	Principal Contractor	Project Arborist	As required prior to the works proceeding adjacent to tree
6	Inspection of trees by Project Arborist	Principal Contractor	Project Arborist	Quarterly during construction period
7	Inspection of trees by Project Arborist	Principal Contractor	Project Arborist	Following the removal of tree protection measures from HP 3
8	Final Inspection of trees by	Principal	Project	Prior to issue of

Project Arborist	Contractor	Arborist	occupation certificate.

7. Tree Survey Table

Tree assessed as part of the REF report | No impact | Minor encroachment | Major encroachment - Sustainable | Major encroachment - Unsustainable | Within development footprint

NO#	Genus	Species	Common Name	Height	Spread	Trunk Dia	Trunk Dia 2	Trunk Dia 3	Trunk Dia 4	DBH	DRB	SRZ	TPZ	Age	Health	Crown	Signifi-cance	Am	Eco	Form	Ret/ Rem Preliminary SDD Main Works	Development Setback and Encroachment SSD Main Works	Comments
2	*Jacaranda*	*mimosifolia*	Jacaranda	7	7	300	100			317	360	2155	3804	SM	Av	Av	L	L	L	D	-	Recommended for removal as part of the REF Early works	Crown skewed to north made of straight epicormic shoots
4	*Melia*	*azedarach*	White cedar	8	8	500	400			641	690	2832	7692	M	Av	Av	M	M	L	D	-	Recommended for removal as part of the REF Early works	Codominant at 500mm Lean to west. Pruned for building clearance. Small amount of deadwood in crown
6	*Melia*	*azedarach*	White cedar	7	7	450				450	500	2474	5400	SM	Av	Av	M	M	L	CD	-	Recommended for removal as part of the REF Early works	
10	*Lophostemon*	*confertus*	Brush Box	6	5	310				310	350	2129	3720	SM	F	F	L	L	M	D	-	Recommended for removal as part of the REF Early works	Growing in garden bed 1mx 1m. Sparse crown and dieback
11	*Melaleuca*	*bracteata*	Black Tea Tree	5	5	100	100	180	120	259	350	2129	3108	M	F	F	L	L	M	CD	Rem	Within the proposed footprint	Multi-trunked from base
13	*Lophostemon*	*confertus*	Brush Box	9	9	500				500	540	2555	6000	M	G	G	M	M	M	CD	Ret	No impact	Buttressed. Loped branch to northwest
14	*Stenocarpus*	*sinuatus*	Firewheel Tree	6	4	100	100	100		174	250	1849	2088	SM	F	F	L	L	M	CD	Ret	No impact	Lopped. Multi-trunked at 200mm
15	*Brachychiton*	*acerifolius*	Illawarra Flame Tree	7	6	280				280	340	2104	3360	M	Av	Av	L	L	M	CD	Ret	No impact	Crown slight skew to east. Branches loped with stubs
16	*Calodendron*	*capense*	Cape Chestnut	9	7	510				510	550	2575	6120	M	Av	Av	M	M	L	CD	Ret	No impact	lean to south
17	*Calodendron*	*capense*	Cape Chestnut	9	7	510				510	560	2594	6120	M	Av	Av	M	M	L	CD	Ret	No impact	Multi-trunked at 1.5m
18	*Brachychiton*	*acerifolius*	Illawarra Flame Tree	6	4	250				250	330	2077	3000	SM	F	F	L	L	M	CD	Ret	No impact	Lean to west. Codominant at 1m with inclusions in junction and at 1.7m
19	*Lophostemon*	*confertus*	Brush Box	12	12	580				580	730	2900	6960	M	G	G	M	M	M	CD	Ret	No impact	Buttressed with exposed root to north. Crown to southwest
20	*Corymbia*	*citriodora*	Lemon Scented Gum	22	20	1340				1340	1440	3857	15000	M	G	Av	H	H	M	D	Ret	Located 4.65m from the proposed paving and 12.2m from the proposed Block 2, providing a combined major (30.8%) encroachment (1% cut & 29.8% fill) into the TPZ. It is located 11m from the proposed roof and minor crown encroachment is anticipated	Buttressed to North, West and south with exposed flare roots for 1m. Asphalt around TPZ. Lean to Northeast. 2nd order branch at 7m to South 3 m over roof. Pruning wounds of 2nd and 3rd order branches to North. 7m long 1st order branch lopped to North.
21	*Eucalyptus*	*saligna x botryoides*	Ecucalyptus saligna x botryoides	8	8	520				520	545	2565	6240	M	F	Av	M	M	H	CD	-	Recommended for removal as part of the REF Early works	General dieback with 20% deadwood. Somewhat sparse crown. Exposed roots to North 1m. Bitumen to base.1m from roof awning.

Tree assessed as part of the REF report	No impact	Minor encroachment	Major encroachment - Sustainable	Major encroachment - Unsustainable	Within development footprint

NO#	Genus	Species	Common Name	Height	Spread	Trunk Dia	Trunk Dia 2	Trunk Dia 3	Trunk Dia 4	DBH	DRB	SRZ	TPZ	Age	Health	Crown	Signifi-cance	Am	Eco	Form	Ret/ Rem Preliminary SDD Main Works	Development Setback and Encroachment SSD Main Works	Comments
22	*Eucalyptus*	*acmenoides*	White Mahogany	7	7	330				330	390	2228	3960	SM	G	Av	L	M	M	CD	-	Recommended for removal as part of the REF Early works	Bitumen to East. Exposed roots for 1.5m to West. Occluding wounds with exposed heartwood at 2.5m to East.
23	*Eucalyptus*	*scoparia*	Wallangarra White Gum	8	7	490				490	640	2744	5880	M	Av	Av	M	M	M	CD	-	Recommended for removal as part of the REF Early works	Buttressed to East and Northwest with exposed roots to East for 2.5m. Lean to Northwest. 10-15% deadwood in crown.
24	*Eucalyptus*	*paniculata*	Grey Ironbark	8	6	250	290			383	400	2252	4596	SM	Av	Av	L-M	M	M	CD	Ret	No impact	Lean to North. Codominant at 800mm. North stem with bark crack to West at 1.7m
25	*Allocasuarina*	*torulosa*	Rose She-oak or Forest Oak	7	6	390				390	420	2299	4680	M	Av	F	L	L	M	CD	Ret	No impact	Skewed to West.1m from building with East branch in contact with roof. Bracing internal branches with included bark
26	*Melaleuca*	*quinquenervia*	Broad-leaved Paperbark	8	6	335				335	390	2228	4020	SM	G	Av	L-M	L	M	CD	Ret	No impact	No lower trunk taper. Crown slightly skewed to north. Base wound to west appears burned
27	*Jacaranda*	*mimosifolia*	Jacaranda	5	5	180	150			235	250	1849	2820	SM	Av	Av	L	L	L	CD	Ret	No impact	Line of 3. Multi-trunked at 500mm.
28	*Jacaranda*	*mimosifolia*	Jacaranda	5	5	200				200	250	1849	2400	SM	Av	Av	L	L	L	CD	Ret	No impact	Line of 3. Multi-trunked from 1m.
29	*Jacaranda*	*mimosifolia*	Jacaranda	5	5	200				200	250	1849	2400	SM	Av	Av	L	L	L	CD	Ret	No impact	Line of 3. Multi-trunked from 1m.
30	*Casuarina*	*cunninghamiana*	River Sheoak	12	8	460				460	600	2670	5520	M	Av	Av	M	M	M	CD	Ret	No impact	Buttressed to south. Trunk and crown slight lean to east
31	*Eucalyptus*	*punctata*	Grey Gum	13	10	575				575	760	2949	6900	M	G	Av	H	H	M	CD	Ret	No impact	Crown skewed to northwest. 1st order branch at 1.7m to northwest with wound in lower junction side. 2 stubs from torn branches at 6m to south
33	*Lophostemon*	*confertus*	Brush Box	8	8	275	460			536	550	2575	6432	M	G	G	M	M	M	CD	Ret	No impact	Exposed root to north for 1m. Codominant at 1.5m. Pruning wounds occluding
34	*Allocasuarina*	*torulosa*	Rose She-oak or Forest Oak	6	4	100	80	80		151	280	1939	2000	SM	Av	Av	L	L	M	CD	Ret	No impact	On top of bank. Multi-trunked at 200mm
35	*Corymbia*	*citriodora*	Lemon Scented Gum	17	11	770				770	930	3210	9240	M	G	G	H	H	M	CD	Ret	No impact	Buttressed. Pruned on South side for overhead services clearance. 500mm stub to east at 2.5m. 2nd order branch at 7m to northwest with wound and exposed heartwood and kino exudate
38	*Lophostemon*	*confertus*	Brush Box	8	8	320	410			521	350	2129	6252	M	G	Av	M	M	M	CD	Ret	No impact	Buttressed. Exposed roots to southeast (1m). Multi-trunked at 500mm with 3 codominant stems with wound at junction occluding well. Not on survey
40	*Allocasuarina*	*torulosa*	Rose She-oak or Forest Oak	6	4	130	80	80		173	280	1939	2076	M	Av	Av	L	L	M	CD	Ret	No impact	On top of bank. Lean to North. Not on survey
41	*Banksia*	*integrifolia*	Coast Banksia	6	5	180				180	200	1683	2160	SM	G	Av	L	L	M	CD	Ret	No impact	On top of bank. Lean to South. Not on survey

Tree assessed as part of the REF report	No impact	Minor encroachment	Major encroachment - Sustainable	Major encroachment - Unsustainable	Within development footprint

NO#	Genus	Species	Common Name	Height	Spread	Trunk Dia	Trunk Dia 2	Trunk Dia 3	Trunk Dia 4	DBH	DRB	SRZ	TPZ	Age	Health	Crown	Signifi-cance	Am	Eco	Form	Ret/ Rem Preliminary SDD Main Works	Development Setback and Encroachment SSD Main Works	Comments
42	*Allocasuarina*	*torulosa*	Rose She-oak or Forest Oak	8	4	180				180	240	1817	2160	SM	G	Av	L	L	M	CD	**Ret**	No impact	Slender, forest form. Not on survey
43	*Lophostemon*	*confertus*	Brush Box	7	7	200	540			576	560	2594	6912	M	G	G	M	M	M	CD	**Ret**	No impact	Multi-stemmed from 400mm. Not on survey
44	*Lophostemon*	*confertus*	Brush Box	7	7	280	460			539	500	2474	6468	M	G	G	M	M	M	CD	**Ret**	No impact	Not on survey
45	*Eucalyptus*	*sideroxylon*	Mugga Ironbark	6	4	170				170	180	1611	2040	SM	Av	Av	L	L	M	CD, Su	**Ret**	No impact	Crown slightly skewed to west. Not on survey
46	*Eucalyptus*	*moluccana*	Grey Box	6	4	170				170	220	1752	2040	SM	Av	Av	L	L	H	CD, Su	**Ret**	No impact	Trunk slight lean to South. Not on survey
47	*Eucalyptus*	*sideroxylon*	Mugga Ironbark	15	12	700				700	700	2849	8400	M	Av	F	M	M	M	CD	**Ret**	No impact	On neighbouring block Altered bark at 1.7 to North. Bulge wood at 4m to southeast. Crown slight skew to southeast. Not on survey
48	*Corymbia*	*citriodora*	Lemon Scented Gum	15	6	380				380	420	2299	4560	M	Av	Av	L	L	M	CD, Su	**Ret**	No impact	On neighbouring block. Not on survey
48a	*Corymbia*	*citriodora*	Lemon Scented Gum	8	6	350				350	370	2180	4200	SM	Av	Av	L	L	M	CD, Su	**Ret**	No impact	Not on survey
49	*Eucalyptus*	*saligna*	Sydney Blue Gum	15	15	1300				1300	1300	3695	15000	M	Av	Av	H	H	M	CD	**Ret**	No impact	On neighbouring block. Multi-trunked at 1.5m Crown skewed to north somewhat sparse. Several dead branches in lower crown to northwest 3m long. Not on survey
50	*Corymbia*	*maculata*	Spotted Gum	15	10	600				600	640	2744	7200	M	G	G	H	H	H	D	**Ret**	No impact	On neighbouring block. Crown slight skew to north. Not on survey
51	*Eucalyptus*	*tereticornis*	Forest Red Gum	6	5	220				220	230	1785	2640	SM	Av	Av	L	L	H	CD	**Ret**	No impact	Wound with exposed heartwood (40%) to south with strong wound margins occluding. Not on survey
52	*Eucalyptus*	*paniculata*	Grey Ironbark	6	5	200				200	230	1785	2400	SM	G	G	L	L	M	CD	**Ret**	No impact	Good future tree. Not on survey
53	*Corymbia*	*citriodora*	Lemon Scented Gum	8	10	470				470	520	2515	5640	M	Av	Av	L-M	L	M	CD	**Ret**	No impact	Crown skewed to north. 1st order branch growing horizontally tat 1.7m on neighbouring block. Not on survey
54	*Callistemon*	*viminalis*	Weeping Bottlebrush	7	7	370	355			513	580	2633	6156	M	F	Av	L	L	M	CD	**Ret**	No impact	Codominant at 300mm 40% of crown dead. Torn branch wound to northwest at 1m occluding. Not on survey
55	*Eucalyptus*	*scoparia*	Wallangarra White Gum	6	5	150	100			181	190	1647	2172	SM	Av	Av	L	L	M	CD	**Ret**	No impact	Codominant at 400mm with a lean to north. Not on survey
56	*Tristaniopsis*	*laurina*	Water Gum	5	5	100	100			142	200	1683	2000	SM	Av	Av	L	L	M	CD	**Ret**	No impact	Codominant from base. Not on survey
57	*Eucalyptus*	*punctata*	Grey Gum	6	3	150				150	180	1611	2000	SM	Av	Av	L	L	H	CD, Su	**Ret**	No impact	Growing 300mm from tree 58. Crown suppressed and skewed to south. Not on survey
58	*Eucalyptus*	*botryoides*	Southern Mahogany	15	12	530				530	660	2779	6360	M	Av	G	H	H	M	D	**Ret**	No impact	Buttressed with exposed roots for 1mm to north, east and south. Not on survey

arboreport™
Vegetation Management Consultants

BANKSTOWN NORTH P.S. TREE SURVEY DATA

DATE OF SURVEY: 09/10/18

Tree assessed as part of the REF report	No impact	Minor encroachment	Major encroachment - Sustainable	Major encroachment - Unsustainable	Within development footprint

NO#	Genus	Species	Common Name	Height	Spread	Trunk Dia	Trunk Dia 2	Trunk Dia 3	Trunk Dia 4	DBH	DRB	SRZ	TPZ	Age	Health	Crown	Signifi-cance	Am	Eco	Form	Ret/ Rem Preliminary SDD Main Works	Development Setback and Encroachment SSD Main Works	Comments
60	*Eucalyptus*	*botryoides*	Southern Mahogany	13	12	410				410	500	2474	4920	M	Av	Av	M	M	M	CD	**Ret**	No impact	Trunk lean to east. Not on survey
61	*Lophostemon*	*confertus*	Brush Box	6	6	240				240	280	1939	2880	M	G	G	L	L	M	CD	**Ret**	No impact	Good future tree. Not on survey
62	*Lophostemon*	*confertus*	Brush Box	5	4	180				180	190	1647	2160	SM	Av	Av	L	L	M	CD	**Ret**	No impact	Buttressed to east with exposed root for 200mm. Not on survey
63	*Eucalyptus*	*microcorys*	Tallowwood	17	15	800				800	900	3166	9600	M	Av	Av	H	H	M	CD	**Ret**	No impact	Growing on neighbouring property 200mm from tree 63a. Not on survey
63a	*Eucalyptus*	*microcorys*	Tallowwood	17	15	800				800	900	3166	9600	M	Av	Av	H	H	M	CD	**Ret**	No impact	Growing on neighbouring property 200mm from tree 63. Not on survey
64	*Eucalyptus*	*moluccana*	Grey Box	15	12	640				640	640	2744	7680	M	G	Av	M	M	H	CD	**Ret**	No impact	Codominant at 2m with inclusion at junction with sharp edge ridges to east and west. Altered bark on lower trunk to north. Not on survey
67	*Angophora*	*bakeri*	Narrow Leaf Apple	8	5	170	150			227	370	2180	2724	SM	Av	Av	M	M	M	CD	**Ret**	No impact	Codominant at 1m with inclusion. Not on survey
70	*Eucalyptus*	*crebra*	Narrow-leaved Ironbark	7	7	300				300	380	2204	3600	M	F	F	L	L	H	CD	**Ret**	No impact	Not on survey
72	*Eucalyptus*	*moluccana*	Grey Box	7	3	140				140	170	1572	2000	J	G	G	L	L	H	CD	**Ret**	No impact	Wounds in lower trunk with kino exudate. Not on survey
74	*Eucalyptus*	*punctata*	Grey Gum	9	6	370				370	460	2388	4440	M	Av	F	M	M	M	CD	**Ret**	No impact	Trunk lean to west. Pruning wound to east occluding. Not on survey
75	*Eucalyptus*	*crebra*	Narrow-leaved Ironbark	6	5	170				170	210	1718	2040	SM	Av	Av	L	L	H	CD	**Ret**	No impact	Not on survey
78	*Angophora*	*floribunda*	Rough-barked Apple	7	7	270				270	330	2077	3240	M	G	G	M	M	M	CD	**Ret**	No impact	Bark with possum damage. Not on survey
79	*Eucalyptus*	*punctata*	Grey Gum	8	8	380				380	470	2410	4560	M	Av	Av	M	M	M	CD	**Ret**	No impact	Trunk and crown lean to east. Not on survey
83	*Casuarina*	*cunninghamiana*	She-oak	8	6	200				200	250	1849	2400	SM	Av	Av	L	L	M	CD	**Ret**	No impact	Not on survey
87	*Eucalyptus*	*paniculata*	Grey Ironbark	8	5	200				200	240	1817	2400	SM	Av	Av	L	M	M	CD	**Ret**	No impact	Not on survey
88	*Eucalyptus*	*moluccana*	Grey Box	9	5	200				200	270	1910	2400	SM	Av	Av	L	L-M	H	CD	**Rem**	Within the proposed footprint	Kink on trunk base. Crown skewed to southwest. Not on survey
89	*Eucalyptus*	*moluccana*	Grey Box	7	5	200				200	270	1910	2400	SM	Av	Av	L	L	H	CD	**Rem**	Located 1.42m from the proposed driveway, providing a major (13.2%) cut encroachment into the TPZ and encroachment into the SRZ	Crown to northwest. Not on survey

Tree assessed as part of the REF report | No impact | Minor encroachment | Major encroachment - Sustainable | Major encroachment - Unsustainable | Within development footprint

NO#	Genus	Species	Common Name	Height	Spread	Trunk Dia	Trunk Dia 2	Trunk Dia 3	Trunk Dia 4	DBH	DRB	SRZ	TPZ	Age	Health	Crown	Signifi-cance	Am	Eco	Form	Ret/ Rem Preliminary SDD Main Works	Development Setback and Encroachment SSD Main Works	Comments
90	*Eucalyptus*	*moluccana*	Grey Box	8	4	170				170	190	1647	2040	SM	Av	Av	L	L	H	CD	**Rem**	Located 0.9m from the proposed driveway, providing a major (21.8%) cut encroachment into the TPZ and encroachment into the SRZ	Forest form. Not on survey
95	*Eucalyptus*	*moluccana*	Grey Box	9	6	210				210	280	1939	2520	SM	Av	F	L-M	M	H	CD	**Rem**	Within the proposed footprint	Codominant at 1.7m with included bark in junction. Kino exudate present
96	*Eucalyptus*	*punctata*	Grey Gum	6	2	120				120	150	1500	2000	J	Av	Av	L	I	M	CD	**Rem**	Within the proposed footprint	
97	*Casuarina*	*cunninghamiana*	She-oak	7	3	120				120	150	1500	2000	SM	Av	Av	L	L	M	CD	**Rem**	Located 1.1m from the proposed driveway, providing a major (16.2%) cut encroachment into the TPZ and encroachment into the SRZ	
98	*Eucalyptus*	*punctata*	Grey Gum	10	8	340				340	430	2322	4080	M	G	Av	M	M	M	CD	**Rem**	Within the proposed footprint	Roots exposed to north5m, southwest 4m and east 4m. Pruned for building clearance.
99	*Eucalyptus*	*moluccana*	Grey Box	6	4	170				170	200	1683	2040	SM	G	G	L	L	H	CD	**Rem**	Located 0.96m from the proposed driveway, providing a major (20.7%) cut encroachment into the TPZ and encroachment into the SRZ	
101	*Eucalyptus*	*sideroxylon*	Mugga Ironbark	8	4	150				150	170	1572	2000	SM	G	Av	L	L	M	CD	**Rem**	Located 1m from the proposed driveway , providing a major (17.4%) cut encroachment into the TPZ and encroachment into the SRZ. There is an additional spot encroachment by the palisade fence	Lean to south
102	*Eucalyptus*	*sideroxylon*	Mugga Ironbark	10	8	390				390	470	2410	4680	M	G	Av	M	M	M	CD	**Rem**	Within the proposed footprint	In grass area south of court
104	*Callistemon*	*viminalis*	Weeping Bottlebrush	6	6	200	220	150	220	400	510	2494	4800	M	G	G	L	M	M	CD	-	Recommended for removal as part of the REF Early works	Multi-stemmed at 500mm. Low crown. Surrounded with AstroTurf over soil to base of trunk

Tree assessed as part of the REF report | No impact | Minor encroachment | Major encroachment - Sustainable | Major encroachment - Unsustainable | Within development footprint

NO#	Genus	Species	Common Name	Height	Spread	Trunk Dia	Trunk Dia 2	Trunk Dia 3	Trunk Dia 4	DBH	DRB	SRZ	TPZ	Age	Health	Crown	Signifi-cance	Am	Eco	Form	Ret/ Rem Preliminary SDD Main Works	Development Setback and Encroachment SSD Main Works	Comments
108	*Eleocarpus*	*reticulatus*	Blueberry Ash	7	7	180				180	200	1683	2160	SM	G	G	L	M	M	CD	-	Recommended for removal as part of the REF Early works	
109	*Eucalyptus*	*melliodora*	Yellow Box	9	8	480				480	560	2594	5760	M	Av	Av	M	H	M	CD	-	Recommended for removal as part of the REF Early works	Lean to northwest
110	*Melaleuca*	*bracteata*	Black Tea Tree	7	6	150	150	150		260	400	2252	3120	M	G	Av	L	M	M	CD	-	Recommended for removal as part of the REF Early works	Multi-trunked from base
111	*Melaleuca*	*bracteata*	Black Tea Tree	7	6	150	150	150		260	500	2474	3120	M	G	Av	L	M	M	CD	-	Recommended for removal as part of the REF Early works	Multi-trunked from base
115	*Eucalyptus*	*paniculata*	Grey Ironbark	10	6	240				240	250	1849	2880	SM	Av	Av	L-M	M	M	CD	**Ret**	No impact	Forest form
116	*Jacaranda*	*mimosifolia*	Jacaranda	6	6	200				200	240	1817	2400	SM	F	F	L	L	L	CD	**Ret**	No impact	Skewed to northeast
117	*Eucalyptus*	*tereticornis*	Forest Red Gum	12	7	360				360	490	2453	4320	M	Av	Av	M	M	H	CD	**Ret**	No impact	Slight trunk and crown lean to south over demountable
118	*Eucalyptus*	*tereticornis*	Forest Red Gum	12	4	360				360	490	2453	4320	SM	Av	Av	L-M	M	H	CD	**Ret**	No impact	Forest form
119	*Eucalyptus*	*punctata*	Grey Gum	12	7	440				440	630	2726	5280	M	Av	Av	M	M	M	CD	**Ret**	No impact	Pruned on north side for demountable clearance
119a	*Jacaranda*	*mimosifolia*	Jacaranda	7	5	230				230	250	1849	2760	SM	Av	Av	L	M	L	CD	**Ret**	No impact	Crown skewed to west
121	*Eucalyptus*	*botryoides*	Southern Mahogany	6	6	380				380	400	2252	4560	SM	Av	Av	L-M	M	M	D	**Ret**	No impact	Roots exposed to north5m, southwest 4m and east 4m. Pruned for building clearance.
122	*Eucalyptus*	*paniculata*	Grey Ironbark	9	5	290				290	380	2204	3480	SM	G	G	M	M	M	CD	**Ret**	No impact	Crown over demountable to east
123	*Eucalyptus*	*paniculata*	Grey Ironbark	7	5	210				210	270	1910	2520	SM	Av	Av	L	M	M	CD	**Ret**	No impact	

Tree assessed as part of the REF report | No impact | Minor encroachment | Major encroachment - Sustainable | Major encroachment - Unsustainable | Within development footprint

NO#	Genus	Species	Common Name	Height	Spread	Trunk Dia	Trunk Dia 2	Trunk Dia 3	Trunk Dia 4	DBH	DRB	SRZ	TPZ	Age	Health	Crown	Signifi-cance	Am	Eco	Form	Ret/ Rem Preliminary SDD Main Works	Development Setback and Encroachment SSD Main Works	Comments
124	*Eucalyptus*	*tereticornis*	Forest Red Gum	7	6	250				250	320	2051	3000	M	F	F	L	M	H	CD	Ret	No impact	Sparse crown
126	*Eucalyptus*	*punctata*	Grey Box	9	8	350				350	360	2155	4200	M	Av	Av	M	M	M	CD	Ret	No impact	Codominant at 1m with inclusion at junction
129	*Eucalyptus*	*tereticornis*	Forest Red Gum	8	5	150				150	190	1647	2000	SM	G	G	L	L	H	CD	Ret	No impact	
131	*Eucalyptus*	*tereticornis*	Forest Red Gum	7	4	80	80	100		151	270	1910	2000	SM	Av	Av	L	L	H	CD	Ret	No impact	Multi-trunked at 1m
132	*Eucalyptus*	*tereticornis*	Forest Red Gum	8	6	300				300	320	2051	3600	M	Av	Av	L	M	H	CD	Ret	No impact	Trunk lean to northwest
133	*Eucalyptus*	*sideroxylon*	Mugga Ironbark	8	6	350				350	430	2322	4200	M	Av	Av	M	M	M	CD	Ret	No impact	
137	*Angophora*	*costata*	Smooth-barked Apple	7	5	200				200	260	1879	2400	SM	Av	Av	L	L	M	CD	Ret	No impact	Trunk lean to south with crown skewed to east.
138	*Casuarina*	*cunninghamiana*	River Sheoak	8	3	130				130	190	1647	2000	SM	Av	F	L	L	M	CD, CS	Ret	No impact	Sparse crown
139	*Eucalyptus*	*moluccana*	Grey Box	12	5	300				300	380	2204	3600	M	G	G	M	M	M	D	Ret	No impact	-
140	*Corymbia*	*maculata*	Spotted Gum	12	4	4	250			251	300	1996	3012	SM	G	G	M	M	H	D	Ret	No impact	Good future tree
142	*Eucalyptus*	*moluccana*	Grey Box	13	5.5	290				290	390	2228	3480	M	G	F	M	M	H	CD	Ret	No impact	Codominant sharp-edged ribs at 2m with associated ears north-south
144	*Corymbia*	*maculata*	Spotted Gum	10	3	240				240	310	2024	2880	SM	G	G	L-M	M	H	D	Ret	No impact	Good future tree
145	*Eucalyptus*	*punctata*	Grey Gum	9.5	4	330				330	400	2252	3960	M	G	Av	L-M	M	M	D	Ret	No impact	Crown completely skewed to north
147	*Eucalyptus*	*tereticornis*	Forest Red Gum	7	2	180				180	240	1817	2160	SM	Av	F	L	L	H	CD	Ret	No impact	Very sparse crown completely skewed to north
148	*Eucalyptus*	*moluccana*	Grey Box	13	4	260				260	320	2051	3120	M	G	G	M	M	H	D	Ret	No impact	
151	*Casuarina*	*glauca*	Swamp Oak	8	3	140				140	290	1968	2000	SM	Av	Av	L	L-M	M	CD	Ret	No impact	-
152	*Corymbia*	*maculata*	Spotted Gum	13	4.5	310				310	360	2155	3720	M	G	G	L-M	M	H	D	Ret	No impact	Good future tree
160	*Casuarina*	*cunninghamiana*	River Sheoak	7	2	110				110	130	1500	2000	SM	G	Av	L	L	M	CD, CS	Ret	No impact	Crown skewed to south
162	*Eucalyptus*	*moluccana*	Grey Box	11	3	230				230	270	1910	2760	SM	F	F	L	L	H	D	Ret	No impact	Sparse crown
163	*Eucalyptus*	*moluccana*	Grey Box	12	5	180	200			270	330	2077	3240	M	G	Av	L-M	M	H	CD, M	Ret	No impact	Two parallel stems from 700mm
164	*Acacia*	*binervata*	Two-veined hHckory	6	3	250				250	270	1910	3000	M	G	Av	L	M	M	D	Ret	No impact	Crown skewed to south. Limb to east on hardstand
165	*Acacia*	*binervata*	Two-veined hHckory	7	3	130				130	160	1533	2000	SM	G	F	L	L	M	CD	Ret	No impact	Crown skewed to east
166	*Lophostemon*	*confertus*	Brush Box	6	5	400				400	400	2252	4800	M	G	G	L	M	M	D	Ret	No impact	
167	*Eucalyptus*	*tereticornis*	Forest Red Gum	12	3	180				180	220	1752	2160	SM	G	Av	L-M	M	H	CD	Ret	No impact	Forest form
169	*Eucalyptus*	*moluccana*	Grey Box	12	5	230				230	290	1968	2760	M	G	G	M	M	H	D	Ret	No impact	
170	*Eucalyptus*	*moluccana*	Grey Box	14	7	250				250	330	2077	3000	M	G	G	M	M	H	D	Ret	No impact	Most of crown on top third of tree
171	*Eucalyptus*	*moluccana*	Grey Box	14	4	200				200	210	1718	2400	M	G	F	L	L	H	CD	Ret	No impact	Forest form
173	*Corymbia*	*maculata*	Spotted Gum	12	5	250				250	300	1996	3000	M	G	Av	M	M	H	CD	Ret	No impact	Located in forest

Tree assessed as part of the REF report | No impact | Minor encroachment | Major encroachment - Sustainable | Major encroachment - Unsustainable | Within development footprint

NO#	Genus	Species	Common Name	Height	Spread	Trunk Dia	Trunk Dia 2	Trunk Dia 3	Trunk Dia 4	DBH	DRB	SRZ	TPZ	Age	Health	Crown	Signifi-cance	Am	Eco	Form	Ret/ Rem Preliminary SDD Main Works	Development Setback and Encroachment SSD Main Works	Comments
174	*Eucalyptus*	*moluccana*	Grey Box	12	7	250				250	320	2051	3000	M	G	Av	M	M	H	CD	**Ret**	No impact (less than 1% spot encroachment by the light weight fence)	Located in forest
175	*Eucalyptus*	*moluccana*	Grey Box	10	6	250				250	320	2051	3000	M	Av	Av	M	M	H	CD	**Ret**	No impact	Located in forest. Inclusion at 5m in codominant stems
177	*Eucalyptus*	*tereticornis*	Forest Red Gum	10	4	250				250	320	2051	3000	M	Av	Av	M	M	H	CD	**Ret**	No impact	Located in forest
180	*Lophostemon*	*confertus*	Brush Box	7	7	180	100	80		221	370	2180	2652	SM	G	Av	L	L	M	CD	**Ret**	Located 1.92m from the proposed driveway, providing a major (5.4%) cut encroachment into the TPZ and encroachment into the SRZ. There is an additional spot encroachment by the palisade fence	Located in forest. Multi-trunked from base
180a	*Eucalyptus*	*microcorys*	Tallowwood	19	12	700				700	800	3013	8400	M	G	G	M	M	M	D	**Ret**	Located 2.49m from the proposed driveway , providing a major (29.2%) cut encroachment into the TPZ and encroachment into the SRZ. There is an additional spot encroachment by the light weight fence to North	Tree within a fenced area. Approximate measurements
182	*Eucalyptus*	*punctata*	Grey Gum	13	7	390				390	470	2410	4680	M	Av	Av	M	M	M	CD	**Rem**	Within the proposed footprint	Located in forest
185	*Eucalyptus*	*sideroxylon*	Mugga Ironbark	7	6	200				200	260	1879	2400	SM	Av	Av	L	L	M	CD	**Ret**	No impact	Located in forest
186	*Eucalyptus*	*moluccana*	Grey Box	12	6	280				280	320	2051	3360	SM	Av	Av	M	M	H	CD	**Ret**	No impact	Located in forest. Forest form
187	*Eucalyptus*	*moluccana*	Grey Box	7	5	200				200	230	1785	2400	SM	Av	Av	L	L	H	CD	**Ret**	No impact	Located in forest
188	*Eucalyptus*	*moluccana*	Grey Box	6	4	180				180	200	1683	2160	SM	Av	Av	L	L	H	CD	**Ret**	No impact	Located in forest. Suppressed
189	*Eucalyptus*	*moluccana*	Grey Box	14	14	610				610	790	2997	7320	M	Av	Av	H	H	H	CD	**Ret**	No impact	Located in forest
190	*Eucalyptus*	*moluccana*	Grey Box	15	6	250				250	280	1939	3000	M	Av	Av	M	M	H	CD	**Ret**	No impact	Located in forest. Leaning to east

Tree assessed as part of the REF report | No impact | Minor encroachment | Major encroachment - Sustainable | Major encroachment - Unsustainable | Within development footprint

NO#	Genus	Species	Common Name	Height	Spread	Trunk Dia	Trunk Dia 2	Trunk Dia 3	Trunk Dia 4	DBH	DRB	SRZ	TPZ	Age	Health	Crown	Signifi-cance	Am	Eco	Form	Ret/ Rem Preliminary SDD Main Works	Development Setback and Encroachment SSD Main Works	Comments
191	*Eucalyptus*	*moluccana*	Grey Box	13	7	250				250	320	2051	3000	M	Av	Av	M	H	H	CD	**Ret**	No impact	Located in forest. Wound at base to southwest
192	*Eucalyptus*	*moluccana*	Grey Box	12	6	260				260	340	2104	3120	M	Av	Av	M	H	H	CD	**Ret**	No impact	Located in forest.
194	*Corymbia*	*maculata*	Spotted Gum	13	6	310				310	400	2252	3720	M	G	Av	M	M	H	CD	**Ret**	No impact	Located in forest. Crown to east
195	*Eucalyptus*	*moluccana*	Grey Box	7	5	200				200	220	1752	2400	SM	Av	Av	L	L	H	CD	**Ret**	No impact	Located in forest
196	*Eucalyptus*	*moluccana*	Grey Box	9	5	180				180	200	1683	2160	SM	Av	Av	L	L	H	CD	**Ret**	No impact	Located in forest
197	*Corymbia*	*maculata*	Spotted Gum	7	5	200				200	260	1879	2400	SM	Av	Av	L	M	H	CD	**Ret**	No impact	Located in forest
198	*Eucalyptus*	*moluccana*	Grey Box	15	8	340				340	400	2252	4080	SM	G	G	H	H	H	CD	**Ret**	No impact	Located in forest
199	*Corymbia*	*maculata*	Spotted Gum	9	5	230				230	290	1968	2760	SM	G	G	L	L	H	CD	**Ret**	No impact	Located in forest. Crown biased to east
202	*Phoenix*	*canariensis*	Canary Island Date Palm	8	8	800				800		-	5000	M	G	G	L	M	L	D	**Ret**	No impact	Pruned to 3m
203	*Corymbia*	*maculata*	Spotted Gum	15	10	580				580	690	2832	6960	M	Av	Av	M	M	H	CD	-	Recommended for removal as part of the REF Early works	Crown skewed to west. Partially codominant crown with Tree 204
204	*Eucalyptus*	*melliodora*	Yellow Box	17	12	490				490	570	2613	5880	M	Av	Av	M-H	M-H	M	CD	-	Recommended for removal as part of the REF Early works	Trunk and crown lean to northwest
207	*Acacia*	*binervata*	Two-veined hHckory	6	4	200				200	250	1849	2400	M	G	Av	L	M	M	D	-	Recommended for removal as part of the REF Early works	Leaning to South
208	*Casuarina*	*cunninghamiana*	River Sheoak	7	5	150				150	200	1683	2000	SM	Av	Av	L	L	M	CD	-	Recommended for removal as part of the REF Early works	Two parallel lines of **13 trees** 1m from the fence wall and 12 trees 2m from the fence wall. Tree tags include 212, 217, 208, 209 & 210,
213	*Acacia*	*binervata*	Two-veined hHckory	6	4	200				200	250	1849	2400	M	G	Av	L	M	M	D	-	Recommended for removal as part of the REF Early works	Leaning to South
214	*Acacia*	*binervata*	Two-veined hHckory	6	4	200				200	250	1849	2400	M	G	Av	L	M	M	D	**Ret**	No impact (less than 1%)	Leaning to South

Tree assessed as part of the REF report | No impact | Minor encroachment | Major encroachment - Sustainable | Major encroachment - Unsustainable | Within development footprint

NO#	Genus	Species	Common Name	Height	Spread	Trunk Dia	Trunk Dia 2	Trunk Dia 3	Trunk Dia 4	DBH	DRB	SRZ	TPZ	Age	Health	Crown	Signifi-cance	Am	Eco	Form	Ret/ Rem Preliminary SDD Main Works	Development Setback and Encroachment SSD Main Works	Comments
218	*Acacia*	*binervata*	Two-veined hHckory	8	4	200				200	300	1996	2400	M	Av	Av	L	M	M	CD	-	Recommended for removal as part of the REF Early works	-
219	*Acacia*	*binervata*	Two-veined hHckory	8	4	200				200	300	1996	2400	M	Av	Av	L	M	M	CD	Ret	No impact	-
220	*Acacia*	*binervata*	Two-veined hHckory	8	4	200				200	300	1996	2400	M	Av	Av	L	M	M	CD	Ret	No impact	-
221	*Acacia*	*binervata*	Two-veined hHckory	8	4	200				200	300	1996	2400	M	Av	Av	L	M	M	CD	Ret	No impact	-
222	*Acacia*	*binervata*	Two-veined hHckory	8	4	200				200	300	1996	2400	M	Av	Av	L	M	M	CD	Ret	No impact	-
229	*Callistemon*	*viminalis*	Weeping Bottlebrush	6	6	200	110			229	300	1996	2748	SM	Av	Av	L	M	M	CD	-	Recommended for removal as part of the REF Early works	Codominant at 1m
230	*Callistemon*	*viminalis*	Weeping Bottlebrush	6	5	200	120			234	320	2051	2808	M	Av	Av	L	M	M	CD	-	Recommended for removal as part of the REF Early works	Codominant at 200mm
A1	*Eucalyptus*	*crebra*	Narrow-leaved Ironbark	12	7	340				340	440	2344	4080	M	Av	Av	M	M	H	CD	Ret	No impact	Street tree in line of 18 along footpath
A2	*Eucalyptus*	*crebra*	Narrow-leaved Ironbark	12	7	340				340	440	2344	4080	M	Av	Av	M	M	H	CD	Ret	No impact	Street tree in line of 18 along footpath
A3	*Eucalyptus*	*crebra*	Narrow-leaved Ironbark	12	7	400				400	490	2453	4800	M	Av	Av	M	M	H	CD	Ret	No impact	Street tree in line of 18 along footpath
A4	*Eucalyptus*	*crebra*	Narrow-leaved Ironbark	12	7	350				350	400	2252	4200	M	Av	Av	M	M	H	CD	Ret	No impact	Street tree in line of 18 along footpath
A5	*Eucalyptus*	*crebra*	Narrow-leaved Ironbark	12	7	350				350	400	2252	4200	M	Av	Av	M	M	H	CD	Ret	No impact	Street tree in line of 18 along footpath
A6	*Eucalyptus*	*crebra*	Narrow-leaved Ironbark	12	7	350				350	400	2252	4200	M	Av	Av	M	M	H	CD	Ret	No impact	Street tree in line of 18 along footpath
A7	*Eucalyptus*	*crebra*	Narrow-leaved Ironbark	12	7	350				350	400	2252	4200	M	Av	Av	M	M	H	CD	Ret	No impact	Street tree in line of 18 along footpath
A8	*Eucalyptus*	*crebra*	Narrow-leaved Ironbark	10	8	380				380	450	2366	4560	M	Av	Av	M	M	H	CD	Ret	No impact	Street tree in line of 18 along footpath
A9	*Eucalyptus*	*crebra*	Narrow-leaved Ironbark	10	8	380				380	450	2366	4560	M	Av	Av	M	M	H	CD	Ret	No impact	Street tree in line of 18 along footpath
A10	*Eucalyptus*	*tereticornis*	Forest Red Gum	10	8	380				380	450	2366	4560	M	Av	Av	M	M	H	CD	Ret	Located 3.04m from the proposed pedestrian access concrete paving, providing a minor (1.3%) cut encroachment into the TPZ	Street tree in line of 18 along footpath

Tree assessed as part of the REF report | No impact | Minor encroachment | Major encroachment - Sustainable | Major encroachment - Unsustainable | Within development footprint

NO#	Genus	Species	Common Name	Height	Spread	Trunk Dia	Trunk Dia 2	Trunk Dia 3	Trunk Dia 4	DBH	DRB	SRZ	TPZ	Age	Health	Crown	Signifi-cance	Am	Eco	Form	Ret/ Rem Preliminary SDD Main Works	Development Setback and Encroachment SSD Main Works	Comments
A11	*Eucalyptus*	*crebra*	Narrow-leaved Ironbark	10	8	380				380	450	2366	4560	M	Av	Av	M	M	H	CD	**Ret**	Located 2.68m the proposed pedestrian access concrete paving, providing a minor (4.5%) cut encroachment into the TPZ	Street tree in line of 18 along footpath
A12	*Eucalyptus*	*crebra*	Narrow-leaved Ironbark	10	8	380				380	450	2366	4560	M	Av	Av	M	M	H	CD	**Ret**	No impact	Street tree in line of 18 along footpath
A13	*Eucalyptus*	*crebra*	Narrow-leaved Ironbark	10	8	380				380	450	2366	4560	M	Av	Av	M	M	H	CD	**Ret**	No impact	Street tree in line of 18 along footpath
A14	*Eucalyptus*	*crebra*	Narrow-leaved Ironbark	10	8	380				380	450	2366	4560	M	Av	Av	M	M	H	CD	**Ret**	No impact	Street tree in line of 18 along footpath
A15	*Eucalyptus*	*crebra*	Narrow-leaved Ironbark	10	8	380				380	450	2366	4560	M	Av	Av	M	M	H	CD	**Ret**	No impact	Street tree in line of 18 along footpath
A16	*Eucalyptus*	*crebra*	Narrow-leaved Ironbark	10	8	380				380	450	2366	4560	M	Av	Av	M	M	H	CD	**Ret**	No impact	Street tree in line of 18 along footpath
A17	*Eucalyptus*	*crebra*	Narrow-leaved Ironbark	10	8	380				380	450	2366	4560	M	Av	Av	M	M	H	CD	**Ret**	No impact	Street tree in line of 18 along footpath
A18	*Eucalyptus*	*crebra*	Narrow-leaved Ironbark	10	8	380				380	450	2366	4560	M	Av	Av	M	M	H	CD	**Ret**	No impact	Street tree in line of 18 along footpath
B	*Casuarina*	*cunninghamiana*	River Sheoak	7	5	150				150	200	1683	2000	SM	Av	Av	L	L	M	CD	**Ret**	No impact	Group of **16 trees**
C1	*Casuarina*	*cunninghamiana*	She-oak	11	6	290				290	370	2180	3480	SM	Av	Av	L	M	M	CD	-	Recommended for removal as part of the REF Early works	Group of 18 trees along northeast fence. Planted in line, all with forest form
C2	*Casuarina*	*cunninghamiana*	She-oak	9	6	290				290	370	2180	3480	SM	Av	Av	L	M	M	CD	**Ret**	No impact	Group of 18 trees along northeast fence. Planted in line, all with forest form
C3	*Casuarina*	*cunninghamiana*	She-oak	11	6	290				290	370	2180	3480	SM	Av	Av	L	M	M	CD	**Ret**	No impact	Group of 18 trees along northeast fence. Planted in line, all with forest form
C4	*Casuarina*	*cunninghamiana*	She-oak	11	6	290				290	370	2180	3480	SM	Av	Av	L	M	M	CD	**Ret**	No impact	Group of 18 trees along northeast fence. Planted in line, all with forest form
C5	*Casuarina*	*cunninghamiana*	She-oak	11	6	290				290	370	2180	3480	SM	Av	Av	L	M	M	CD	**Ret**	No impact	Group of 18 trees along northeast fence. Planted in line, all with forest form
C6	*Casuarina*	*cunninghamiana*	She-oak	11	6	290				290	370	2180	3480	SM	Av	Av	L	M	M	CD	**Ret**	No impact	Group of 18 trees along northeast fence. Planted in line, all with forest form
C7	*Casuarina*	*cunninghamiana*	She-oak	11	6	290				290	370	2180	3480	SM	Av	Av	L	M	M	CD	**Ret**	No impact	Group of 18 trees along northeast fence. Planted in line, all with forest form
C8	*Casuarina*	*cunninghamiana*	She-oak	11	6	290				290	370	2180	3480	SM	Av	Av	L	M	M	CD	**Ret**	No impact	Group of 18 trees along northeast fence. Planted in line, all with forest form

Tree assessed as part of the REF report	No impact	Minor encroachment	Major encroachment - Sustainable	Major encroachment - Unsustainable	Within development footprint

NO#	Genus	Species	Common Name	Height	Spread	Trunk Dia	Trunk Dia 2	Trunk Dia 3	Trunk Dia 4	DBH	DRB	SRZ	TPZ	Age	Health	Crown	Signifi-cance	Am	Eco	Form	Ret/ Rem Preliminary SDD Main Works	Development Setback and Encroachment SSD Main Works	Comments
C9	*Casuarina*	*cunninghamiana*	She-oak	11	6	290				290	370	2180	3480	SM	Av	Av	L	M	M	CD	**Ret**	No impact	Group of 18 trees along northeast fence. Planted in line, all with forest form
C10	*Casuarina*	*cunninghamiana*	She-oak	11	6	290				290	370	2180	3480	SM	Av	Av	L	M	M	CD	**Ret**	No impact	Group of 18 trees along northeast fence. Planted in line, all with forest form
C11	*Casuarina*	*cunninghamiana*	She-oak	11	6	290				290	370	2180	3480	SM	Av	Av	L	M	M	CD	**Ret**	No impact	Group of 18 trees along northeast fence. Planted in line, all with forest form

8. Tree Survey Table Notes

8.1. Genus, Species and Common Name

The botanical and common name of each tree is identified and recorded. Occasionally the exact species name is unknown; *sp.* is recorded to indicate this.

8.2. Height, Spread, Trunk Dia, DBH and DRB

- The tree's height and spread is recorded in metres.
- The tree **DBH** is recorded in millimetres. DBH is an abbreviation of Diameter (of the trunk) measured at Breast Height (or 1.2m from the base of the trunk). If more than one trunk is present the DBH is calculated in accordance with AS4970-2009 Protection of Trees on Development Sites.
- If the tree has multiple trunks multiple trunks each trunk DBH (**Trunk Dia**) will be recorded individually.
- The tree **DRB** is recorded in millimetres. DRB is an abbreviation of Diameter (of the trunk) measured above the Root Buttress. It is required to calculate the SRZ in accordance with AS4970-2009 Protection of Trees on Development Sites when there is major encroachment within the TPZ, ie. greater than 10% is encroached upon or if there is an encroachment within the SRZ.

8.3. Age

The age class of each tree is estimated as either:

- **J** – Juvenile, a young sapling, easily replaced from nursery stock.
- **SM** - Semi Mature, a tree that has not grown to mature size.
- **M** - Mature, a tree that has reached mature size and will slowly increase in size over time.
- **OM** - Over Mature, a tree that has been mature for a long period and is beginning to display signs of decline, e.g. large dead branches.
- **S** - Senescent, an over mature tree that is now in decline.

8.4. Health and Vigour

The trees health and vigour is recorded as a measurement of:

- **G** - Good the tree does not appear stressed with no excessive dieback, insect infestation, decay, dead wood or epicormic shoots.
- **Avg** - Average Health the tree appears stressed and have some crown dieback, and/or a few epicormic shoots, and/or some dead wood in the crown and some new growth at branch tips. These trees may benefit from remediation of the growing environment to reduce stress and return it to good health.
- **F** - Fair the tree may have areas of crown dieback, and/or epicormic shoots, and/or areas of decay, and/or reduced new growth at branch tips. These trees have been stressed for a short period of time, remediation of the growing environment may improve the trees health.
- **P** - Poor the tree may have large areas of crown dieback, and/or many epicormic shoots, and/or reduced new growth at branch tips. These trees have been stressed for a long time, remediation of the growing environment would not return the tree to good health.

- **D** – Dead the tree is dead

8.5. Crown Condition

The crown condition of each tree is assessed and recorded as either:

- **G** - Good Condition: the tree appears to have no visible indication of inherent structural defects.
- **Avg** - Average Condition: the tree has minor structural defects which may be corrected with remedial works or pruning, allowing the tree to return to Good Condition.
- **F** - Fair Condition: the tree has visible structural defects such as (but not limited to) dead branches, and/or an unbalanced crown, and/or leaning trunk and/or areas of decay. These trees do not demonstrate the typical form of their species, or have been damaged or have begun to deteriorate. Remedial works or pruning may return the tree to Average Condition.
- **P** - Poor Condition: the tree has significant structural defects such as (but not limited to) very large dead branches, and/or extremely unbalanced crown, and/or subsiding trunk and/or large areas of decay. These trees do not demonstrate the typical form of their species, or have been severely damaged or have deteriorated significantly. Remedial pruning would not return the tree to Fair Condition.

8.6. Significance

Measured as High, Medium or Low. Significance may be expressed in increments of High, Medium or Low. For a High rating the majority (≥4) of the answers will be yes; For a Medium-High rating 3.5 of the answers will be yes; for a Medium rating half (=3) of the answers will be yes; for a Low-Medium rating 2.5 of the answers will be yes; and for the Low rating the minority of answers will be yes (≤2).

8.7. Amenity Value

Amenity value is a subjective measurement based on the tree's contribution to the landscape, it may be based on the tree's visual form, however it also includes non visual attributes such as provision of shade for a seat, screening of poor views or for privacy, or if it has historical significance. The amenity value is recorded as:

- **H** - High, the trees form is an excellent example of its species and it makes a great specimen and/or it has other attributes such screening, or is historical significance. These trees are visually prominent and valuable to the community or public domain.
- **M** - Medium, the tree may have an altered form and/or it has attributes that provides amenity to local residents only.
- **L** – Low, the tree is not a good specimen and it does not provide substantial benefit to local residents or the community.

8.8. Ecological Value

Ecological value is a measurement of the trees contribution to the environment. It is determined by the trees area of origin, its potential to provide habitat to native fauna and its potential to become an environmental pest. The ecological value is recorded as:

- **H** - High, the tree is locally native or remnant and/or it has habitat value for native fauna.
- **M** - Medium the tree is native but not locally native.
- **L** - Low, the tree is not native and/or it may be a listed nuisance or weed species.
- **Ha** – Habitat, is the tree valued by fauna for food (ie. foliage fruit or sap) or shelter (ie. nesting, roosting, dray or hollow).

8.9. Form

The form, structure or shape of each tree is assessed and recorded as either one or a combination of several of the below terms; (**U**) Upright, (**B**) Broad, (**C**) Conical, (**Sh**) Shrub, (**CS**) Crown Shy (also referenced is the adjacent dominant tree canopy ie. **T4**), (**V**) Vase, (**D**) Dome, (**P**) Palm, (**S**) Spreading, (**L**) Leaning or (**BM**) Basal Multi Trunked.

Crown form may also be assessed in accordance with the relationship with the neighbouring tree and recorded as either: **S** - Suppressed, the crown is located beneath another larger crown and is leaning away (Crown Shy); **CD** - Codominant, the crown is adjacent to another crown of similar size, their crown areas may appear joined; **D** - Dominant, the crown is above other lower crowns; **E** - Emergent, the crown emerges from a lower canopy formed by other dominant or codominant crowns.

8.10. Defects

The presence of one or a combination of several defects is recorded (**W**) Wound, (**D**) Decay, (**F**) Fungus, (**B**) Bulge, (**FB**) Fibre Buckling, (**C**) Cracks, (**S**) Split, (**H**) Hollow, (**DB**) Die Back, (**E**) Epicormic shoots, (**DW**) Dead Wood, (**I**) Inclusion, (**CA**) Cavities, (**PF**) Previous Failure, (**R**) Root Damage, (**P**) Pruning wound, (**PD**) Pests and diseases, (**ST**) Storm Damage.

8.11. SRZ (Structural Root Zone)

The SRZ is a radial area extending outwards from the centre of the trunk. This area contains the majority of the structural woody roots. This area is responsible primarily for stability. Root damage or root loss within this zone greatly increases the opportunity for decay fungi to ingress into the heartwood, causing internal decay in addition to destabilising the tree's structural integrity. The SRZ is calculated as follows (This calculation is derived from the Australian Standard 4970 – 2009 Protection of Trees on Development Sites):

$$\textbf{SRZ (Radius)} = (D \times 50)^{0.42} \times 0.64$$

8.12. TPZ (Tree Protection Zone)

The TPZ is a circular area with a radius measured by multiplying the DBH by twelve (12), or a circular area the size of the tree's drip line whichever is greater. This area contains the majority of the essential structural and feeder roots responsible for stability, gaseous exchange and water and nutrient uptake. Excavation, back filling, compaction or other disturbance should not occur in this area.

The TPZ is used to identify the minimum area required for the safe retention of a given tree. This calculation is derived from the Australian Standard 4970 – 2009 Protection of Trees on Development Sites. An incursion to 10% within the TPZ is potentially acceptable if no other option is available. A major encroachment (in excess of 10%) is required to be clearly justified by the project Arborist and compensated for elsewhere.

Justification methodology may vary depending on site or the individual tree's health, vigour and ability to withstand disturbance and may require root investigation.

8.13. Development Setback / Impact

The successful retention of trees on construction sites is dependent on the adequate allocation and management of the space above, below and around trees to be retained.

The trunk and canopy of trees to be retained must be protected to ensure the trunk and branches are not damaged during construction. The removal of bark and / or branches allows the potential ingress of micro organisms which may cause decay. Similarly the removal of bark restricts the tree's ability to distribute water, mineral ions and glucose.

It is essential to prevent the disturbance of the soil beneath the drip line of each tree, because this is the area where oxygen, water and mineral ions are absorbed by tree roots. Oxygen, water and mineral ions are essential for healthy plant growth. If soil becomes compacted, the ability of roots to function correctly is greatly reduced. Similarly the removal or damage of roots will reduce the ability of roots to function correctly. Woody roots provide stability for the tree and they also transport nutrients to the leaves.

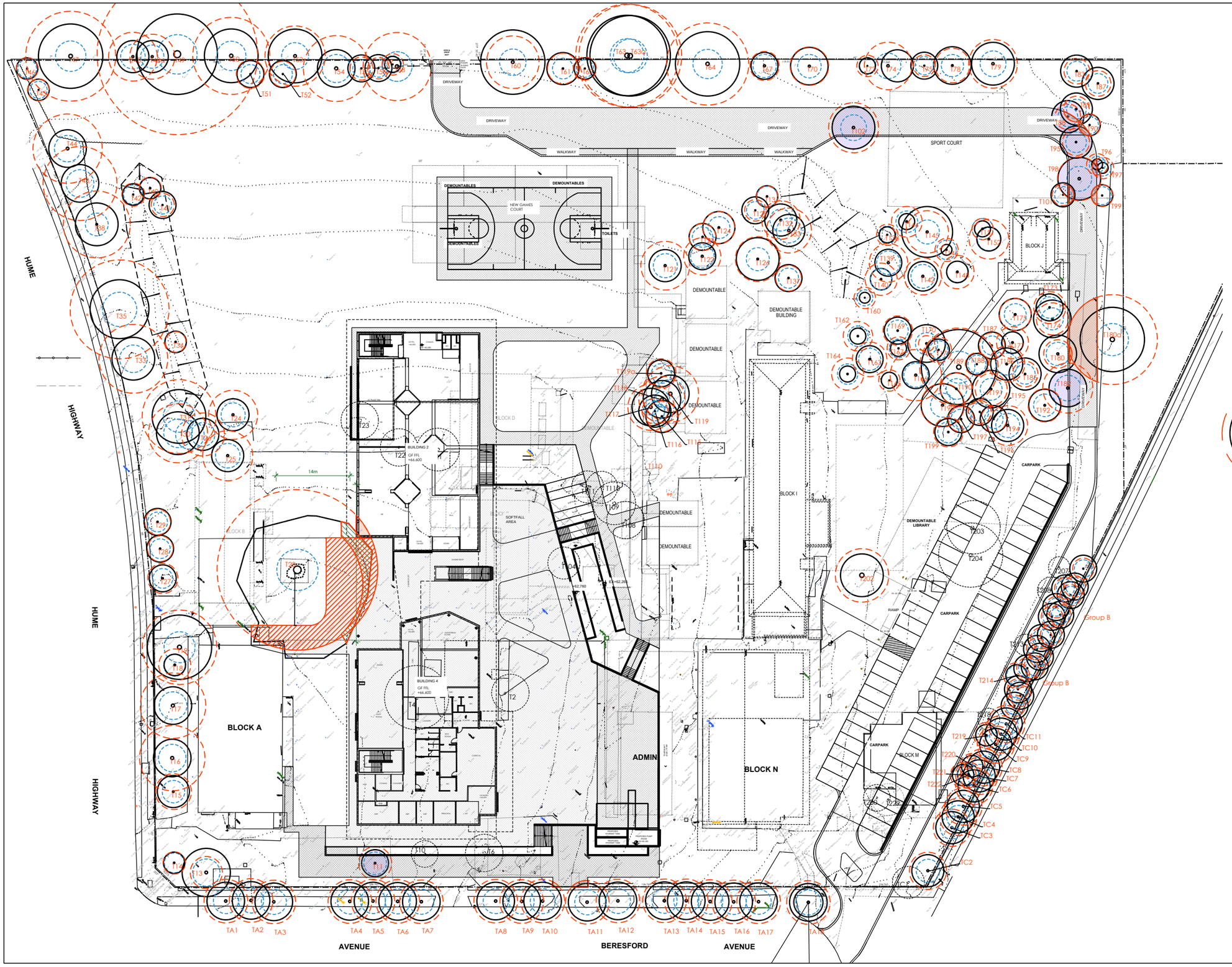
The potential implications of removing or damaging roots are threefold:

1. The risk of whole tree failure is increased, as tree roots anchor and stabilise the tree. Woody roots are developed to assist in the support of the tree in prevailing wind, with these roots removed wind throw may occur, which would result in the mass failure of the tree.
2. The ability of the tree to absorb and transfer the essential nutrients, oxygen and water from the soil to the leaves is greatly affected. This will place the tree under stress and reduce the tree's ability to photosynthesise, and in turn cause the tree to use up stored energy reserves. These energy reserves are used to fight infection and insect attack, for new growth, maintenance of existing tissues and also for healing wounds. Once energy reserves become depleted a tree is much more susceptible to drought, disease and pest attack.
3. Open wounds are sites by which decay-causing pathogens can enter the tree. The severance or damage of woody roots creates sites where pathogens may gain ingress. Whilst the effect of decay may not be immediately apparent, the long term health and structure of the tree will be compromised.

8.14. Comments

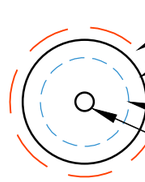
Comments generally relate to the suitability for retention. The comments allow for a brief notation of other factors relevant to the assessment of the tree.

9. Tree Location Plan



LEGEND

- +101.45 — Existing levels
- + RL 101.55 — Proposed levels
- + TOW 101.55 — Proposed Top Of Wall levels
- Boundary
- To be removed / demolished
- Existing Building to be retained
- Proposed Demountable Building
- Retaining walls



- Existing tree proposed to be removed as part of the REF Early Works AIA report
- Assessed tree within development footprint
- Potential cut - encroachment into Tree Protection Zone
- Anticipated fill - encroachment into Tree Protection Zone
- Anticipated crown encroachment

REVISION	DESCRIPTION	DRAWN	CHECK	DATE
A	SUBMITTED TO CLIENT FOR COMMENT - preliminary data issue	DP	AM	17-10-18
B	SUBMITTED TO CLIENT FOR COMMENT - relocation of trees as indicated on recently provided survey	DP	AM	07-11-18
C	SUBMITTED TO CLIENT FOR COMMENT -trees with highest retention value	DP	AM	31-01-19
D	SUBMITTED TO CLIENT FOR COMMENT - Rev dated 11-10-19	DP	AM	16-10-19
F	SUBMITTED TO CLIENT FOR COMMENT - SSD Main works	DP	AM	17-03-2020

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ADDRESS
BANKSTOWN NORTH PUBLIC SCHOOL, BANKSTOWN

CLIENT
JDH ARCHITECTS

PROJECT: SSD MAIN WORKS
DRAWING: TREE LOCATION PLAN
SCALE: N.T.S. @ A3 | ISSUE: DA | SHEET: T - 01
DRAWN: DP | CHECK: AM | DATE: 17-02-2020 | REVISION: F

10. General Tree Protection Notes

10.1. Structural Root Zone (SRZ)

The SRZ is a radial area extending outwards from the centre of the trunk calculated as follows:

$$\textbf{SRZ (Radius)} = (D \times 50)^{0.42} \times 0.64$$

10.2. Tree Protection Zone (TPZ)

The TPZ is a radial area extending outwards from the centre of the trunk equal to the DBH x 12. This area shall be protected by a TPF (*see below*). For all trees to be retained a TPZ is to be created and maintained.

The TPZ function is primarily to protect the root zone by restricting access however the canopy of the tree shall also be protected from damage or injury. The Project Arborist shall approve the extent of the TPZ.

The TPZ shall be mulched to a depth of 75mm with an approved organic mulch. Supplementary watering shall be provided in dry periods to reduce water or construction stress, particularly to those trees which may have incurred root disturbance.

An area equivalent to the encroachment is required to be provided (additional to and contiguous with the remaining TPZ) to offset against the encroachment. This additional area is to be protected during construction.

In the TPZ the following activities shall be excluded:

- Excavation, compaction or disturbance of the existing soil.
- The movement or storage of materials, waste or fill.
- Movement or storage of plant, machinery, equipment or vehicles.
- Any activity likely to damage the trunk, crown or root system.
- Scaffolding.

10.3. Tree Protection Fencing (TPF)

Prior to site establishment, tree protection fencing shall be installed to establish the TPZ for trees to be retained. Tree protection fencing shall be maintained entire for the duration of the construction program.

Tree protection fencing shall be:

- To enclose as much of the TPZ as can reasonably be enclosed, allowing for pedestrian access and 1m offset around construction footprint and scaffolding.
- Cyclone chain link wire fence or similar, with lockable access gates.
- Certified and Inspected by the Project Arborist
- Installed prior to the commencement of the works.
- Prominently signposted with 300mm x 450mm boards stating "**NO ACCESS TO THIS AREA - TREE PROTECTION ZONE CONTACT PROJECT ARBORIST 0407 006 852**".

10.4. Trunk and Root Zone Protection

Other measures may be required in addition to tree protection fencing. These specific protection measures will be installed as directed by the Project Arborist to protect the canopy, trunk or branches from the risk of damage.

The Project Arborist shall be consulted if there is risk of damage to a retained tree. The Project Arborist may require:

- A 75mm layer of approved mulch to be installed to the TPZ.
- A temporary drip irrigation system to be installed to the TPZ.
- Additional root protection to be installed.
- Additional trunk and branch protection to be installed.

10.5. Tree Damage

In the event of damage to a tree or the TPZ of a tree to be retained the Project Arborist shall be engaged to inspect and provide advice on remedial action. This should be implemented as soon as practicable and certified by the Project Arborist.

10.6. Excavation within the TPZ

Excavation within the TPZ shall be avoided. All care shall be undertaken to preserve tree root systems. Excavation within the canopy drip line or TPZ shall subject to the approval and supervision of the Project Arborist. Excavation shall be executed by hand to avoid damage to roots.

If excavation within the TPZ is required other than that anticipated in this report the Project Arborist shall be notified. A root mapping exercise may be required and should be certified by the Project Arborist. Root mapping shall be undertaken by either ground penetrating radar (GPR), air spade, water laser or by hand excavation. The purpose shall be to locate woody structural roots greater than 50mm in diameter.

Where roots 50mm dia. or greater are encountered, alternative construction method shall be considered to ensure roots are not severed. Adequate allowance must also be made for future radial root growth. In paved areas, consideration should be given to raising the proposed pavement level and using a porous fill material in preference to excavation.

If there is no avoiding placing services through the TPZ excavate outside the TPZ and underbore below the root ball of the tree as directed by the Arborist.

10.7. Fill

All fill material to be placed within the TPZ should be approved by Arborist and equal to 5-7mm Round River Pea Gravel to provide aeration and percolation to the root zone. Otherwise no fill should be placed within the TPZ of trees to be retained.

10.8. Pavements

Proposed paved areas within the TPZ should be placed on or above grade to minimise excavation, and avoid root severance and/or damage. Pavements should be permeable or avoided otherwise.

10.9. Pruning

All pruning work required (including root pruning) should be in accordance with Australian Standard No *4373 -2007 - Pruning of Amenity Trees*.

If required, roots should be severed with clean sharp implement flush with the face of the excavation and maintained in a moist condition. Root pruning shall be performed under the supervision of the Project Arborist.

10.10. Tree Removal

Tree removal work shall be carried out by an experienced Level 3 Arborist in accordance with the NSW Work Cover Code of Practice for the Amenity Tree Industry (1998).

Care shall be taken to avoid damage to trees during the felling operation. Stumps shall be grubbed-out using a mechanical stump grinder to a minimum depth of 300mm without damage to other retained root systems.

10.11. Post Construction Maintenance

In the event of any tree deteriorating in health after the construction period, the Project Arborist shall be engaged to provide advice on any remedial action. Remedial action shall be implemented as soon as practicable and certified by the Project Arborist.

Tree protection fencing with additional trunk and root protection shall be removed following completion of construction. The mulch layer in the TPZ shall be retained and replenished where required to maintain a 75mm thickness.

11. References

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