Project No: SYD/ADV/13 Report No: SYD/ADV172/AIA/A

ARBORICULTURAL IMPACT ASSESSMENT
TREE PROTECTION SPECIFICATION

Sydney Adventist Hospital
172 Fox Valley Road
Wahroonga

Prepared for: Seventh-day Adventist Church - South Pacific Division (SPD)

20th February 2012
Rev A

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1.0 INTRODUCTION

1.1 Background

1.1.1 This Arboricultural Impact Assessment Report & Tree Protection Specification was prepared for John Staff Projects Pty Ltd on behalf of the Seventh-day Adventist Church South Pacific Division, in relation to the proposed development of Sydney Adventist Hospital at 172 Fox Valley Road, Wahroonga.

1.1.2 The scope of this report is limited to undertaking a Visual Tree Assessment (VTA) and an assessment of the impact of the proposed works on fifty (50) trees. It is understood that the removal of five (5) trees adjacent to Comenarra Parkway and Fox Valley Road as per RMS recommendations and the Wahroonga Concept Plan has been addressed as part of a separate Development Application.

1.1.3 In preparing this report the author is aware of and has taken into account the objectives of Ku-ring-gai Council's *Tree Preservation Order* and *Guidelines for Arborist Reports*, and the *Australian Standard 4970-2009 Protection of Trees on Development Sites.*

Refer to **Appendix 1:** Methodology

1.1.4 The following documentation/plans were viewed in the preparation of this report:

- Site Plan – prepared by MBMO, dated 19.02.13 – Rev A: DA Issue to Council
- Demolition Plan – prepared by MBMO, dated 19.02.13 – Rev A: DA Issue to Council
- Excavation Plan– prepared by MBMO, dated 19.02.13 – Rev A: DA Issue to Council
- Basement Plan 1 – prepared by MBMO, dated 19.02.13 – Rev A: DA Issue to Council
- Basement Plan 2 – prepared by MBMO, dated 19.02.13 – Rev A: DA Issue to Council
- Ground Floor Plan – prepared by MBMO, dated 19.02.13 – Rev A: DA Issue to Council
- Roof Plan - prepared by MBMO, dated 19.02.13 – Rev A: DA Issue to Council
- Elevations Sheet 1 - prepared by MBMO, dated 19.02.13 – Rev A: DA Issue to Council
- Elevations Sheet 2 - prepared by MBMO, dated 19.02.13 – Rev A: DA Issue to Council

Refer to **Appendix 3:** Supplied Plans

1.2 Aims

1.2.1 The aims of this report are to:

- Review Council's policies for applicable conditions regarding the preparation of Arboricultural Reports
- Conduct a visual assessment of the subject trees and their growing environment
- Review the supplied plan to determine the impact on the subject trees
- Where appropriate, recommend the use of sensitive construction methods to minimise the adverse impacts on the subject trees
- Prepare general tree protection measures for the subject trees to be retained

1.2.2 There is no warranty or guarantee, expressed or implied that problems or deficiencies regarding the subject trees or the subject site may not arise in the future. Information contained in this report covers only the subject tree that was assessed and reflects the condition of the subject tree at the time of inspection.

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2.0 RESULTS

2.1 The Site

2.1.1 The Sydney Adventist Hospital is positioned on the eastern and western sides of Fox Valley Road, Wahroonga.

2.1.2 For the purpose of this report, the subject site is the area to the north-east of the junction of Fox Valley Road and Comenarra Parkway. There are two existing buildings positioned roughly centrally within the subject site. Both buildings are 'U' shaped brick structures with internal grassed areas.

2.1.3 The building to the west is a single-storey brick structure with a double-storey addition in the centre. The building to the east is a single-storey brick structure.

2.1.4 The grounds surrounding these buildings comprise predominantly of lawn areas with vehicular access via a driveway crossover from The Comenarra Parkway.

2.1.5 In general the subject site has an even, gentle slope with an easterly aspect. Ground levels to the east and north-east of the subject site fall sharply beyond the car parking area where the eastern boundary adjoins adjacent bushland. The majority of the subject trees are located within the site boundary at the edge of this bushland area.

2.2 The Trees

2.2.1 Fifty (50) trees have been surveyed as part of this assessment. In general the subject trees have been assessed as being of good to fair health and fair to poor structural condition. Full results of the tree assessment are shown in **Appendix 2**: Tree Assessment Schedule. Tree numbers correlate with the supplied plans attached as **Appendix 3**.

2.2.2 The subject trees consist of a mix of locally indigenous species, Australian native and exotic species. The species *Syncarpia glomulifera* (Turpentine), *Eucalyptus paniculata* (Grey Ironbark) and *Eucalyptus resinifera* (Red Mahogany) were identified at the site and are represented in the Sydney Turpentine Ironbark Forest ecological community.[1] The ecological significance and habitat value of the subject trees has not been assessed and is beyond the scope of this report.

2.2.3 The subject trees are covered under the provisions of the Ku-ring-gai Council's Tree Preservation Order (2007), with the exception of four (4) trees that are listed as exempt species. These are Trees 60 (*Liquidamber styraciflua* - Liquidambar), 61, 62 (*Eribotrya japonica* - Loquat Tree) and 77 (*Robinia pseudoacacia* 'Frisia' - Robinia).[2] Tree 42 is dead. These trees have not been included in Section 3 (Arboricultural Impact Assessment) below.

2.3 The Proposal

2.3.1 The proposal involves the demolition of existing structures on the subject site and construction of three individual buildings connected by a central atrium with two levels of basement parking.

2.3.2 The proposal also includes a driveway with access to The Comenarra Parkway running around the eastern side of the proposed Building 1. A second driveway with access to Fox Valley Road runs through the northern area of the site and ramps down to the basement parking areas below the proposed buildings.

2.3.3 An Asset Protection Zone (APZ) comprising of an inner and outer setback runs around the eastern perimeter of the proposed development.

[1] http://www.environment.nsw.gov.au/determinations/SydneyTurpentineIronbarkForestEndComListing.html (website current June 2012)
[2] http://www.kmc.nsw.gov.au/resources/documents/Tree_Preservation.pdf

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3.0 ARBORICULTURAL IMPACT ASSESSMENT

3.1 Tree to be removed

3.1.1 The supplied plans show that six (6) trees will need to be removed to accommodate the proposed development. These include two (2) trees with a Retention Value of *Priority for Retention,* one (1) tree with a Retention Value of *Consider for Retention* and three (3) trees with a Retention Value of *Consider for Removal* (refer Table 1).

Table 1: Trees to be removed

Priority for Retention	Consider for Retention	Consider for Removal
50 & 66	49	28, 74 & 76

3.1.2 An additional tree is also proposed for removal as part of the development. Whilst not affected by the proposed works, this tree is not considered worthy of retention in the short-term. This tree is discussed in detail below:

3.1.3 **Tree 48** has been identified as *Prunus armeniaca* (Apricot). This tree has been determined to be of low Landscape Significance, with an estimated Useful Life Expectancy (ULE) range of less than 5 years and has been allocated a Retention Value of *Priority for Removal.*

3.1.4 The tree's health has been assessed as poor due to the presence of moderate volumes of large diameter (>75mmø) deadwood and high volumes of small diameter (<25mmø) epicormic growth within its crown. The structural condition of the tree has been assessed as poor due to the presence of a number of wounds that are in various stages of decay.

3.1.5 **Trees 29, 30, 31, 32 and 75** are to be removed as part of RMS road widening works, which is being assessed as part of a separate Development Application.

3.2 Tree to be retained

3.2.1 The supplied plans show that thirty-three (33) trees are to be retained as part of the proposed development. These include sixteen (16) trees with a Retention Value of *Priority for Retention*, nine (9) trees with a Retention Value of *Consider for Retention*, two (2) trees with a Retention Value of *Consider for Removal* and six (6) trees with a Retention Value of *Priority for Removal* (refer Table 2).

Table 2: Trees to be retained

Priority for Retention	Consider for Retention	Consider for Removal	Priority for Removal
39, 40, 43, 47, 52, 53, 55, 56, 57, 59, 63, 64, 65, 68, 70 & 72	33, 35, 37, 45, 46, 51, 54, 58 & 73	41 & 71	34, 36, 38, 44, 67 & 69

3.2.2 Of the trees listed above, works are located with the Tree Protection Zone (TPZ) of nine (9) trees; these are Trees 35, 40, 51, 52, 55, 56, 63, 65 and 69. These trees are discussed in detail below.

3.2.3 The supplied plans show that works are proposed within the TPZ of Trees 40, 51, 52, 55, 56, 65 and 69. As the incursion into the TPZ is 10% or less than the total TPZ area, the extent of works represents a *Minor Encroachment* as defined by *Australian Standard 4970-2009 Protection of Trees on Development Sites* (AS-4970). A *Minor Encroachment* is considered acceptable by AS-4970 when it is compensated for elsewhere and contiguous within the TPZ. The incursion into the TPZ can be compensated for by extending the areas of the TPZs.

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3.2.4 The supplied plans show that demolition of pavement/structures is proposed within the TPZ of Tree 35. To minimise the impact of the works, tree sensitive demolition methods should be used for the removal of existing pavement/structures.

3.2.5 Sections 1.9 and 1.10 of the Tree Protection Specification (**Appendix 5**) provides a detailed specification for undertaking these works.

3.2.5 The supplied plans show that the new driveway is proposed within the TPZ of Tree 63. An anchored shotecrete wall has been designed to minimize over-excavation and battering. This will result in an excavation of up to 18% of its TPZ. No works are to be undertaken within its Structural Root Zone (SRZ).

3.2.6 It is possible that the excavation works may impact the tree's health and ULE. The decline in health of a tree impacted by development works may be a slow process spanning a number of years. However, even in a reduced state of health, the retention of an existing indigenous tree, provides habitat for wildlife and also maintains a degree of canopy cover whilst new trees become established.

3.2.7 Root pruning along the line of the proposed basement should be undertaken prior to the installation of the shotecrete wall to prevent tearing and shattering damage to the roots (which can extend beyond the point of excavation back towards the tree) from excavation equipment. Section 1.12 of the Tree Protection Specification (**Appendix 5**) provides a detailed specification for undertaking these works.

3.3 Replacement Planting

3.3.1 The supplied Landscape Plan shows the replacement planting is to include the installation of approximately twenty-three (23) trees within the subject site.

3.3.2 The new tree plantings should be supplied in accordance with Natspec Guide- Specifying Trees.

4.0 CONCLUSION

4.1 Fifty (50) trees have been surveyed as part of this assessment. In general the subject trees have been assessed as being of good to fair health and fair to poor structural condition.

4.2 The proposal involves the demolition of existing structures on the subject site and construction of three individual buildings, basement parking and driveway access.

4.3 The supplied plans show that six (6) trees will need to be removed to accommodate the proposed development; these are Trees 28, 49, 50, 66, 74 and 76. Of these, Trees 28, 74 and 76 have been determined to be of low Landscape Significance and their removal should have a minimal impact on the amenity of the site.

4.4 Whilst not affected by the proposed works, Tree 48 is also proposed for removal as part of the development. This tree has been allocated a Retention Value of *Priority for Removal* is not considered worthy of retention in the short-term.

4.5 Trees 29, 30, 31, 32 and 75 are to be removed as part of RMS road widening works, which is being assessed as part of a separate Development Application.

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4.6 The supplied plans show that thirty-three (33) trees are to be retained as part of the proposed development. These are Trees 33-41, 43-47, 51-59, 63-65 and 67-73.

4.7 The supplied plans show that works are proposed within the TPZ of Trees 40, 51, 52, 55, 56, 65 and 69. The extent of works represents a *Minor Encroachment* as defined by AS-4970. The incursion into the TPZ can be compensated for by extending the areas of the TPZ.

4.8 The supplied plans show that demolition of pavement/structures is proposed within the TPZ of Tree 35. To minimise the impact of the works, tree sensitive demolition methods as outlined within Sections 1.9 and 1.10 of the Tree Protection Specification (**Appendix 5**) should be used for the removal of existing pavement/structures.

4.9 The supplied plans show that the new driveway is proposed within the TPZ of Tree 63. This will result in an excavation of up to 18% of its TPZ. No works are to be undertaken within its SRZ. It is possible that the excavation works may impact the tree's health and Useful Life Expectancy. However, even in a reduced state of health, the retention of an existing indigenous tree, provides habitat for wildlife and also maintains a degree of canopy cover whilst new trees become established. Root pruning as outlined within Section 1.12 of the Tree Protection Specification (**Appendix 5**) should be undertaken along the line of the proposed basement prior to the installation of the shotecrete wall within the TPZ of Tree 63.

4.10 The supplied Landscape Plan shows the replacement planting is to include the installation of approximately twenty-three (23) trees within the subject site. The new tree plantings should be supplied in accordance with Natspec Guide-Specifying Trees.

4.11 The trees to be retained should be protected as outlined within the Tree Protection Specification attached as **Appendix 5**.

NOTE 1: Reference should be made to any relevant legislation including Tree Preservation Orders. All recommendations contained within this report are subject to approval from the relevant Consent Authority.

NOTE 2: This report provides recommendations relating to tree management only. Advice should be sought from appropriately qualified consultants regarding design/construction issues.

NOTE 3: It should be acknowledged that a comprehensive hazard assessment and management plan for the trees is beyond the scope of this report.

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6.0 APPENDICES

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Appendix 1: Methodology

1.1 **Site Inspection**: This report was determined as a result of a comprehensive site inspection during December 2012. The comments and recommendations in this report are based on findings from this site inspection.

1.2 **Visual Tree Assessment (VTA)**: The subject tree(s) was visually assessed from the ground using the industry standard, VTA criteria and notes. The inspection was limited to a visual examination of the subject tree(s) from ground level only. No internal diagnostic testing was undertaken as part of this assessment. Trees outside the subject site were assessed from the property boundaries only.

1.3 **Tree Dimensions**: The dimensions of the subject tree(s) are approximate only.

1.4 **Tree Locations:** The location of the subject tree(s) was determined from the supplied plans attached as Appendix 3. Trees not shown on the supplied plans have been plotted in their approximate location only.

1.5 **Trees & Development**: Tree Protection Zones, Tree Protection Measures and Sensitive Construction Methods for the subject tree were based on methods outlined in *Australian Standard 4970-2009 Protection of Trees on Development Sites*.

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

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

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

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

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

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

I. Visible evidence of structural defects or instability
II. Evidence of previous pruning or physical damage

Where the tree's base could not be accessed, no structural rating has been allocated.

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

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

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

Landscape Significance	Description
Very High	The subject tree is listed as a Heritage Item under the *Local Environmental Plan* with a local or state level of significance.
	The subject tree is listed on Council's Significance Tree Register.
	The subject tree is a remnant tree.
High	The subject tree creates a 'sense of place' or is considered 'landmark' tree.
	The subject tree is of local, cultural or historical importance or is widely known.
	The subject tree is scheduled as a Threatened or Vulnerable Species or forms part of an Endangered Ecological Community under the provisions of the *Threatened Species Conservation Act* 1995 (NSW) or the *Environmental Protection and Biodiversity Conservation Act* 1999.
	The subject tree is known to provide habitat to a threatened species.
	The subject tree is an excellent representative of the species in terms of aesthetic value.
	The subject tree is of significant size, scale or makes a significant contribution to the canopy cover of the locality.
	The subject tree forms part of the curtilage of a heritage item with a known or documented association with that item.
Moderate	The subject tree makes a positive contribution to the visual character or amenity of the area.
	The subject tree provides a specific function such as screening or minimising the scale of a building.
	The subject tree has a known habitat value.
	The subject tree is a good representative of the species in terms of aesthetic value.
Low	The subject tree is an environmental pest species or is exempt under the provisions of the local Council's Tree Preservation Order.
	The subject tree makes little or no contribution to the amenity of the locality.
	The subject tree is a poor representative of the species in terms of aesthetic value.
Insignificant	The subject tree is declared a Noxious Weed under the Noxious Weeds Act

The above table has been modified from the Earthscape Criteria for Assessment of Landscape Significance

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

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

<table>
<tr><th>ULE</th><th></th><th colspan="4">Landscape Significance</th></tr>
<tr><th></th><th>Very High</th><th>High</th><th>Moderate</th><th>Low</th><th>Insignificant</th></tr>
<tr><td>40 years +</td><td rowspan="3">Priority for Retention</td><td colspan="2">Priority for Retention</td><td rowspan="3">Consider for Removal</td><td rowspan="3">Priority for Removal</td></tr>
<tr><td>15-40 years</td><td>Priority for Retention</td><td>Consider for Retention</td></tr>
<tr><td>5-15 years</td><td colspan="2">Consider for Retention</td></tr>
<tr><td>Less than 5 years</td><td>Consider for Removal</td><td colspan="4">Priority for Removal</td></tr>
</table>

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

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Appendix 2: Tree Assessment Schedule

Tree No.	Species	DBH (mm)	Height (m)	Radial Crown Spread (m)	Health Rating	Structural Rating	Comments	ULE (years)	L/Significance	Retention Value	TPZ (m)	Implication
28	*Jacaranda mimosifolia* (Jacaranda)	250	8	6	Good	Good	Crown density 75-100%.	15-40	Low	Consider for Removal	3	Remove. Building footprint.
29	*Eucalyptus elata* (River Peppermint)	450 450	15	8	Fair	Poor	Small (<25mm), medium (25-75mm) & large (75mm+) diameter deadwood in low volumes. Large basal wound with advanced stages of decay. Wounds with decay on main branches. Crown density 25-50%.	<5	Moderate	Priority for Removal	7.7	Remove. Road widening.
30	*Eucalyptus microcorys* (Tallowwood)	800	20	10	Good	Good	Previous branch failure/s. Medium (25-75mm) deadwood in low volumes. Mechanical damage to exposed surface roots.	15-40	High	Priority for Retention	9.6	Remove. Road widening.
31	*Eucalyptus microcorys* (Tallowwood)	800	20	10	Good	Fair	Seam of depressed tissue at 5m. Mechanical damage to exposed surface roots.	15-40	High	Priority for Retention	9.6	Remove. Road widening.
32	*Eucalyptus botryoides* (Bangalay)	600	20	7	Fair	Good	Crown density 75-100%. Large (>75mm) epicormic growth in low volumes. Wound/s, no visible signs of decay. Wound/s, early stages of decay. Mechanical damage to exposed surface roots.	5-15	Moderate	Consider for Retention	7.2	Remove. Road widening.
33	*Angophora costata* (Sydney Red Gum)	550	13	8	Fair	Poor	Wound/s, no visible signs of decay. Borer. Medium (25-75mm) deadwood in low volumes.	5-15	High	Consider for Retention	6.6	Retain. No works within TPZ.
34	*Eucalyptus saligna* (Sydney Blue Gum)	500	13	5	Poor	Poor	Crown density 25-50%. Medium (25-75mm) deadwood. Large (>75mm) diameter deadwood in high volumes. Wound/s, early stages of decay. Seam of depressed tissue on trunk.	<5	High	Priority for Removal	6	Retain. No works within TPZ.

Tree No.	Species	DBH (mm)	Height (m)	Radial Crown Spread (m)	Health Rating	Structural Rating	Comments	ULE (years)	L/Significance	Retention Value	TPZ (m)	Implication
35	*Eucalyptus scoparia* (Willow Gum)	650	16	7	Fair	Poor	Small (<25mm) diameter deadwood. Medium (25-75mm) deadwood. Large (>75mm) diameter deadwood in moderate volumes.	5-15	Moderate	Consider for Retention	7.8	Retain. Major encroachment. Use tree sensitive demolition methods.
36	*Allocasuarina littoralis* (Black She Oak)	200	6	5	Poor	Fair	Crown density 0-25%. Crown density 25-50%. Partially suppressed. Phototropic lean, moderate. Fine weeping foliage.	<5	Moderate	Priority for Removal	2.4	Retain. No works within TPZ.
37	*Syncarpia glomulifera* (Turpentine)	350	15	4	Good	Poor	Seam of depressed tissue at 4m. Wound/s, no visible signs of decay.	5-15	High	Consider for Retention	4.2	Retain. No works within TPZ.
38	*Allocasuarina littoralis* (Black She Oak)	350	7	5	Fair	Poor	Wound/s, early stages of decay. Phototropic lean, severe. Large (>75mm) epicormic growth in moderate volumes. Heavily suppressed.	<5	Moderate	Priority for Removal	4.2	Retain. No works within TPZ.
39	*Angophora costata* (Sydney Red Gum)	550	17	9	Good	Fair	Large (>75mm) diameter deadwood in low volumes. Wound/s, early stages of decay.	15-40	High	Priority for Retention	6.6	Retain. No works within TPZ.
40	*Eucalyptus paniculata* (Grey Ironbark)	250	14	8	Good	Good	Iron bark. Brown bark. Small leaves. Medium (25-75mm) deadwood in low volumes. Partially suppressed.	15-40	High	Priority for Retention	3	Retain. Minor encroachment, driveway.
41	*Allocasuarina littoralis* (Black She Oak)	200	9	3	Fair	Fair	Heavily suppressed. Crown density 50-75%. Small (<25mm) diameter deadwood in moderate volumes.	5-15	Low	Consider for Removal	2.4	Retain. No works within TPZ.
42							Dead					
43	*Syncarpia glomulifera* (Turpentine)	400	13	7	Good	Fair	Seam of depressed tissue on trunk. Partially suppressed.	15-40	High	Priority for Retention	4.8	Retain. No works within TPZ.
44	*Syncarpia glomulifera* (Turpentine)	200	16	2	Poor	Poor	Possible lightning strike. Crown density 0-25%.	<5	High	Priority for Removal	2.4	Retain. No works within TPZ.
45	*Syncarpia glomulifera* (Turpentine)	150	8	1	Good	Fair	Wound/s, early stages of decay. Partially suppressed.	5-15	High	Consider for Retention	2	Retain. No works within TPZ.
46	*Syncarpia glomulifera* (Turpentine)	150	9	4	Good	Fair	Wound/s, early stages of decay. Heavily suppressed.	5-15	High	Consider for Retention	2	Retain. No works within TPZ.

Tree No.	Species	DBH (mm)	Height (m)	Radial Crown Spread (m)	Health Rating	Structural Rating	Comments	ULE (years)	L/Significance	Retention Value	TPZ (m)	Implication
47	*Syncarpia glomulifera* (Turpentine)	400	16	8	Good	Fair	Branch inclusion/s, minor. Partially suppressed.	15-40	High	Priority for Retention	4.8	Retain. No works within TPZ.
48	*Prunus armeniaca* (Apricot)	150 100	6	6	Fair	Poor	Wound/s, advanced stages of decay. Large (>75mm) diameter deadwood in moderate volumes. Small (<25mm) epicormic growth in high volumes.	<5	Low	Priority for Removal	2.3	Remove. Minor encroachment. Tree not worthy of retention.
49	*Pittosporum undulatum* (Native Daphne)	200 100 100	6	6	Good	Good	Partially suppressed. Phototropic lean, moderate. Land drain outfall erosion at base.	5-15	High	Consider for Retention	3	Remove. Driveway footprint. Within APZ.
50	*Syncarpia glomulifera* (Turpentine)	250 200	15	3	Good	Fair	Mature epicormics from stump.	15-40	High	Priority for Retention	4	Remove. Major encroachment, driveway.
51	*Eucalyptus elata* (River Peppermint)	450 450 200	18	10	Fair	Fair	Crown density 50-75%. Wound/s, early stages of decay. Medium (25-75mm) deadwood in low volumes.	5-15	High	Consider for Retention	8	Retain. Minor encroachment, driveway.
52	*Syncarpia glomulifera* (Turpentine)	600	17	5	Good	Good	Crown density 75-100%. Medium (25-75mm) deadwood in low volumes.	40+	High	Priority for Retention	7.2	Retain. Minor encroachment, driveway.
53	*Syncarpia glomulifera* (Turpentine)	400	16	3	Good	Good	Partially suppressed. Medium (25-75mm) deadwood in low volumes.	40+	High	Priority for Retention	4.8	Retain. No works within TPZ.
54	*Pittosporum undulatum* (Native Daphne)	200	9	6	Good	Good	Heavily suppressed. Medium (25-75mm) deadwood in low volumes.	5-15	High	Consider for Retention	2.4	Retain. No works within TPZ.
55	*Syncarpia glomulifera* (Turpentine)	550	16	7	Good	Good		40+	High	Priority for Retention	6.6	Retain. Minor encroachment, driveway.
56	*Syncarpia glomulifera* (Turpentine)	700	18	8	Good	Fair	Wound/s, early stages of decay. Storm damage. Previous branch failure/s. Medium (25-75mm) deadwood in low volumes.	40+	High	Priority for Retention	8.4	Retain. Minor encroachment, driveway.
57	*Syncarpia glomulifera* (Turpentine)	250	9	6	Good	Good	Partially suppressed.	40+	High	Priority for Retention	3	Retain. No works within TPZ.
58	*Angophora costata* (Sydney Red Gum)	450	12	12	Fair	Fair	Phototropic lean, moderate. Co-dominant inclusion. Partially suppressed. Crown density 50-75%.	5-15	High	Consider for Retention	5.4	Retain. No works within TPZ.

Tree No.	Species	DBH (mm)	Height (m)	Radial Crown Spread (m)	Health Rating	Structural Rating	Comments	ULE (years)	L/Significance	Retention Value	TPZ (m)	Implication
59	*Syncarpia glomulifera* (Turpentine)	150	8	3	Good	Good	Heavily suppressed. Small (<25mm) diameter deadwood in moderate volumes.	15-40	High	Priority for Retention	2	Retain. No works within TPZ.
60	*Liquidamber styraciflua* (Liquidambar)	300	7	4	Good	Good	Partially suppressed.	15-40	Moderate	Consider for Retention	3.6	Not covered by Council TPO
61	*Eribotrya japonica* (Loquat Tree)	200 200 100	7	6	Good	Fair	Trunk cavity, minor. Branch inclusion/s, minor. Small (<25mm) diameter deadwood in low volumes.	5-15	Low	Consider for Removal	3.6	Not covered by Council TPO
62	*Eribotrya japonica* (Loquat Tree)	100 100	7	3	Good	Poor	Wound/s, advanced stages of decay. Heavily suppressed. Co-dominant inclusion.	<5	Low	Priority for Removal	2	Not covered by Council TPO
63	*Syncarpia glomulifera* (Turpentine)	600	14	6	Good	Good	Climber in crown.	40+	High	Priority for Retention	7.2	Retain. Major encroachment, driveway.
64	*Syncarpia glomulifera* (Turpentine)	200 50	7	3	Good	Fair	Mature coppice regrowth. Climber in growth. Partially suppressed.	15-40	High	Priority for Retention	2.5	Retain. No works within TPZ.
65	*Syncarpia glomulifera* (Turpentine)	550	15	8	Good	Fair	Branch inclusion/s, typical of species. Small (<25mm) diameter deadwood. Medium (25-75mm) deadwood in low volumes.	40+	High	Priority for Retention	6.6	Retain. Minor encroachment, driveway.
66	*Eucalyptus pilularis* (Blackbutt)	1100	22	14	Good	Fair	Medium (25-75mm) epicormic growth in moderate volumes. Mechanical damage to exposed surface roots.	15-40	High	Priority for Retention	13.2	Remove. Major encroachment, driveway.
67	*Allocasuarina littoralis* (Black She Oak)	300 250	11	6	Fair	Poor	Fungal bracket/s. Wound/s, early stages of decay. Crown density 25-50%.	<5	Moderate	Priority for Removal	4.8	Retain. No works within TPZ.
68	*Syncarpia glomulifera* (Turpentine)	450 500	16	6	Good	Fair	Wound/s, early stages of decay. Medium (25-75mm) deadwood in low volumes. Two trees. Remove western stem. Partially suppressed.	15-40	High	Priority for Retention	8.2	Retain. No works within TPZ.
69	*Eucalyptus pilularis* (Blackbutt)	900 1200	20	12	Fair	Poor	Wound/s, early stages of decay. Wound/s, advanced stages of decay. Crown consists mainly of epicormic growth. Large (>75mm) diameter deadwood in moderate volumes.	<5	High	Priority for Removal	15	Retain. Minor encroachment, exhaust shaft.

Tree No.	Species	DBH (mm)	Height (m)	Radial Crown Spread (m)	Health Rating	Structural Rating	Comments	ULE (years)	L/Significance	Retention Value	TPZ (m)	Implication
70	*Eucalyptus paniculata* (Grey Ironbark)	500	16	10	Good	Fair	Medium (25-75mm) deadwood in low volumes. Adaptive growth trunk at 5m	15-40	High	Priority for Retention	6	Retain. No works within TPZ.
71	*Callitris* spp. (Cypress Pine)	400	12	3	Good	Fair	Partially suppressed. Wound/s, early stages of decay.	5-15	Low	Consider for Removal	4.8	Retain. No works within TPZ.
72	*Syncarpia glomulifera* (Turpentine)	650	18	5	Good	Fair	Co-dominant inclusion. Medium (25-75mm) deadwood in low volumes.	15-40	High	Priority for Retention	7.8	Retain. No works within TPZ.
73	*Eucalyptus resinifera* (Red Mahogany)	550	17	9	Fair	Fair	Co-dominant inclusion. Major. Large (>75mm) diameter deadwood in moderate volumes. Cult pit under rootplate in srz.	5-15	High	Consider for Retention	6.6	Retain. No works within TPZ.
74	*Melia azedarach* (White cedar)	300	7	4	Good	Fair	Wound/s, early stages of decay. Medium (25-75mm) deadwood in low volumes.	5-15	Low	Consider for Removal	3.6	Remove. Driveway footprint.
75	*Callistemon viminalis* (Weeping Bottlebrush)	150 150 150	5	3	Good	Fair	Branch inclusion/s, major. Lopped for line clearance.	5-15	Low	Consider for Removal	3.1	Remove. Road widening.
76	*Jacaranda mimosifolia* (Jacaranda)	150	5	3	Good	Fair	Co-dominant inclusion.	15-40	Low	Consider for Removal	2	Remove. Landscape treatment.
77	*Robinia pseudoacacia* 'Frisia' (Robinia)	250 200	7	4	Good	Fair	Co-dominant inclusion. Branch inclusion/s, major.	5-15	Moderate	Consider for Retention	4	Not covered by Council TPO

Appendix 3: Supplied Plans

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DEVELOPMENT MANAGER/CLIENT
Sydney Adventist Church

PROJECT
DEVELOPMENT AT
172 Fox Valley Road, Wahroonga

PROJECT NORTH
N

DRAWING NAME:	DRAWING NUMBER	ISSUE
SITE PLAN	**12008 -DA-04**	**A**

SCALE	DRAWN	QA	PLOT DATE
1:500 @A2	VW	SO	19/02/2013

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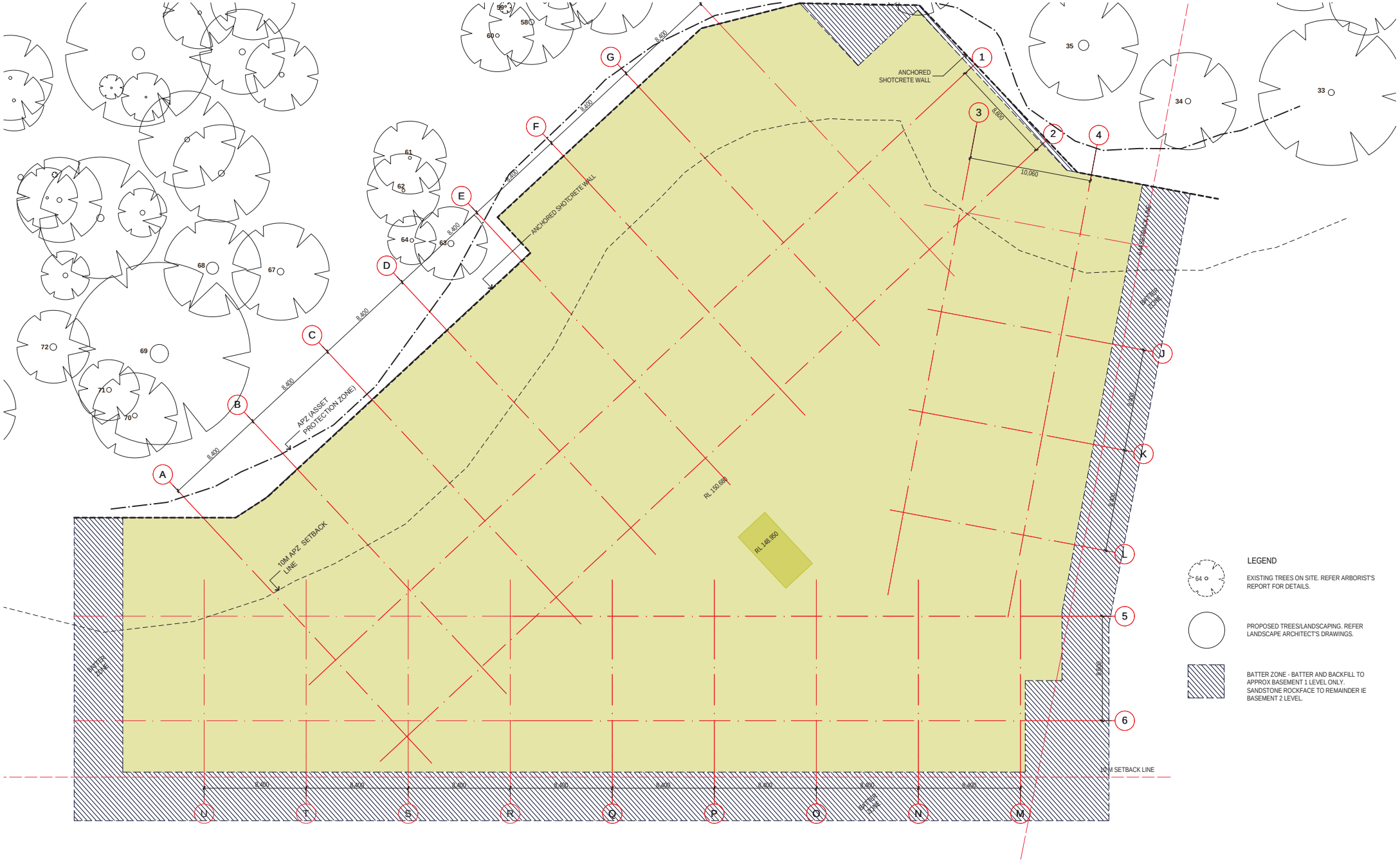

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DEVELOPMENT MANAGER/CLIENT
Sydney Adventist Church

PROJECT
DEVELOPMENT AT
172 Fox Valley Road, Wahroonga

PROJECT NORTH
N

DRAWING NAME:	DRAWING NUMBER	ISSUE
EXCAVATION PLAN	**12008 -DA-06**	**A**

SCALE	DRAWN	QA	PLOT DATE
1:200 @A2	VW	SO	19/02/2013

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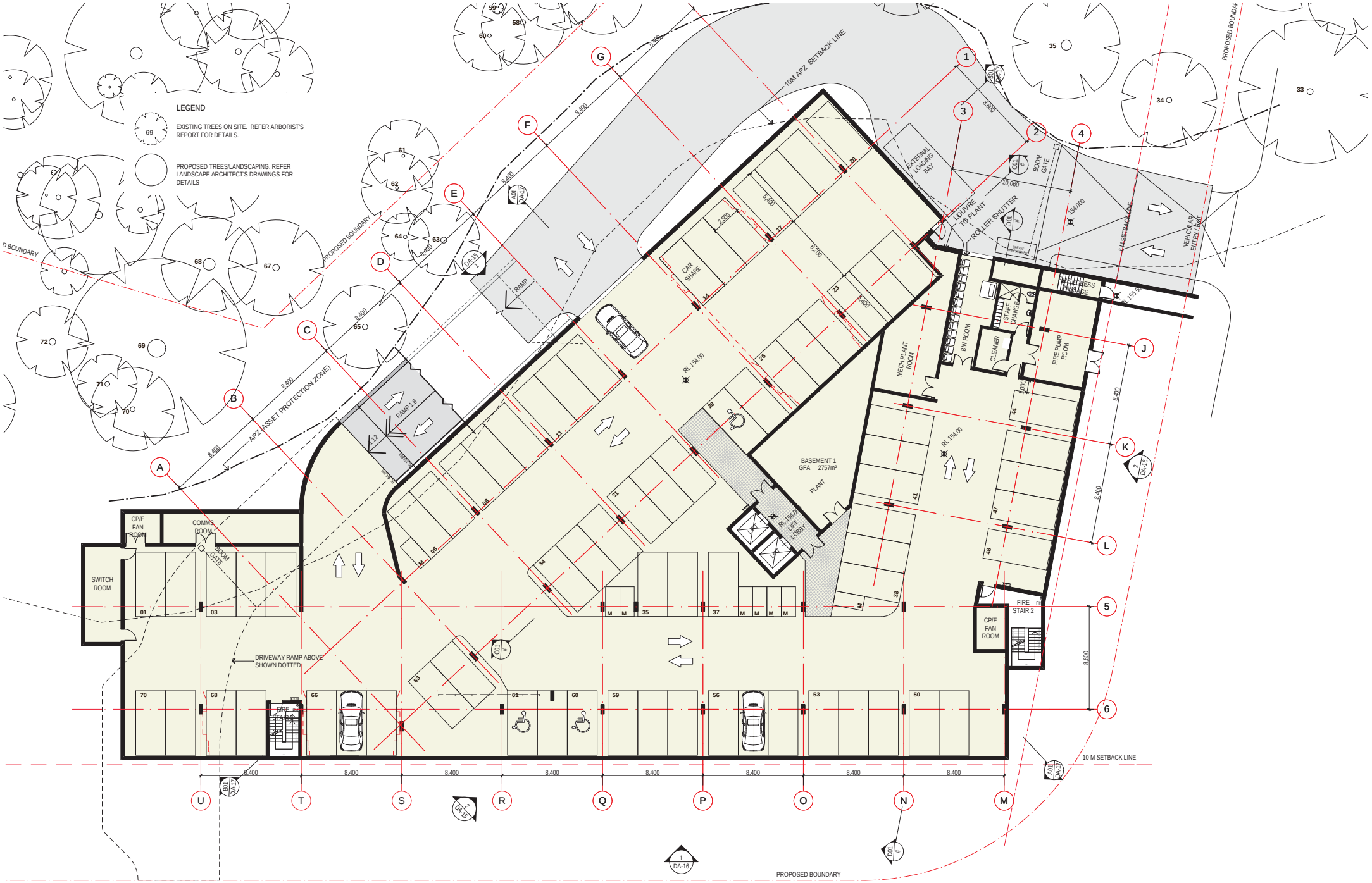

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DEVELOPMENT MANAGER/CLIENT
Sydney Adventist Church

PROJECT
DEVELOPMENT AT
172 Fox Valley Road, Wahroonga

PROJECT NORTH

DRAWING NAME: **BASEMENT 1 PLAN**
DRAWING NUMBER **12008 -DA-08**
ISSUE **A**
SCALE 1:200 @A2
DRAWN VW
QA SO
PLOT DATE 19/02/2013

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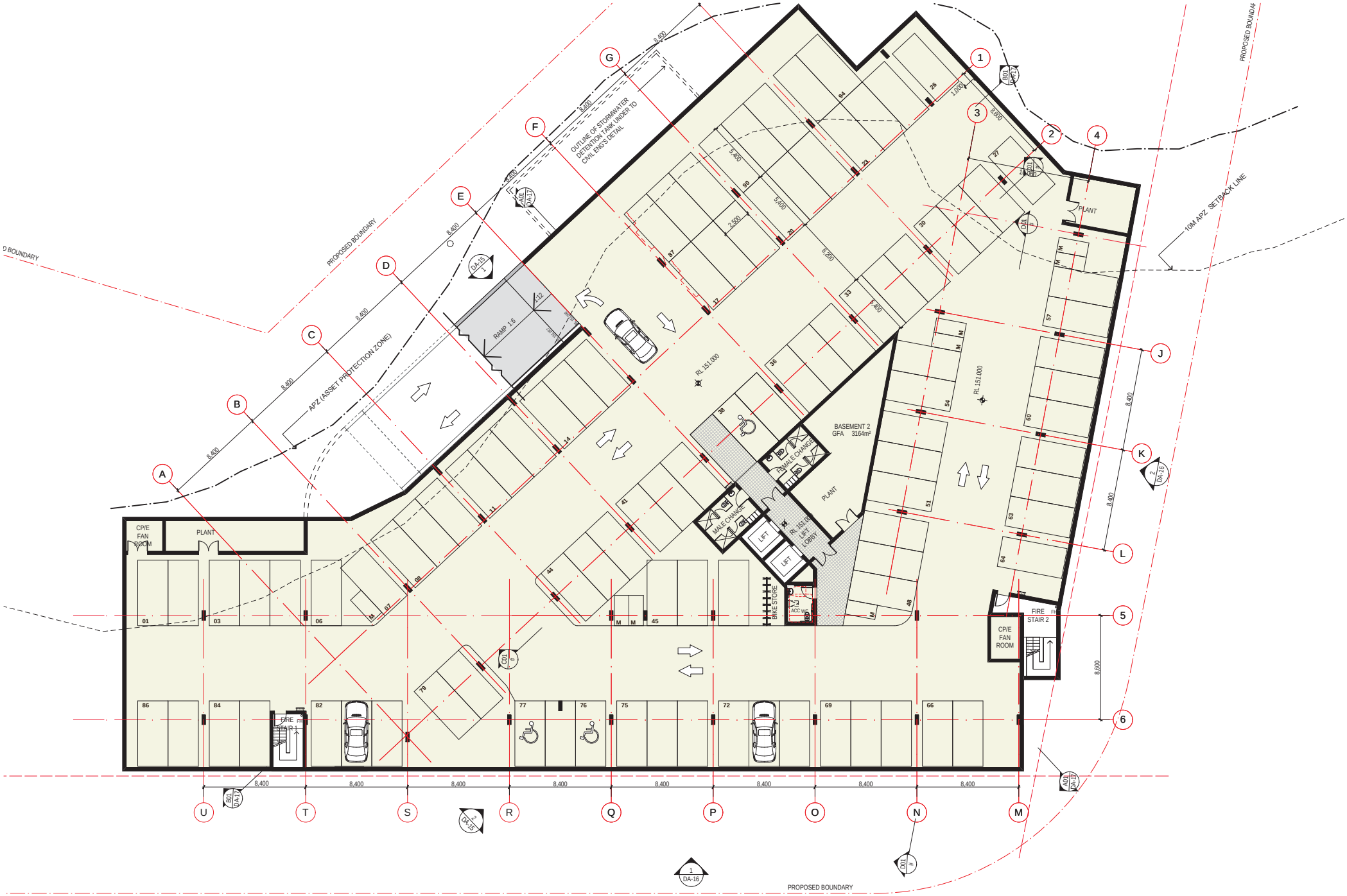

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PROJECT
DEVELOPMENT AT
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PROJECT NORTH
N

DRAWING NAME:
BASEMENT 2 PLAN

DRAWING NUMBER
12008 -DA-07

ISSUE
A

SCALE 1:200 @A2
DRAWN VW
QA SO
PLOT DATE 19/02/2013

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DEVELOPMENT MANAGER/CLIENT
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PROJECT
DEVELOPMENT AT
172 Fox Valley Road, Wahroonga

PROJECT NORTH

DRAWING NAME: **GROUND FLOOR PLAN**

DRAWING NUMBER **12008 -DA-09**

ISSUE **A**

SCALE 1:200 @A2 | DRAWN VW | QA SO | PLOT DATE 19/02/2013

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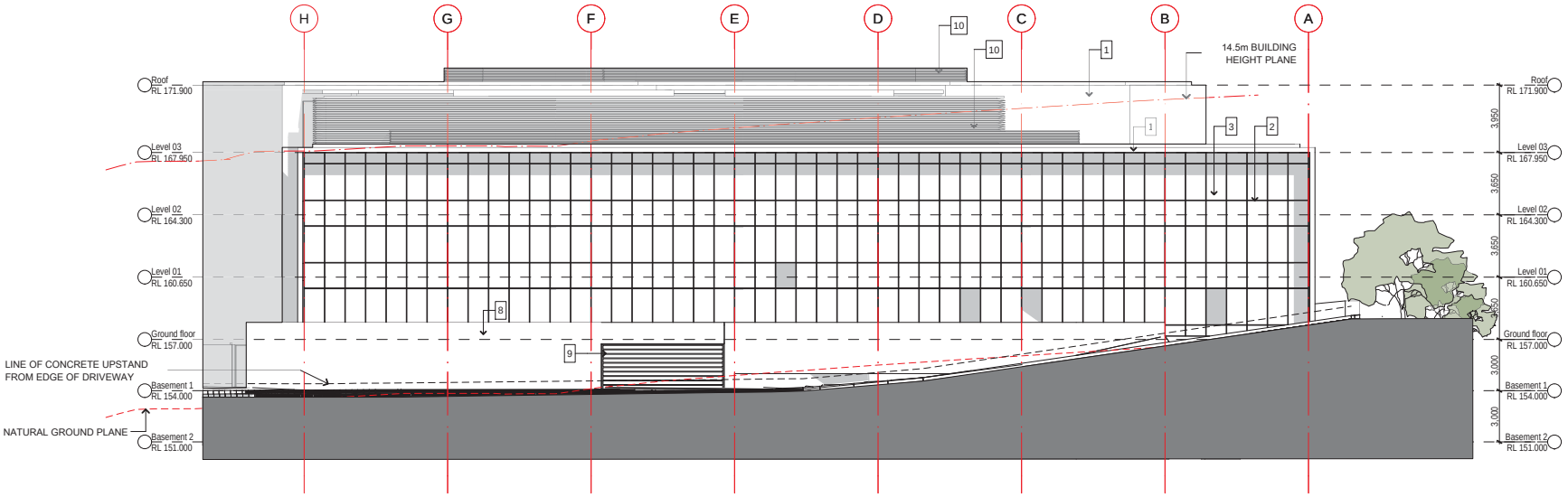


1 NORTH-EAST

12008 DA 01b

SCALE 1:200

FINISHES LEGEND

1 Precast Concrete Panel Acid Etched Finish. Colour: White

2 Anodised Aluminium Frame to Glazed Facade. Colour: Satin Charcoal Grey

3 Facade Glazing. Colour: Grey*

4 Facade Glazing. Colour: Clear*

5 Concrete Roof w/ Ballast Finish (over membrane & insulation). Ballast: Light River Pebble mix

6 Vertical Timber cladd Sun Louvres Aluminium framed

7 External Steel Stair Paint Finish. Colour: Charcoal

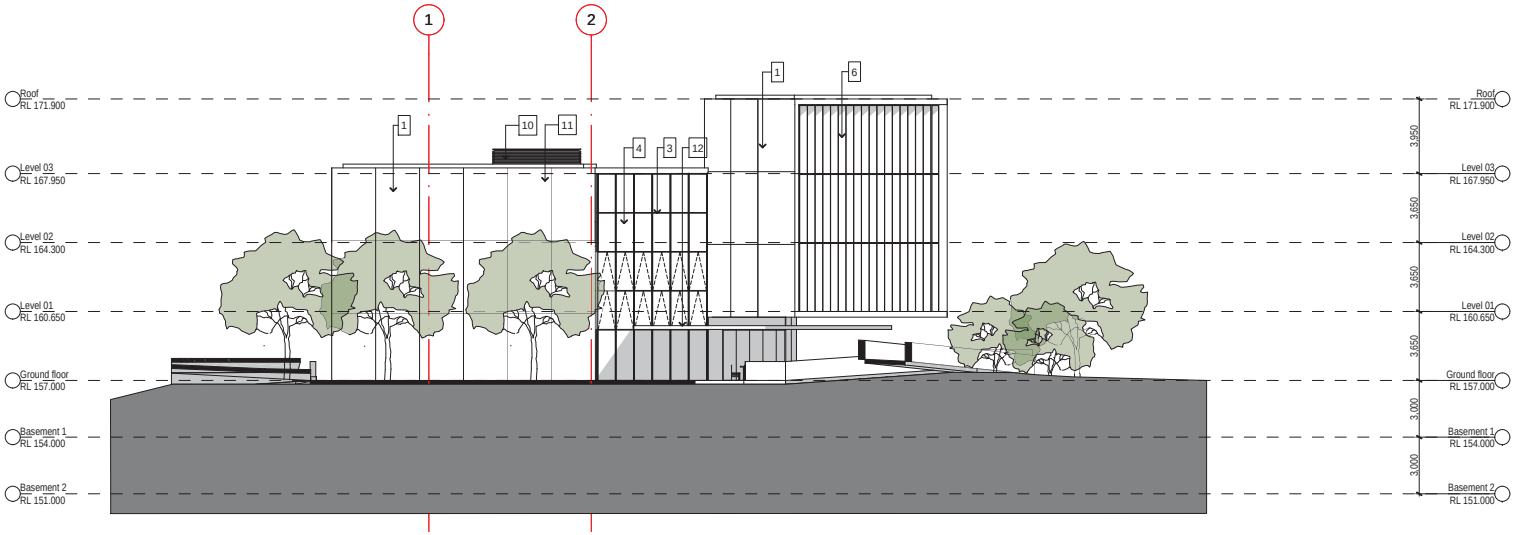
8 Masonry Rendered & Painted Finish. Colour: Charcoal

9 Aluminium Framed Roller Shutter Powdercoat Finish. Colour: Charcoal

10 Roof Plant Screens. Powdercoat Finish. Colour: Dark Grey

11 Building Signage Zone

12 Metal Entry Awning



2 NORTH-WEST

12008 DA 01b

SCALE 1:200

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DEVELOPMENT MANAGER/CLIENT

Sydney Adventist Church

PROJECT

DEVELOPMENT AT

172 Fox Valley Road, Wahroonga

PROJECT NORTH

DRAWING NAME: **ELEVATIONS SHEET 1**

DRAWING NUMBER **12008 -DA-15**

ISSUE **A**

SCALE		DRAWN	QA	PLOT DATE
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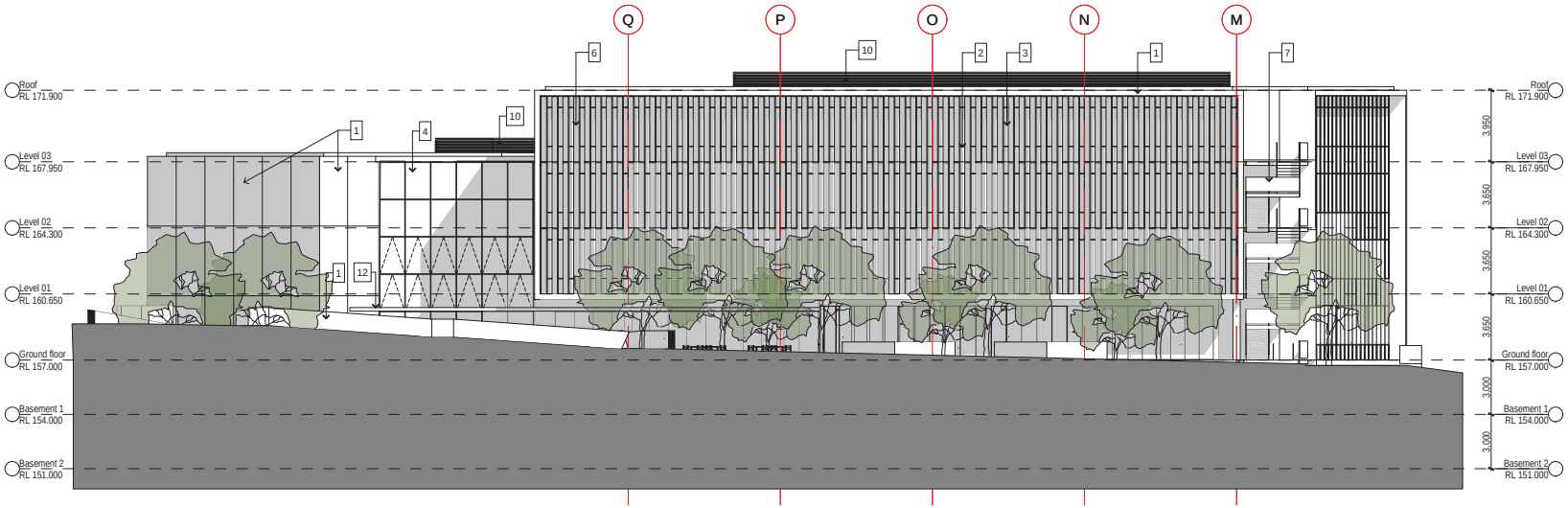


FINISHES LEGEND

1 Precast Concrete Panel Acid Etched Finish. Colour: White

2 Anodised Aluminium Frame to Glazed Facade. Colour: Satin Charcoal Grey

3 Facade Glazing. Colour: Grey*

4 Facade Glazing. Colour: Clear*

5 Concrete Roof w/ Ballast Finish (over membrane & insulation). Ballast: Light River Pebble mix

6 Vertical Timber cladd Sun Louvres Aluminium framed

7 External Steel Stair Paint Finish. Colour: Charcoal

8 Masonry Rendered & Painted Finish. Colour: Charcoal

9 Aluminium Framed Roller Shutter Powdercoat Finish. Colour: Charcoal

10 Roof Plant Screens. Powdercoat Finish. Colour: Dark Grey

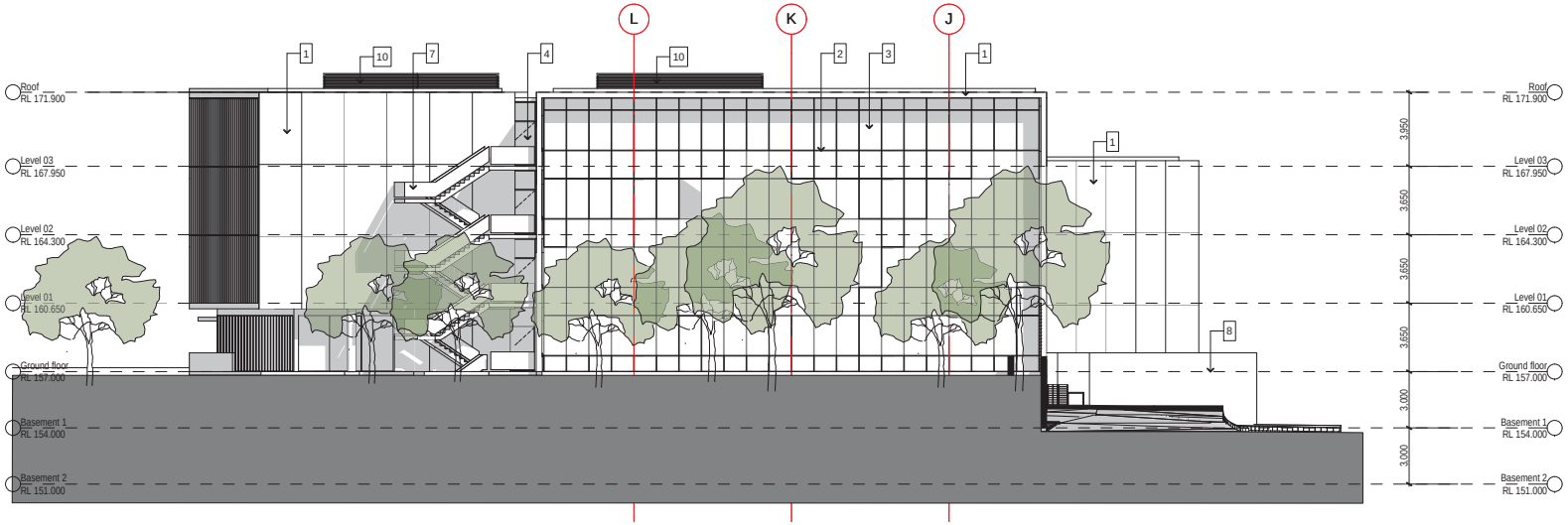
11 Building Signage Zone

12 Metal Entry Awning

1 WEST - FOX VALLEY ROAD

12008 DA 01b

SCALE 1:200



2 SOUTH - COMENARRA PARKWAY

12008 DA 01b

SCALE 1:200

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Sydney Adventist Church

PROJECT

DEVELOPMENT AT

172 Fox Valley Road, Wahroonga

PROJECT NORTH

DRAWING NAME:	DRAWING NUMBER	ISSUE
ELEVATIONS SHEET 2	**12008 -DA-16**	**A**

SCALE		DRAWN	QA	PLOT DATE
1:200	@A2	VW	SO	19/02/2013

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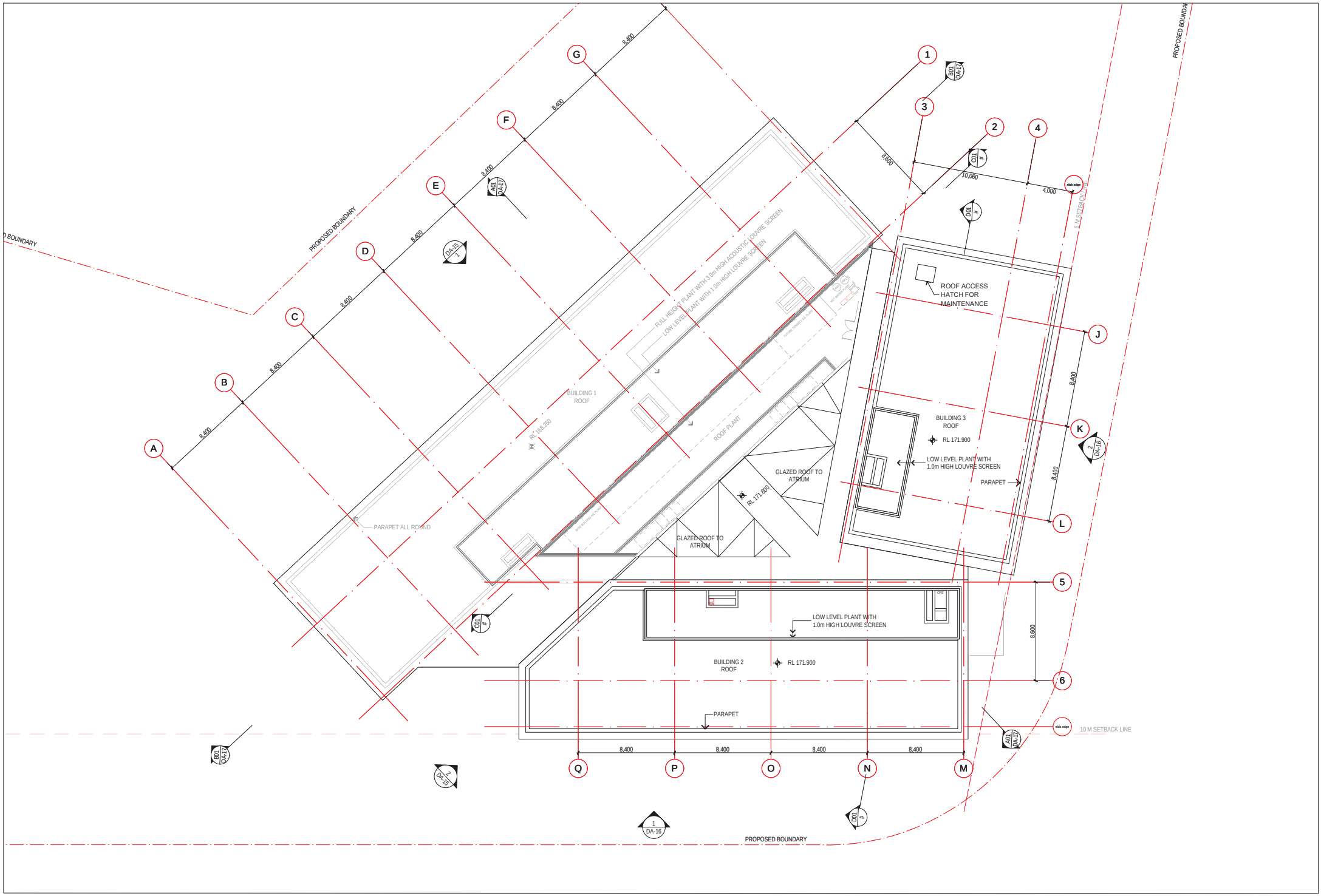

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Sydney Adventist Church

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PROJECT NORTH

DRAWING NAME: **ROOF PLAN**

DRAWING NUMBER **12008 -DA-13**

ISSUE **A**

SCALE	DRAWN	QA	PLOT DATE
1:200 @A2	VW	SO	19/02/2013

12008 DA 01b [BIMServer]

Appendix 4: Plates

Plates (left to right)
Plate 1: Tree 77

Plate 2: Tree 29 (foreground)

Plate 3: Trees 33, 34 & 35 (right to left)

Plate 4: Tree 51 (centre of frame)

Plate 5: Tree 63 showing extensive Bougainvillea growth throughout the crown

Plate 6: Tree 73 (foreground)

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Appendix 5: Tree Protection Specification

1.0 Appointment of Project Arborist

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

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

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

1.1 Compliance

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

1.2 Tree Protection Zone

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

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

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

1.3 Tree Protection Fencing

Tree Protection Fencing shall be installed at the perimeter of the TPZ. Due to the trees' location and proximity to one another, TPZ areas shall be combined to form one large TPZ. Fencing shall be placed immediately adjacent to the eastern edge of the road as indicated on the Site Plan. As a minimum, the Tree Protection Fence shall consist of 1.8m high wire mesh panels supported by concrete feet. Fence panels shall be fastened together and supported to prevent sideways movement. The fence must have a lockable opening for access. The tree shall not be damaged during the installation of the Tree Protection Fencing. at the Refer to **Appendix 6**: Typical Tree Protection Details (3).

1.4 Signage

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

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1.5 Trunk & Branch Protection

Where deemed necessary by the Project Arborist, trunk protection shall be installed by wrapping padding around the trunk to a minimum height of 2m or as the lower branches permit. 2m lengths of timber battons (75 x 50 x 200mm) spaced at 100mm centres shall be strapped together and placed over the padding. Branch protection shall be installed to those branches 1m or closer to scaffolding. Branch protection shall be installed by wrapping padding around the branch. Refer to **Appendix 6**: Typical Tree Protection Details (4).

1.6 Site Management

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

1.7 Ground Protection & Temporary Access

Where required, Ground Protection & Temporary Access within the TPZ shall be shall be confirmed through consultation between the Head Contractor/Project Manager and the Project Arborist.

Where light traffic access <3.5tons is required the ground surface shall be protected by a 100mm deep mulch cover overlaid with rumble boards/road plates. The mulch shall be Horticultural Grade Pine Bark as certified to *AS4454: Composts, Soil Conditioners and Mulches* (1997). The mulch shall be spread by hand to avoid soil disturbance and compaction.

Where heavy traffic access >3.5 tons is required the ground surface shall be protected by a layer of geo-textile fabric over a 100mm layer of compacted road base. The geo-textile shall extend a minimum of 300mm beyond the edge of the mulch and road base. When removing temporary access road the material shall be removed with care to prevent disturbance of natural ground levels below. Refer to **Appendix 6**: Typical Tree Protection Details (4).

1.8 Works within the Tree Protection Zones

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

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

1.9 Structure Demolition

Demolition of existing structures within the TPZ shall be supervised by the Project Arborist. Machinery is to be excluded from the TPZ unless operating from the existing slabs or pavements. Machinery should not contact the tree's roots, trunk, branches and crown.

When removing slab sections within TPZ, machinery shall work backwards out of the TPZ to ensure machinery remains on un-demolished sections of slab at all times. Wherever possible, footings or elements below grade shall be retained to minimise disturbance to the tree's roots.

Where deemed necessary by the Project Arborist, the structures shall be shattered prior to removal with a hand-operated pneumatic/electric breaker.

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

1.10 Pavement Demolition

Demolition of the existing pavements within the TPZ shall be supervised by the Project Arborist. The existing pavement shall be carefully lifted by hand to minimise damage to the existing sub-base and to prevent damage to tree roots. Wherever possible, the existing sub-base material shall remain in-situ.

Machinery is to be excluded from the TPZ unless operating from existing slabs or pavements. Machinery should not contact the tree's roots, trunk, branches and crown.

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The exposed roots shall be protected from direct sunlight, drying out and extremes of temperature by covering with a 10mm thick jute mat. The mat shall be kept in a damp condition at all times.

If structural roots (>25mmø) are encountered during the lifting of the existing pavement surfaces, these roots must be retained in an undamaged condition and advice sought from the Project Arborist.

Where the Project Arborist determines that the subject tree is using underground elements (i.e footings, pipes, rocks, kerbs etc.) or support, these elements shall be left in-situ.

1.11 Underground Services

Installation of underground services within the TPZ shall be supervised by the Project Arborist. Wherever possible, underground services shall not be located within the TPZ.

Where underground services run through the TPZ of trees to be retained, hand trenching/hydro vacuum excavation methods shall be used to minimise damage to tree roots. When undertaking hydro-vacuum excavation, the tip of the high pressure lance is not to be pointed directly at roots at close range to avoid the removal or damage to bark. It is essential that the bark of roots remain intact.

If structural roots (>25mmø) are encountered during the excavation works, these roots should be retained in an undamaged condition and advice sought from the Project Arborist. In section of trench where structural roots (>25mmø) are present and are to be retained, the services shall be either be re-routed or where falls permit, feed below these roots.

If there is any delay between excavation works and backfilling, exposed roots shall be protected from direct sunlight, drying out and extremes of temperature by covering with a 10mm thick jute mat. The mat shall be kept in a damp condition at all times.

Root pruning and excavations shall be undertaken as outlined within Section 1.15.

1.12 Excavations & Root Pruning

Excavations and root pruning within the TPZ shall be supervised by the Project Arborist. Excavations within the TPZ shall be avoided wherever possible.

Pruned roots shall be cleanly severed with sharp pruning implements to ensure a smooth wound face, free from tears. Severance of structural roots (>25mmø) within the Structural Root Zone is not recommended as it may lead to tree destabilisation. **All root pruning requires approval from the Project Arborist.**

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Appendix 6: Typical Tree Protection Details

Adapted from *AS 4970-2009 Protection of Trees on Development Sites*
(Source: Institute of Australian Consulting Arboriculturists)

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

Option 1 - Fencing
1.8m high chain wire mesh panels with shade cloth attached (if required), held in place with concrete feet.

Tree Protection Zone (TPZ) sign

Option 2 - Fencing
Plywood or wooden panel paling fence. This type of fencing material also prevents building materials or soil entering the TPZ.

Installation of supports should avoid damaging roots.

Bracing is permissible within the TPZ.

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

03

Tree Protection Fencing

Not to Scale

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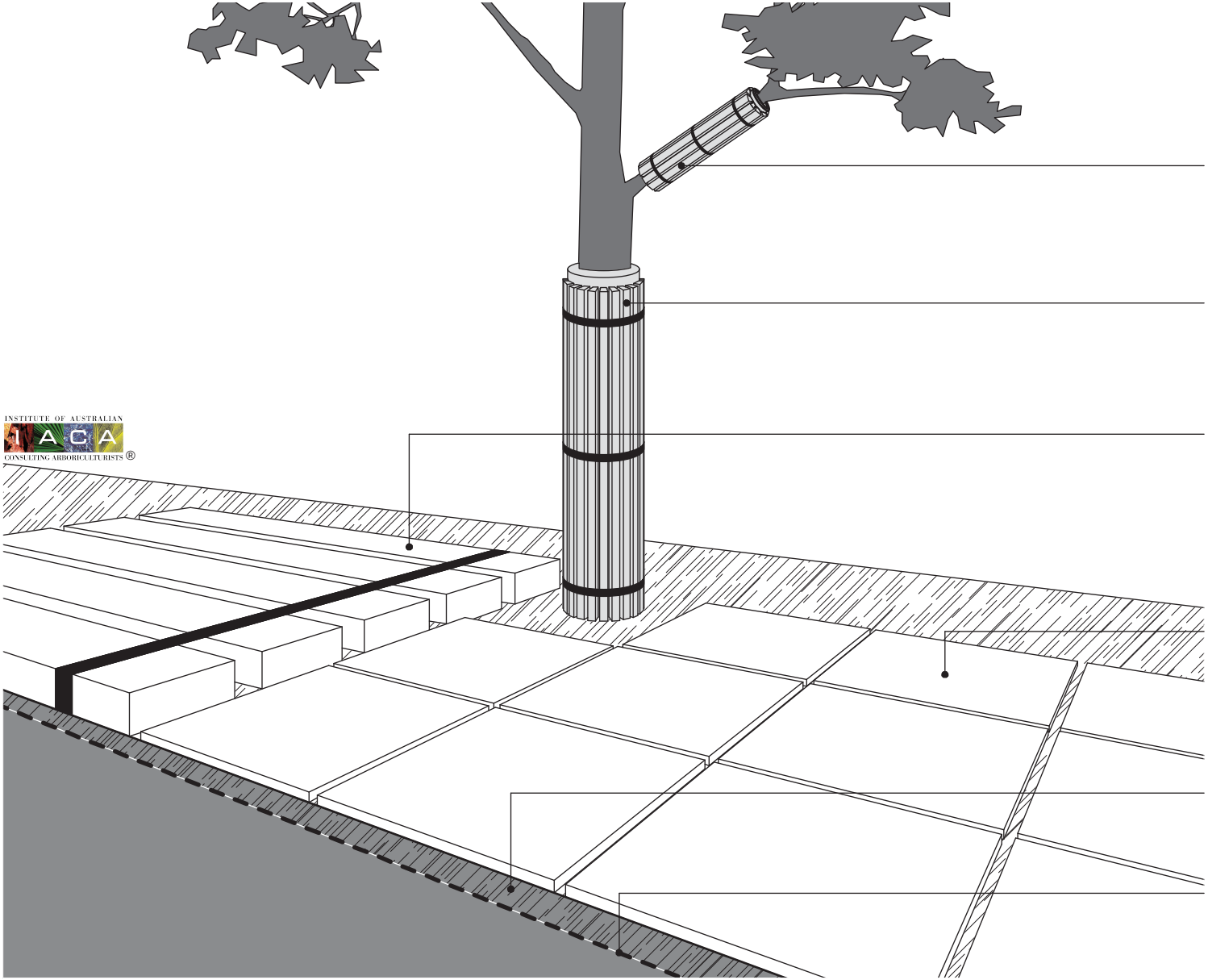

Branch Protection - use boards and padding to prevent damage to bark on branch. Boards are to be strapped, not screwed or nailed to the branch.

Trunk Protection - use boards and padding to prevent damage to bark (minimum 2m). Boards are to be strapped, not screwed or nailed to the trunk.

Ground Protection - use device strapped over mulch or aggregate layer. Ground protection device should be of a suitable thickness to prevent soil compaction and root damage.

Steel plates (or approved equivalent) with or without mulch or aggregate layer below.

Maximum 100mm and minimum 50mm depth mulch or aggregate layer.

Geotextile fabric underneath mulch or aggregate layer.

04 Examples of Branch, Trunk and Ground Protection

Not to Scale

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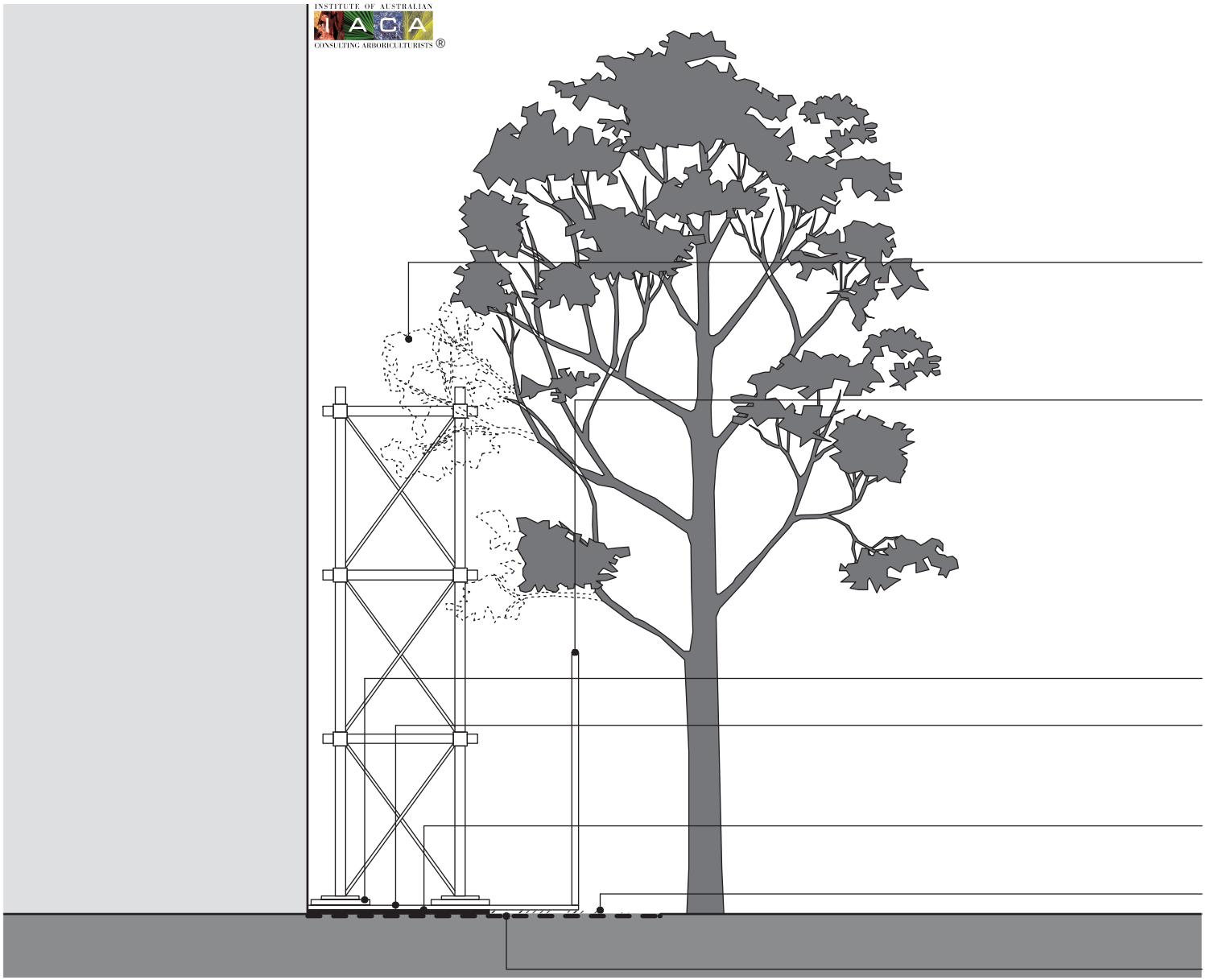

Branches may require pruning to erect scaffolding. Pruning may be subject to local regulations. Flexible branches should be tied back in preference to pruning.

Minimum 1.8m high hoarding. Temporary fencing may be incorporated into scaffolding as either containment screening or as hoarding.

Note:
If excavation is required for installation of support post for fencing, the Project Arborist should assess any pruning of roots greater than 20mm diameter.

Scaffold planks

Boards or plywood to be installed over mulch or aggregate layer for any areas requiring access within the TPZ.

Soleplate over geotextile. No excavation for soleplate within TPZ.

Maximum 100mm and minimum 50mm depth mulch or aggregate layer within TPZ.

Geotextile fabric

05

Indicative Scaffolding within a Tree Protection Zone (TPZ)

Not to Scale

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