

Tree Impact Assessment Report

City and Southwest Metro Station Upgrade Works Package 5 & 6

**Project wide: Hurlstone Park, Wiley Park, Belmore,
Campsie, Dulwich Hill and Punchbowl**

Contract: Package 5: 00013/11766

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Rev 1	18/03/2021	Endorsed	Address Sydney Metro comments
Rev 2	31/03/2021	Endorsed	Incorporate additional stations scopes
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Rev 11	29/05/2022	Endorsed	Incorporate additional stations scopes

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APPENDIX 6.3 CCBC APPROVAL FOR TREE REMOVAL AT HURLSTONE PARK

APPROVAL FOR TREE REMOVAL AND TREE PRUNING

Date: 20May2021

Location: Railway Street, Near Hurlstone Park Precinct

Contractor: Downer

Approval for the pruning and removal of the council trees identified in the attachments to facilitate the works required for the Metro project is approved subject to the following conditions:

Any trees removed will require replacement at councils standard rate of 3:1. The tree/s shall have a container size not less than 75 litres, shall comply with NATSPEC Specifying Trees: a guide to assessment of tree quality (2003) or Australian Standard AS 2303 – 2015 Tree stock for landscape use, and be planted and maintained in accordance with Councils street tree planting specifications Standard Drawing No. S-201.

The tree pruning and removal works are subject to the following conditions:

- All pruning and removal works must be carried out by a qualified arborist (minimum qualifications AQF Level 3 or equivalent);
- All pruning works shall comply with Australian Standard AS4373-2007 Pruning of amenity trees
- The tree pruning work must comply with the Amenity Tree Industry – Code of Practice, 1998 (Workcover, NSW) and the Guide to Managing Risks of Tree Trimming and Removal Work (Safe Work Australia 2016).
- The tree pruning contractor must hold a Public Liability Insurance Certificate of Currency with a minimum indemnity of \$20 million, together with a NSW Workers Compensation Insurance Certificate of Currency;
- All tree material shall be removed from site;
- The site must be maintained in a safe condition at all times;
- Appropriate hazard signage to be in place at all times during the tree pruning works.

Tree reference:

T1,T2,T194,T198,T199

Wayne Broomfield
Team Leader Open Space Services

From: James Magsipoc <James.Magsipoc@cbccity.nsw.gov.au>
Sent: Thursday, 20 May 2021 1:15 PM
To: Ismet Ozen <Ismet.Ozen@downergroup.com>
Cc: Julie Henderson <Julie.Henderson@Downergroup.com>; Ben Webb <Ben.Webb@cbccity.nsw.gov.au>; Peter Anderson <Peter.ANDERSON@cbccity.nsw.gov.au>; Ash Jarvis <Ash.Jarvis2@transport.nsw.gov.au>; Peter D'Costa <Peter.D'Costa@Downergroup.com>; Ben Webb <Ben.Webb@cbccity.nsw.gov.au>; Peter Anderson <Peter.ANDERSON@cbccity.nsw.gov.au>; Wayne Bromfield <Wayne.Bromfield@cbccity.nsw.gov.au>
Subject: RE: Approval to Remove Trees: T1,T2,T194,T198,T199

[External Email] This email was sent from outside the organisation – be cautious, particularly with links and attachments.

Hi Ismet,

Permission is hereby granted to removed five trees as per attached document based on Arborist report as previously submitted.

Best regards,



James Magsipoc - Project Officer
T 02 9707 9771
E James.Magsipoc@cbccity.nsw.gov.au
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@ourcbcity
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From: Ismet Ozen <Ismet.Ozen@downergroup.com>
Sent: Thursday, 13 May 2021 4:27 PM
To: James Magsipoc <James.Magsipoc@cbccity.nsw.gov.au>
Cc: Robel Chowdhury <Robel.Chowdhury@downergroup.com>; Gareth O'Brien <Gareth.O'Brien@Downergroup.com>
Subject: 2x Tree Removal on Railway Street

Hi James,

As per our prior discussion, please see attached updated arborist & ecologist reports including the 2x trees we need to remove as part of our works on Railway Street, Hurlstone Park.

Please refer to the following pages on:

- Page 4 & 5 on arborist report
- Page 6 & 14 on ecologist report

If you could please review & approve as soon as possible we can start planning dates for these works.

Feel free to call me if you have any questions.

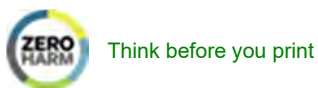


Kind Regards,
Ismet Ozen (Izzy)
Site Engineer

Sydney Metro – Hurlstone Park Station
Infrastructure Projects



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Downer

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APPENDIX 7 CAMPSIE AIA (URBAN ARBOR)



Arboricultural Impact Assessment Report

Site location:

South West Metro
Campsie Station
Campsie NSW

Prepared for:

Metron T2M

Prepared by: Bryce Claassens

Urban Arbor Pty Ltd

Date: 21 May 2021

Ref: 210521-SWMCS-AIA

Rev: C

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1. INTRODUCTION

- 1.1 Urban Arbor have been instructed by Metron T2M to provide an Arboricultural Impact Assessment Report for trees located within the site and adjoining sites in relation to a proposed development.
- 1.2 Below is a list of all documents and information provided to Urban Arbor to assist in preparing this report.
- A) Campsie Landscape Drawings, Metron T2M, Rev B, Including Sheet No: 8, 7 November 2020.
 - B) Civil Engineering Package No. 1533, Metron T2M, Rev C, 125 Pages in total, 5 June 2020.
 - C) Campsie Station Service Building, Metron T2M, Rev C, 11 December 2020.
 - D) Campsie Station Civil Engineering Combined Service Route Detail Layout Plans, Metron T2M, Rev: 00, Sheet 1, 2 and 3, 14 April 2021.
 - E) Construction RFI, Metron T2M, CRFI Reference No : SMCSWSW5-SMD-CRFI-000034, 14 May 2021.
- 1.3 The trees were inspected on 5 December 2019 and 17 December 2020. Access was available to the subject site and the adjoining public areas only. All tree data contained in this report was collected during these site inspections.

2. SCOPE OF THE REPORT

- 2.1 This report has been undertaken to meet the following objectives.
- 2.1.1 Conduct a visual assessment of all significant trees located within 10 metres of development works from ground level. For the purpose of this report, a significant tree is a tree with a height equal to or greater than 5 metres.
 - 2.1.2 Determine the trees estimated contribution years and remaining, useful life expectancy and award the trees a retention value.
 - 2.1.3 Provide an assessment of the potential impact the proposed development is likely to cause to the condition of the subject trees in accordance with AS4970 Protection of trees on development sites (2009).
 - 2.1.4 Specify tree protection measures for trees to be retained in accordance with AS4970-2009.

3. LIMITATIONS

- 3.1 The observations and recommendations are based on the site inspections identified in the introduction (section 1) and the access available at the time of inspection. Findings of this report are based on the observations and site conditions at the time inspection.
- 3.2 All of the observations were carried out from ground level and none of the surrounding surfaces were lifted or removed during the inspection. No tests were carried out to the subject trees or surrounding area during the inspection.
- 3.3 Root decay can sometimes be present with no visual indication above ground. It is also impossible to know the extent of any root damage caused by mechanical damage such as underground root cutting during the installation of services without undertaking detailed root investigation. Any form of tree failure due to these activities is beyond the scope of this assessment.
- 3.4 The report reflects the subject tree(s) as found on the day of inspection. Any changes to the growing environment of the subject tree, or tree management works beyond those recommended in this report may alter the findings of the report. There is no warranty, expressed or implied, that problems or deficiencies relating to the subject tree, or subject site may not arise in the future.
- 3.5 Tree identification is based on accessible visual characteristics at the time of inspection. As key identifying features are not always available the accuracy of identification is not guaranteed. Where tree species is unknown, it is indicated with an *spp.*
- 3.6 All diagrams, plans and photographs included in this report are visual aids only, and are not to scale unless otherwise indicated.
- 3.7 Urban Arbor neither guarantees, nor is it responsible for, the accuracy of information provided by others that is contained within this report.
- 3.8 While an assessment of the subject trees estimated useful life expectancy is included in this report, no specific tree risk assessment has been undertaken for any of trees at the site.
- 3.9 The ultimate safety of any tree cannot be categorically guaranteed. Even trees apparently free of defects can collapse or partially collapse in extreme weather conditions. Trees are dynamic, biological entities subject to changes in their environment, the presence of pathogens and the effects of ageing. These factors reinforce the need for regular inspections. It is generally accepted that hazards can only be identified from distinct defects or from other failure-prone characteristics of a tree or its locality.
- 3.10 Alteration of this report invalidates the entire report.

4. METHODOLOGY

- 4.1 The following information was collected during the assessment of the subject tree(s).
- 4.1.1 Tree common name
 - 4.1.2 Tree botanical name
 - 4.1.3 Tree age class
 - 4.1.4 DBH (Trunk/Stem diameter at breast height/1.4m above ground level) - millimetres.
 - 4.1.5 Estimated height - metres
 - 4.1.6 Estimated crown spread (diameter of crown) - metres
 - 4.1.7 Health
 - 4.1.8 Structural condition
 - 4.1.9 Amenity value
 - 4.1.10 Estimated remaining contribution years (SULE)¹
 - 4.1.11 Retention value (Tree AZ)²
 - 4.1.12 Notes/comments
- 4.2 An assessment of the trees condition was made using the visual tree assessment (VTA) model (Mattheck & Breloer, 1994).³
- 4.3 Tree diameter was measured using a DBH tape or in some cases estimated. Tree height and tree canopy spread was measured with a clinometer or in some cases estimated. All other measurements were estimations unless otherwise stated. The other tools used during the assessment were a nylon mallet, compass, camera and a steel probe.
- 4.4 All information was imported into our computerised geographical information system (GIS) PT-mapper pro. This software was used to measure/calculate all encroachment estimates included in this report.
- 4.5 All DBH measurements, tree protection zones, and structural root zones were calculated in accordance with methods set out in AS4970 Protection of trees on development sites (2009)⁴ and in some cases estimated. See appendices for information.
- 4.6 Details of how the observations in this report have been assessed are listed in the appendices.

¹ Barrell Tree Consultancy, *SULE: Its use and status into the New Millennium*, TreeAZ/03/2001, <http://www.treeaz.com/>.

² Barrell Tree Consultancy, *Tree AZ version 10.04-ANZ*, <http://www.treeaz.com/>.

³ Mattheck, C. & Breloer, H., *The body language of trees - A handbook for failure analysis*, The Stationary Office, London, England (2015).

⁴ Council Of Standards Australia, *AS4970 Protection of trees on development sites* (2009).

5. SITE LOCATION AND BRIEF DESCRIPTION

- 5.1 The site is located in the suburb of Campsie, New South Wales, which is located in the Canterbury Bankstown Local Government Area (LGA). The trees are subject to protection under the Canterbury Local Environmental Plan (LEP) 2012⁵ and Development Control Plan (DCP) 2012.⁶ The site is identified as a heritage item (I40) in the LEP heritage maps.⁷

6. GENERAL INFORMATION IN RELATION TO PROTECTING TREES ON DEVELOPMENT SITES

- 6.1 **Tree protection zone (TPZ):** The TPZ is the principle means of protecting trees on development sites and is an area required to maintain the viability of trees during development. It is commonly observed that tree roots will extend significantly further than the indicative TPZ, however the TPZ is an area identified in AS4970-2009 to be the area where root loss or disturbance will generally impact the viability of the tree. The TPZ is identified as a restricted area to prevent damage to trees either above or below ground during a development. Where trees are intended to be retained proposed developments must provide an adequate TPZ around trees. The TPZ is set aside for the tree's root zone, trunk and crown and it is essential for the stability and longevity of the tree. The TPZ also incorporates the SRZ (see below for more information about the SRZ). The TPZ is calculated by multiplying the DBH by twelve, with the exception of palms, other monocots, cycads and tree ferns, the TPZ of which have been calculated at one metre outside the crown projection. Additional information about the TPZ is included in appendix 3.
- 6.2 **Structural Root Zone (SRZ):** This is the area around the base of a tree required for the trees stability in the ground. An area larger than the SRZ always needs to be maintained to preserve a viable tree. The SRZ is calculated using the following formula; $(DAB \times 50)^{0.42} \times 0.64$. There are several factors that can vary the SRZ which include height, crown area, soil type and soil moisture. It can also be influenced by other factors such as natural or built structures. Generally, work within the SRZ should be avoided. Soil level changes should also generally be avoided inside the SRZ of trees to be retained. Palms, other monocots, cycads and tree ferns do not have an SRZ. See the appendices for more information about the SRZ.

⁵ Canterbury Local Environmental Plan 2012, <https://www.legislation.nsw.gov.au/#/view/EPI/2012/673>, accessed 21 May 2021.

⁶ Canterbury Development Control Plan 2012, <https://www.cbcity.nsw.gov.au/development/planning-control-policies/canterbury-development-control-plan-2012>, accessed 21 May 2021.

⁷ Canterbury Local Environmental Plan Heritage Map - Sheet HER_006, https://www.legislation.nsw.gov.au/maps/7f4de097-5304-ece6-cc55-b2dfeeb11fd/1550_COM_HER_006_010_20130513.pdf, accessed 21 May 2021.

6.3 Minor encroachment into TPZ: Sometimes encroachment into the TPZ is unavoidable. Encroachment includes but is not limited to activities such as excavation, compacted fill and machine trenching. Minor encroachment of up to 10% of the overall TPZ area is normally considered acceptable, providing there is space adjacent to the TPZ for the tree to compensate and the tree is displaying adequate vigour/health to tolerate changes to its growing environment.

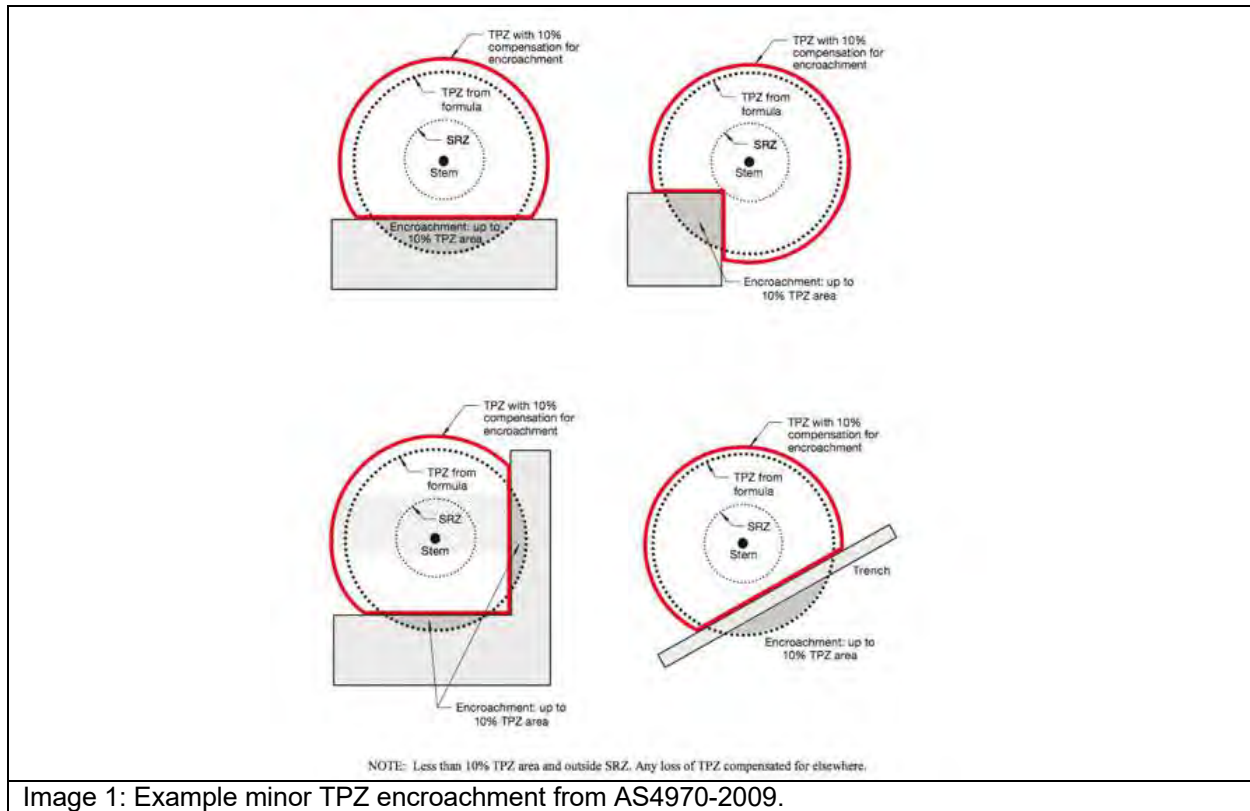


Image 1: Example minor TPZ encroachment from AS4970-2009.

6.4 Major encroachment into TPZ: Where encroachment of more than 10% of the overall TPZ area is proposed the project Arborist must investigate and demonstrate that the tree will remain in a viable condition. In some cases, tree sensitive construction methods such as pier and beam footings, suspended slabs, or cantilevered sections, can be utilised to allow additional encroachment into the TPZ by bridging over roots and minimising root disturbance. Major encroachment is only possible if it can be undertaken without severing significant size roots, or if it can be demonstrated that significant roots will not be impacted. Root investigations may be required to identify roots that will be impacted during major TPZ encroachment (see appendix 3 for more information in relation to root investigations).

7. OBSERVATIONS

- 7.1 **Tree information:** Details of each individual tree assessed, including the observations taken during the site inspection can be found in the tree inspection schedule in appendix 2, where the indicative tree protection zone (TPZ) for the subject trees has been calculated. The TPZ and SRZ should be measured in radius from the centre of the trunk. The subject trees have been awarded a retention value based on the observations during the site inspection. The system used to award the retention value is Tree AZ. Tree AZ is used to identify higher value trees worthy of being a constraint to development and lower value trees that should generally not be a constraint to the development. The Tree AZ categories sheet (Barrell Tree Consultancy) has been included in the appendices to assist with understanding the retention values. The retention value that has been allocated to the subject trees in this report is not definitive and should only be used as a guideline. This information has been summarised below.
- 7.2 **Site Plan:** Site plans have been included in appendix 1, where the indicative TPZ and SRZ of the trees have been overlaid onto the received plans provided by the client. The following plans are included in appendix 1;
- Appendix 1A: Proposed Site Plan Overview
 - Appendix 1B: Proposed Service Building
 - Appendix 1C: Proposed Service Route Plan

8. ASSESSMENT OF CONSTRUCTION IMPACTS

8.1 Table 1: In the table below, the impact of the proposed development has been assessed for all trees included in the report. The assessed TPZ encroachments include proposed structures and hard landscaping only. All soft landscaping should be completed in accordance with section 11.10.

Tree ID	Species	Retention value	TPZ radius (m)	TPZ area (m ²)	SRZ radius (m)	TPZ encroachment	Discussion/ Conclusion	Recommendation
511	<i>Leptospermum petersonii</i>	A1	3.2	32.2	2.4	None	No proposed TPZ encroachment.	Retain and protect
515	<i>Cotoneaster spp</i>	Z1	2.0	12.6	1.8	None	No proposed TPZ encroachment.	Retain and protect
516	<i>Leptospermum petersonii</i>	Z1	2.0	12.6	1.6	None	No proposed TPZ encroachment.	Retain and protect
517	<i>Pittosporum undulatum</i>	A1	3.5	38.5	2.0	None	No proposed TPZ encroachment.	Retain and protect
518	<i>Pittosporum undulatum</i>	Z1	2.0	12.6	1.7	None	No proposed TPZ encroachment.	Retain and protect
519	<i>Callistemon viminalis</i>	A1	4.0	50.3	2.3	None	No proposed TPZ encroachment.	Retain and protect
520	<i>Callistemon viminalis</i>	A1	3.2	32.2	2.2	None	No proposed TPZ encroachment.	Retain and protect
521	<i>Leptospermum petersonii</i>	A2	4.1	52.8	2.2	None	No proposed TPZ encroachment.	Retain and protect
522	<i>Grevillea robusta</i>	A1	5.4	91.6	2.4	None	No proposed TPZ encroachment.	Retain and protect
523	<i>Eucalyptus microcorys</i>	Z9	3.8	45.4	2.1	Footprint	The trunk of the tree is located within the footprint of the proposed service building padmount.	Remove

Tree ID	Species	Retention value	TPZ radius (m)	TPZ area (m ²)	SRZ radius (m)	TPZ encroachment	Discussion/ Conclusion	Recommendation
524	<i>Lophostemon confertus</i>	A1	2.0	12.6	1.6	Major	The proposed service building construction area will encroach into the TPZ and SRZ, indicating the condition and stability of the tree will be impacted. The tree is recommended for removal due to impacts from the proposed development.	Remove
525	<i>Eucalyptus microcorys</i>	A1	3.4	36.3	2.0	None	No proposed TPZ encroachment.	Retain and protect
610	<i>Platanus x acerifolia</i>	A1	6.5	132.7	2.7	None	No proposed TPZ encroachment.	Retain and protect
611	<i>Elaeocarpus reticulatus</i>	A1	2.7	22.9	1.9	None	No proposed TPZ encroachment.	Retain and protect
612	<i>Elaeocarpus reticulatus</i>	A1	3.7	43.0	2.0	None	No proposed TPZ encroachment.	Retain and protect
613	<i>Elaeocarpus reticulatus</i>	A1	3.6	40.7	2.0	None	No proposed TPZ encroachment.	Retain and protect
614	<i>Triadica sebifera</i>	A1	3.9	47.8	2.3	None	No proposed TPZ encroachment.	Retain and protect
615	<i>Acacia podalyriifolia</i>	Z3	2.0	12.6	1.7	None	No proposed TPZ encroachment.	Retain and protect
616	<i>Pittosporum undulatum</i>	A1	4.1	52.8	2.6	None	No proposed TPZ encroachment.	Retain and protect
617	<i>Melaleuca bracteata</i>	A1	2.2	15.2	1.7	None	No proposed TPZ encroachment.	Retain and protect
618	<i>Callistemon viminalis</i>	A1	2.4	18.1	1.7	None	No proposed TPZ encroachment.	Retain and protect
619	<i>Melaleuca bracteata</i>	A1	3.1	30.2	2.0	None	No proposed TPZ encroachment.	Retain and protect
620	<i>Acacia podalyriifolia</i>	Z3	2.4	18.1	1.7	None	No proposed TPZ encroachment.	Retain and protect

Site Address: Campsie Station, Campsie, NSW.

Prepared for: Metron T2M.

Prepared by: Bryce Claassens, Urban Arbor Pty Ltd, sales@urbanarbor.com.au, (02) 8004 2802.

Date of prepared: 21 May 2021. Rev: C.

Tree ID	Species	Retention value	TPZ radius (m)	TPZ area (m ²)	SRZ radius (m)	TPZ encroachment	Discussion/ Conclusion	Recommendation
621	<i>Syncarpia glomulifera</i>	A1	3.1	30.2	2.0	None	No proposed TPZ encroachment.	Retain and protect
622	<i>Melaleuca bracteata</i>	A1	2.2	15.2	1.8	None	No proposed TPZ encroachment.	Retain and protect
623	<i>Callistemon viminalis</i>	Z4	2.0	12.6	1.5	None	No proposed TPZ encroachment.	Retain and protect
624	<i>Melaleuca bracteata</i>	A1	2.2	15.2	1.7	None	No proposed TPZ encroachment.	Retain and protect
625	<i>Callistemon viminalis</i>	A1	2.1	13.9	1.7	None	No proposed TPZ encroachment.	Retain and protect
626	<i>Melaleuca bracteata</i>	A1	2.0	12.6	1.6	None	No proposed TPZ encroachment.	Retain and protect
627	<i>Melaleuca bracteata</i>	A1	2.3	16.6	1.9	None	No proposed TPZ encroachment.	Retain and protect
628	<i>Callistemon viminalis</i>	A1	3.0	28.3	1.8	None	No proposed TPZ encroachment.	Retain and protect
629	<i>Callistemon viminalis</i>	A1	3.6	40.7	2.0	None	No proposed TPZ encroachment.	Retain and protect
630	<i>Callistemon viminalis</i>	A1	2.4	18.1	1.8	None	No proposed TPZ encroachment.	Retain and protect
631	<i>Callistemon viminalis</i>	A1	2.2	15.2	1.7	None	No proposed TPZ encroachment.	Retain and protect
632	<i>Callistemon viminalis</i>	A1	3.4	36.3	1.9	None	No proposed TPZ encroachment.	Retain and protect
633	<i>Callistemon viminalis</i>	A1	2.9	26.4	1.9	None	No proposed TPZ encroachment.	Retain and protect

 Site Address: Campsie Station, Campsie, NSW.

Prepared for: Metron T2M.

Prepared by: Bryce Claassens, Urban Arbor Pty Ltd, sales@urbanarbor.com.au, (02) 8004 2802.

Date of prepared: 21 May 2021. Rev: C.

Tree ID	Species	Retention value	TPZ radius (m)	TPZ area (m ²)	SRZ radius (m)	TPZ encroachment	Discussion/ Conclusion	Recommendation
634	<i>Callistemon viminalis</i>	A1	2.8	24.6	1.8	None	No proposed TPZ encroachment.	Retain and protect
635	<i>Callistemon viminalis</i>	A1	2.4	18.1	1.8	None	No proposed TPZ encroachment.	Retain and protect
636	<i>Melaleuca bracteata</i>	A1	2.0	12.6	1.6	None	No proposed TPZ encroachment.	Retain and protect
637	<i>Melaleuca quinquenervia</i>	A1	4.1	52.8	2.2	Major	The proposed LCR, LV, comms route TL04 and platform reconstruction works will encroach into the TPZ by 54% (28.7m ²) and into the SRZ. This is considered to be a major TPZ encroachment and the proposed works could potentially impact the condition and stability of the tree. The tree is recommended for removal due to development impacts.	Remove
638	<i>Ficus rubiginosa</i>	A1	9.1	260.2	3.1	Major	The proposed LCR, LV, comms route TL04 and platform reconstruction works will encroach into the TPZ by 76% (197.7m ²) and into the SRZ. This is considered to be a major TPZ encroachment and the proposed works could potentially impact the condition and stability of the tree. The tree is recommended for removal due to development impacts.	Remove
639	<i>Melia azedarach</i>	A1	3.4	36.3	2.1	Major	The proposed LCR, LV, comms route TL04 and platform reconstruction works will encroach into the TPZ by 47% (16.9m ²) and into the SRZ. This is considered to be a major TPZ encroachment and the proposed works could potentially impact the condition and stability of the tree. The tree is recommended for removal due to development impacts.	Remove
640	<i>Schinus molle</i>	A1	9.8	301.7	3.4	Footprint	The trunk of the tree is located within the footprint of the proposed CSR route section T02.	Remove
641	<i>Cinnamomum camphora</i>	A1	6.6	136.8	2.9	None	No proposed TPZ encroachment.	Retain and protect
642	<i>Lophostemon confertus</i>	A1	6.0	113.1	2.6	None	No proposed TPZ encroachment.	Retain and protect

Tree ID	Species	Retention value	TPZ radius (m)	TPZ area (m ²)	SRZ radius (m)	TPZ encroachment	Discussion/ Conclusion	Recommendation
643	<i>Brachychiton populneus</i>	A1	4.2	55.4	2.3	None	No proposed TPZ encroachment.	Retain and protect
644	<i>Ligustrum lucidum</i>	Z3	3.2	32.2	2.3	None	No proposed TPZ encroachment.	Retain and protect
645	<i>Cinnamomum camphora</i>	A1	8.0	201.1	3.4	None	No proposed TPZ encroachment.	Retain and protect

Notes

TPZ Encroachment Percentage: TPZ encroachment percentages are based on new structures and hard surfaces only. New soft landscaping, such as turf or amenity planting areas have not been included in the calculation for TPZ encroachment.

9. CONCLUSIONS

9.1 **Table 2:** Summary of the impact to trees during the development;

Impact	Reason	Category A	Category Z	Total
		A	Z	
Trees to be removed	Building construction, new surfacing and/or proximity, or trees in poor condition.	524, 637, 638, 639, 640 (Five trees)	523 (One tree)	6 trees
Retained trees subject to TPZ encroachment greater than 10%	Removal of existing surfacing/structures and/or installation of new surfacing/structures.	None	None	None
Retained trees subject to TPZ encroachment of 10% or less	Removal of existing surfacing/structures and/or installation of new surfacing/structures.	511, 517, 519, 520, 521, 522, 525, 610, 611, 612, 613, 614, 616, 617, 618, 619, 621, 622, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 641, 642, 643, 645 (Thirty-five trees)	515, 516, 518, 615, 620, 623, 644 (Seven trees)	42 trees

10. RECOMMENDATIONS

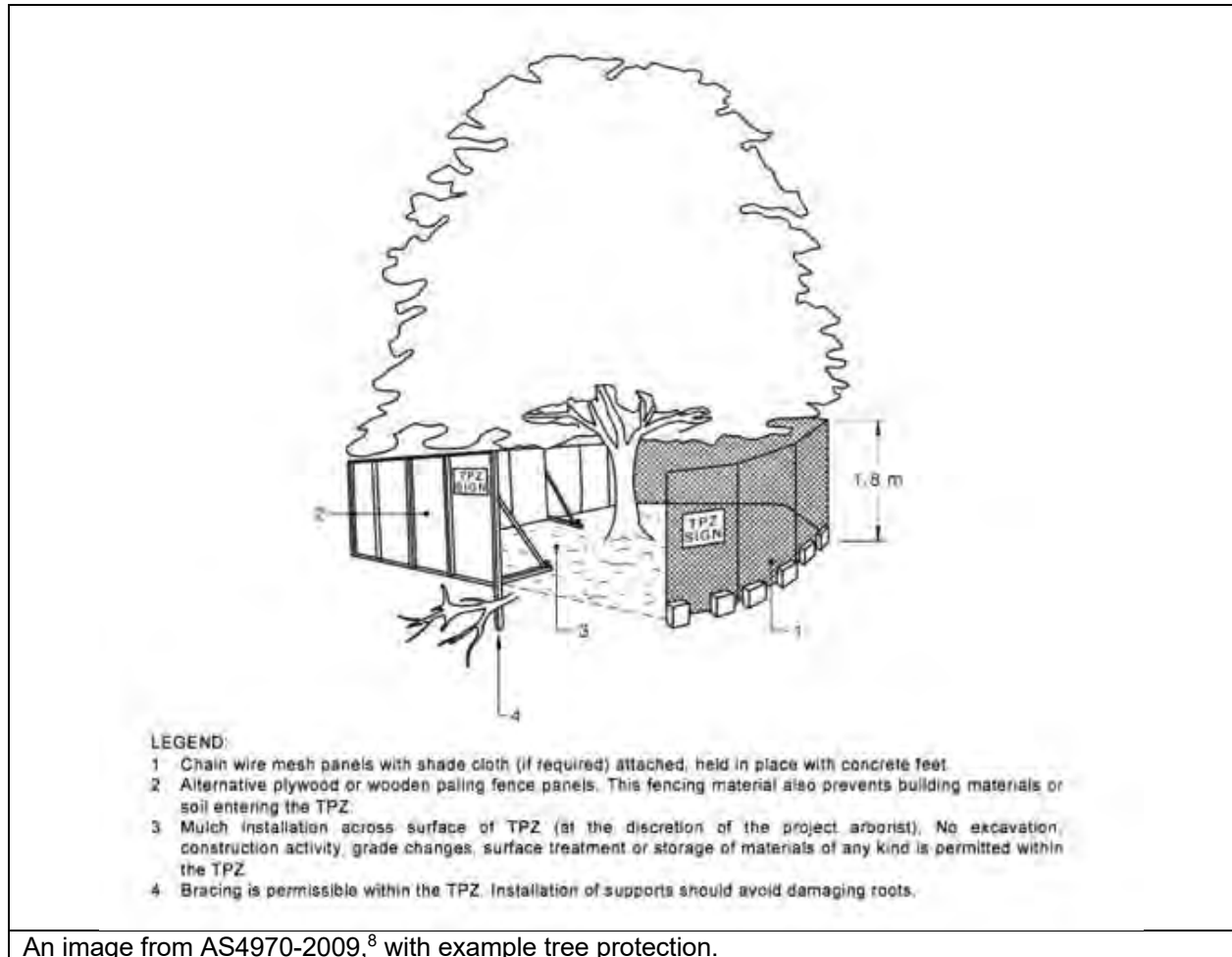
- 10.1 This report assesses the impact of a proposed development at the subject site to forty-eight (48) trees located within the site and adjoining sites, in accordance with AS4970 Protection of trees on development sites (2009).
- 10.2 Site plans have been included in appendix 1, where the indicative TPZ and SRZ of the trees have been overlaid onto the received plans provided by the client. The following plans are included in appendix 1;
- Appendix 1A: Proposed Site Plan Overview
 - Appendix 1B: Proposed Service Building
 - Appendix 1C: Proposed Service Route Plan
- 10.3 Six (6) trees have been recommended for removal in this report, including tree 523, 524, 637, 638, 639 and 640. Tree 524, 637, 638, 639 and 640 are higher value category A retention value trees. Tree 523 is a lower value category Z retention value tree that generally should not be a constraint to development works.
- 10.4 The remaining forty-two trees (42) will be subject to minor and acceptable TPZ encroachments of 10% or less and can be retained in a viable condition, including tree 511, 515, 516, 517, 518, 519, 520, 521, 522, 525, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 641, 642, 643, 644 and 645.
- 10.5 All trees to be retained must be protected for the duration of development, (including demolition and landscaping, in accordance with AS4970-2009). See section 11 for more information.
- 10.6 See section 11.10 for general landscape guidance when working within the TPZ of trees to be retained.
- 10.7 Where possible underground services must be located outside the TPZ of trees to be retained. All underground services located inside the TPZ of any tree to be retained must be installed via tree sensitive techniques. This should include either directional drilling methods or manual excavations to minimise the impact to trees identified for retention.
- 10.8 This report does not provide approval for tree removal or pruning works. All recommendations in this report are subject to approval by the relevant authorities and/or tree owners. This report should be submitted as supporting evidence with any tree removal/pruning or development application.

11. TREE PROTECTION REQUIREMENTS

- 11.1 **Use of this report:** All contractors must be made aware of the tree protection requirements prior to commencing works at the site. This report and a copy of the site plan (Appendix 1) drawings must also be made available to any contractor prior to works commencing and during any on site operations.
- 11.2 **Project Arborist:** Prior to any works commencing at the site a project Arborist should be appointed. The project Arborist should be qualified to a minimum AQF level 5 and/or equivalent qualifications and experience, and should assist with any development issues relating to trees that may arise. If at any time it is not feasible to carryout works in accordance with this, an alternative must be agreed in writing with the project Arborist.
- 11.3 **Tree work:** All tree work must be carried out by a qualified and experienced Arborist with a minimum of AQF level 3 in arboriculture, in accordance with NSW Work Cover Code of Practice for the Amenity Tree Industry (1998) and AS4373 Pruning of amenity trees (2007).
- 11.4 **Initial site meeting/on-going regular inspections:** The project Arborist is to hold a pre-construction site meeting with principle contractor to discuss methods and importance of tree protection measures and resolve any issues in relation to tree protection that may arise. In accordance with AS4970-2009, the project Arborist should carryout regular site inspections to ensure works are carried out in accordance with this document throughout the development process. Site inspections are recommended on a one-month frequency.
- 11.5 **Site Specific Tree Protection Recommendations:** All trees to be retained must be protected in accordance with general requirements of AS4970-2009 for the duration of the development, details of which are discussed in further details in this section of the report. Trees set back from the proposed works by more than 10m will not require tree protection unless designated construction traffic areas are proposed within the TPZ. If construction traffic areas are proposed adjacent to the trees, tree protection fencing and ground protection will be required. The tree below requires the following tree protection:
- Tree 525:** Tree protection fencing is to encompass the TPZ perimeter (3.4m radius from centre of tree). TPZ signage is required on the fencing. The fencing can only be moved under the approval of the project arborist.
- 11.6 **Tree protection Specifications:** It is the responsibility of the principle contractor to install tree protection prior to works commencing at the site (prior to demolition works) and to ensure that the tree protection remains in adequate condition for the duration of the development. The tree protection must not be moved without prior agreement of the project Arborist. The project Arborist must inspect that the tree protection has been installed in accordance with this document and AS4970-2009 prior to works commencing.

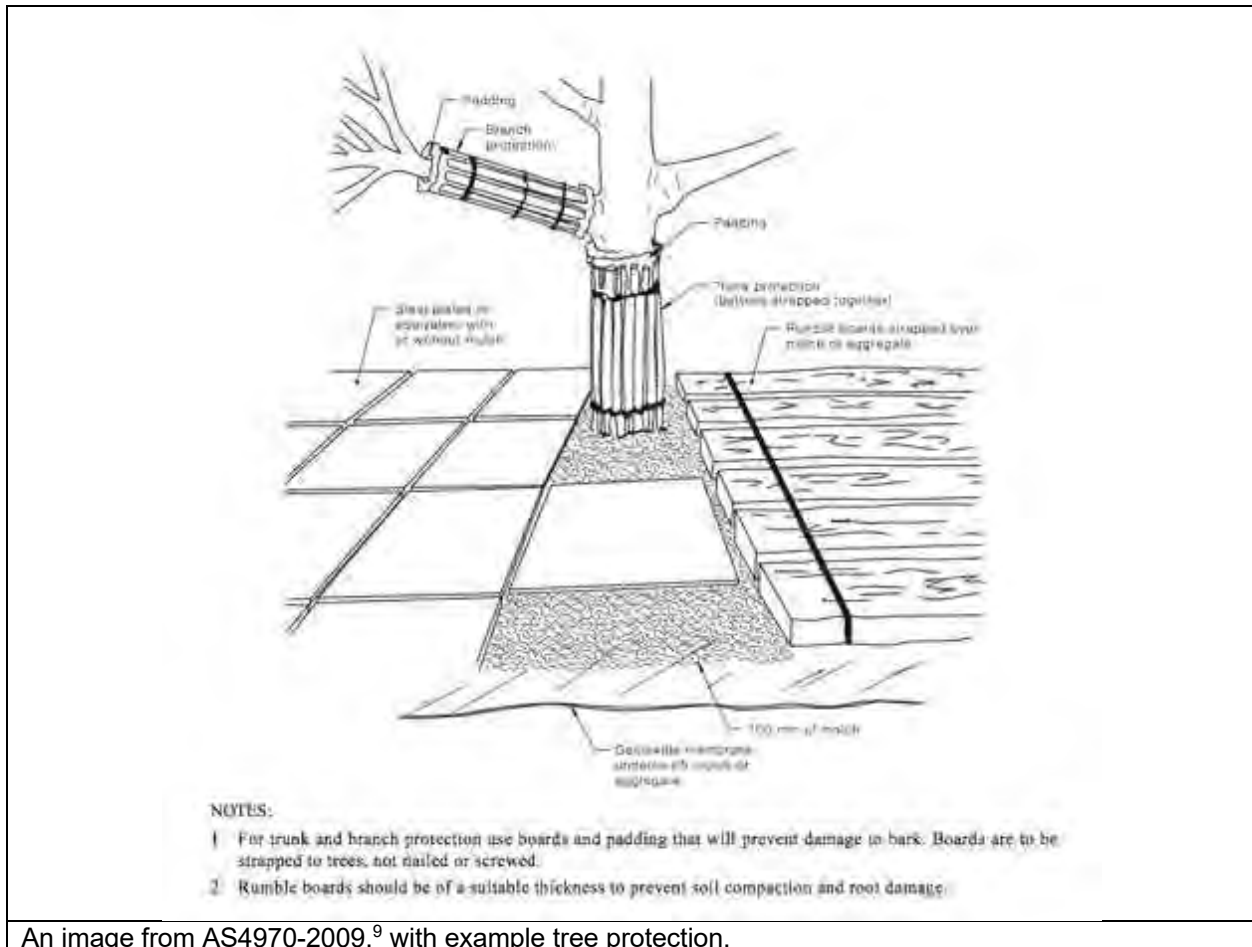
- 11.6.1 Protective fencing: Site specific tree protection requirements are in section 11.5. Where it is not feasible to install fencing at the specified location due to factors such as restricting access to areas of the site or for constructing new structures, an alternative location and protection specification must be agreed with the project Arborist. Where the installation of fencing is unfeasible due to restrictions on space, trunk and branch protection will be required (see below). The protective fencing must be constructed of 1.8 metre 'cyclone chainmesh fence'. The fencing must only be removed for the landscaping phase and must be authorised by the project Arborist. Any modifications to the fencing locations must be approved by the project Arborist.
- 11.6.2 TPZ signage: Tree protection signage is to be attached to the protective fencing, displayed in a prominent position and the sign repeated at 10 metres intervals or closer where the fence changes direction. Each sign shall contain in a clearly legible form, the following information:
- Tree protection zone/No access.
 - This fence has been installed to prevent damage to the tree/s and their growing environment both above and below ground. Do not move fencing or enter TPZ without the agreement of the project Arborist.
 - The name, address, and telephone number of the developer/builder and project Arborist
- 11.6.3 Trunk and Branch Protection: The trunk must be protected by wrapped hessian or similar material to limit damage. Timber planks (50mm x 100mm or similar) should then be placed around tree trunk. The timber planks should be spaced at 100mm intervals, and must be fixed against the trunk with tie wire, or strapping and connections finished or covered to protect pedestrians from injury. The hessian and timber planks must not be fixed to the tree in any instance. The trunk and branch protection shall be installed prior to any work commencing on site and shall be maintained in good condition for the entire development period.
- 11.6.4 Mulch: Any areas of the TPZ located inside the subject site (only trees to be retained directly adjacent to site works must be mulched to a depth of 75mm with good quality composted wood chip/leaf mulch.
- 11.6.5 Ground Protection: Ground protection is required to protect the underlying soil structure and root system in areas where it is not practical to restrict access to whole TPZ, while allowing space for construction. Ground protection must consist of good quality composted wood chip/leaf mulch to a depth of between 150-300mm, laid on top of geo textile fabric. If vehicles are to be using the area, additional protection will be required such as rumble boards or track mats to spread the weight of the vehicle and avoid load points. Ground protection is to be specified by the project Arborist as required.

11.6.6 Temporary irrigation: Temporary irrigation should be set up in the TPZ of all trees to be retained, and should distribute water evenly throughout the area of the TPZ. The irrigation should be used for at minimum one hour daily throughout all stages of the development.



An image from AS4970-2009,⁸ with example tree protection.

⁸ Council Of Standards Australia, *AS4970 Protection of trees on development sites* (2009), page 16.



An image from AS4970-2009,⁹ with example tree protection.

11.7 Restricted activities inside TPZ: The following activities must be avoided inside the TPZ of all trees to be retained unless approved by the project Arborist. If at any time these activities cannot be avoided an alternative must be agreed in writing with the project Arborist to minimise the impact to the tree.

- A) Machine excavation.
- B) Ripping or cultivation of soil.
- C) Storage of spoil, soil or any such materials
- D) Preparation of chemicals, including preparation of cement products.
- E) Refuelling.
- F) Dumping of waste.
- G) Wash down and cleaning of equipment.
- H) Placement of fill.
- I) Lighting of fires.
- J) Soil level changes.
- K) Any physical damage to the crown, trunk, or root system.
- L) Parking of vehicles.

⁹ Council Of Standards Australia, *AS4970 Protection of trees on development sites* (2009), page 17.

- 11.8 **Demolition:** The demolition of all existing structures inside or directly adjacent to the TPZ of trees to be retained must be undertaken in consultation with the project Arborist. Any machinery is to work from inside the footprint of the existing structures or outside the TPZ, reaching in to minimise soil disturbance and compaction. If it is not feasible to locate demolition machinery outside the TPZ of trees to be retained, ground protection will be required. The demolition should be undertaken inwards into the footprint of the existing structures, sometimes referred to as the ‘top down, pull back’ method.
- 11.9 **Excavations:** The project Arborist must supervise and certify that all excavations and root pruning are in accordance with AS4373-2007 and AS4970-2009. For continuous strip footings, first manual excavation is required along the edge of the structures closest to the subject trees. Manual excavation should be a depth of 1 metre (or to unfavourable root growth conditions such as bed rock or heavy clay, if agreed by project Arborist). Next roots must be pruned back in accordance with AS4373-2007. After all root pruning is completed, machine excavation is permitted within the footprint of the structure. For tree sensitive footings, such as pier and beam, all excavations inside the TPZ must be manual. Manual excavation may include the use of pneumatic and hydraulic tools, high-pressure air or a combination of high-pressure water and a vacuum device. No pruning of roots greater 30mm in diameter is to be carried out without approval of the project arborist. All pruning of roots greater than 30mm in diameter must be carried out by a qualified Arborist/Horticulturalist with a minimum AQF level 3. Root pruning is to be a clean cut with a sharp tool in accordance with AS4373 Pruning of amenity trees (2007).¹⁰ The tree root is to be pruned back to a branch root if possible. Make a clean cut and leave as small a wound as possible.
- 11.10 **Landscaping:** All landscaping works within the TPZ of trees to be retained are to be undertaken in consultation with a consulting Arborist to minimize the impact to trees. General guidance is provided below to minimise the impact of new landscaping to trees to be retained.
- Level changes should be minimised. The existing ground levels within the landscape areas should not be lowered by more than 100mm or increased by more than 100mm (300mm increase is acceptable if using a coarse free draining material) without assessment by a consulting Arborist.
 - New retaining walls should be avoided. Where new retaining walls are proposed inside the TPZ of trees to be retained, they should be constructed from tree sensitive material, such as timber sleepers, that require minimal footings/excavations. If brick retaining walls are proposed inside the TPZ, considerer pier and beam type footings to bridge significant roots that are critical to the trees condition. Retaining walls must be located outside the SRZ and sleepers/beams located above existing soil grades.

¹⁰ Council Of Standards Australia, AS 4373 Pruning of amenity trees (2007) page 18

- New footpaths and hard surfaces should be minimised, as they can limit the availability of water, nutrients and air to the trees root system. Where they are proposed, they should be constructed on or above existing soil grades to minimise root disturbance and consider using a permeable surface. Footpaths should be located outside the SRZ where possible.
- Where fill/sub base is used inside the TPZ, fill material should be a coarse granular material that does not restrict the flow of water and air to the root system below. This type of material will also reduce the impact of soil compaction during construction.
- The location of new plantings inside the TPZ of trees to be retained should be flexible to avoid unnecessary damage to tree roots greater than 30mm in diameter.

11.11 **Sediment and Contamination:** All contamination run off from the development such as but not limited to concrete, sediment and toxic wastes must be prevented from entering the TPZ at all times.

11.12 **Tree Wounding/Injury:** Any wounding or injury that occurs to a tree during the construction process will require the project Arborist to be contacted for an assessment of the injury and provide mitigation/remediation advice. It is generally accepted that trees may take many years to decline and eventually die from root damage. All repair work is to be carried out by the project Arborist, at the contractor's expense.

11.13 **Completion of Development Works:** After all construction works are complete the project Arborist should assess that the subject trees have been retained in the same condition and vigour. If changes to condition are identified the project Arborist should provide recommendations for remediation.

12. CONSTRUCTION HOLD POINTS FOR TREE PROTECTION

12.1 **Hold Points:** Below is a sequence of hold points requiring project Arborist certification throughout the development process. It provides a list of hold points that must be checked and certified. All certification must be provided in written format upon completion of the development. The final certification must include details of any instructions for remediation undertaken during the development. The principle contractor should be responsible for implementing all tree protection requirements.

Hold Point	Stage	Date Completed and Signature of Project Arborist Responsible
Project Arborist to hold pre construction site meeting with principal contractor to discuss methods and importance of tree protection measures and resolve any issues in relation to feasibility of tree protection requirements that may arise. Project Arborist to mark all trees approved for removal under DA consent.	Prior to development work commencing	
Project Arborist to assess and certify that tree protection has been installed in accordance with AS4970-2009 prior to works commencing at site.	Prior to development work commencing.	
In accordance with AS4970-2009 the project arborist should carryout regular site inspections to ensure works are carried out in accordance with the recommendations. Site inspections are recommended on a monthly frequency.	On-going throughout the development	
The removal of existing structures inside the TPZ of any tree to be retained, such as the existing buildings and hard surfaces must be supervised by the project Arborist.	Demolition	
Project Arborist to supervise all manual excavations and root pruning inside the TPZ of any tree to be retained. Project Arborist to approve all pruning of roots greater than 30mm inside TPZ. All root pruning of roots greater than 30mm in diameter must be carried out by a qualified Arborist/Horticulturalist with a minimum AQF level 3.	Construction	
Project Arborist to certify that all underground services including storm water inside TPZ of any tree to be retained have been installed in accordance with AS4970-2009.	Construction	
All landscaping works within the TPZ of trees to be retained are to be undertaken in consultation with the project Arborist to minimise the impact to trees.	Construction/ Landscape	
After all demolition, construction and landscaping works are complete the project Arborist should assess that the subject trees have been retained in the same condition and vigour. If changes to condition are identified the project Arborist should provide recommendations for remediation.	Upon completion of development	

13. BIBLIOGRAPHY/REFERENCES

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- *Canterbury Development Control Plan 2012*,
<https://www.cbccity.nsw.gov.au/development/planning-control-policies/canterbury-development-control-plan-2012>.

14. LIST OF APPENDICES

The following are included in the appendices:

Appendix 1A: Proposed Site Plan Overview

Appendix 1B: Proposed Service Building

Appendix 1C: Proposed Service Route Plan

Appendix 2 - Tree Inspection Schedule

Appendix 3 - Further information of methodology

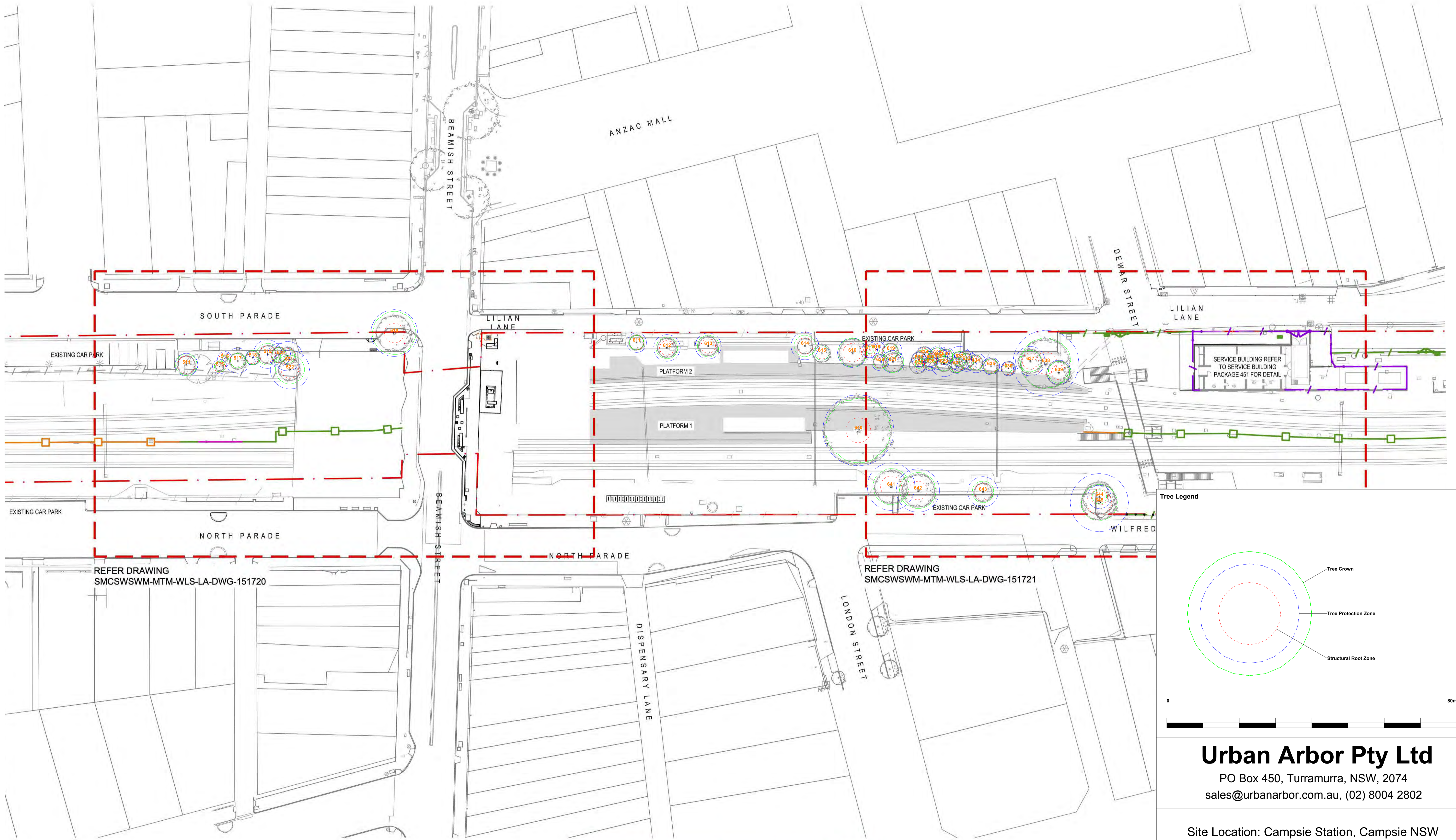


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ISA Tree Risk Assessment Qualification (TRAQ)

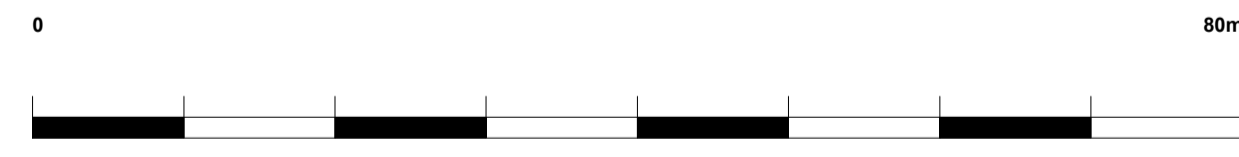
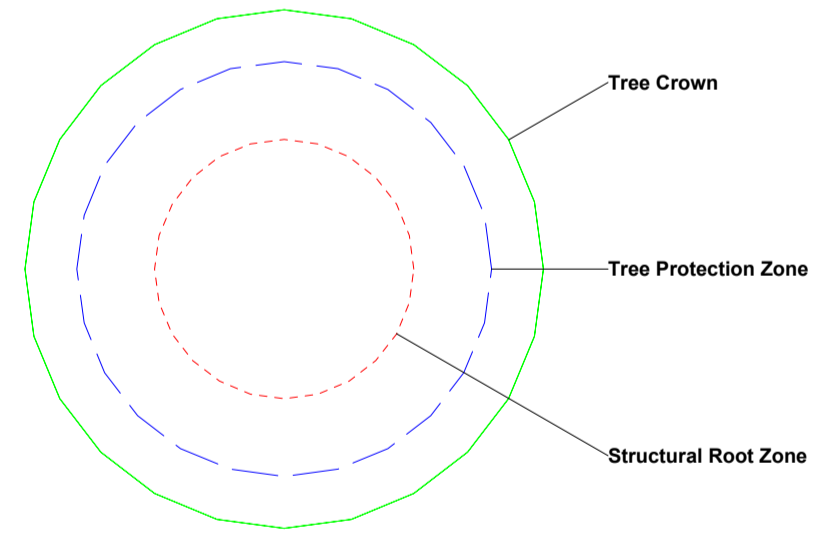


TO SYDNEY ←

TO BANKSTOWN →



Tree Legend



Urban Arbor Pty Ltd

PO Box 450, Turrumurra, NSW, 2074
sales@urbanarbor.com.au, (02) 8004 2802

Site Location: Campsie Station, Campsie NSW

SCALE : 1 : 500 @ A1	DATE : 21/12/2020
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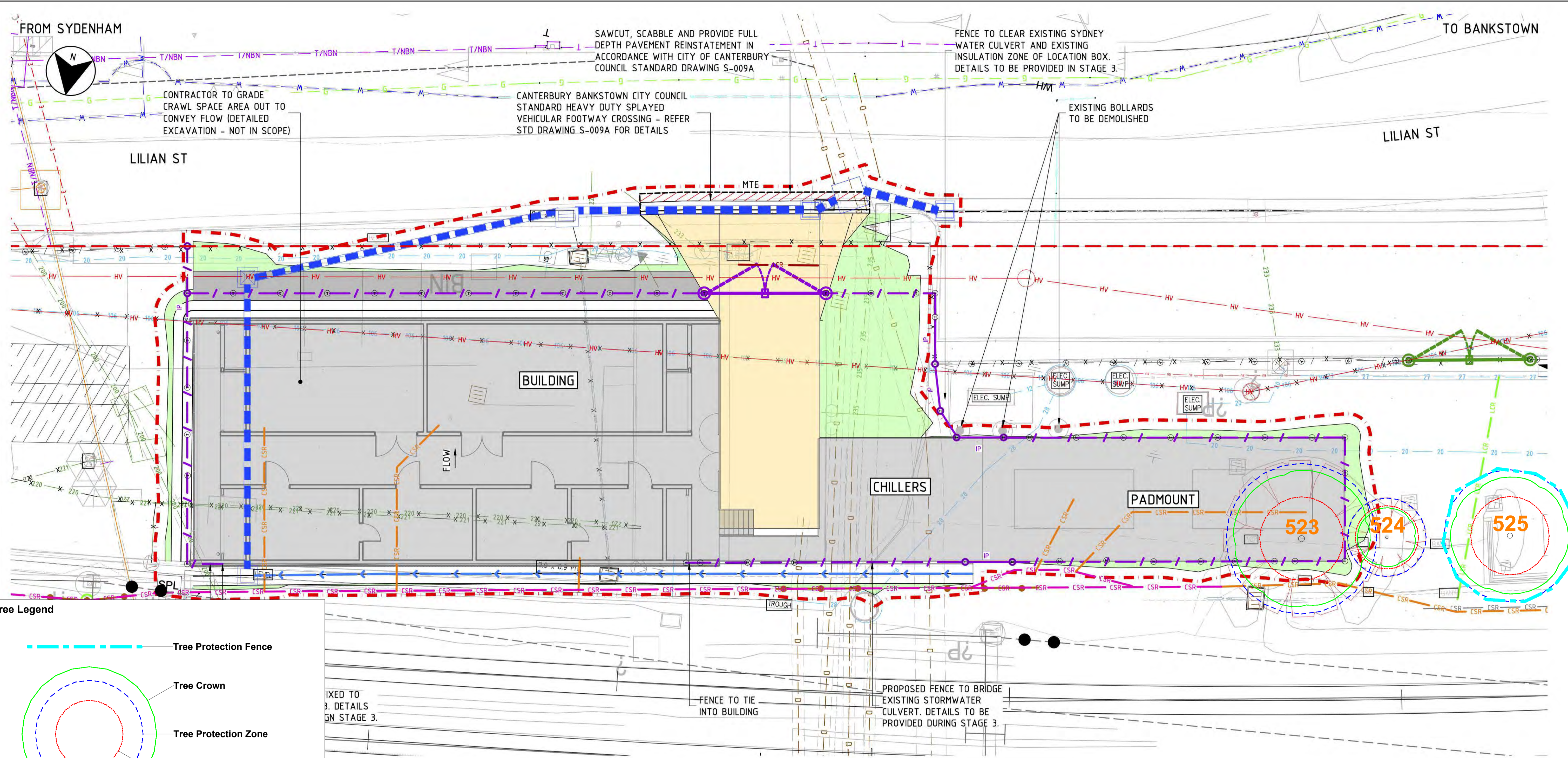
Appendix 1A: Proposed Site Plan Overview

Prepared by: Bryce Claassens

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REFER DRAWING
SMCSWSWM-MTM-WLS-LA-DWG-151720

REFER DRAWING
SMCSWSWM-MTM-WLS-LA-DWG-151721



Tree Legend

- Tree Protection Fence
- Tree Crown
- Tree Protection Zone
- Structural Root Zone

PLAN
SCALE 1:100



Urban Arbor Pty Ltd
 PO Box 450, Turramurra, NSW, 2074
 sales@urbanarbor.com.au, (02) 8004 2802

Site Location: Campsie Station, Campsie, NSW

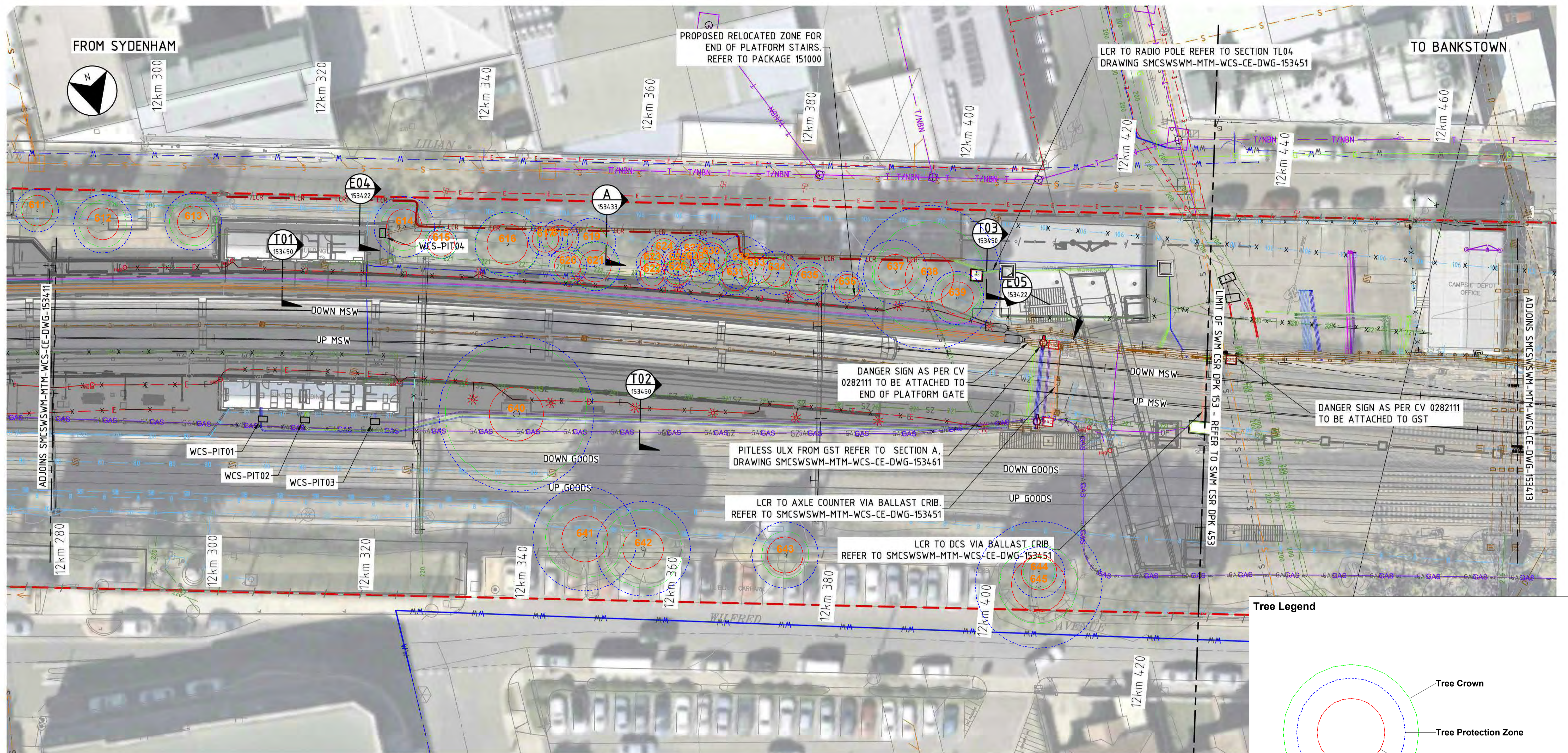
SCALE : 1:100 @ A1 DATE : 21/12/2020



Appendix 1B: Proposed Service Building

Prepared by: Bryce Claassens

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PLAN VIEW
SCALE 1:250

NOTES

1. FOR GENERAL NOTES REFER TO DRAWINGS SMCSWSWM-MTM-WCS-CE-DWG-1534.01 TO 1534.05.
2. FOR LEGEND REFER TO DRAWINGS SMCSWSWM-MTM-WCS-CE-DWG-1534.08 AND 1534.09.
3. FOR CORRIDOR CSR WORKS, REFER TO S2B CSR DPK 660.

LEGEND

BACKBONE (CSR) CONDUITS

- CSR - HV (33kV)
- CSR - HV (11kV)
- CSR - LOW VOLTAGE
- CSR - COMMUNICATIONS
- CSR - SIGNALLING

LOCAL (LCR) CONDUITS

- LCR - LOW VOLTAGE
- LCR - COMMUNICATIONS
- LCR - SIGNALLING

OTHER

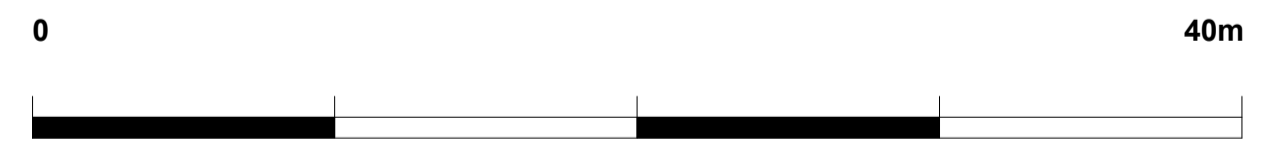
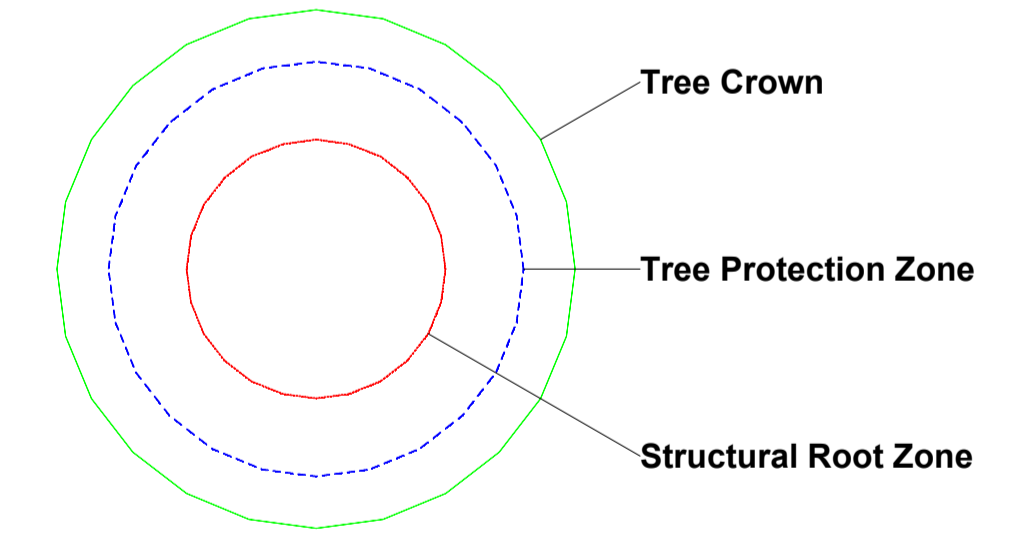
- CSR - PROPOSED GST ROUTE
- CSR - PROPOSED CABLE TRAY ROUTE
- CSR - PROPOSED PIT

- LCR - PROPOSED TRENCH ROUTE
- LCR - PROPOSED BALLAST ROUTE
- LCR - PROPOSED GST ROUTE

SYDNEY TRAINS RELOCATED SERVICES

- ST - SYDNEY TRAINS RELOCATION ROUTE

Tree Legend



Urban Arbor Pty Ltd

PO Box 450, Turrumurra, NSW, 2074
sales@urbanarbor.com.au, (02) 8004 2802

Site Location: Campsie Station, Campsie, NSW

SCALE : 1 : 250 @ A1	DATE : 21/05/2021	
Appendix 1C: Proposed Service Route Plan		

Appendix 2 - Tree Inspection Schedule

Tree ID	Common Name	Botanical Name	Age Class	Height (m)	Canopy Spread Radius (m)	Stem 1	Stem 2	Stem 3	Stem 4	Stem 5	DBH (mm)	DAB (mm)	Health	Structure	Amenity Value	SULE	Retention Value	TPZ Radius (m)	SRZ Radius (m)	Notes
644	Broad Leaved Privet	<i>Ligustrum lucidum</i>	Mature	8	2	200	180				269	400	Fair	Fair	Very Low	3. Short	Z3	3.2	2.3	Located within corridor. Exempt species.
645	Camphor Laurel	<i>Cinnamomum camphora</i>	Mature	10	5	300	300	300	300	300	671	1100	Good	Fair	Medium	2. Medium	A1	8.0	3.4	Located within corridor. Multi stem.

Explanatory Notes

Tree Species - Common name followed by botanical name. Where species is unknown it is indicated with an 'spp'.

Age Class - Over mature (OM), Mature (M), Early mature (EM), Semi mature (SM), Young (Y).

Diameter at Breast Height (DBH) - Measured with a DBH tape or estimated at approximately 1.4m above ground level.

Diameter Above root Buttresses (DAB): Measured with a DBH tape or estimated above root buttresses (DAB) for calculating the SRZ.

Height - Height from ground level to top of crown. All heights are estimated unless otherwise indicated.

Spread - Radius of crown at widest section. All tree spreads are estimated unless otherwise indicated.

Tree Protection Zone (TPZ) - $DBH \times 12$. Measured in radius from the centre of the trunk. Rounded to nearest 0.1m. For monocots, the TPZ is set at 1 metre outside the crown projection.

Structural Root Zone (SRZ) - $(DAB \times 50)^{0.42} \times 0.64$. Measured in radius from the centre of the trunk. Rounded up to nearest 0.1m.

Health - Good/Fair/Poor/Dead

Structure - Good/Fair/Poor

Safe Useful Life Expectancy (SULE) - 1. Long(40+years), 2. Medium (15 - 40 years), 3. Short (5 - 15 years), 4. Remove (under 5 years), 5. Small/young

Amenity Value - Very High/High/Medium/Low/Very Low.

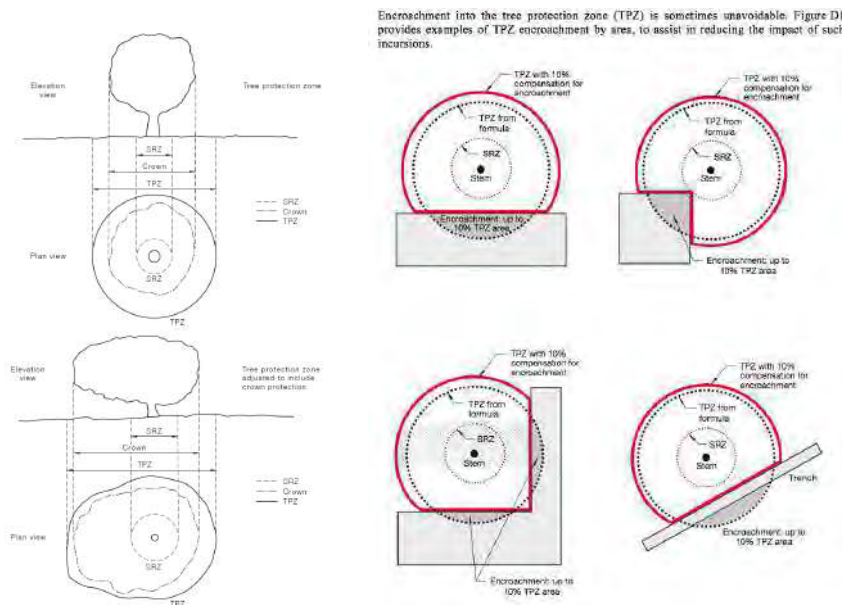
Retention Value: Tree AZ, see appendix 3 for categories.

Appendix 3 - Further Information of Methodology

1. **Tree Protection Zone:** The tree protection zone (TPZ) is the principle means of protecting trees on development sites. The TPZ is 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 radius of the TPZ is calculated for each tree by multiplying its DBH x 12. The derived value is measured in radius from the centre of the stem/trunk at ground level. A TPZ should not be less than 2.0 metres nor greater than 15 metres (except where crown protection is required). It is commonly observed that tree roots will extend significant further than the indicative TPZ, however the TPZ is an area identified AS4970-2009 to be extent where root loss or disturbance will generally not impact the viability of the tree. The TPZ is identified as a restricted area to prevent damage to trees either above or below ground during a development. Where trees are intended to be retained proposed developments must provide an adequate TPZ around trees. The TPZ is set aside for the tree's root zone, trunk and crown and it is essential for the stability and longevity of the tree. The tree protection also incorporates the SRZ (see below for more information about the SRZ). I have calculated the TPZ of palms, other monocots, cycads and tree ferns at one metre outside the crown projection. See appendices for additional information about the TPZ including information about calculating the TPZ and examples of TPZ encroachment.

Minor encroachment into TPZ: Sometimes encroachment into the TPZ is unavoidable. Encroachment includes but is not limited to activities such as excavation, compacted fill and machine trenching. Minor encroachment of up to 10% of the overall TPZ area is normally considered acceptable, providing there is space adjacent to the TPZ for the tree to compensate and the tree is displaying adequate vigour/health to tolerate changes to its growing environment.

Major encroachment into TPZ: Where encroachment of more than 10% of the overall TPZ area is proposed the project Arborist must investigate and demonstrate that the tree will remain in a viable condition. In some cases, tree sensitive construction methods such as pier and beam footings, suspended slabs, or cantilevered sections, can be utilised to allow additional encroachment into the TPZ by bridging over roots and minimising root disturbance. Major encroachment is only possible if it can be undertaken without severing significant size roots, or if it can be demonstrated that significant roots will not be impacted.



2. **Structural Root Zone:** This is the area around the base of a tree required for the trees stability in the ground. An area larger than the SRZ always need to be maintained to preserve a viable tree as it will only have a minor effect on the trees vigour and health. There are several factors that determine the SRZ which include height, crown area, soil type and soil moisture. It can also be influenced by other factors such as natural or built structures. Generally work within the SRZ should be avoided.

An indicative SRZ radius can be determined from the diameter of the trunk measured immediately above the root buttresses. Root investigation could provide more information about the extent of the SRZ. The following formula should be used to calculate the SRZ.

$$\text{SRZ radius} = (D \times 50)^{0.42} \times 0.64 \quad (D = \text{Diameter above root buttress}).$$

3. **Tree Age Class:** If can be difficult to determine the age of a tree without carrying out invasive tests that may damage the tree, so we have categorised there likely age class which is defined below;

- Young/Newly planted: Young or recently planted tree.
- Semi Mature: Up to 20% of the usual life expectancy for the species.
- Early mature/Mature: Between 20%-80% of the usual life expectancy for the species.
- Over mature: Over 80% of the usual life expectancy for the species.
- Dead: Tree is dead or almost dead.

4. **Health/Physiological Condition:** Below are examples conditions used when assigning a category for tree health.

<u>Category</u>	<u>Example condition</u>	<u>Summary</u>
Good	<ul style="list-style-type: none"> • Crown has good foliage density for species. • Tree shows no or minimal signs of pathogens that are unlikely to have an effect on the health of the tree. • Tree is displaying good vigour and reactive growth development. 	<ul style="list-style-type: none"> • The tree is in above average health and condition and no remedial works are required.
Fair	<ul style="list-style-type: none"> • The tree may be starting to dieback or have over 25% deadwood. • Tree may have slightly reduced crown density or thinning. • There may be some discolouration of foliage. • Average reactive growth development. • There may be early signs of pathogens which may further deteriorate the health of the tree. • There may be epicormic growth indicating increased levels of stress within the tree. 	<ul style="list-style-type: none"> • The tree is in below average health and condition and may require remedial works to improve the trees health.
Poor	<ul style="list-style-type: none"> • The tree may be in decline, have extensive dieback or have over 30% deadwood. • The canopy may be sparse or the leaves may be unusually small for species. • Pathogens or pests are having a significant detrimental effect on the tree health. 	<ul style="list-style-type: none"> • The tree is displaying low levels of health and removal or remedial works may be required.
Dead	<ul style="list-style-type: none"> • The tree is dead or almost dead. 	<ul style="list-style-type: none"> • The tree should generally be removed.

5. **Structural Condition:** Below are examples conditions used when assigning a category for structural condition.

<u>Category</u>	<u>Example condition</u>	<u>Summary</u>
Good	<ul style="list-style-type: none"> • Branch unions appear to be strong with no sign of defects. • There are no significant cavities. • The tree is unlikely to fail in usual conditions. • The tree has a balanced crown shape and form. 	<ul style="list-style-type: none"> • The tree is considered structurally good with well developed form.
Fair	<ul style="list-style-type: none"> • The tree may have minor structural defects within the structure of the crown that could potentially develop into more significant defects. • The tree may have a cavity that is currently unlikely to fail but may deteriorate in the future. • The tree is an unbalanced shape or leans significantly. • The tree may have minor damage to its roots. • The root plate may have moved in the past but the tree has now compensated for this. • Branches may be rubbing or crossing. 	<ul style="list-style-type: none"> • The identified defects are unlikely cause major failure. • Some branch failure may occur in usual conditions. • Remedial works can be undertaken to alleviate potential defects.
Poor	<ul style="list-style-type: none"> • The tree has significant structural defects. • Branch unions may be poor or weak. • The tree may have a cavity or cavities with excessive levels of decay that could cause catastrophic failure. • The tree may have root damage or is displaying signs of recent movement. • The tree crown may have poor weight distribution which could cause failure. 	<ul style="list-style-type: none"> • The identified defects are likely to cause either partial or whole failure of the tree.

6. **Amenity Value:** To determine the amenity value of a tree we assess a number of different factors, which include but are not limited to the information below.

- The visibility of the tree to adjacent sites.
- The relationship between the tree and the site.
- Whether the tree is protected by any statutory conditions.
- The habitat value of the tree.
- Whether the tree is considered a noxious weed species.

The amenity value is rated using one of the following values.

- Very High
- High
- Moderate
- Low
- Very Low

7. **Safe Useful Life Expectancy (SULE), (Barrel, 2001):** A trees safe useful life expectancy is determined by assessing a number of different factors including the health and vitality, estimated age in relation to expected life expectancy for the species, structural defects, and remedial works that could allow retention in the existing situation.

Category	Description
1. Long - Over 40 years	(a) Structurally sound trees located in positions that can accommodate future growth. (b) Trees that could be made suitable for retention in the long term by remedial tree care. (c) Trees of special significance for historical, commemorative or rarity reasons that would warrant extraordinary efforts to secure their long term retention.
2. Medium - 15 to 40 years	(a) Trees that may only live between 15 and 40 more years. (b) Trees that could live for more than 40 years but may be removed for safety or nuisance reasons. (c) Trees that could live for more than 40 years but may be removed to prevent interference with more suitable individuals or to provide space for new planting. (d) Trees that could be made suitable for retention in the medium term by remedial tree care.
3. Short - 5 to 15 years	(a) Trees that may only live between 5 and 15 more years. (b) Trees that could live for more than 15 years but may be removed for safety or nuisance reasons. (c) Trees that could live for more than 15 years but may be removed to prevent interference with more suitable individuals or to provide space for new planting. (d) Trees that require substantial remedial tree care and are only suitable for retention in the short term.
4. Remove - Under 5 years	(a) Dead, dying, suppressed or declining trees because of disease or inhospitable conditions. (b) Dangerous trees because of instability or recent loss of adjacent trees. (c) Dangerous trees because of structural defects including cavities, decay, included bark, wounds or poor form. (d) Damaged trees that are clearly not safe to retain. (e) Trees that could live for more than 5 years but may be removed to prevent interference with more suitable individuals or to provide space for new planting. (f) Trees that are damaging or may cause damage to existing structures within 5 years. (g) Trees that will become dangerous after removal of other trees for the reasons given in (a) to (f). (h) Trees in categories (a) to (g) that have a high wildlife habitat value and, with appropriate treatment, could be retained subject to regular review.
5. Small/Young	(a) Small trees less than 5m in height. (b) Young trees less than 15 years old but over 5m in height. (c) Formal hedges and trees intended for regular pruning to artificially control growth.

8. **Root investigations:** The root investigations should identify roots greater than 30mm in diameter that are located along the edge of the structures footprint or in the location of footings. Root investigations must be carried out using non-invasive methods (manual excavations). Any excavations for the root investigations must carried out manually to avoid damaging the roots during excavations. Manual excavation may include the use of a high-pressure air/air knife, or a combination of high-pressure water and a vacuum device. When hand excavating carefully work around roots retaining as many as possible. Take care to not fray, wound, or cause damage to any roots during excavations as this may cause decay or infection from pathogens. It is essential that exposed roots are kept moist and the excavation back filled as soon as possible. The root investigations should be carried out by a qualified Arborist minimum AQF3. Once roots are exposed, a visual assessment can be carried out by a consulting Arborist to evaluate the potential impact of the proposed root loss on the health and stability of the tree. A root map/report should be prepared identifying the findings of investigations, including photographs as supporting evidence in the report.

9. **Retention Value:** The system I have used to award the retention value is Tree AZ. Tree AZ is used to identify higher value trees worthy of being a constraint to development and lower value trees that should generally not be a constraint to the development. The table below provides a brief description of each category.

TreeAZ Categories (Version 10.04-ANZ)

CAUTION: TreeAZ assessments must be carried out by a competent person qualified and experienced in arboriculture. The following category descriptions are designed to be a brief field reference and are not intended to be self-explanatory. They must be read in conjunction with the most current explanations published at www.TreeAZ.com.

Category Z: Unimportant trees not worthy of being a material constraint

Local policy exemptions: Trees that are unsuitable for legal protection for local policy reasons including size, proximity and species

- Z1 Young or insignificant small trees, i.e. below the local size threshold for legal protection, etc
- Z2 Too close to a building, i.e. exempt from legal protection because of proximity, etc
- Z3 Species that cannot be protected for other reasons, i.e. scheduled noxious weeds, out of character in a setting of acknowledged importance, etc

High risk of death or failure: Trees that are likely to be removed within 10 years because of acute health issues or severe structural failure

- Z4 Dead, dying, diseased or declining
Severe damage and/or structural defects where a high risk of failure cannot be satisfactorily reduced by reasonable remedial care, i.e. cavities, decay, included bark, wounds, excessive imbalance, overgrown and vulnerable to adverse weather conditions, etc
- Z5 Severe damage and/or structural defects where a high risk of failure cannot be satisfactorily reduced by reasonable remedial care, i.e. cavities, decay, included bark, wounds, excessive imbalance, overgrown and vulnerable to adverse weather conditions, etc
- Z6 Instability, i.e. poor anchorage, increased exposure, etc
Excessive nuisance: Trees that are likely to be removed within 10 years because of unacceptable impact on people
- Z7 Excessive, severe and intolerable inconvenience to the extent that a locally recognized court or tribunal would be likely to authorize removal, i.e. dominance, debris, interference, etc
- Z8 Excessive, severe and intolerable damage to property to the extent that a locally recognized court or tribunal would be likely to authorize removal, i.e. severe structural damage to surfacing and buildings, etc

Good management: Trees that are likely to be removed within 10 years through responsible management of the tree population

- Z9 Severe damage and/or structural defects where a high risk of failure can be temporarily reduced by reasonable remedial care, i.e. cavities, decay, included bark, wounds, excessive imbalance, vulnerable to adverse weather conditions, etc
- Z10 Poor condition or location with a low potential for recovery or improvement, i.e. dominated by adjacent trees or buildings, poor architectural framework, etc
- Z11 Removal would benefit better adjacent trees, i.e. relieve physical interference, suppression, etc
- Z12 Unacceptably expensive to retain, i.e. severe defects requiring excessive levels of maintenance, etc

NOTE: Z trees with a high risk of death/failure (Z4, Z5 & Z6) or causing severe inconvenience (Z7 & Z8) at the time of assessment and need an urgent risk assessment can be designated as ZZ. ZZ trees are likely to be unsuitable for retention and at the bottom of the categorization hierarchy. In contrast, although Z trees are not worthy of influencing new designs, urgent removal is not essential and they could be retained in the short term, if appropriate.

Category A: Important trees suitable for retention for more than 10 years and worthy of being a material constraint

- A1 No significant defects and could be retained with minimal remedial care
- A2 Minor defects that could be addressed by remedial care and/or work to adjacent trees
- A3 Special significance for historical, cultural, commemorative or rarity reasons that would warrant extraordinary efforts to retain for more than 10 years
- A4 Trees that may be worthy of legal protection for ecological reasons. (Advisory requiring specialist assessment)

NOTE: Category A1 trees that are already large and exceptional, or have the potential to become so with minimal maintenance, can be designated as AA at the discretion of the assessor. Although all A and AA trees are sufficiently important to be material constraints, AA trees are at the top of the categorization hierarchy and should be given the most weight in any selection process.

TreeAZ is designed by Barrell Tree Consultancy (www.barrelltreecare.co.uk) and is reproduced with their permission

Glossary of Terms

Abiotic - Pertaining to non-living agents; e.g. environmental factors

Adventitious shoots - Shoots that develop other than from apical, axillary or dormant buds; see also 'epicormic'

Anchorage - The system whereby a tree is fixed within the soil, involving cohesion between roots and soil and the development of a branched system of roots which withstands wind and gravitational forces transmitted from the aerial parts of the tree

Bark - A term usually applied to all the tissues of a woody plant lying outside the vascular cambium, thus including the phloem, cortex and periderm; occasionally applied only to the periderm or the phellem

Branch:

- **Primary**. A first order branch arising from a stem
- **Lateral**. A second order branch, subordinate to a primary branch or stem and bearing sub-lateral branches
- **Sub-lateral**. A third order branch, subordinate to a lateral or primary branch, or stem and usually bearing only twigs

Branch collar - A visible swelling formed at the base of a branch whose diameter growth has been disproportionately slow compared to that of the parent stem; a term sometimes applied also to the pattern of growth of the cells of the parent stem around the branch base

Brown-rot - A type of wood decay in which cellulose is degraded, while lignin is only modified

Buckling - An irreversible deformation of a structure subjected to a bending load

Buttress zone - The region at the base of a tree where the major lateral roots join the stem, with buttress-like formations on the upper side of the junctions

Cambium - Layer of dividing cells producing xylem (woody) tissue internally and phloem (bark) tissue externally

Canker - A persistent lesion formed by the death of bark and cambium due to colonisation by fungi or bacteria

Compartmentalisation - The confinement of disease, decay or other dysfunction within an anatomically discrete region of plant tissue, due to passive and/or active defences operating at the boundaries of the affected region

Compressive loading - Mechanical loading which exerts a positive pressure; the opposite to tensile loading

Condition - An indication of the physiological condition of the tree. Where the term 'condition' is used in a report, it should not be taken as an indication of the stability of the tree

Crown/Canopy - The main foliage bearing section of the tree

Crown lifting - The removal of limbs and small branches to a specified height above ground level

Crown thinning - The removal of a proportion of secondary branch growth throughout the crown to produce an even density of foliage around a well-balanced branch structure

Crown reduction/shaping - A specified reduction in crown size whilst preserving, as far as possible, the natural tree shape

DAB (Diameter Above Buttress) - Trunk diameter measured above the root buttress

Defect - In relation to tree hazards, any feature of a tree which detracts from the uniform distribution of mechanical stress, or which makes the tree mechanically unsuited to its environment

Dieback - The death of parts of a woody plant, starting at shoot-tips or root-tips

Disease - A malfunction in or destruction of tissues within a living organism, usually excluding mechanical damage; in trees, usually caused by pathogenic micro-organisms

Dominance - In trees, the tendency for a leading shoot to grow faster or more vigorously than the lateral shoots; also the tendency of a tree to maintain a taller crown than its neighbours

Dormant bud - An axial bud which does not develop into a shoot until after the formation of two or more annual wood increments; many such buds persist through the life of a tree and develop only if stimulated to do so

Dysfunction - In woody tissues, the loss of physiological function, especially water conduction, in sapwood

DBH (Diameter at Breast Height) - Stem diameter measured at a height of 1.4 metres or the nearest measurable point. Where measurement at a height of 1.4 metres is not possible, another height may be specified

Deadwood - Branch or stem wood bearing no live tissues. Retention of deadwood provides valuable habitat for a wide range of species and seldom represents a threat to the health of the tree. Removal of deadwood can result in the ingress of decay to otherwise sound tissues and climbing operations to access deadwood can cause significant damage to a tree. Removal of deadwood is generally recommended only where it represents an unacceptable level of hazard

Epicormic shoot - A shoot having developed from a dormant or adventitious bud and not having developed from a first year shoot

Flush-cut - A pruning cut which removes part of the branch bark ridge and or branch-collar

Girdling root - A root which circles and constricts the stem or roots possibly causing death of phloem and/or cambial tissue

Habit - The overall growth characteristics, shape of the tree and branch structure

Hazard beam - An upwardly curved part of a tree in which strong internal stresses may occur without being reduced by adaptive growth; prone to longitudinal splitting

Heartwood/false-heartwood - The dead central wood that has become dysfunctional as part of the aging processes and being distinct from the sapwood

Heave - A term mainly applicable to a shrinkable clay soil which expands due to re-wetting after the felling of a tree which was previously extracting moisture from the deeper layers; also the lifting of pavements and other structures by root diameter expansion; also the lifting of one side of a wind-rocked root-plate

Included bark (ingrown bark) - Bark of adjacent parts of a tree (usually forks, acutely joined branches or basal flutes) which is in face-to-face contact

Lever arm - A mechanical term denoting the length of the lever represented by a structure that is free to move at one end, such as a tree or an individual branch

Lignin - The hard, cement-like constituent of wood cells; deposition of lignin within the matrix of cellulose microfibrils in the cell wall is termed Lignification

Lions tailing - A term applied to a branch of a tree that has few if any side-branches except at its end, and is thus liable to snap due to end-loading

Loading - A mechanical term describing the force acting on a structure from a particular source; e.g. the weight of the structure itself or wind pressure

Mycelium - The body of a fungus, consisting of branched filaments (hyphae)

Occlusion - The process whereby a wound is progressively closed by the formation of new wood and bark around it

Pathogen - A micro-organism which causes disease in another organism

Photosynthesis - The process whereby plants use light energy to split hydrogen from water molecules, and combine it with carbon dioxide to form the molecular building blocks for synthesizing carbohydrates and other biochemical products

Probability - A statistical measure of the likelihood that a particular event might occur

Pruning - The removal or cutting back of twigs or branches, sometimes applied to twigs or small branches only, but often used to describe most activities involving the cutting of trees or shrubs

Radial - In the plane or direction of the radius of a circular object such as a tree stem

Reactive Growth/Reaction Wood - Production of woody tissue in response to altered mechanical loading; often in response to internal defect or decay and associated strength loss (cf. adaptive growth)

Ring-barking - The removal of a ring of bark and phloem around the circumference of a stem or branch, normally resulting in an inability to transport photosynthetic assimilates below the area of damage. Almost inevitably results in the eventual death of the affected stem or branch above the damage

Root-collar - The transitional area between the stem/s and roots

Sapwood - Living xylem tissues

Soft-rot - A kind of wood decay in which a fungus degrades cellulose within the cell walls, without any general degradation of the wall as a whole

Stem/s - Principle above-ground structural component(s) of a tree that supports its branches

Stress - In plant physiology, a condition under which one or more physiological functions are not operating within their optimum range, for example due to lack of water, inadequate nutrition or extremes of temperature

SRZ (Structural Root Zone) - The area around the base of the tree required for the trees stability in the ground

Subsidence - In relation to soil or structures resting in or on soil, a sinking due to shrinkage when certain types of clay soil dry out, sometimes due to extraction of moisture by tree roots

Taper - In stems and branches, the degree of change in girth along a given length

Targets - In tree risk assessment (with slight misuse of normal meaning) persons or property or other things of value which might be harmed by mechanical failure of the tree or by objects falling from it

Topping - In arboriculture, the removal of the crown of a tree, or of a major proportion of it

Transpiration - The evaporation of moisture from the surface of a plant, especially via the stomata of leaves; it exerts a suction which draws water up from the roots and through the intervening xylem cells

TPZ (Tree Protection Zone) - A specified area above and below ground and at a given distance from the trunk set aside for the protection of a tree's roots and crown to provide for the viability and stability of a tree to be retained where it is potentially subject to damage by development

Understory - This layer consists of younger individuals of the dominant trees, together with smaller trees and shrubs which are adapted to grow under lower light conditions

Veteran tree - Tree that, by recognised criteria, shows features of biological, cultural or aesthetic value that are characteristic of, but not exclusive to, individuals surviving beyond the typical age range for the species concerned. These characteristics might typically include a large girth, signs of crown retrenchment and hollowing of the stem

Vigour - The expression of carbohydrate expenditure to growth (in trees)

White-rot - A range of kinds of wood decay in which lignin, usually together with cellulose and other wood constituents, is degraded

Wind exposure - The degree to which a tree or other object is exposed to wind, both in terms of duration and velocity

Wind pressure - The force exerted by a wind on a particular object

Windthrow - The blowing over of a tree at its roots

APPENDIX 8 CAMPSIE AIA (PLATEAU TREES)

Date: 13 March 2021

Re: Additional tree removals at Campsie Station as part of the Southwest Metro Package.

At the request of Downer Group an onsite inspection was undertaken at Campsie Station. It has been asked to identify and record additional tree removals beyond those recommended within the Arboricultural Impact Assessment (AIA) prepared by Urban Arbor, dated 17 December 2019, Ref 19/12/17/SWMMS. On the 5 March a site walkthrough was undertaken by myself. Additional tree removals were identified under guidance of a Downer Group representative.

I can confirm that no tree removals were identified within the initial AIA report. Three additional trees located to the rear of the station adjacent the commuter car park off Lillian Street have been identified for removal based on direct design clash and 100% encroachment of TPZ and SRZ. Data for these trees can be found as Appendix 1 of this report. Image 1 shows the location of the additional tree removals.

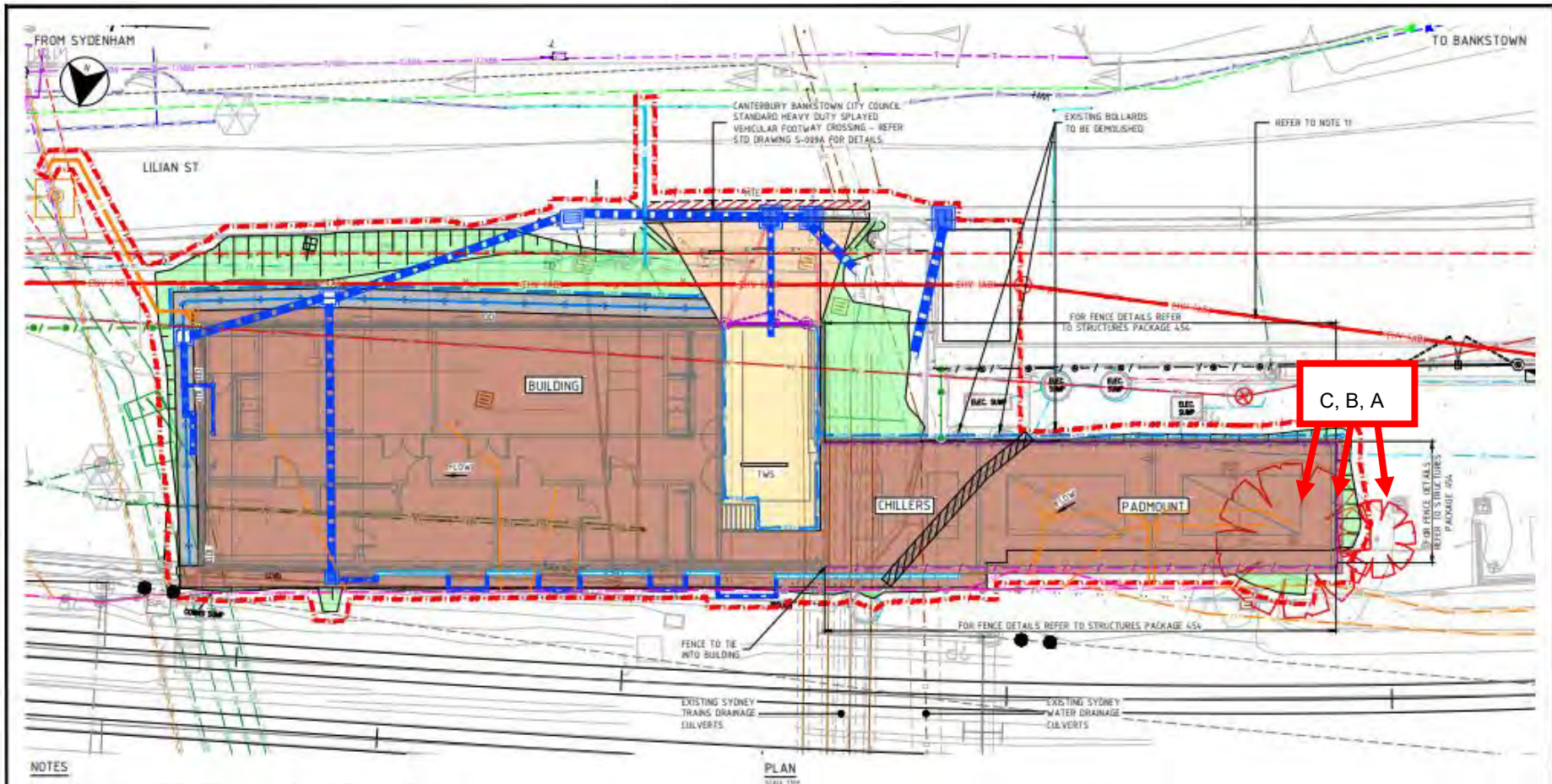
Trees A, Tallowwood and B Brush Box were found to be in good health and condition. They are considered to have a medium useful life expectancy and landscape significance. Tree C Tallowwood was found to have normal vigour and fair condition. Deadwood and canopy dieback was observed within the tree indicating a possible decline in health and condition. As such the tree is considered to have a short useful life expectancy. Image 2 shows the subject trees. The trees provide some screening and relief from the rail corridor and associated infrastructure along Lillian Street.



Image 1: Aerial image showing location of additional tree removals.



Image 2: The three additional trees identified for removal as part of the Southwest Metro Package works.



NOTES

1. FOR GENERAL NOTES REFER TO DRAWINGS SHCSWSWM-MTM-WCS-CE-DWG-453104 TO 453197.
2. FOR LEGEND REFER TO DRAWING SHCSWSWM-MTM-WCS-CE-DWG-453108 TO 453109.
3. REFER TO STATION DESIGN PACKAGES FOR PLATFORM AND BUILDING WORKS.
4. FOR PAVEMENT PLAN REFER TO DRAWING SHCSWSWM-MTM-WCS-CE-DWG-453261
5. FOR BULK EARTHWORKS CUT AND FILL PLAN REFER DRAWING SHCSWSWM-MTM-WCS-CE-DWG-453201.
6. FOR BULK EARTHWORKS GRADING PLAN AND LONGITUDINAL SECTION REFER TO DRAWING SHCSWSWM-MTM-WCS-CE-DWG-453206.
7. FOR DRAINAGE LAYOUT REFER TO DRAWING SHCSWSWM-MTM-WCS-CE-DWG-453301.
8. FOR CSR LAYOUT REFER TO DRAWING SHCSWSWM-MTM-WCS-CE-DWG-453418. DO NOT REFER TO ANY OTHER GENERAL ARRANGEMENT PLANS FOR THE DESIGN AND EXTENTS OF CSR WORKS.
9. FOR UTILITIES LAYOUT REFER TO DRAWING SHCSWSWM-MTM-WCS-CE-DWG-453501.
10. FOR AUGRID LOCATION NOTES REFER TO UTILITIES LAYOUT DRAWING SHCSWSWM-MTM-WCS-CE-DWG-453501.
11. REFER TRACTION SUBSTATION ENABLING WORKS PACKAGE 030 FOR HV RELOCATION DETAILS.
12. THE SERVICE BUILDING IS REQUIRED TO COMPLY WITH EIS REQUIREMENTS. FURTHER FLOOD ASSESSMENT IS PENDING FOR SYDNEY METRO APPROVAL / ACCEPTANCE OF FLOOD IMPACTS BY THE PROPOSED SERVICE BUILDING.



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NO.	DATE	DESCRIPTION	APPROV.
1	18/12/2020	ISSUED FOR STAGE 1	[Signature]
2	18/12/2020	ISSUED FOR STAGE 2	[Signature]
3	18/12/2020	ISSUED FOR STAGE 3	[Signature]
4	18/12/2020	ISSUED FOR STAGE 4	[Signature]

NSW sydney METRO

METRON T2M

SYDNEY METRO

STATUS: STAGE 3

SHEET 2 OF 2

PROJ: SHCSWSWM-MTM-WCS-CE-DWG-453111

SYDNEY METRO

CAMPSE STATION - SERVICE BUILDING

CIVIL ENGINEERING

SERVICE BUILDING - CIVIL

GENERAL ARRANGEMENT PLAN

STATUS: STAGE 3

SHEET 2 OF 2

PROJ: SHCSWSWM-MTM-WCS-CE-DWG-453111

The additional trees to be removed are not representative of an endangered or threatened species or ecological community.

All appropriate approvals and consents are to be obtained prior to tree and vegetation removal works commencing. All tree removal works are to be undertaken by suitably qualified tree workers and in accordance with Safe Work Australia's Guide to Managing Risks of Tree Trimming and Removal Works.

Please feel free to contact me should you require any further assistance regarding this matter.

Regards.

Owen Tebbutt



Consulting Arborist
Plateau Tree Service

Appendix 1: Tree Assessment Schedule

Tree number	Tree name	Tree dimensions				Vigour	Condition	Age class	ULE	Amenity and Visual value	Native or Exotic	TPZ (m)	SRZ (m)	Comments	Remove or Retain
	Botanical name Common name	Height (m)	Spread (m)	D.B.H. (mm)	D.A.B. (mm)										
A	<i>Eucalyptus microcorys</i> (Tallowwood)	15-20	5x5	350	400	N	G	M	M	M	N	4.20	2.25	Tree within rail corridor. Tree located within padmount designed access footprint.	Remove
B	<i>Lophostemon confertus</i> (Brush Box)	10-15	2x2	200	300	N	G	Y	M	M	N	2.40	2.00	Tree within rail corridor. Tree located within padmount designed footprint.	Remove
C	<i>Eucalyptus microcorys</i> (Tallowwood)	10-15	4x4	350	350	N	F	M	S	M	N	4.20	2.13	Tree within rail corridor. Tree is in a state of declining health and located in padmount location.	Remove

Appendix 2: Tree Assessment Criteria

Tree number: Identifying number given to individual (or group) trees.

Botanical Name: Latin name for tree showing genus and species.

Common Name: The common name given to the tree.

Tree Dimensions: The physical dimensions of the tree.

- **Height:** Estimated or measured height of tree in meters.
- **Spread:** Estimated or measured radial canopy spread of tree in meters.
- **Diameter at Breast Height (DBH):** The estimated or measured diameter of trunk given in mm measured at 1.4m from ground.
- **Diameter Above Base:** The estimated or measured diameter of trunk given in mm measured above the root flare. Used to calculate the structural root zone of the tree.

Age Class: An estimation of how old the tree is in relation to its life expectancy.

- **Young** – Age less than 20% of life expectancy of tree in situ
- **Mature** – Age 20% - 80% of life expectancy of tree in situ
- **Old** – Age greater than 80% of life expectancy of tree in situ
- **Dead** – Tree is dead

Vigour: Ability of a tree to sustain its life processes. This is independent of the condition of a tree but may impact upon it. Vigour can appear to alter rapidly with change of seasons (seasonality) e.g., dormant, deciduous or semi-deciduous trees. Vigour can be categorised as Dormant, Low, Normal and High.

- **Dormant Vigour** – Determined by the existing turgidity in the lower order branches in the outer extremity of the crown, with good bud set and formation, and where the last extension growth is distinct from those most recently preceding it, evident by bud scale scars. Normal vigour during dormancy is achieved when such growth is evident on a majority of branches throughout the crown.
- **Low Vigour** – Reduced ability of a tree to sustain its life processes. This may be evident by the atypical growth of leaves, reduced crown cover and reduced crown density, branches, roots and trunk, and a deterioration of their functions with reduced resistance to predation. This is independent of the condition of a tree but may impact upon it, and especially the ability of a tree to sustain itself against predation.
- **Normal Vigour** – Ability of a tree to maintain and sustain its life processes. This may be evident by the typical growth of leaves, crown cover and crown density, branches, roots and trunk and resistance to predation. This is independent of the condition of a tree but may impact upon it, and especially the ability of a tree to sustain itself against predation.
- **High Vigour** – Accelerated growth of a tree due to incidental or deliberate artificial changes to its growing environment that are seemingly beneficial, but may result in premature aging or failure if the favourable conditions cease, or promote prolonged senescence if the favourable conditions remain, e.g. water from a leaking pipe, water and nutrients from a leaking or disrupted sewer pipe, nutrients from animal waste, a tree growing next to a chicken coop, or a stock feed lot, or a regularly used stockyard, a tree subject to stringent watering and fertilisation program, or some trees may achieve an extended lifespan from continuous pollarding practices over the life of the tree.

Condition: A tree's crown form and growth habit, as modified by its environment (aspect, suppression by other trees, soils) the stability and viability of the root plate, trunk and structural branches (first (1st) and possibly (2nd) order branches), including structural defects such as wounds, cavities or hollows, crooked trunk or weak trunk/branch junctions and the effects of predation by pests and diseases. These may not be directly connected with vigour and it is possible for a tree to be of normal vigour but in poor condition. Condition can be categorised as Dead, Poor, Fair and Good.

- **Dead Condition** – Tree is no longer capable of performing any of the following processes or is exhibiting any of the following symptoms; Photosynthesis via its foliage crown (as indicated by the presence of moist, green or other coloured leaves), Osmosis (the ability of the roots system to take up water), Turgidity (the ability of the plant to sustain moisture pressure in its cells), Epicormic shoots or epicormic strands in Eucalypts (the production of new shoots as a response to stress, generated from latent or adventitious buds or from a lignotuber), Permanent leaf loss, Permanent leaf wilting (the loss of turgidity which is marked by desiccation of stems leaves and roots), Abscission of the epidermis (bark desiccates and peels off to the beginning of the sap wood).
- **Poor Condition** - Tree is of good habit or misshapen, a form that may be severely restricted for space and light, exhibits symptoms of advanced and irreversible decline such as fungal, or bacterial infestation, major die-back in the branch and foliage crown, structural deterioration from insect damage e.g. termite infestation, or storm damage or lightning strike, ring barking from borer activity in the trunk, root damage or instability of the tree, or damage from physical wounding impacts or abrasion, or from altered local environmental conditions and has been unable to adapt to such changes and may decline further to death regardless of remedial works or other modifications to the local environment that would normally be sufficient to provide for its basic survival if in good to fair condition. Deterioration physically, often characterised by a gradual and continuous reduction in vigour but may be independent of a change in vigour, but characterised by a proportionate increase in susceptibility to, and predation by pests and diseases against which the tree cannot be sustained. Such conditions may also be evident in trees of advanced senescence due to normal phenological processes, without modifications to the growing environment or physical damage having been inflicted upon the tree. This may be independent from, or contributed to by vigour.
- **Fair Condition** - Tree is of good habit or misshapen, a form not severely restricted for space and light, has some physical indication of decline due to the early effects of predation by pests and diseases, fungal, bacterial, or insect infestation, or has suffered physical injury to itself that may be contributing to instability or structural weaknesses, or is faltering due to the modification of the environment essential for its basic survival. Such a tree may recover with remedial works where appropriate, or without intervention may stabilise or improve over time, or in response to the implementation of beneficial changes to its local environment. This may be independent from, or contributed to by vigour.
- **Good Condition** - Tree is of good habit, with crown form not severely restricted for space and light, physically free from the adverse effects of predation by pests and diseases, obvious instability or structural weaknesses, fungal, bacterial or insect infestation and is expected to continue to live in much the same condition as at the time of inspection provided conditions around it for its basic survival do not alter greatly. This may be independent from, or contributed to by vigour.

Safe Useful Life Expectancy (SULE) SULE is the length of time that the arborist assesses an individual tree can be retained with an acceptable level of risk based on the information available at the time of inspection. It is a snapshot in time of the potential an individual tree has for survival in the eyes of the assessor. SULE is not static – it is closely related to tree health and the surrounding conditions. Alterations in these variables may result in changes to the SULE assessment. Consequently, the reliability all SULE assessments have will decrease as time passes from the initial assessment and the potential for changes in variables increases.

- **Remove** – Trees that should be removed within the next 5 years
- **Short** – Trees that appear to be retainable at the time of the assessment for 5-15 years with an acceptable level of risk.
- **Medium** – Trees that appear to be retainable at the time of the assessment for 15-40 years with an acceptable level of risk.
- **Long** – Trees that appear to be retainable at the time of the assessment for 40+ years with an acceptable level of risk.

Amenity and Visual Value – For the purposes of assessing the visual and landscape value of each tree the IACA Significance of a Tree, Assessment Rating System (STARS) © (IACA 2010) © has been adopted. - The landscape significance of a tree is an essential criterion to establish the importance that a particular tree may have on a site. The system uses a scale of High, Medium and Low significance in the landscape.

High significance in landscape

- The tree is in good condition and good vigour
- The tree has a form typical for the species
- The tree is a remnant or is a planted locally indigenous specimen and/or is rare or uncommon in the local area or of botanical interest or of substantial age
- The tree is listed as a heritage item, threatened species or part of an endangered ecological community or listed on council's significant tree register
- The tree is visually prominent and visible from a considerable distance when viewed from most directions within the landscape due to its size and scale and makes a positive contribution to the local amenity
- The tree supports social and cultural sentiments or spiritual associations, reflected by the broader population or community group or has commemorative values
- The tree's growth is unrestricted by above and below ground influences, supporting its ability to reach dimensions typical for the taxa in situ – tree is appropriate to the site conditions

Medium significance in landscape

- The tree is in fair-good condition and good or low vigour
- The tree has form typical or atypical of the species
- The tree is a planted locally indigenous or a common species with its taxa commonly planted in the local area
- The tree is visible from surrounding properties, although not visually prominent as partially obstructed by other vegetation or buildings when viewed from the street
- The tree provides a fair contribution to the visual character and amenity of the local area
- The tree's growth is moderately restricted by above or below ground influences, reducing its ability to reach dimensions typical for the taxa in situ

Low significance in landscape

- The tree is in fair-poor condition and good or low vigour
- The tree has form atypical of the species
- The tree is not visible or is partly visible from the surrounding properties as obstructed by other vegetation or buildings
- The tree provides a minor contribution or has a negative impact on the visual character and amenity of the local area
- The tree is a young specimen which may or may not have reached dimensions to be protected by local Tree Preservation Orders or similar protection mechanisms and can easily be replaced with a suitable specimen
- The tree's growth is severely restricted by above or below ground influences, unlikely to reach dimensions typical for the taxa in situ – tree is inappropriate to the site conditions
- The tree is listed as exempt under the provisions of the local Council Tree Preservation Order or similar protection mechanisms
- The tree has a wound or defect that has the potential to become structurally unsound
- **Environmental Pest / Noxious Weed Species**
- The tree is an environmental pest species due to its invasiveness or poisonous/allergenic properties.
- The tree is a declared noxious weed by legislation
- **Hazardous / Irreversible Decline**
- The tree is structurally unsound and/or unstable and is considered potentially dangerous
- The tree is dead, or is in irreversible decline, or has the potential to fail or collapse in full or in part in the immediate to short term

The tree is to have a minimum of three (3) criteria in a category to be classified in that group.

In the development of this document IACA acknowledges the contribution and original concept of the Footprint Green Tree Significance & Retention Value Matrix, developed by Footprint Green Pty Ltd in June 2010.

The Australian Standard 4970-2009 Protection of Trees on Development Sites defines the requirements for assessing trees with respect to development. It provides the guidance on how to decide which trees are appropriate for retention and on the means of protecting them during construction works. It describes the areas and offsets, referred to as the Tree Protection Zone (TPZ) and Structural Root Zone (SRZ) required to be free from development works to maintain tree vitality and stability. This report has been prepared in accordance with the conditions set out within the standard.

- **Tree Protection Zone** – The tree protection zone is defined as a specified area above and below ground set aside for the protection of the tree's roots and crown. It is expressed as a radial measurement taken from the centre of the trunk at ground level.

Structural Root Zone – The structural root zone is defined as a specified area around the base of a tree required to maintain its stability within the ground. It is expressed as a radial measurement taken from the center of the trunk at ground level. Excavation and development works are not recommended within the structural root zone unless additional investigation as to root size and location is undertaken

APPENDIX 8.1 CAMPSIE AIA (PLATEAU TREES)

Date: 28 September 2021

Re: Additional tree removal and pruning works at Campsie Station as part of the Southwest Metro Package.

At the request of Downer Group an onsite inspection was undertaken at Campsie Station. It has been asked to identify and record additional tree removal and pruning works beyond those recommended within the Arboricultural Impact Assessment (AIA) prepared by Urban Arbor, dated 17 December 2019, Ref 19/12/17/SWMMS. On the 21 June a site walkthrough was undertaken by myself. Additional tree removals were identified under guidance of a Downer Group representative.

Six trees were assessed with respects to the proposed works. Three of these, being trees 614 *Triadica sebifera* (Chinese Tallow), 627 *Melaleuca bracteata* (Black Tea Tree) and 632 *Callistemon viminalis* (Weeping Bottlebrush) were assessed under the initial AIA prepared by Urban Arbor. The remaining three trees identified as tree 1 *Cinnamomum camphora* (Camphor Laurel), 2 and 3 *Celtis sinensis* (Hackberry) were not identified within the AIA. Data relating to these trees can be found as **Appendix 1** of this report. In addition, a dead tree and a clump of *Lantana camara* (Lantana) were identified for removal. Image 1 shows the approximate location of the assessed trees.

The proposed works involve the alignment of a new GST adjacent the southern side of the rail corridor. The western end of the GST transfers to an underground services alignment requiring a pit to be excavated. Tree 1 has been identified for

removal to accommodate the pit. The proposed GST is to be aligned within and follow the existing rail corridor fence. Trees 614 and 632 were identified for removal to accommodate the GST's alignment at and around the corners of the existing fence line. Selective pruning works to tree 627 were identified as being required to provide a workable area to install the GST. Three first order branches up to 25mm in diameter were identified for removal and constitute approximately 10-15% of the total canopy volume of the tree. The pruning is considered to be minor and is not expected to have a significant impact upon the health, condition or useful life expectancy of the tree. A reduction in short term growth and physiological function can be expected as a result of the pruning works. **Appendix 2** photographs 1 to 4 shows these trees.

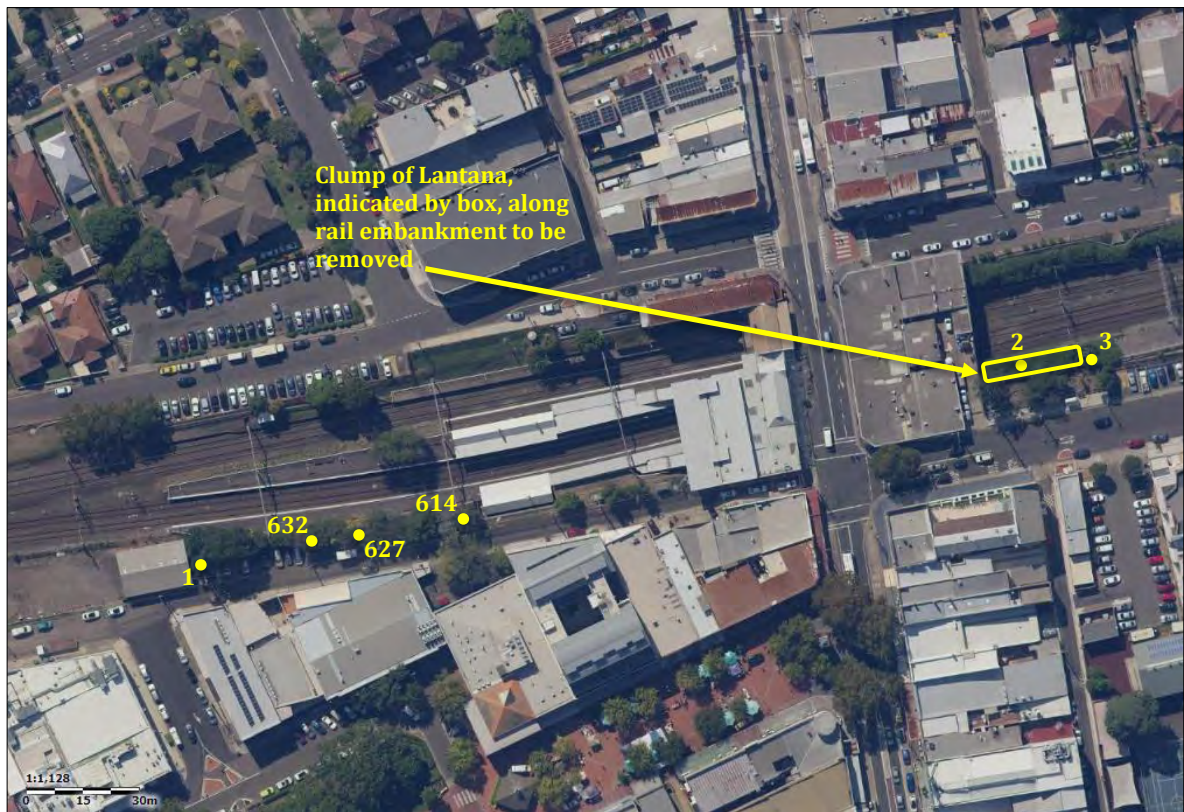


Image 1: Aerial image of Campsie station showing the approximate locations of assessed trees. (Source: Six Maps accessed 21/06/2021).

The eastern end of the new GST crosses the rail embankment on the eastern side of the rail bridge and requires the removal of the clump of Lantana and trees 2 and 3. **Appendix 2** photographs 5 and 6 shows these trees.

In order to minimise the impacts of installing the GST adjacent retained trees (611 to 637) all excavation for the GST support posts is to be undertaken using methods that do

not damage tree roots. The excavation must be carried out carefully using spades, forks, and trowels, taking care not to damage the bark and wood of any roots. Specialist tools for removing soil around roots using high-pressure air or water and a vac-truck may be an appropriate alternative to hand digging. If using high-pressure water, the operator is to be appropriately counselled about its use around roots prior to works commencing. Significant damage to tree roots can be caused if high-pressure water is directed upon them. All soil removal must be undertaken with care to minimise disturbance of roots beyond the immediate area of the excavation. Where possible, flexible clumps of smaller roots, including fibrous roots, should be retained if they can be displaced temporarily or permanently beyond the excavation without damage. If digging by hand, a fork should be used to loosen the soil and help locate any substantial roots. Once roots have been located, the trowel should be used to clear the soil away from them without damaging the bark.

Roots <100mm in diameter exposed within the support post excavations are to be appropriately pruned. All root pruning cuts are to be made using sharp clean tools such as secateurs, pruners or handsaws, into clean woody tissue perpendicular to the direction of root growth. Where possible the pruning cut is to be made to an appropriate growth point along the root. It should be understood that the effects of root pruning are not always predictable and can result in a decline in tree health and/or condition. A recommendation to remove a tree may be given by the project arborist where it is found that root pruning works are believed to result in a significant impact upon the health, condition, viability or stability of the tree (roots >100mm in diameter) and the relocation of the GST support post is not deemed possible.

The additional trees to be removed are not representative of an endangered or threatened species or ecological community. The Camphor Laurel, Hackberry and Lantana are identified weed species under the Biosecurity Act 2015. A general biosecurity duty exists to prevent, eliminate or minimise any biosecurity risk the plant may pose. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable.

All appropriate approvals and consents are to be obtained prior to tree and vegetation removal works commencing. All tree pruning and removal works are to be undertaken by suitably qualified tree workers and in accordance with *AS4373-2007 Pruning of Amenity Trees* and the Safe Work Australia's Guide to Managing Risks of Tree Trimming and Removal Works.

Please feel free to contact me should you require any further assistance regarding this matter.

Regards.

Owen Tebbutt



Consulting Arborist
Plateau Tree Service

Appendix 1: Tree assessment Schedule

Tree number	Tree name	Tree dimensions				Vigour	Condition	Age class	ULE	Amenity and Visual Value	Native or Exotic	TPZ (m)	SRZ (m)	Comments	Remove or Retain
	Botanical name Common name	Height (m)	Spread (m)	D.B.H. (mm)	D.A.B. (mm)										
1	<i>Cinnamomum camphora</i> (Camphor Laurel)	5-10	1x1	50-90	-	N	G	SM	S	L	E	2	1.5	Fourteen individual stems. Likely to be self-seeded or originating off old stumps. Listed weed species under the Biosecurity act 2015. Clash with permanent GST, underground services and platform 2 retaining wall.	Remove
2	<i>Celtis sinensis</i> (Hackberry)	5-10	3x3	-	-	N	G	M	S	L	E	2	1.5	Trunk of tree obscured from view – minimum TPZ and SRZ apply. Growing on embankment within rail corridor. Likely to be self-seeded. Listed weed species under the Biosecurity act 2015. Clash with permanent GST.	Remove
3	<i>Celtis sinensis</i> (Hackberry)	1-5	2x2	6x50-100	400	N	G	M	S	L	E	2.88	2.25	Multi-stemmed specimen. Growing on embankment within rail corridor. Likely to be self-seeded. Listed weed species under the Biosecurity act 2015. Clash with permanent GST.	Remove
614	<i>Triadica sebifera</i> (Chinese Tallow)	5-10	3x3	321	400	N	F	M	M	M	E	3.9	2.3	Multi-stemmed specimen within rail corridor. Clash with permanent GST, underground services and platform 2 retaining wall.	Remove
627	<i>Melaleuca bracteata</i> (Black Tea Tree)	5-10	2x2	194	260	N	F	SM	M	M	N	2.3	1.9	Twin-stemmed specimen within rail corridor. Clash with permanent GST, underground services and platform 2 retaining wall.	Remove
632	<i>Callistemon viminalis</i> (Weeping Bottlebrush)	5-10	2x2	284	284	N	G	M	M	M	N	3.4	1.9	Multi-stemmed specimen within rail corridor. Clash with permanent GST, underground services and platform 2 retaining wall.	Remove

Appendix 2: Site Photographs

Photograph 1: Clump of vegetation consisting of approximately 14 individual stems of *Cinnamomum camphora* (Camphor Laurel) and a dead tree identified for removal.



Photograph 2: Tree 632 *Callistemon viminalis* (Bottlebrush) identified for removal to accommodate the new GST alignment.



Photograph 3: Tree 627 *Leptospermum petersonii* (Lemon-scented Teatree) identified for selective pruning works create clearances to allow for the new GST alignment.



Photograph 4: Tree 614 *Sapium sebiferum* (Chinese Tallowwood) identified for removal to accommodate the new GST alignment.

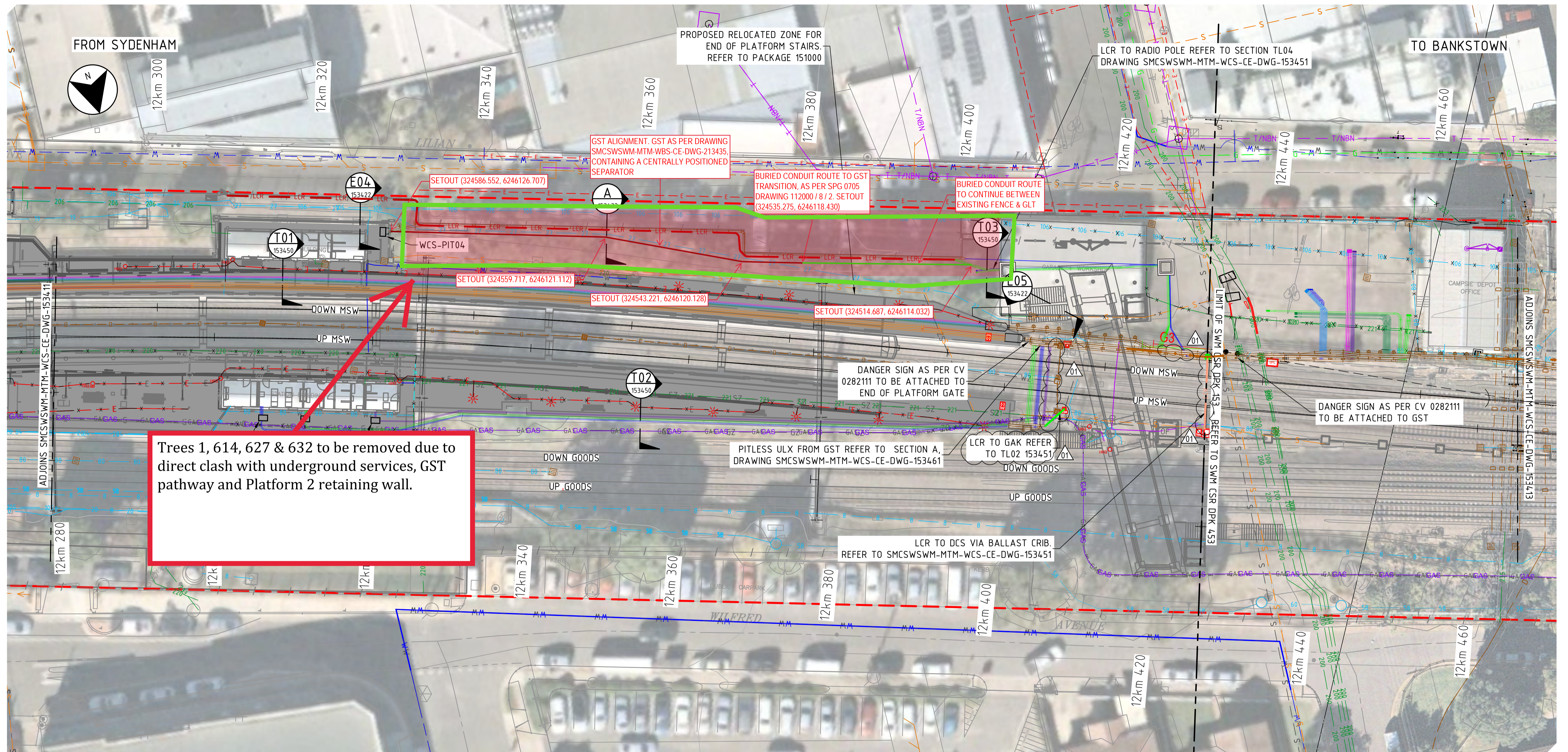


Photograph 5: Tree 6 *Celtis sinensis* (Hackberry) located within rail corridor. Tree to be removed to accommodate the new GST alignment. The surrounding Lantana along the rail embankment is also to be removed.



Photograph 6: Tree 7 *Celtis sinensis* (Hackberry) located within rail corridor. Tree to be removed to accommodate the new GST alignment.





Trees 1, 614, 627 & 632 to be removed due to direct clash with underground services, GST pathway and Platform 2 retaining wall.

PLAN VIEW
SCALE 1:250

NOTES

- FOR GENERAL NOTES REFER TO DRAWINGS SMCSWSWM-MTM-WCS-CE-DWG-153401 TO 153405.
- FOR LEGEND REFER TO DRAWINGS SMCSWSWM-MTM-WCS-CE-DWG-153408 AND 153409.
- FOR CORRIDOR CSR WORKS, REFER TO S2B CSR DPK 660.

LEGEND

- BACKBONE (CSR) CONDUITS**
- CSR - HV (33kV)
 - CSR - HV (11kV)
 - CSR - LOW VOLTAGE
 - CSR - COMMUNICATIONS
 - CSR - SIGNALLING

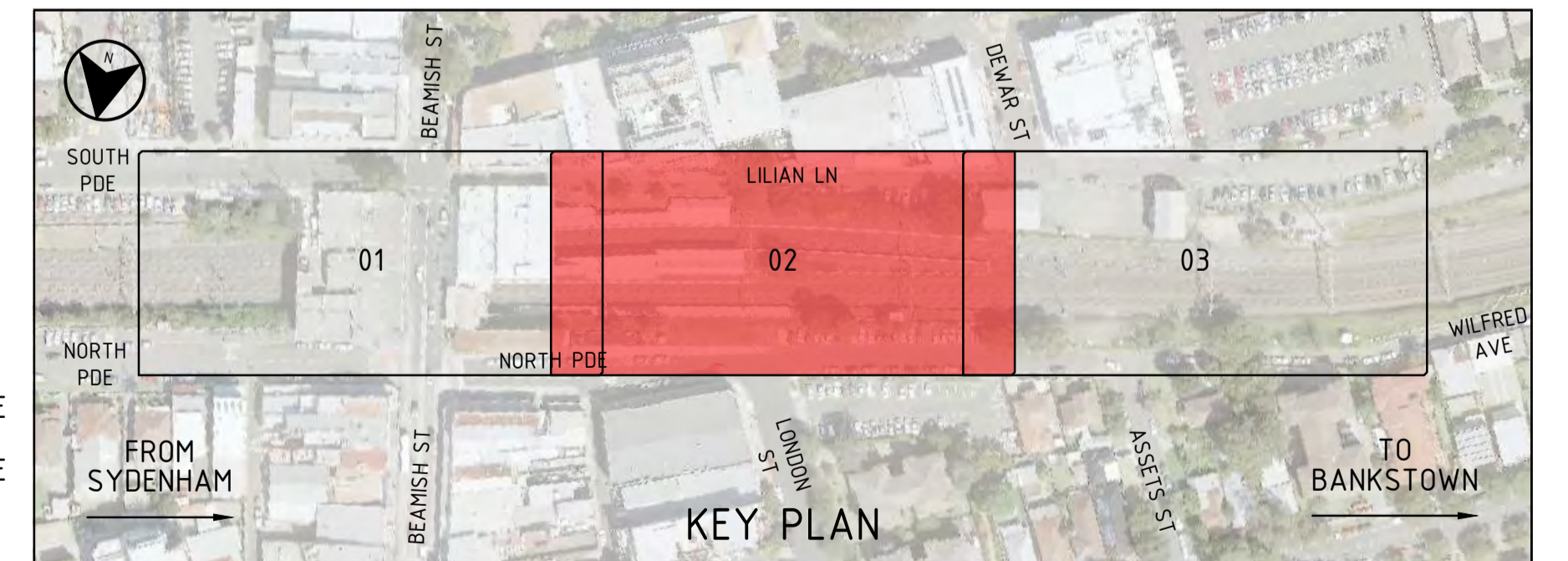
- LOCAL (LCR) CONDUITS**
- LCR - LOW VOLTAGE
 - LCR - COMMUNICATIONS
 - LCR - SIGNALLING

- OTHER**
- CSR - PROPOSED GST ROUTE
 - CSR - PROPOSED CABLE TRAY ROUTE
 - CSR - PROPOSED PIT

- LCR - PROPOSED TRENCH ROUTE
- LCR - PROPOSED BALLAST ROUTE
- LCR - PROPOSED GST ROUTE

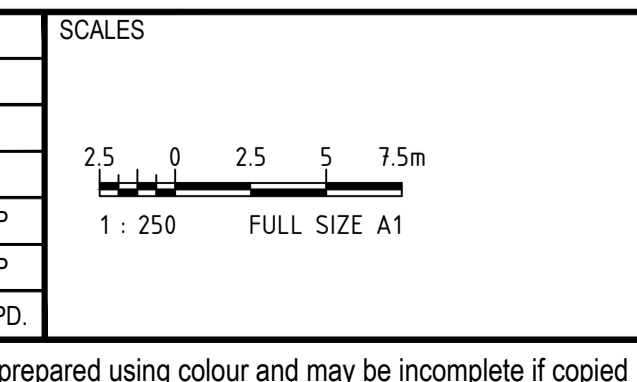
SYDNEY TRAINS RELOCATED SERVICES

- ST - SYDNEY TRAINS RELOCATION ROUTE
- ST - SYDNEY TRAINS RELOCATION ROUTE BY OTHERS



DRAWING COLOUR CODED - PRINT ALL COPIES IN COLOUR FOR CONSTRUCTION

REV.	BY	DATE	DESCRIPTION	APPD.
01.02			CRFI-000492	
01	NJ	20/08/2021	CRFI-000299	LP
00	NJ	14/04/2021	APPROVED FOR CONSTRUCTION	LP



NOTE: Do not scale from this drawing. ALT. DRG No SMCSWSWM-MTM-WCS-CE-DWG-153412

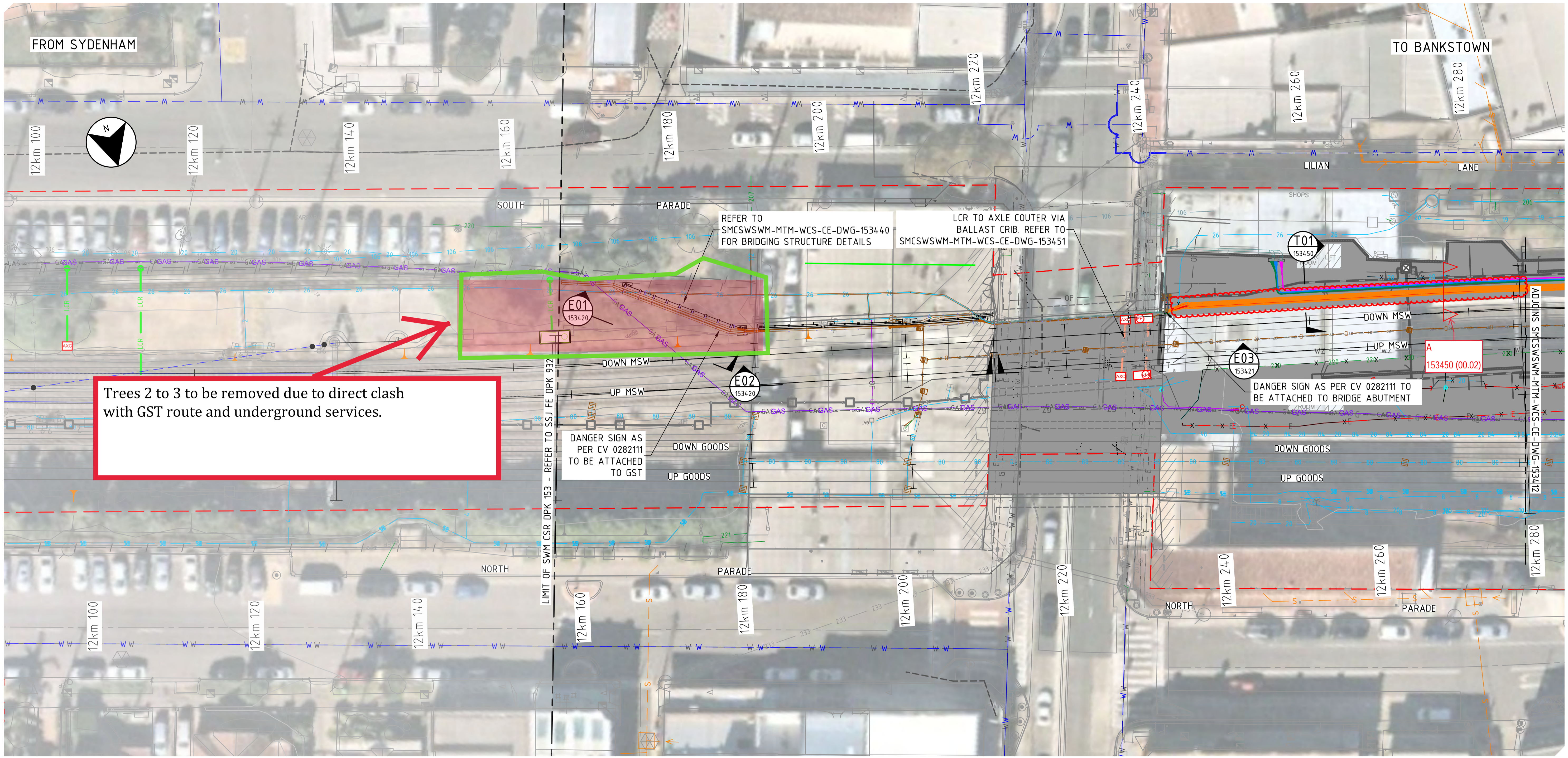


CLIENT: METRON T2M
 SERVICE PROVIDERS: H.HU & A.DILLON
 DRAWN: H.HU & A.DILLON
 DESIGNED: N.JULIAN
 DRG CHECK: P.ALFORD
 DESIGN CHECK: O.COLE & A.SHANTIA
 APPROVED: L.PALMER
 DATE: 20/08/2021

SYDNEY METRO
 CAMPSIE STATION (12.165KM TO 12.505KM)
 CIVIL ENGINEERING
 COMBINED SERVICES ROUTE (CSR)
 DETAIL LAYOUT PLAN
 STATUS: FOR CONSTRUCTION SHEET 2 OF 3
 DRG No SMCSWSWM-MTM-WCS-CE-DWG-153412 REV. 01

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Plot Date: 07/04/21 - 16:23 Cad File: C:\pwworking\au\p05\heleen.hu\168937\SMCSWSWM-MTM-WCS-CE-DWG-153411.dwg



Trees 2 to 3 to be removed due to direct clash with GST route and underground services.

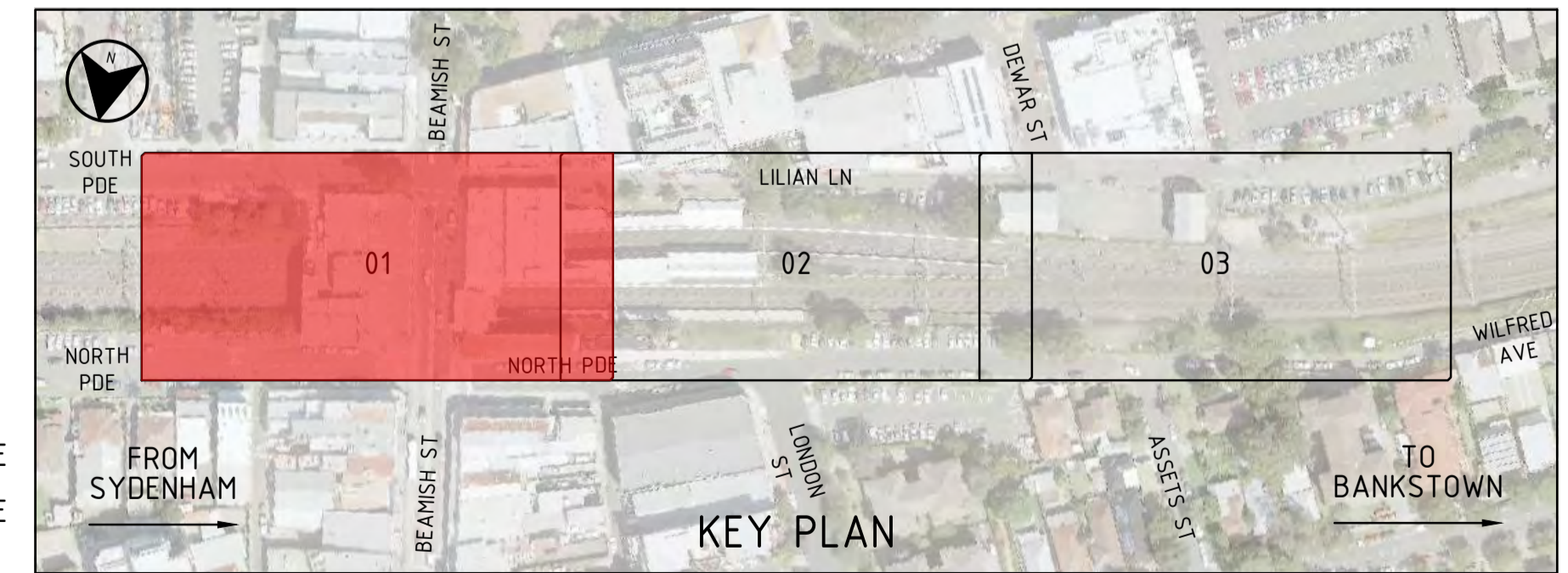
PLAN VIEW
SCALE 1:250

NOTES

1. FOR GENERAL NOTES REFER TO DRAWINGS SMCSWSWM-MTM-WCS-CE-DWG-153401 TO 153405.
2. FOR LEGEND REFER TO DRAWINGS SMCSWSWM-MTM-WCS-CE-DWG-153408 AND 153409.

LEGEND

<p>BACKBONE (CSR) CONDUITS</p> <ul style="list-style-type: none"> — CSR - HV (33kV) — CSR - HV (11kV) — CSR - LOW VOLTAGE — CSR - COMMUNICATIONS — CSR - SIGNALLING 	<p>LOCAL (LCR) CONDUITS</p> <ul style="list-style-type: none"> — LCR - LOW VOLTAGE — LCR - COMMUNICATIONS — LCR - SIGNALLING 	<p>OTHER</p> <ul style="list-style-type: none"> — CSR - PROPOSED GST ROUTE — CSR - PROPOSED CABLE TRAY ROUTE CSR - PROPOSED PIT — LCR - PROPOSED TRENCH ROUTE — LCR - PROPOSED BALLAST ROUTE — LCR - PROPOSED GST ROUTE 	<p>SYDNEY TRAINS RELOCATED SERVICES</p> <ul style="list-style-type: none"> — ST - SYDNEY TRAINS RELOCATION ROUTE — ST - SYDNEY TRAINS RELOCATION ROUTE BY OTHERS
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DRAWING COLOUR CODED - PRINT ALL COPIES IN COLOUR FOR CONSTRUCTION

REV.	BY	DATE	DESCRIPTION	APPD.
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00	NJ	14/04/2021	APPROVED FOR CONSTRUCTION	LP

SCALES

1 : 250 FULL SIZE A1

NOTE: Do not scale from this drawing. ALT. DRG No SMCSWSWM-MTM-WCS-CE-DWG-153411



CLIENT

SYDNEY METRO

SERVICE PROVIDERS

METRON T2M

DRAWN: H.HU & A.DILLON
 DESIGNED: N.JALILIAN
 DRG CHECK: P.ALFORD
 DESIGN CHECK: O.COLE & A.SHANTIA
 APPROVED: L.PALMER 14/04/2021

SYDNEY METRO

CAMPSIE STATION (12.165KM TO 12.505KM)
 CIVIL ENGINEERING
 COMBINED SERVICES ROUTE (CSR)
 DETAIL LAYOUT PLAN

STATUS: FOR CONSTRUCTION SHEET 1 OF 3

DRG No: SMCSWSWM-MTM-WCS-CE-DWG-153411 REV. 00

Appendix 3: Tree Assessment Criteria

Tree number: Identifying number given to individual (or group) trees.

Botanical Name: Latin name for tree showing genus and species.

Common Name: The common name given to the tree.

Tree Dimensions: The physical dimensions of the tree.

- **Height:** Estimated or measured height of tree in meters.
- **Spread:** Estimated or measured radial canopy spread of tree in meters.
- **Diameter at Breast Height (DBH):** The estimated or measured diameter of trunk given in mm measured at 1.4m from ground.
- **Diameter Above Base (DAB):** The estimated or measured diameter of trunk given in mm measured above the root flare. Used to calculate the structural root zone of the tree.

Age Class: An estimation of how old the tree is in relation to its life expectancy.

- **Young** – New tree planting
- **Semi-Mature** – Established tree with an age less than 20% of life expectancy of tree in situ
- **Mature** – Established tree with an age 20% - 80% of life expectancy of tree in situ
- **Old** – Established tree with an age greater than 80% of life expectancy of tree in situ
- **Dead** – Tree is dead

Vigour: Ability of a tree to sustain its life processes. This is independent of the condition of a tree but may impact upon it. Vigour can appear to alter rapidly with change of seasons (seasonality) e.g., dormant, deciduous or semi-deciduous trees. Vigour can be categorised as Dormant, Low, Normal and High.

- **Dormant Vigour** – Determined by the existing turgidity in the lower order branches in the outer extremity of the crown, with good bud set and formation, and where the last extension growth is distinct from those most recently preceding it, evident by bud scale scars. Normal vigour during dormancy is achieved when such growth is evident on a majority of branches throughout the crown.
- **Low Vigour** – Reduced ability of a tree to sustain its life processes. This may be evident by the atypical growth of leaves, reduced crown cover and reduced crown density, branches, roots and trunk, and a deterioration of their functions with reduced resistance to predation. This is independent of the condition of a tree but may impact upon it, and especially the ability of a tree to sustain itself against predation.
- **Normal Vigour** – Ability of a tree to maintain and sustain its life processes. This may be evident by the typical growth of leaves, crown cover and crown density, branches, roots and trunk and resistance to predation. This is independent of the condition of a tree but may impact upon it, and especially the ability of a tree to sustain itself against predation.
- **High Vigour** – Accelerated growth of a tree due to incidental or deliberate artificial changes to its growing environment that are seemingly beneficial, but may result in premature aging or failure if the favourable conditions cease, or promote prolonged senescence if the favourable conditions remain, e.g. water from a leaking pipe, water and nutrients from a leaking or disrupted sewer pipe, nutrients from animal waste, a tree growing next to a chicken coop, or a stock feed lot, or a regularly used stockyard, a tree subject to stringent watering and fertilisation program, or some trees may achieve an extended lifespan from continuous pollarding practices over the life of the tree.

Condition: A tree's crown form and growth habit, as modified by its environment (aspect, suppression by other trees, soils) the stability and viability of the root plate, trunk and structural branches (first (1st) and possibly (2nd) order branches), including structural defects such as wounds, cavities or hollows, crooked trunk or weak trunk/branch junctions and the effects of predation by pests and diseases. These may not be directly connected with vigour and it is possible for a tree to be of normal vigour but in poor condition. Condition can be categorised as Dead, Poor, Fair and Good.

- **Dead Condition** – Tree is no longer capable of performing any of the following processes or is exhibiting any of the following symptoms; Photosynthesis via its foliage crown (as indicated by the presence of moist, green or other coloured leaves), Osmosis (the ability of the roots system to take up water), Turgidity (the ability of the plant to sustain moisture pressure in its cells), Epicormic shoots or epicormic strands in Eucalypts (the production of new shoots as a response to stress, generated from latent or adventitious buds or from a lignotuber), Permanent leaf loss, Permanent leaf wilting (the loss of turgidity which is marked by desiccation of stems leaves and roots), Abscission of the epidermis (bark desiccates and peels off to the beginning of the sap wood).
- **Poor Condition** - Tree is of good habit or misshapen, a form that may be severely restricted for space and light, exhibits symptoms of advanced and irreversible decline such as fungal, or bacterial infestation, major die-back in the branch and foliage crown, structural deterioration from insect damage e.g. termite infestation, or storm damage or lightning strike, ring barking from borer activity in the trunk, root damage or instability of the tree, or damage from physical wounding impacts or abrasion, or from altered local environmental conditions and has been unable to adapt to such changes and may decline further to death regardless of remedial works or other modifications to the local environment that would normally be sufficient to provide for its basic survival if in good to fair condition. Deterioration physically, often characterised by a gradual and continuous reduction in vigour but may be independent of a change in vigour, but characterised by a proportionate increase in susceptibility to, and predation by pests and diseases against which the tree cannot be sustained. Such conditions may also be evident in trees of advanced senescence due to normal phenological processes, without modifications to the growing environment or physical damage having been inflicted upon the tree. This may be independent from, or contributed to by vigour.
- **Fair Condition** - Tree is of good habit or misshapen, a form not severely restricted for space and light, has some physical indication of decline due to the early effects of predation by pests and diseases, fungal, bacterial, or insect infestation, or has suffered physical injury to itself that may be contributing to instability or structural weaknesses, or is faltering due to the modification of the environment essential for its basic survival. Such a tree may recover with remedial works where appropriate, or without intervention may stabilise or improve over time, or in response to the implementation of beneficial changes to its local environment. This may be independent from, or contributed to by vigour.
- **Good Condition** - Tree is of good habit, with crown form not severely restricted for space and light, physically free from the adverse effects of predation by pests and diseases, obvious instability or structural weaknesses, fungal, bacterial or insect infestation and is expected to continue to live in much the same condition as at the time of inspection provided conditions around it for its basic survival do not alter greatly. This may be independent from, or contributed to by vigour.

Useful Life Expectancy (ULE) ULE is the length of time that the arborist assesses an individual tree can be retained with an acceptable level of risk based on the information available at the time of inspection. It is a snapshot in time of the potential an individual tree has for survival in the eyes of the assessor. ULE is not static – it is closely related to tree health and the surrounding conditions. Alterations in these variables may result in changes to the ULE assessment. Consequently, the reliability all ULE assessments have will decrease as time passes from the initial assessment and the potential for changes in variables increases.

- **Remove** – Trees that should be removed within the next 5 years
- **Short** – Trees that appear to be retainable at the time of the assessment for 5-15 years with an acceptable level of risk.
- **Medium** – Trees that appear to be retainable at the time of the assessment for 15-40 years with an acceptable level of risk.
- **Long** – Trees that appear to be retainable at the time of the assessment for 40+ years with an acceptable level of risk.

Amenity and Visual Value – For the purposes of assessing the visual and landscape value of each tree the IACA Significance of a Tree, Assessment Rating System (STARS) © (IACA 2010) © has been adopted. - The landscape significance of a tree is an essential criterion to establish the importance that a particular tree may have on a site. The system uses a scale of High, Medium and Low significance in the landscape.

High significance in landscape

- The tree is in good condition and good vigour
- The tree has a form typical for the species
- The tree is a remnant or is a planted locally indigenous specimen and/or is rare or uncommon in the local area or of botanical interest or of substantial age
- The tree is listed as a heritage item, threatened species or part of an endangered ecological community or listed on council's significant tree register
- The tree is visually prominent and visible from a considerable distance when viewed from most directions within the landscape due to its size and scale and makes a positive contribution to the local amenity
- The tree supports social and cultural sentiments or spiritual associations, reflected by the broader population or community group or has commemorative values
- The tree's growth is unrestricted by above and below ground influences, supporting its ability to reach dimensions typical for the taxa in situ – tree is appropriate to the site conditions

Medium significance in landscape

- The tree is in fair-good condition and good or low vigour
- The tree has form typical or atypical of the species
- The tree is a planted locally indigenous or a common species with its taxa commonly planted in the local area
- The tree is visible from surrounding properties, although not visually prominent as partially obstructed by other vegetation or buildings when viewed from the street
- The tree provides a fair contribution to the visual character and amenity of the local area
- The tree's growth is moderately restricted by above or below ground influences, reducing its ability to reach dimensions typical for the taxa in situ

Low significance in landscape

- The tree is in fair-poor condition and good or low vigour
- The tree has form atypical of the species
- The tree is not visible or is partly visible from the surrounding properties as obstructed by other vegetation or buildings
- The tree provides a minor contribution or has a negative impact on the visual character and amenity of the local area
- The tree is a young specimen which may or may not have reached dimensions to be protected by local Tree Preservation Orders or similar protection mechanisms and can easily be replaced with a suitable specimen
- The tree's growth is severely restricted by above or below ground influences, unlikely to reach dimensions typical for the taxa in situ – tree is inappropriate to the site conditions
- The tree is listed as exempt under the provisions of the local Council Tree Preservation Order or similar protection mechanisms
- The tree has a wound or defect that has the potential to become structurally unsound
- **Environmental Pest / Noxious Weed Species**
- The tree is an environmental pest species due to its invasiveness or poisonous/allergenic properties.
- The tree is a declared noxious weed by legislation
- **Hazardous / Irreversible Decline**
- The tree is structurally unsound and/or unstable and is considered potentially dangerous
- The tree is dead, or is in irreversible decline, or has the potential to fail or collapse in full or in part in the immediate to short term

The tree is to have a minimum of three (3) criteria in a category to be classified in that group.

In the development of this document IACA acknowledges the contribution and original concept of the Footprint Green Tree Significance & Retention Value Matrix, developed by Footprint Green Pty Ltd in June 2010.

The Australian Standard 4970-2009 Protection of Trees on Development Sites defines the requirements for assessing trees with respect to development. It provides the guidance on how to decide which trees are appropriate for retention and on the means of protecting them during construction works. It describes the areas and offsets, referred to as the Tree Protection Zone (TPZ) and Structural Root Zone (SRZ) required to be free from development works to maintain tree vitality and stability. This report has been prepared in accordance with the conditions set out within the standard.

- **Tree Protection Zone** – The tree protection zone is defined as a specified area above and below ground set aside for the protection of the tree's roots and crown. It is expressed as a radial measurement taken from the centre of the trunk at ground level.
- **Structural Root Zone** – The structural root zone is defined as a specified area around the base of a tree required to maintain its stability within the ground. It is expressed as a radial measurement taken from the center of the trunk at ground level. Excavation and development works are not recommended within the structural root zone unless additional investigation as to root size and location is undertaken

APPENDIX 8.2 CAMPSIE AIA (PLATEAU TREES)

Date: 28 September 2021

Re: Additional tree removal and pruning works at Campsie Station as part of the Southwest Metro Package.

At the request of Downer Group an onsite inspection was undertaken at Campsie Station. It has been asked to identify and record additional tree removal and pruning works beyond those recommended within the Arboricultural Impact Assessment (AIA) prepared by Urban Arbor, dated 17 December 2019, Ref 19/12/17/SWMMMS. On the 20 August a site walkthrough was undertaken by myself. Additional tree removals were identified under guidance of a Downer Group representative.

It is proposed to construct a new fence along the southern side of Platform 2 and access the rail corridor adjacent South Parade to undertake pilling works (Image 1 shows the proposed works locations). These works impact upon twenty-one individual trees all of which are identified within the existing AIA report.

The new fencing, including access requirements, adjacent the southern side of Platform 2 shall require the removal of trees 615, 616, 620, 621, 622, 623, 624, 625, 626, 628, 629, 630, 631, 633, 634, 635 and 636. Access requirements adjacent South Parade require trees 515, 516, 517 and 519 to be removed as well as an existing dead palm tree stump. Data relating to the trees can be found as Appendix 1 Tree Assessment Schedule for data relating to the aforementioned trees. The AIA report prepared by Urban Arbor states the health of tree 516 as fair and 517 as good. I can confirm that at the time of the inspection these trees were found to be

dead. Tree 615 was also found to be in a state of declining health and beyond reasonable attempts to remediate. The AIA report also identifies trees 615 and 620 as being exempt from local tree preservation controls. The additional trees to be removed are not representative of an endangered or threatened species or ecological community. Photographs of the assessed trees have been attached to the rear of this report as Appendix 2 Site Photographs.



Image 1: Aerial image of Campsie station showing the approximate locations of assessed trees. (Source: Six Maps accessed 23/08/2021).

Tree removals are only to be undertaken where a direct conflict between the proposed works and the position of the tree exists. Where appropriate selective pruning and implementation of tree protection measures is to be considered as a preferred option to whole tree removal. Tree protection measures are to be implemented in accordance with section 11 of the AIA report and the project arborists recommendations.

All appropriate approvals and consents are to be obtained prior to tree and vegetation removal works commencing. All tree pruning and removal works are to be undertaken by suitably qualified tree workers and in accordance with *AS4373-2007 Pruning of Amenity Trees* and the Safe Work Australia's Guide to Managing Risks of Tree Trimming and Removal Works.

Please feel free to contact me should you require any further assistance regarding this matter.

Regards.

Owen Tebbutt



Consulting Arborist
Plateau Tree Service

Appendix 1: Tree Assessment Schedule

Tree number	Tree name	Tree dimensions				Vigour	Condition	Age class	ULE	Amenity and Visual Value	Native or Exotic	TPZ (m)	SRZ (m)	Comments	Remove or Retain
	Botanical name Common name	Height (m)	Spread (m)	D.B.H. (mm)	D.A.B. (mm)										
515	<i>Cotoneaster</i> sp (Cotoneaster)	1-5	2x2	-	-	N	G	M	R	L	N	2	1.5	Listed weed species. All plants are regulated with a general biosecurity duty to prevent, eliminate or minimise any biosecurity risk they may pose. Any person who deals with any plant, who knows (or ought to know) of any biosecurity risk, has a duty to ensure the risk is prevented, eliminated or minimised, so far as is reasonably practicable.	Remove
516	<i>Leptosporum petersonii</i> (Lemon-scented Tea Tree)	1-5	1x1	160	180	-	D	D	R	L	N	2	1.6	Dead tree. Tree located within rail corridor adjacent Platform 2.	Remove
517	<i>Pittosporum undulatum</i> (Sweet Pittosporum)	5-10	2x2	290	300	-	D	D	R	L	N	3.5	2	Dead tree. Tree located within rail corridor adjacent Platform 2.	Remove
519	<i>Callistemon viminalis</i> (Weeping Bottlebrush)	5-10	2x2	330	400	N	G	M	L	M	N	4	2.3	Tree located within rail corridor adjacent Platform 2.	Remove
615	<i>Acacia podalyrifolia</i> (Queensland Wattle)	5-10	2x2	156	200	L	F	M	Y	L	N	2	1.7	Tree located within rail corridor adjacent Platform 2. Exempt tree species.	Remove
616	<i>Pittosporum undulatum</i> (Sweet Pittosporum)	5-10	4x4	341	550	N	G	M	S	M	N	4.1	2.6	Tree located within rail corridor adjacent Platform 2.	Remove
620	<i>Acacia podalyrifolia</i> (Queensland Wattle)	5-10	2x2	200	200	N	G	M	Y	L	N	2.4	1.7	Tree located within rail corridor adjacent Platform 2. Exempt tree species.	Remove
621	<i>Syncarpia glomulifera</i> (Turpentine)	5-10	3x3	260	300	N	G	SM	L	M	N	3.1	2	Tree located within rail corridor adjacent Platform 2.	Remove
622	<i>Melaleuca bracteata</i> (Black Tea Tree)	5-10	1x1	185	250	N	G	SM	M	M	N	2.2	1.8	Tree located within rail corridor adjacent Platform 2.	Remove
623	<i>Callistemon viminalis</i> (Weeping Bottlebrush)	5-10	1x1	120	150	N	G	SM	R	L	N	2	1.5	Tree located within rail corridor adjacent Platform 2.	Remove

Tree number	Tree name	Tree dimensions				Vigour	Condition	Age class	ULE	Amenity and Visual Value	Native or	TPZ (m)	SRZ (m)	Comments	Remove or Retain
624	<i>Melaleuca bracteata</i> (Black Tea Tree)	5-10	2x2	186	200	N	G	SM	M	M	N	2.2	1.7	Tree located within rail corridor adjacent Platform 2.	Remove
625	<i>Callistemon viminalis</i> (Weeping Bottlebrush)	5-10	1x1	174	200	N	G	SM	L	M	N	2.1	1.7	Tree located within rail corridor adjacent Platform 2.	Remove
626	<i>Melaleuca bracteata</i> (Black Tea Tree)	5-10	2x2	160	190	N	G	SM	L	M	N	2	1.6	Tree located within rail corridor adjacent Platform 2.	Remove
628	<i>Callistemon viminalis</i> (Weeping Bottlebrush)	5-10	2x2	250	250	N	G	SM	L	M	N	3	1.8	Tree located within rail corridor adjacent Platform 2.	Remove
629	<i>Callistemon viminalis</i> (Weeping Bottlebrush)	5-10	2x2	300	300	N	G	SM	M	M	N	3.6	2	Tree located within rail corridor adjacent Platform 2.	Remove
630	<i>Callistemon viminalis</i> (Weeping Bottlebrush)	5-10	2x2	198	220	N	G	SM	L	M	N	2.4	1.8	Tree located within rail corridor adjacent Platform 2.	Remove
631	<i>Callistemon viminalis</i> (Weeping Bottlebrush)	5-10	2x2	185	200	N	G	SM	M	M	N	2.2	1.7	Tree located within rail corridor adjacent Platform 2.	Remove
633	<i>Callistemon viminalis</i> (Weeping Bottlebrush)	5-10	2x2	240	280	N	G	SM	L	M	N	2.9	1.9	Tree located within rail corridor adjacent Platform 2.	Remove
634	<i>Callistemon viminalis</i> (Weeping Bottlebrush)	5-10	2x2	233	220	N	G	SM	L	M	N	2.8	1.8	Tree located within rail corridor adjacent Platform 2.	Remove
635	<i>Callistemon viminalis</i> (Weeping Bottlebrush)	5-10	2x2	200	220	N	G	SM	L	M	N	2.4	1.8	Tree located within rail corridor adjacent Platform 2.	Remove
636	<i>Callistemon viminalis</i> (Weeping Bottlebrush)	5-10	2x2	160	180	N	G	SM	M	M	N	2	1.6	Tree located within rail corridor adjacent Platform 2.	Remove

Appendix 2: Site Photographs

Photograph 1: Tree 515 *Cotoneaster* sp (Cotoneaster) located adjacent the northern side of South Parade.



Photograph 2: Tree 516 *Leptosporum petersonii* (Lemon-scented Teatree) was found to be dead.



Photograph 3: Tree 517 *Pittosporum undulatum* (Sweet Pittosporum) was found to be dead.



Photograph 4: Tree 519 *Callistemon viminalis* (Weeping Bottlebrush) located adjacent the northern side of South Parade.



Photograph 5: Tree 615 *Acacia podalyrifolia* (Queensland Silver Wattle) located adjacent Platform 2. The adjacent Queensland Silver Wattle's are near dead.



Photograph 6: Tree 5 *Melaleuca bracteata* (Black Teatree) located adjacent Platform 2.

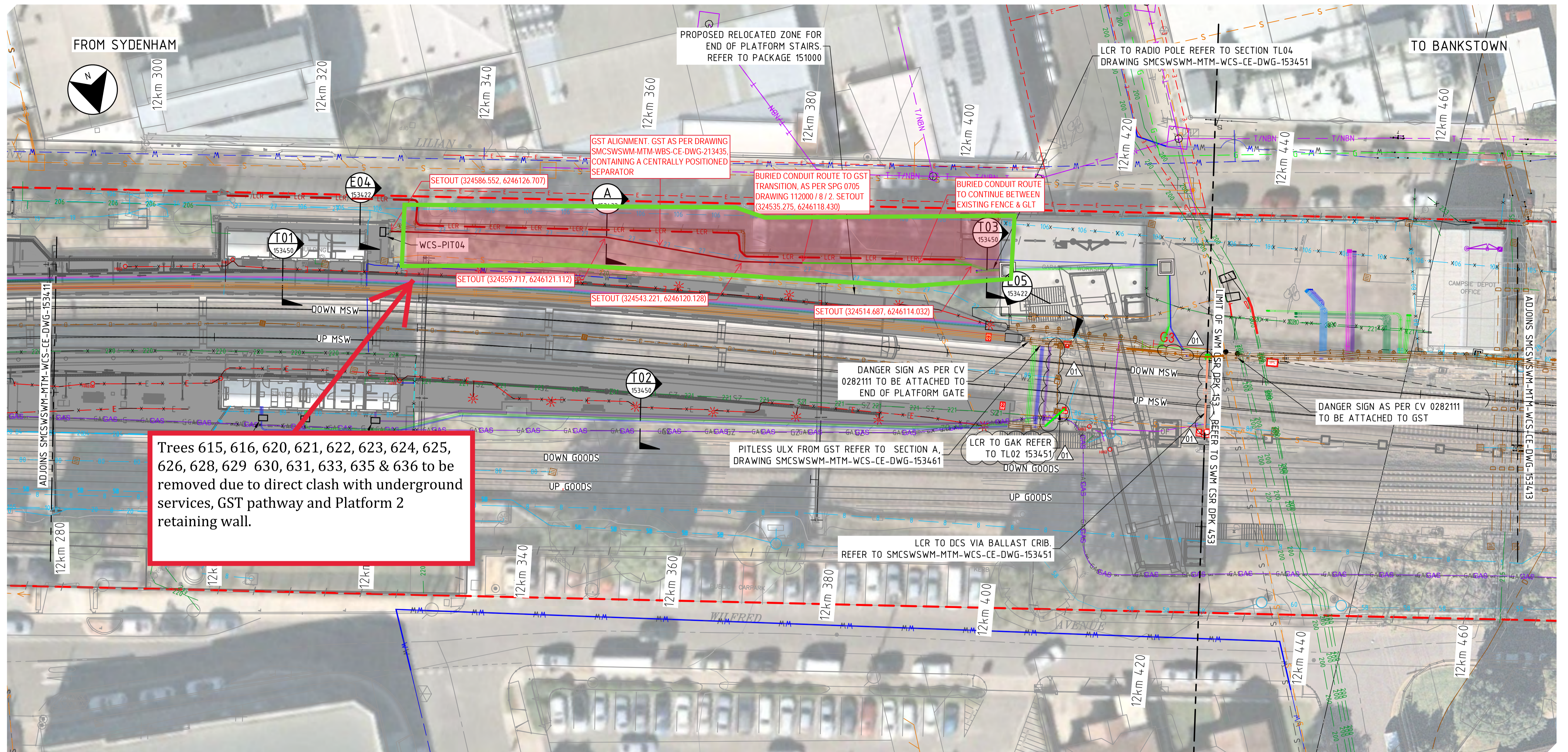


Photograph 7: Showing trees adjacent Platform 2. Tree 621 *Syncarpia glomulifera* (Turpentine) is shown for reference.



Photograph 8: Showing trees adjacent Platform 2. Tree 632 *Callistemon viminalis* (Weeping Bottlebrush) is shown for reference.





PLAN VIEW
SCALE 1:250

NOTES

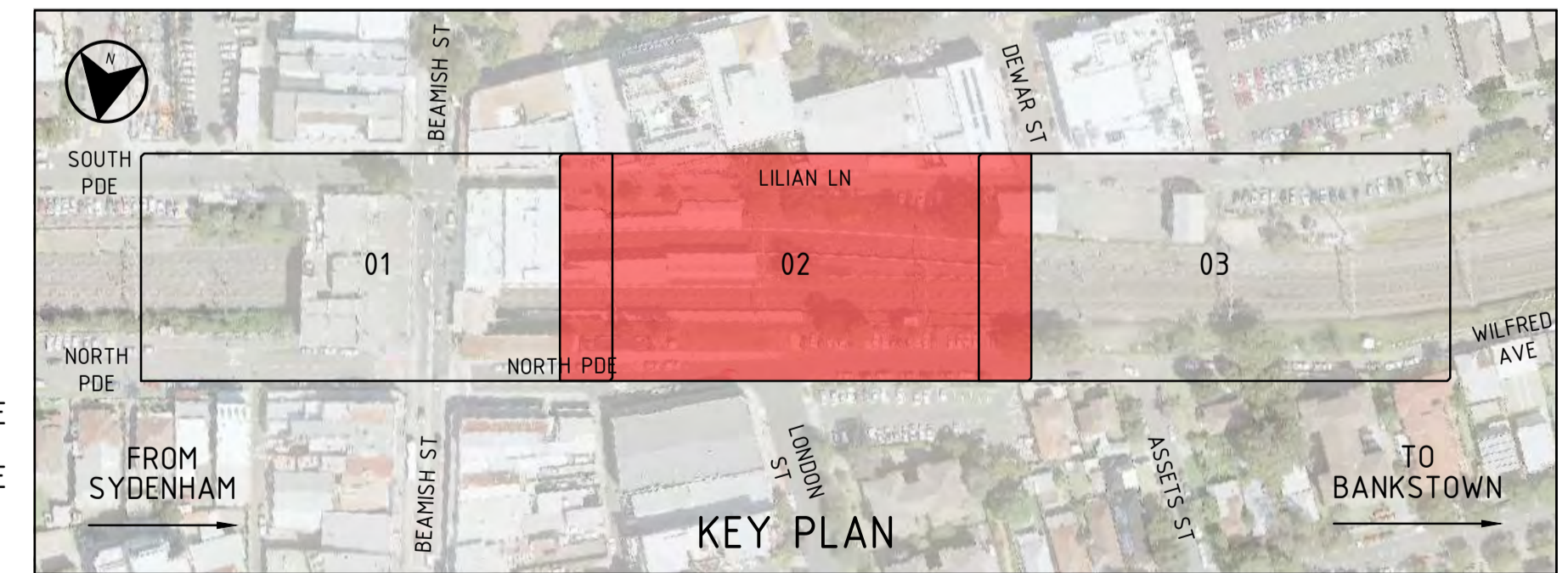
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- FOR LEGEND REFER TO DRAWINGS SMCSWSWM-MTM-WCS-CE-DWG-153408 AND 153409.
- FOR CORRIDOR CSR WORKS, REFER TO S2B CSR DPK 660.

LEGEND

BACKBONE (CSR) CONDUITS	LOCAL (LCR) CONDUITS	OTHER
CSR - HV (33kV)	LCR - LOW VOLTAGE	CSR - PROPOSED GST ROUTE
CSR - HV (11kV)	LCR - COMMUNICATIONS	CSR - PROPOSED CABLE TRAY ROUTE
CSR - LOW VOLTAGE	LCR - SIGNALLING	LCR - PROPOSED TRENCH ROUTE
CSR - COMMUNICATIONS		LCR - PROPOSED BALLAST ROUTE
CSR - SIGNALLING		LCR - PROPOSED GST ROUTE
		CSR - PROPOSED PIT

SYDNEY TRAINS RELOCATED SERVICES

	ST - SYDNEY TRAINS RELOCATION ROUTE
	ST - SYDNEY TRAINS RELOCATION ROUTE BY OTHERS



DRAWING COLOUR CODED - PRINT ALL COPIES IN COLOUR FOR CONSTRUCTION

REV.	BY	DATE	DESCRIPTION	APPD.
01.02			CRFI-000492	
01	NJ	20/08/2021	CRFI-000299	LP
00	NJ	14/04/2021	APPROVED FOR CONSTRUCTION	LP

SCALES
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NOTE: Do not scale from this drawing. ALT. DRG No SMCSWSWM-MTM-WCS-CE-DWG-153412

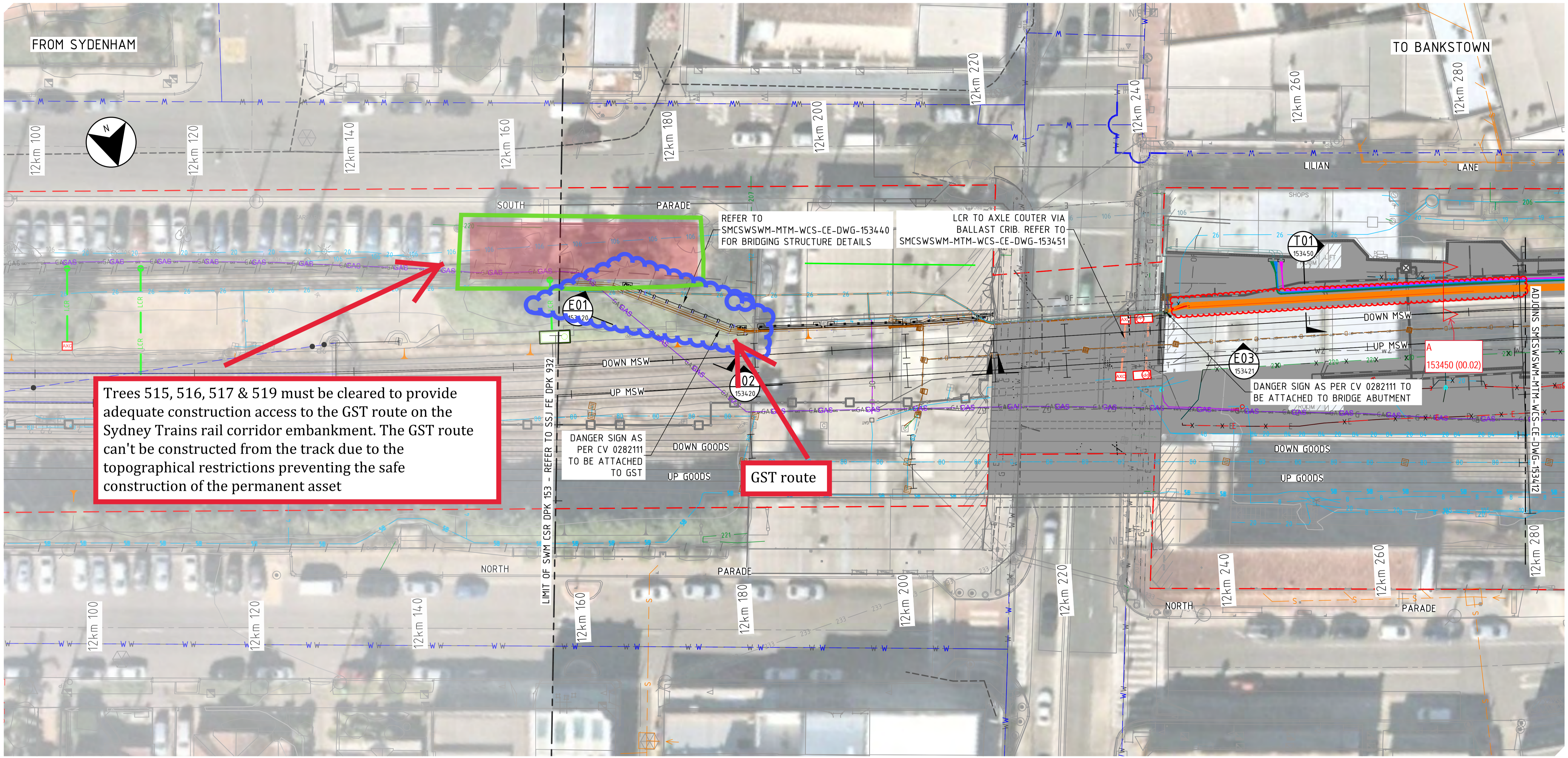


CLIENT: METRON T2M
 SERVICE PROVIDERS: H.HU & A.DILLON
 DRAWN: H.HU & A.DILLON
 DESIGNED: N.JULIAN
 DRG CHECK: P.ALFORD
 DESIGN CHECK: O.COLE & A.SHANTIA
 APPROVED: L.PALMER
 DATE: 20/08/2021

SYDNEY METRO
 CAMPSE STATION (12.165KM TO 12.505KM)
 CIVIL ENGINEERING
 COMBINED SERVICES ROUTE (CSR)
 DETAIL LAYOUT PLAN
 STATUS: FOR CONSTRUCTION SHEET 2 OF 3
 DRG No SMCSWSWM-MTM-WCS-CE-DWG-153412 REV. 01

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Plot Date: 07/04/21 - 16:23
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 100mm AT FULL SIZE



Trees 515, 516, 517 & 519 must be cleared to provide adequate construction access to the GST route on the Sydney Trains rail corridor embankment. The GST route can't be constructed from the track due to the topographical restrictions preventing the safe construction of the permanent asset

PLAN VIEW
SCALE 1:250

NOTES

1. FOR GENERAL NOTES REFER TO DRAWINGS SMCSWSWM-MTM-WCS-CE-DWG-153401 TO 153405.
2. FOR LEGEND REFER TO DRAWINGS SMCSWSWM-MTM-WCS-CE-DWG-153408 AND 153409.

LEGEND

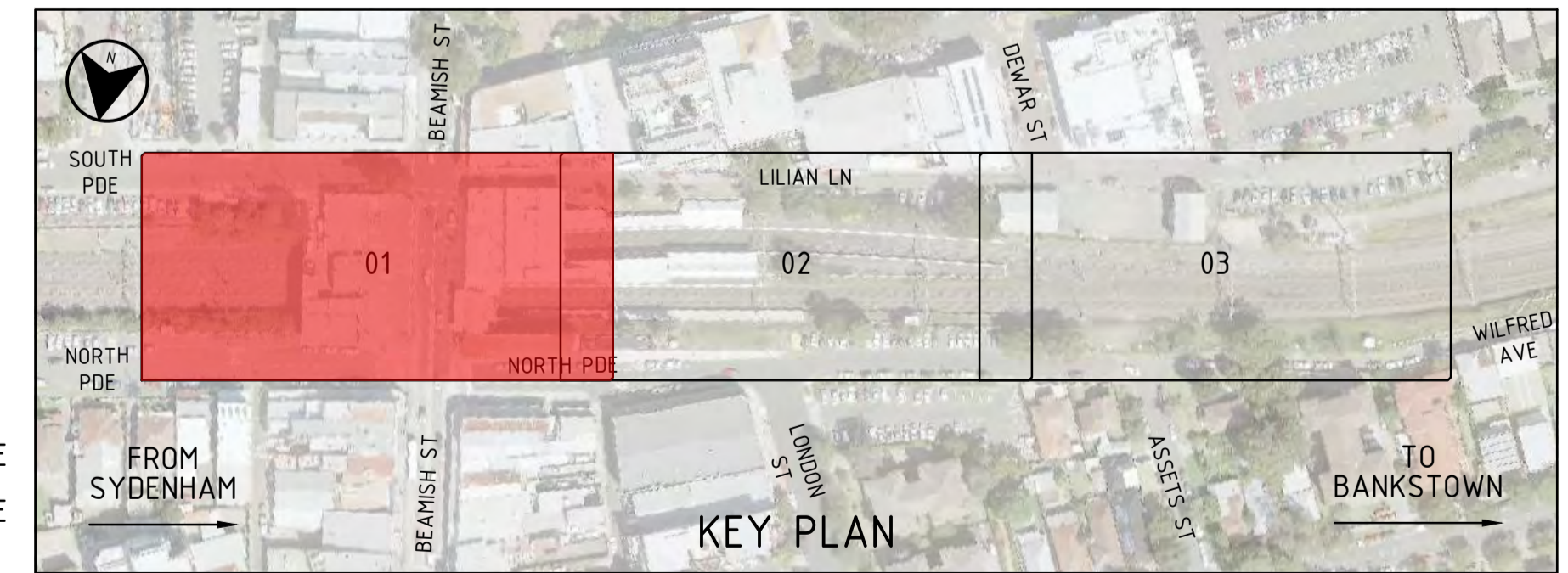
- BACKBONE (CSR) CONDUITS**
- CSR - HV (33kV)
 - CSR - HV (11kV)
 - CSR - LOW VOLTAGE
 - CSR - COMMUNICATIONS
 - CSR - SIGNALLING

- LOCAL (LCR) CONDUITS**
- LCR - LOW VOLTAGE
 - LCR - COMMUNICATIONS
 - LCR - SIGNALLING

- OTHER**
- CSR - PROPOSED GST ROUTE
 - CSR - PROPOSED CABLE TRAY ROUTE
 - CSR - PROPOSED PIT

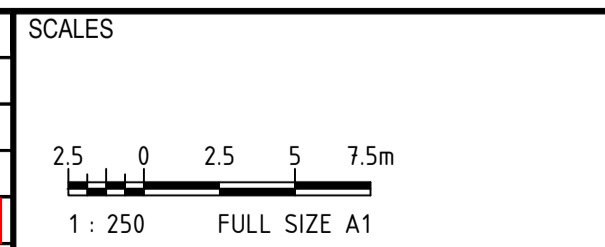
- LCR - PROPOSED TRENCH ROUTE**
- LCR - PROPOSED TRENCH ROUTE
 - LCR - PROPOSED BALLAST ROUTE
 - LCR - PROPOSED GST ROUTE

- SYDNEY TRAINS RELOCATED SERVICES**
- ST - SYDNEY TRAINS RELOCATION ROUTE
 - ST - SYDNEY TRAINS RELOCATION ROUTE BY OTHERS



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REV.	BY	DATE	DESCRIPTION	APPD.
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00	NJ	14/04/2021	APPROVED FOR CONSTRUCTION	LP



NOTE: Do not scale from this drawing. ALT. DRG No SMCSWSWM-MTM-WCS-CE-DWG-153411



CLIENT

Service Providers

METRON T2M

DRAWN: H.HU & A.DILLON
 DESIGNED: N.JALILIAN
 DRG CHECK: P.ALFORD
 DESIGN CHECK: O.COLE & A.SHANTIA
 APPROVED: L.PALMER
 14/04/2021

SYDNEY METRO
 CAMPSIE STATION (12.165KM TO 12.505KM)
 CIVIL ENGINEERING
 COMBINED SERVICES ROUTE (CSR)
 DETAIL LAYOUT PLAN

STATUS: FOR CONSTRUCTION SHEET 1 OF 3 ©
 DRG No: SMCSWSWM-MTM-WCS-CE-DWG-153411 REV. 00

Appendix 3: Tree Assessment Criteria

Tree number: Identifying number given to individual (or group) trees.

Botanical Name: Latin name for tree showing genus and species.

Common Name: The common name given to the tree.

Tree Dimensions: The physical dimensions of the tree.

- **Height:** Estimated or measured height of tree in meters.
- **Spread:** Estimated or measured radial canopy spread of tree in meters.
- **Diameter at Breast Height (DBH):** The estimated or measured diameter of trunk given in mm measured at 1.4m from ground.
- **Diameter Above Base (DAB):** The estimated or measured diameter of trunk given in mm measured above the root flare. Used to calculate the structural root zone of the tree.

Age Class: An estimation of how old the tree is in relation to its life expectancy.

- **Young** – New tree planting
- **Semi-Mature** – Established tree with an age less than 20% of life expectancy of tree in situ
- **Mature** – Established tree with an age 20% - 80% of life expectancy of tree in situ
- **Old** – Established tree with an age greater than 80% of life expectancy of tree in situ
- **Dead** – Tree is dead

Vigour: Ability of a tree to sustain its life processes. This is independent of the condition of a tree but may impact upon it. Vigour can appear to alter rapidly with change of seasons (seasonality) e.g., dormant, deciduous or semi-deciduous trees. Vigour can be categorised as Dormant, Low, Normal and High.

- **Dormant Vigour** – Determined by the existing turgidity in the lower order branches in the outer extremity of the crown, with good bud set and formation, and where the last extension growth is distinct from those most recently preceding it, evident by bud scale scars. Normal vigour during dormancy is achieved when such growth is evident on a majority of branches throughout the crown.
- **Low Vigour** – Reduced ability of a tree to sustain its life processes. This may be evident by the atypical growth of leaves, reduced crown cover and reduced crown density, branches, roots and trunk, and a deterioration of their functions with reduced resistance to predation. This is independent of the condition of a tree but may impact upon it, and especially the ability of a tree to sustain itself against predation.
- **Normal Vigour** – Ability of a tree to maintain and sustain its life processes. This may be evident by the typical growth of leaves, crown cover and crown density, branches, roots and trunk and resistance to predation. This is independent of the condition of a tree but may impact upon it, and especially the ability of a tree to sustain itself against predation.
- **High Vigour** – Accelerated growth of a tree due to incidental or deliberate artificial changes to its growing environment that are seemingly beneficial, but may result in premature aging or failure if the favourable conditions cease, or promote prolonged senescence if the favourable conditions remain, e.g. water from a leaking pipe, water and nutrients from a leaking or disrupted sewer pipe, nutrients from animal waste, a tree growing next to a chicken coop, or a stock feed lot, or a regularly used stockyard, a tree subject to stringent watering and fertilisation program, or some trees may achieve an extended lifespan from continuous pollarding practices over the life of the tree.

Condition: A tree's crown form and growth habit, as modified by its environment (aspect, suppression by other trees, soils) the stability and viability of the root plate, trunk and structural branches (first (1st) and possibly (2nd) order branches), including structural defects such as wounds, cavities or hollows, crooked trunk or weak trunk/branch junctions and the effects of predation by pests and diseases. These may not be directly connected with vigour and it is possible for a tree to be of normal vigour but in poor condition. Condition can be categorised as Dead, Poor, Fair and Good.

- **Dead Condition** – Tree is no longer capable of performing any of the following processes or is exhibiting any of the following symptoms; Photosynthesis via its foliage crown (as indicated by the presence of moist, green or other coloured leaves), Osmosis (the ability of the roots system to take up water), Turgidity (the ability of the plant to sustain moisture pressure in its cells), Epicormic shoots or epicormic strands in Eucalypts (the production of new shoots as a response to stress, generated from latent or adventitious buds or from a lignotuber), Permanent leaf loss, Permanent leaf wilting (the loss of turgidity which is marked by desiccation of stems leaves and roots), Abscission of the epidermis (bark desiccates and peels off to the beginning of the sap wood).
- **Poor Condition** - Tree is of good habit or misshapen, a form that may be severely restricted for space and light, exhibits symptoms of advanced and irreversible decline such as fungal, or bacterial infestation, major die-back in the branch and foliage crown, structural deterioration from insect damage e.g. termite infestation, or storm damage or lightning strike, ring barking from borer activity in the trunk, root damage or instability of the tree, or damage from physical wounding impacts or abrasion, or from altered local environmental conditions and has been unable to adapt to such changes and may decline further to death regardless of remedial works or other modifications to the local environment that would normally be sufficient to provide for its basic survival if in good to fair condition. Deterioration physically, often characterised by a gradual and continuous reduction in vigour but may be independent of a change in vigour, but characterised by a proportionate increase in susceptibility to, and predation by pests and diseases against which the tree cannot be sustained. Such conditions may also be evident in trees of advanced senescence due to normal phenological processes, without modifications to the growing environment or physical damage having been inflicted upon the tree. This may be independent from, or contributed to by vigour.
- **Fair Condition** - Tree is of good habit or misshapen, a form not severely restricted for space and light, has some physical indication of decline due to the early effects of predation by pests and diseases, fungal, bacterial, or insect infestation, or has suffered physical injury to itself that may be contributing to instability or structural weaknesses, or is faltering due to the modification of the environment essential for its basic survival. Such a tree may recover with remedial works where appropriate, or without intervention may stabilise or improve over time, or in response to the implementation of beneficial changes to its local environment. This may be independent from, or contributed to by vigour.
- **Good Condition** - Tree is of good habit, with crown form not severely restricted for space and light, physically free from the adverse effects of predation by pests and diseases, obvious instability or structural weaknesses, fungal, bacterial or insect infestation and is expected to continue to live in much the same condition as at the time of inspection provided conditions around it for its basic survival do not alter greatly. This may be independent from, or contributed to by vigour.

Useful Life Expectancy (ULE) ULE is the length of time that the arborist assesses an individual tree can be retained with an acceptable level of risk based on the information available at the time of inspection. It is a snapshot in time of the potential an individual tree has for survival in the eyes of the assessor. ULE is not static – it is closely related to tree health and the surrounding conditions. Alterations in these variables may result in changes to the ULE assessment. Consequently, the reliability all ULE assessments have will decrease as time passes from the initial assessment and the potential for changes in variables increases.

- **Young** – Young/small or newly planted trees that can easily be replaced.
- **Remove** – Trees that should be removed within the next 5 years
- **Short** – Trees that appear to be retainable at the time of the assessment for 5-15 years with an acceptable level of risk.
- **Medium** – Trees that appear to be retainable at the time of the assessment for 15-40 years with an acceptable level of risk.

- **Long** – Trees that appear to be retainable at the time of the assessment for 40+ years with an acceptable level of risk.

Amenity and Visual Value – For the purposes of assessing the visual and landscape value of each tree the IACA Significance of a Tree, Assessment Rating System (STARS) © (IACA 2010) © has been adopted. - The landscape significance of a tree is an essential criterion to establish the importance that a particular tree may have on a site. The system uses a scale of High, Medium and Low significance in the landscape.

High significance in landscape

- The tree is in good condition and good vigour
- The tree has a form typical for the species
- The tree is a remnant or is a planted locally indigenous specimen and/or is rare or uncommon in the local area or of botanical interest or of substantial age
- The tree is listed as a heritage item, threatened species or part of an endangered ecological community or listed on council's significant tree register
- The tree is visually prominent and visible from a considerable distance when viewed from most directions within the landscape due to its size and scale and makes a positive contribution to the local amenity
- The tree supports social and cultural sentiments or spiritual associations, reflected by the broader population or community group or has commemorative values
- The tree's growth is unrestricted by above and below ground influences, supporting its ability to reach dimensions typical for the taxa in situ – tree is appropriate to the site conditions

Medium significance in landscape

- The tree is in fair-good condition and good or low vigour
- The tree has form typical or atypical of the species
- The tree is a planted locally indigenous or a common species with its taxa commonly planted in the local area
- The tree is visible from surrounding properties, although not visually prominent as partially obstructed by other vegetation or buildings when viewed from the street
- The tree provides a fair contribution to the visual character and amenity of the local area
- The tree's growth is moderately restricted by above or below ground influences, reducing its ability to reach dimensions typical for the taxa in situ

Low significance in landscape

- The tree is in fair-poor condition and good or low vigour
- The tree has form atypical of the species
- The tree is not visible or is partly visible from the surrounding properties as obstructed by other vegetation or buildings
- The tree provides a minor contribution or has a negative impact on the visual character and amenity of the local area
- The tree is a young specimen which may or may not have reached dimensions to be protected by local Tree Preservation Orders or similar protection mechanisms and can easily be replaced with a suitable specimen
- The tree's growth is severely restricted by above or below ground influences, unlikely to reach dimensions typical for the taxa in situ – tree is inappropriate to the site conditions
- The tree is listed as exempt under the provisions of the local Council Tree Preservation Order or similar protection mechanisms
- The tree has a wound or defect that has the potential to become structurally unsound
- **Environmental Pest / Noxious Weed Species**
- The tree is an environmental pest species due to its invasiveness or poisonous/allergenic properties.
- The tree is a declared noxious weed by legislation
- **Hazardous / Irreversible Decline**
- The tree is structurally unsound and/or unstable and is considered potentially dangerous
- The tree is dead, or is in irreversible decline, or has the potential to fail or collapse in full or in part in the immediate to short term

The tree is to have a minimum of three (3) criteria in a category to be classified in that group.

In the development of this document IACA acknowledges the contribution and original concept of the Footprint Green Tree Significance & Retention Value Matrix, developed by Footprint Green Pty Ltd in June 2010.

The Australian Standard 4970-2009 Protection of Trees on Development Sites defines the requirements for assessing trees with respect to development. It provides the guidance on how to decide which trees are appropriate for retention and on the means of protecting them during construction works. It describes the areas and offsets, referred to as the Tree Protection Zone (TPZ) and Structural Root Zone (SRZ) required to be free from development works to maintain tree vitality and stability. This report has been prepared in accordance with the conditions set out within the standard.

- **Tree Protection Zone** – The tree protection zone is defined as a specified area above and below ground set aside for the protection of the tree's roots and crown. It is expressed as a radial measurement taken from the centre of the trunk at ground level.
- **Structural Root Zone** – The structural root zone is defined as a specified area around the base of a tree required to maintain its stability within the ground. It is expressed as a radial measurement taken from the center of the trunk at ground level. Excavation and development works are not recommended within the structural root zone unless additional investigation as to root size and location is undertaken

APPENDIX 9 DULWICH HILL AIA (URBAN ARBOR)



Arboricultural Impact Assessment Report

Site location:

South West Metro
Dulwich Hill Station
Dulwich Hill NSW

Prepared for:

Metron T2M

Prepared by: Jack Williams and
Bryce Claassens
Urban Arbor Pty Ltd

Date: 22 December 2020

Ref: 201222-SWMDH-AIA

Rev: B

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1. INTRODUCTION

- 1.1 Urban Arbor have been instructed by Metron T2M to provide an Arboricultural Impact Assessment Report for trees located within the site and adjoining sites in relation to a proposed development.
- 1.2 Below is a list of all documents and information provided to Urban Arbor to assist in preparing this report.
 - A) Dulwich Hill Landscape Drawings, Metron T2M, Rev E, Including Sheet No: 8 and 10, 30 October 2020.
 - B) Civil Engineering Package No. 123, Metron T2M, Rev C, 170 Pages in total, 17 June 2020.
 - C) Dulwich Hill Station Service Building, Metron T2M, Rev C, 3 December 2020.
- 1.3 The trees were inspected on 4 December 2019. Access was available to the subject site and the adjoining public areas only. All tree data contained in this report was collected during this site inspection.

2. SCOPE OF THE REPORT

- 2.1 This report has been undertaken to meet the following objectives.
 - 2.1.1 Conduct a visual assessment of all significant trees located within 10 metres of development works from ground level. For the purpose of this report, a significant tree is a tree with a height equal to or greater than 5 metres.
 - 2.1.2 Determine the trees estimated contribution years and remaining, useful life expectancy and award the trees a retention value.
 - 2.1.3 Provide an assessment of the potential impact the proposed development is likely to cause to the condition of the subject trees in accordance with AS4970 Protection of trees on development sites (2009).
 - 2.1.4 Specify tree protection measures for trees to be retained in accordance with AS4970-2009.

3. LIMITATIONS

- 3.1 The observations and recommendations are based on the site inspections identified in the introduction (section 1) and the access available at the time of inspection. Findings of this report are based on the observations and site conditions at the time inspection.
- 3.2 All of the observations were carried out from ground level and none of the surrounding surfaces were lifted or removed during the inspection. No tests were carried out to the subject trees or surrounding area during the inspection.
- 3.3 Root decay can sometimes be present with no visual indication above ground. It is also impossible to know the extent of any root damage caused by mechanical damage such as underground root cutting during the installation of services without undertaking detailed root investigation. Any form of tree failure due to these activities is beyond the scope of this assessment.
- 3.4 The report reflects the subject tree(s) as found on the day of inspection. Any changes to the growing environment of the subject tree, or tree management works beyond those recommended in this report may alter the findings of the report. There is no warranty, expressed or implied, that problems or deficiencies relating to the subject tree, or subject site may not arise in the future.
- 3.5 Tree identification is based on accessible visual characteristics at the time of inspection. As key identifying features are not always available the accuracy of identification is not guaranteed. Where tree species is unknown, it is indicated with an *spp.*
- 3.6 All diagrams, plans and photographs included in this report are visual aids only, and are not to scale unless otherwise indicated.
- 3.7 Urban Arbor neither guarantees, nor is it responsible for, the accuracy of information provided by others that is contained within this report.
- 3.8 While an assessment of the subject trees estimated useful life expectancy is included in this report, no specific tree risk assessment has been undertaken for any of trees at the site.
- 3.9 The ultimate safety of any tree cannot be categorically guaranteed. Even trees apparently free of defects can collapse or partially collapse in extreme weather conditions. Trees are dynamic, biological entities subject to changes in their environment, the presence of pathogens and the effects of ageing. These factors reinforce the need for regular inspections. It is generally accepted that hazards can only be identified from distinct defects or from other failure-prone characteristics of a tree or its locality.
- 3.10 Alteration of this report invalidates the entire report.

4. METHODOLOGY

- 4.1 The following information was collected during the assessment of the subject tree(s).
- 4.1.1 Tree common name
 - 4.1.2 Tree botanical name
 - 4.1.3 Tree age class
 - 4.1.4 DBH (Trunk/Stem diameter at breast height/1.4m above ground level) - millimetres.
 - 4.1.5 Estimated height - metres
 - 4.1.6 Estimated crown spread (diameter of crown) - metres
 - 4.1.7 Health
 - 4.1.8 Structural condition
 - 4.1.9 Amenity value
 - 4.1.10 Estimated remaining contribution years (SULE)¹
 - 4.1.11 Retention value (Tree AZ)²
 - 4.1.12 Notes/comments
- 4.2 An assessment of the trees condition was made using the visual tree assessment (VTA) model (Mattheck & Breloer, 1994).³
- 4.3 Tree diameter was measured using a DBH tape or in some cases estimated. Tree height and tree canopy spread was measured with a clinometer or in some cases estimated. All other measurements were estimations unless otherwise stated. The other tools used during the assessment were a nylon mallet, compass, camera and a steel probe.
- 4.4 All information was imported into our computerised geographical information system (GIS) PT-mapper pro. This software was used to measure/calculate all encroachment estimates included in this report.
- 4.5 All DBH measurements, tree protection zones, and structural root zones were calculated in accordance with methods set out in AS4970 Protection of trees on development sites (2009) ⁴ and in some cases estimated. See appendices for information.
- 4.6 Details of how the observations in this report have been assessed are listed in the appendices.

¹ Barrell Tree Consultancy, *SULE: Its use and status into the New Millennium*, TreeAZ/03/2001, <http://www.treeaz.com/>.

² Barrell Tree Consultancy, *Tree AZ version 10.04-ANZ*, <http://www.treeaz.com/>.

³ Mattheck, C. & Breloer, H., *The body language of trees - A handbook for failure analysis*, The Stationary Office, London, England (2015).

⁴ Council Of Standards Australia, *AS4970 Protection of trees on development sites* (2009).

5. SITE LOCATION AND BRIEF DESCRIPTION

5.1 The site is located in the suburb of Dulwich Hill, New South Wales, which is located in the Inner West Local Government Area (LGA). Therefore, all trees at the site are subject to protection under the Marrickville Local Environmental Plan (LEP) 2011⁵, Marrickville Development Control Plan (DCP) 2011⁶ and the Inner West Council Tree Management DCP 2020.⁷ The site has been identified as a heritage item (item number I316) in the LEP heritage maps.⁸ The site has been identified as containing biodiversity in the LEP Natural Resource Biodiversity maps.⁹

6. GENERAL INFORMATION IN RELATION TO PROTECTING TREES ON DEVELOPMENT SITES

6.1 **Tree protection zone (TPZ):** The TPZ is the principle means of protecting trees on development sites and is an area required to maintain the viability of trees during development. It is commonly observed that tree roots will extend significantly further than the indicative TPZ, however the TPZ is an area identified in AS4970-2009 to be the area where root loss or disturbance will generally impact the viability of the tree. The TPZ is identified as a restricted area to prevent damage to trees either above or below ground during a development. Where trees are intended to be retained proposed developments must provide an adequate TPZ around trees. The TPZ is set aside for the tree's root zone, trunk and crown and it is essential for the stability and longevity of the tree. The TPZ also incorporates the SRZ (see below for more information about the SRZ). The TPZ is calculated by multiplying the DBH by twelve, with the exception of palms, other monocots, cycads and tree ferns, the TPZ of which have been calculated at one metre outside the crown projection. Additional information about the TPZ is included in appendix 3.

⁵ Marrickville Local Environmental Plan 2011, <https://www.legislation.nsw.gov.au/#/view/EPL/2011/645/full>, accessed 22 December 2020.

⁶ Marrickville Development Control Plan 2011, <https://www.innerwest.nsw.gov.au/develop/planning-controls/current-development-control-plans-dcp/marrickville-dcp>, accessed 22 December 2020.

⁷ Inner West Tree Management Development Control Plan 2020, <https://www.innerwest.nsw.gov.au/live/information-for-residents/trees/trees-on-your-property-pruning-or-removing>, accessed 22 December 2020.

⁸ Marrickville LEP Heritage map - Sheet HER_002, <https://www.legislation.nsw.gov.au/view/pdf/map/14391361-91d4-4b7f-86d5-b2f4d6a79fd6>, accessed 22 December 2020.

⁹ Marrickville LEP Natural Resource Biodiversity map - Sheet NRB_002, <https://www.legislation.nsw.gov.au/view/pdf/map/df0a5a54-fe19-696a-ac57-a2dcc4b418b1>, accessed 22 December 2020.

- 6.2 Structural Root Zone (SRZ):** This is the area around the base of a tree required for the trees stability in the ground. An area larger than the SRZ always needs to be maintained to preserve a viable tree. The SRZ is calculated using the following formula; $(DAB \times 50)^{0.42} \times 0.64$. There are several factors that can vary the SRZ which include height, crown area, soil type and soil moisture. It can also be influenced by other factors such as natural or built structures. Generally, work within the SRZ should be avoided. Soil level changes should also generally be avoided inside the SRZ of trees to be retained. Palms, other monocots, cycads and tree ferns do not have an SRZ. See the appendices for more information about the SRZ.
- 6.3 Minor encroachment into TPZ:** Sometimes encroachment into the TPZ is unavoidable. Encroachment includes but is not limited to activities such as excavation, compacted fill and machine trenching. Minor encroachment of up to 10% of the overall TPZ area is normally considered acceptable, providing there is space adjacent to the TPZ for the tree to compensate and the tree is displaying adequate vigour/health to tolerate changes to its growing environment.

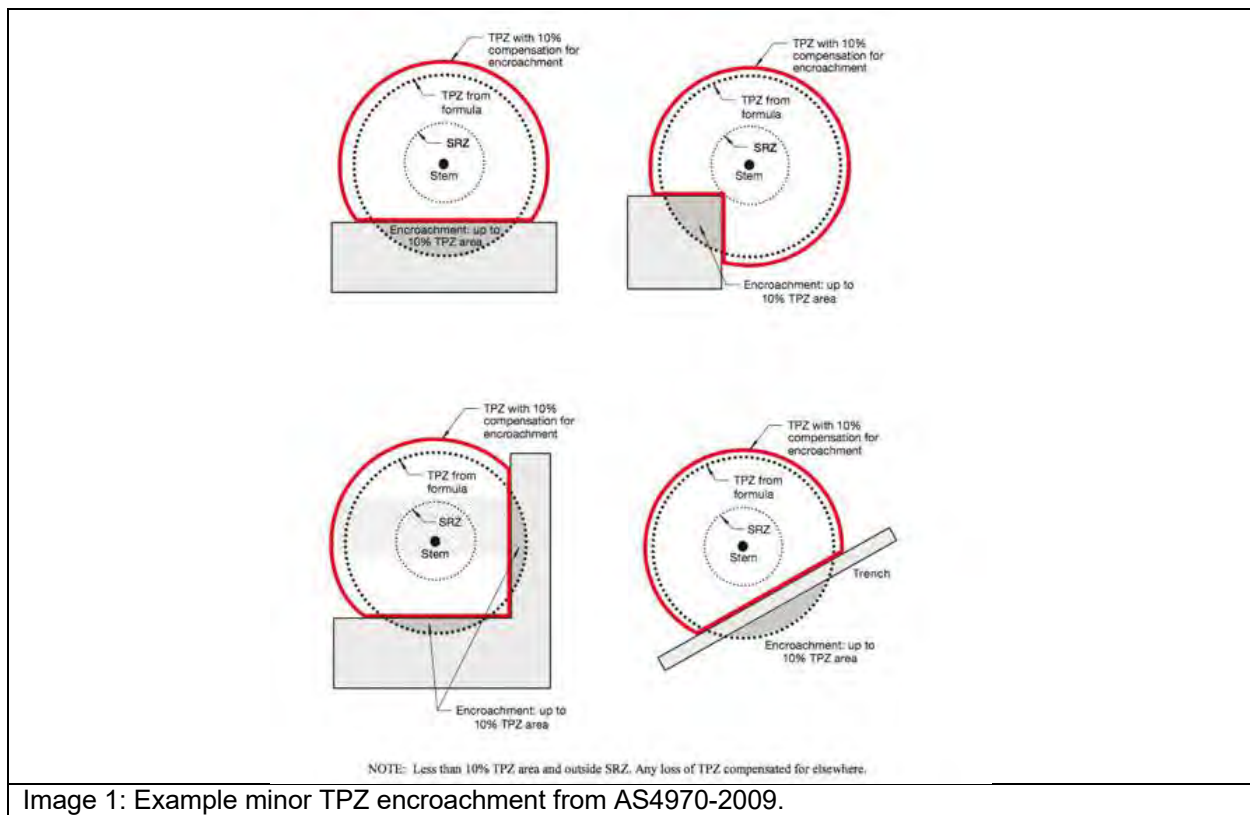


Image 1: Example minor TPZ encroachment from AS4970-2009.

6.4 Major encroachment into TPZ: Where encroachment of more than 10% of the overall TPZ area is proposed the project Arborist must investigate and demonstrate that the tree will remain in a viable condition. In some cases, tree sensitive construction methods such as pier and beam footings, suspended slabs, or cantilevered sections, can be utilised to allow additional encroachment into the TPZ by bridging over roots and minimising root disturbance. Major encroachment is only possible if it can be undertaken without severing significant size roots, or if it can be demonstrated that significant roots will not be impacted. Root investigations may be required to identify roots that will be impacted during major TPZ encroachment (see appendix 3 for more information in relation to root investigations).

7. OBSERVATIONS

7.1 Tree information: Details of each individual tree assessed, including the observations taken during the site inspection can be found in the tree inspection schedule in appendix 2, where the indicative tree protection zone (TPZ) for the subject trees has been calculated. The TPZ and SRZ should be measured in radius from the centre of the trunk. The subject trees have been awarded a retention value based on the observations during the site inspection. The system used to award the retention value is Tree AZ. Tree AZ is used to identify higher value trees worthy of being a constraint to development and lower value trees that should generally not be a constraint to the development. The Tree AZ categories sheet (Barrell Tree Consultancy) has been included in the appendices to assist with understanding the retention values. The retention value that has been allocated to the subject trees in this report is not definitive and should only be used as a guideline. This information has been summarised below.

7.2 Site Plan: Three site plans have been included in appendix 1, where the indicative TPZ and SRZ of the trees have been overlaid onto the received plans provided by the client. The following plans are included in appendix 1;

- Appendix 1A: Proposed Landscape South
- Appendix 1B: Proposed Landscape North
- Appendix 1C: Proposed Service Building

8. ASSESSMENT OF CONSTRUCTION IMPACTS

8.1 Table 1: In the table below, the impact of the proposed development has been assessed for all trees included in the report. The assessed TPZ encroachments include proposed structures and hard landscaping only. All soft landscaping should be completed in accordance with section 11.10.

Tree ID	Species	Retention value	TPZ radius (m)	TPZ area (m ²)	SRZ radius (m)	TPZ encroachment	Discussion/ Conclusion	Recommendation
93	<i>Platanus x hispanica</i>	A1	13.2	547.4	3.6	Footprint	The trunk of the tree is located within the footprint of the proposed service building construction.	Remove
94	<i>Platanus x hispanica</i>	A1	14.4	651.4	3.7	Major	The proposed service building structures and service installation will encroach into the TPZ by 23% (152m ²) but not into the SRZ. A palisade fence and combined service route (CSR) will also encroach into the TPZ and SRZ. This is considered to be a major TPZ encroachment and the proposed works could potentially impact the condition and stability of the tree. To reduce the impact to the tree, the proposed services, palisade fence and CSR must be installed in accordance with section 9.2 of this report.	Retain and protect*
95	<i>Platanus x hispanica</i>	A1	14.4	651.4	3.6	Major	A palisade and combined service route (CSR) will encroach into the TPZ and SRZ. This is considered to be a major TPZ encroachment and the proposed works could potentially impact the condition and stability of the tree. To reduce the impact to the tree, the proposed palisade fence and CSR must be installed in accordance with section 9.2 of this report.	Retain and protect*
563	<i>Cupaniopsis anacardioides</i>	Z1	2.0	12.6	1.5	Major	A security fence will encroach into the TPZ and SRZ. This is considered to be a major TPZ encroachment and the proposed works could potentially impact the condition and stability of the tree. To reduce the impact to the tree, the proposed security fence must be installed in accordance with section 9.2 of this report.	Retain and protect*
564	<i>Cupaniopsis anacardioides</i>	A1	4.8	72.4	2.5	Footprint	The trunk of the tree is located within the footprint of the proposed security fence. The proposed kiss and ride shelter structure and footings will also encroach into the TPZ and SRZ by 17% (12.1m ²) and into the SRZ. The tree is recommended for removal due to impacts from the proposed development.	Remove

Tree ID	Species	Retention value	TPZ radius (m)	TPZ area (m ²)	SRZ radius (m)	TPZ encroachment	Discussion/ Conclusion	Recommendation
565	<i>Cupaniopsis anacardioides</i>	A1	4.3	58.1	2.3	Footprint	The trunk of the tree is located within the footprint of the proposed kiss and ride shelter.	Remove
566	<i>Cupaniopsis anacardioides</i>	Z1	2.0	12.6	1.6	Major	A security fence will encroach into the TPZ and SRZ. This is considered to be a major TPZ encroachment and the proposed works could potentially impact the condition and stability of the tree. To reduce the impact to the tree, the proposed security fence must be installed in accordance with section 9.2 of this report.	Retain and protect*
567	<i>Cupaniopsis anacardioides</i>	Z1	2.0	12.6	1.8	Major	A security fence will encroach into the TPZ and SRZ. This is considered to be a major TPZ encroachment and the proposed works could potentially impact the condition and stability of the tree. To reduce the impact to the tree, the proposed security fence must be installed in accordance with section 9.2 of this report.	Retain and protect*
568	<i>Cupaniopsis anacardioides</i>	Z1	2.0	12.6	1.6	Major	A security fence will encroach into the TPZ and SRZ. This is considered to be a major TPZ encroachment and the proposed works could potentially impact the condition and stability of the tree. To reduce the impact to the tree, the proposed security fence must be installed in accordance with section 9.2 of this report.	Retain and protect*
569	<i>Cupaniopsis anacardioides</i>	Z1	2.0	12.6	1.5	Major	A security fence will encroach into the TPZ and SRZ. This is considered to be a major TPZ encroachment and the proposed works could potentially impact the condition and stability of the tree. To reduce the impact to the tree, the proposed security fence must be installed in accordance with section 9.2 of this report.	Retain and protect*
570	<i>Cupaniopsis anacardioides</i>	Z1	2.0	12.6	1.5	Major	A security fence will encroach into the TPZ and SRZ. This is considered to be a major TPZ encroachment and the proposed works could potentially impact the condition and stability of the tree. To reduce the impact to the tree, the proposed security fence must be installed in accordance with section 9.2 of this report.	Retain and protect*
571	<i>Cupaniopsis anacardioides</i>	Z1	2.0	12.6	1.5	Major	A security fence will encroach into the TPZ and SRZ. This is considered to be a major TPZ encroachment and the proposed works could potentially impact the condition and stability of the tree. To reduce the impact to the tree, the proposed security fence must be installed in accordance with section 9.2 of this report.	Retain and protect*

Site Address: Dulwich Hill Station, Dulwich Hill, NSW.

Prepared for: Metron T2M.

Prepared by: Jack Williams & Bryce Claassens, Urban Arbor Pty Ltd, sales@urbanarbor.com.au, (02) 8004 2802.

Date of prepared: 22 December 2020. Rev: B.

Tree ID	Species	Retention value	TPZ radius (m)	TPZ area (m ²)	SRZ radius (m)	TPZ encroachment	Discussion/ Conclusion	Recommendation
572	<i>Cupaniopsis anacardioides</i>	Z1	2.0	12.6	1.5	Major	A security fence will encroach into the TPZ and SRZ. This is considered to be a major TPZ encroachment and the proposed works could potentially impact the condition and stability of the tree. To reduce the impact to the tree, the proposed security fence must be installed in accordance with section 9.2 of this report.	Retain and protect*
573	<i>Cupaniopsis anacardioides</i>	Z1	2.0	12.6	1.5	Major	A security fence will encroach into the TPZ and SRZ. This is considered to be a major TPZ encroachment and the proposed works could potentially impact the condition and stability of the tree. To reduce the impact to the tree, the proposed security fence must be installed in accordance with section 9.2 of this report.	Retain and protect*
574	<i>Backhousia citriodora</i>	Z1	2.0	12.6	1.5	None	No proposed TPZ encroachment.	Retain and protect
575	<i>Backhousia citriodora</i>	Z1	2.0	12.6	1.5	Major	The proposed hard surface paving will encroach into the TPZ and SRZ. This is considered to be a major TPZ encroachment and the proposed works could potentially impact the condition and stability of the tree. To reduce the impact to the tree, the proposed hard surfacing must be installed in accordance with section 9.2 of this report.	Retain and protect*
576	<i>Backhousia citriodora</i>	Z1	2.0	12.6	1.5	Major	The proposed hard surface paving will encroach into the TPZ and SRZ. This is considered to be a major TPZ encroachment and the proposed works could potentially impact the condition and stability of the tree. To reduce the impact to the tree, the proposed hard surfacing must be installed in accordance with section 9.2 of this report.	Retain and protect*
577	<i>Cinnamomum camphora</i>	Z9	3.8	45.4	2.1	None	No proposed TPZ encroachment.	Retain and protect
578	<i>Cinnamomum camphora</i>	Z9	3.0	28.3	2.3	None	No proposed TPZ encroachment.	Retain and protect
G12	<i>Mixed spp</i>	Z3	2.0	12.6	1.6	None	Group of mixed species trees located within the rail corridor. All species within the group are weed/exempt species. No proposed TPZ encroachment.	Retain and protect
579	<i>Triadica sebifera</i>	A1	2.0	12.6	1.7	None	No proposed TPZ encroachment.	Retain and protect

Site Address: Dulwich Hill Station, Dulwich Hill, NSW.

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Date of prepared: 22 December 2020. Rev: B.

Tree ID	Species	Retention value	TPZ radius (m)	TPZ area (m ²)	SRZ radius (m)	TPZ encroachment	Discussion/ Conclusion	Recommendation
580	<i>Liquidambar styraciflua</i>	A1	2.2	15.2	1.7	None	No proposed TPZ encroachment.	Retain and protect
581	<i>Ficus rubiginosa</i>	A1	3.8	45.4	2.4	None	No proposed TPZ encroachment.	Retain and protect
582	<i>Casuarina glauca</i>	Z1	2.0	12.6	1.7	Major	The proposed hard surfacing will encroach into the TPZ by 40% (5.1m ²) and into the SRZ. The proposed hard surfacing levels will be lower than the existing hard surfacing and excavations will be required. This is considered to be a major TPZ encroachment and the proposed works could potentially impact the condition and stability of the tree. The tree is recommended for removal due to impacts from the proposed development.	Remove
583	<i>Casuarina glauca</i>	Z1	2.0	12.6	1.8	Major	The proposed hard surfacing will encroach into the TPZ by 35% (4.4m ²) and into the SRZ. The proposed hard surfacing levels will be lower than the existing hard surfacing and excavations will be required. This is considered to be a major TPZ encroachment and the proposed works could potentially impact the condition and stability of the tree. The tree is recommended for removal due to impacts from the proposed development.	Remove
584	<i>Casuarina glauca</i>	Z1	2.0	12.6	1.5	Major	The proposed hard surfacing will encroach into the TPZ by 33% (4.1m ²) and into the SRZ. The proposed hard surfacing levels will be lower than the existing hard surfacing and excavations will be required. This is considered to be a major TPZ encroachment and the proposed works could potentially impact the condition and stability of the tree. The tree is recommended for removal due to impacts from the proposed development.	Remove
585	<i>Casuarina glauca</i>	Z1	2.0	12.6	1.5	Major	The proposed hard surfacing will encroach into the TPZ by 35% (4.1m ²) and into the SRZ. The proposed hard surfacing levels will be lower than the existing hard surfacing and excavations will be required. This is considered to be a major TPZ encroachment and the proposed works could potentially impact the condition and stability of the tree. The tree is recommended for removal due to impacts from the proposed development.	Remove

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Prepared for: Metron T2M.

Prepared by: Jack Williams & Bryce Claassens, Urban Arbor Pty Ltd, sales@urbanarbor.com.au, (02) 8004 2802.

Date of prepared: 22 December 2020. Rev: B.

Tree ID	Species	Retention value	TPZ radius (m)	TPZ area (m ²)	SRZ radius (m)	TPZ encroachment	Discussion/ Conclusion	Recommendation
586	<i>Casuarina glauca</i>	Z1	2.0	12.6	1.5	Major	The proposed hard surfacing will encroach into the TPZ by 24% (3.0m ²) and into the SRZ. The proposed hard surfacing levels will be lower than the existing hard surfacing and excavations will be required. This is considered to be a major TPZ encroachment and the proposed works could potentially impact the condition and stability of the tree. The tree is recommended for removal due to impacts from the proposed development.	Remove
587	<i>Casuarina glauca</i>	Z1	2.0	12.6	1.5	Major	The proposed hard surfacing will encroach into the TPZ by 26% (3.3m ²) and into the SRZ. The proposed hard surfacing levels will be lower than the existing hard surfacing and excavations will be required. This is considered to be a major TPZ encroachment and the proposed works could potentially impact the condition and stability of the tree. The tree is recommended for removal due to impacts from the proposed development.	Remove
588	<i>Casuarina glauca</i>	Z1	2.0	12.6	1.5	Major	The proposed hard surfacing will encroach into the TPZ by 35% (4.4m ²) and into the SRZ. The proposed hard surfacing levels will be lower than the existing hard surfacing and excavations will be required. This is considered to be a major TPZ encroachment and the proposed works could potentially impact the condition and stability of the tree. The tree is recommended for removal due to impacts from the proposed development.	Remove
589	<i>Casuarina glauca</i>	Z1	2.0	12.6	1.5	Major	The proposed hard surfacing will encroach into the TPZ by 31% (3.9m ²) and into the SRZ. The proposed hard surfacing levels will be lower than the existing hard surfacing and excavations will be required. This is considered to be a major TPZ encroachment and the proposed works could potentially impact the condition and stability of the tree. The tree is recommended for removal due to impacts from the proposed development.	Remove

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Tree ID	Species	Retention value	TPZ radius (m)	TPZ area (m ²)	SRZ radius (m)	TPZ encroachment	Discussion/ Conclusion	Recommendation
590	<i>Casuarina glauca</i>	Z1	2.0	12.6	1.5	Major	The proposed hard surfacing will encroach into the TPZ by 35% (4.4m ²) and into the SRZ. The proposed hard surfacing levels will be lower than the existing hard surfacing and excavations will be required. This is considered to be a major TPZ encroachment and the proposed works could potentially impact the condition and stability of the tree. The tree is recommended for removal due to impacts from the proposed development.	Remove

Notes

TPZ Encroachment Percentage: TPZ encroachment percentages are based on new structures and hard surfaces only. New soft landscaping, such as turf or amenity planting areas have not been included in the calculation for TPZ encroachment.

Retain and protect*: The proposed construction must be completed in accordance with section 9.2 to reduce the impact to the tree.

9. CONCLUSIONS

9.1 **Table 2:** Summary of the impact to trees during the development;

Impact	Reason	Category A	Category Z	Total
		A	Z	
Trees to be removed	Building construction, new surfacing and/or proximity, or trees in poor condition.	93, 564, 565 (Three trees)	582, 583, 584, 585, 586, 587, 588, 589, 590 (Nine trees)	12 trees
Trees subject to TPZ encroachment greater than 10% requiring tree sensitive design and construction to be retained	Removal of existing surfacing/structures and/or installation of new surfacing/structures.	94, 95 (Two trees)	563, 566, 567, 568, 569, 570, 571, 572, 573, 575, 576 (Eleven trees)	13 trees
Retained trees subject to TPZ encroachment of 10% or less	Removal of existing surfacing/structures and/or installation of new surfacing/structures.	579, 580, 581 (Three trees)	574, 577, 578, G12 (Three trees and one group of trees)	6 trees and one group

9.2 Construction Design/Specification Requirements: The proposed construction will encroach into the TPZ of trees 94, 95, 563, 566, 567, 568, 569, 570, 571, 572, 573, 575 and 576 by more than 10%. To ensure the trees are not adversely impacted by the construction, it must be demonstrated the following design and construction specifications can be implemented within the TPZ of the trees. If the construction cannot be completed in accordance with these specifications, the trees may not be viable for retention.

9.2.1 Underground Services – tree 94: AS4970 Protection of trees on development sites (2009) recommends that all underground services located inside the TPZ of any tree to be retained should be installed via tree sensitive techniques. This should include either directional drilling methods or manual excavations to minimise the impact to trees identified for retention.

If directional drilling is proposed, section 4.5.5 of AS4970-2009 says that ‘The directional drilling bore should be at least 600 mm deep. The project Arborist should assess the likely impacts of boring and bore pits on retained trees’.¹⁰ The feasibility of sub-surface boring/directional drilling will need to be investigated by a sub-surface boring/directional drilling specialist. The project Arborist should provide advice and supervise excavations for bore pits, which must be carried out manually if located within the TPZ. The top of the pipe must be at least 600mm below the existing soil grade. The location of bore pits should be flexible in the TPZ to avoid significant roots, the project Arborist should assess and advise in writing the impact of any significant root severance to the condition of the tree.

If manual excavations are proposed, all excavations for the services should be carried out manually under the supervision of the project Arborist (minimum qualification AQF 5). Manual excavation may include the use of pneumatic and hydraulic tools, high-pressure air or a combination of high-pressure water and a vacuum device. All roots greater than 40mm in diameter should be retained in the service trench. The service pipe should then be threaded below the retained roots where practical. Roots greater than 40mm within the alignment of the service pipe should only be severed/pruned under the approval of the project Arborist. All root pruning should be in accordance with AS4373 Pruning of amenity trees (2007).

9.2.2 Palisade/Security Fence – tree 94, 95, 563, 566, 567, 568, 569, 570, 571, 572 and 573: The proposed fencing will be installed using the tree sensitive method of post and rail type construction. To ensure the trees are not significantly impacted by the works, all post holes must be excavated manually. The post location must be flexible to avoid the severance of significant roots 40mm and greater in diameter. No posts are to be located within the SRZ or root investigations will be required to determine the post location. See appendix 3 for more information in regards to root investigations. All rails/horizontal materials are to be located on or above existing soil grades. This will allow for the majority of the root system to be retained between the posts, minimising root loss.

¹⁰ Council Of Standards Australia, *AS 4970 Protection of trees on development sites* (2009) page 18.

9.2.3 CSR – tree 94 and 95: The proposed CSR will be installed using the tree sensitive method of post and rail type construction. To ensure the trees are not significantly impacted by the works, all post holes within the TPZ must be excavated manually. The post location must be flexible to avoid the severance of significant roots 40mm and greater in diameter. No posts are to be located within the SRZ or root investigations will be required to determine the post location. See Appendix 3 for more information in regards to root investigations. All rails/horizontal materials are to be located on or above existing soil grades. This will allow for the majority of the root system to be retained between the posts, minimising root loss.

9.2.4 Tree Sensitive Hard Surfacing Construction – tree 575 and 576: To retain the trees in a viable condition, the hard surfacing must be constructed in a tree sensitive method. The hard surfacing should be constructed above existing grades in the TPZ of the trees. The diagram below (Image A) gives an example of a no-excavation method for constructing hard surfacing close to trees. The location of retaining pegs should be flexible, avoiding damage to structural roots.

If excavations are essential, they must not exceed 100mm below the existing grades. The excavations should be supervised by a project Arborist with a minimum AQF level 5 qualification. All excavations for the hard surfacing should be carried out manually to avoid impacting retained tree roots. All tree roots greater than 40mm in diameter should be retained, unless the project arborist has assessed and advised that the pruning/severing of the root will not impact the condition or stability of the tree. Manual excavation may include the use of pneumatic and hydraulic tools, high-pressure air or a combination of high-pressure water and a vacuum device.

Where tree roots greater than 40mm are encountered that must be retained, the hard surfacing should be elevated over the individual tree root to allow for its retention. Examples of methods that can be used to bridge individual tree roots have been included below (Image B and C). Using pier and beam bridges as per image C is the recommended/preferred method, as it will allow for future growth of the tree roots, reducing future damage to the surfacing from the roots.

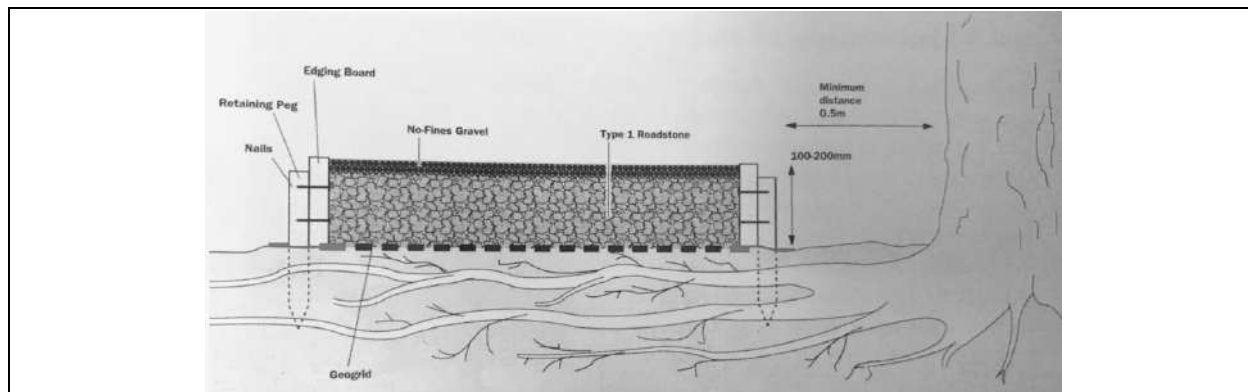


Image A: An image from 'Tree Roots in the Built Environment'¹¹, showing how to construct hard surfacing above a trees root system without excavation. Type 1 Roadstones are an example of blue metal or crushed sandstone.

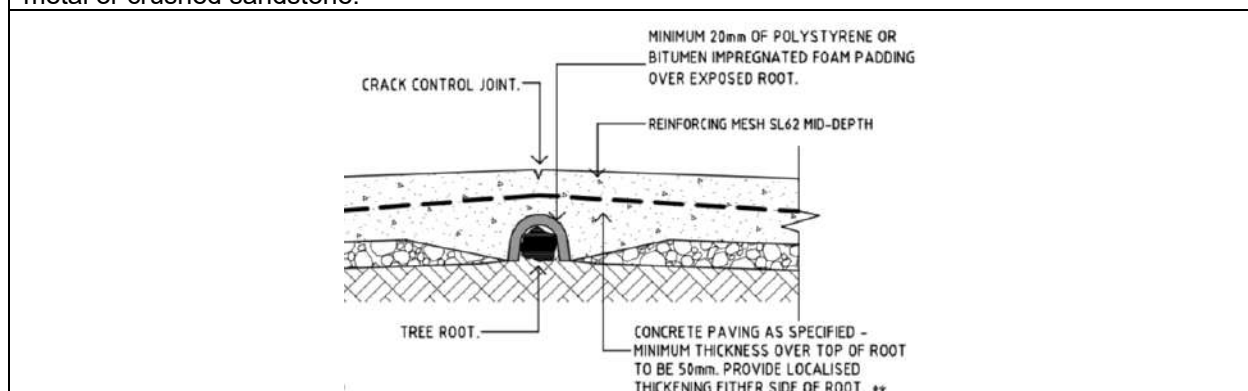


Image B: Example method for bridging concrete surfacing over tree roots provided in the Canterbury Bankstown Council standard drawings.¹²

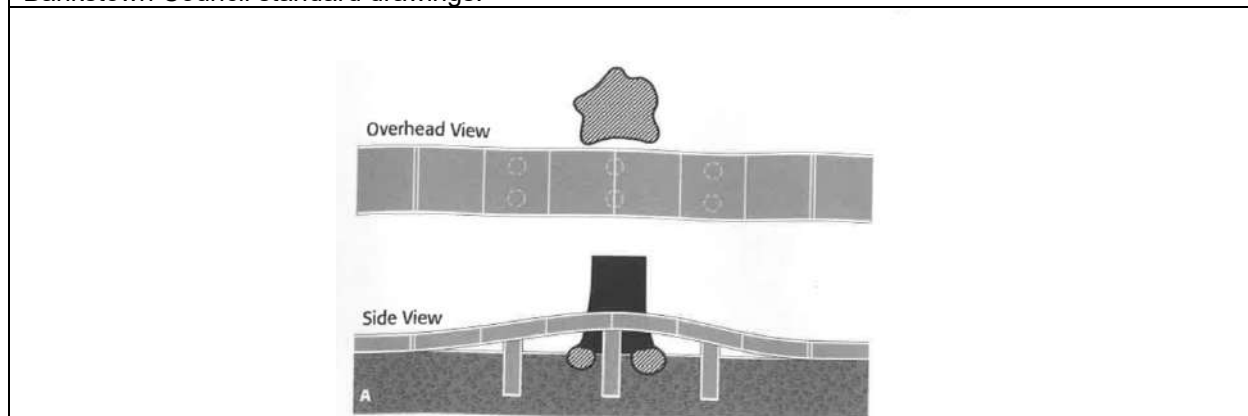


Image C: Example method from Reducing infrastructure damage by tree roots: A compendium of strategies.¹³

¹¹ Roberts, J., Jackson, N., & Smith, M., *Tree Roots in the Built Environment*, The Stationary Office, London, England (2006). Page 305 & 306.

¹² Canterbury Bankstown Council standard drawing S-209 Existing street tree treatments, <https://www.cbccity.nsw.gov.au/development/planning-control-policies/council-standard-drawings>, accessed 3 October 2019.

¹³ Costello, L. R., & Jones, K. S., *Reducing infrastructure damage by tree roots: A compendium of strategies*, Western Chapter of the International Society of Arboriculture, 31883 Success Valley Drive, Porterville, CA (2003), page 27.

9.3 Photographs



Image 1: Looking North towards trees 586, 587, 588, 589 and 590. The trees have been recommended for removal due to impacts from the proposed hard surfacing excavations.

10. RECOMMENDATIONS

- 10.1 This report assesses the impact of a proposed development at the subject site to thirty-one (31) trees and one (1) group of trees located within the site and adjoining sites, in accordance with AS4970 Protection of trees on development sites (2009).
- 10.2 Site plans have been included in appendix 1, where the indicative TPZ and SRZ of the trees have been overlaid onto the received plans provided by the client. The following plans are included in appendix 1;
- Appendix 1A: Proposed Landscape South
 - Appendix 1B: Proposed Landscape North
 - Appendix 1C: Proposed Service Building
- 10.3 Twelve (12) trees have been recommended for removal within this report, including tree 93, 564, 565, 582, 583, 584, 585, 586, 587, 588, 589 and 590. Tree 93, 564 and 565 are higher value category A retention value trees. The remaining trees recommended for removal are lower value category Z retention value trees that generally should not be a constraint to development works.
- 10.4 Thirteen (13) trees have been recommended to be retained that will be subject to TPZ encroachments greater than 10%, including tree 94, 95, 563, 566, 567, 568, 569, 570, 571, 572, 573, 575 and 576. To reduce the impact to the trees, the proposed construction within the TPZ of the trees must be completed in accordance with section 9.2 of this report.
- 10.5 The remaining six (6) trees and one (1) group of trees will be subject to minor and acceptable TPZ encroachments of 10% or less and can be retained in a viable condition, including tree 574, 577, 578, 579, 580, 581 and G12.
- 10.6 All trees to be retained must be protected for the duration of development, (including demolition and landscaping, in accordance with AS4970-2009). See section 11 for more information.
- 10.7 See section 11.10 for general landscape guidance when working within the TPZ of trees to be retained.
- 10.8 Where possible underground services must be located outside the TPZ of trees to be retained. All underground services located inside the TPZ of any tree to be retained must be installed via tree sensitive techniques. See section 9.2.1 for more information.
- 10.9 This report does not provide approval for tree removal or pruning works. All recommendations in this report are subject to approval by the relevant authorities and/or tree owners. This report should be submitted as supporting evidence with any tree removal/pruning or development application.

11. TREE PROTECTION REQUIREMENTS

- 11.1 **Use of this report:** All contractors must be made aware of the tree protection requirements prior to commencing works at the site. This report and a copy of the site plan (Appendix 1) drawings must also be made available to any contractor prior to works commencing and during any on site operations.
- 11.2 **Project Arborist:** Prior to any works commencing at the site a project Arborist should be appointed. The project Arborist should be qualified to a minimum AQF level 5 and/or equivalent qualifications and experience, and should assist with any development issues relating to trees that may arise. If at any time it is not feasible to carryout works in accordance with this, an alternative must be agreed in writing with the project Arborist.
- 11.3 **Tree work:** All tree work must be carried out by a qualified and experienced Arborist with a minimum of AQF level 2 in arboriculture, in accordance with NSW Work Cover Code of Practice for the Amenity Tree Industry (1998) and AS4373 Pruning of amenity trees (2007).
- 11.4 **Initial site meeting/on-going regular inspections:** The project Arborist is to hold a pre-construction site meeting with principle contractor to discuss methods and importance of tree protection measures and resolve any issues in relation to tree protection that may arise. In accordance with AS4970-2009, the project Arborist should carryout regular site inspections to ensure works are carried out in accordance with this document throughout the development process. Site inspections are recommended on a one-month frequency.
- 11.5 **Site Specific Tree Protection Recommendations:** The table below provides recommendations for each tree, including site specific tree protection requirements. All trees to be retained must be protected in accordance with general requirements of AS4970-2009 for the duration of the development, details of which are discussed in further details in this section of the report.

Tree ID	Tree Species	TPZ Radius (m)	SRZ Radius (m)	Recommendations
93	<i>Platanus x hispanica</i>	13.2	3.6	Remove.
94	<i>Platanus x hispanica</i>	14.4	3.7	Retain and protect. Tree protection fencing is to create a combined exclusion zone for tree 93 and 94. The fencing is to encompass as much of the TPZ area as practical while allowing space for construction activities. TPZ signage is required on the fencing.
95	<i>Platanus x hispanica</i>	14.4	3.6	Retain and protect. See tree protection recommendations for tree 94.
563	<i>Cupaniopsis anacardioides</i>	2.0	1.5	Retain and protect. Tree protection fencing is to run along the edge of the existing hard surfacing, encompassing the garden bed area adjacent to the tree. TPZ signage is required on the fencing.

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564	<i>Cupaniopsis anacardioides</i>	4.8	2.5	Remove.
565	<i>Cupaniopsis anacardioides</i>	4.3	2.3	Remove.
566	<i>Cupaniopsis anacardioides</i>	2.0	1.6	Retain and protect. Tree protection fencing is to create a combined exclusion zone for tree 566 – 573. Fencing is to run along the edge of the existing hard surfacing, encompassing the garden bed area adjacent to the trees. TPZ signage is required on the fencing.
567	<i>Cupaniopsis anacardioides</i>	2.0	1.8	Retain and protect. See tree protection recommendations for tree 566.
568	<i>Cupaniopsis anacardioides</i>	2.0	1.6	Retain and protect. See tree protection recommendations for tree 566.
569	<i>Cupaniopsis anacardioides</i>	2.0	1.5	Retain and protect. See tree protection recommendations for tree 566.
570	<i>Cupaniopsis anacardioides</i>	2.0	1.5	Retain and protect. See tree protection recommendations for tree 566.
571	<i>Cupaniopsis anacardioides</i>	2.0	1.5	Retain and protect. See tree protection recommendations for tree 566.
572	<i>Cupaniopsis anacardioides</i>	2.0	1.5	Retain and protect. See tree protection recommendations for tree 566.
573	<i>Cupaniopsis anacardioides</i>	2.0	1.5	Retain and protect. See tree protection recommendations for tree 566.
574	<i>Backhousia citriodora</i>	2.0	1.5	Retain and protect. Tree protection fencing is to run along the edge of the existing hard surfacing, encompassing the garden bed area adjacent to the tree. TPZ signage is required on the fencing.
575	<i>Backhousia citriodora</i>	2.0	1.5	Retain and protect. Tree protection fencing is to run along the edge of the existing hard surfacing, encompassing the garden bed area adjacent to the tree. TPZ signage is required on the fencing.
576	<i>Backhousia citriodora</i>	2.0	1.5	Retain and protect. Tree protection fencing is to run along the edge of the existing hard surfacing, encompassing the garden bed area adjacent to the tree. TPZ signage is required on the fencing.
577	<i>Cinnamomum camphora</i>	3.8	2.1	Retain. Set back from works. No tree protection required.
578	<i>Cinnamomum camphora</i>	3.0	2.3	Retain. Set back from works. No tree protection required.
G12	<i>Mixed spp</i>	2.0	1.6	Retain. Set back from works. No tree protection required.
579	<i>Triadica sebifera</i>	2.0	1.7	Retain. Set back from works. No tree protection required.
580	<i>Liquidambar styraciflua</i>	2.2	1.7	Retain. Set back from works. No tree protection required.
581	<i>Ficus rubiginosa</i>	3.8	2.4	Retain. Set back from works. No tree protection required.
582	<i>Casuarina glauca</i>	2.0	1.7	Remove.
583	<i>Casuarina glauca</i>	2.0	1.8	Remove.
584	<i>Casuarina glauca</i>	2.0	1.5	Remove.

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585	<i>Casuarina glauca</i>	2.0	1.5	Remove.
586	<i>Casuarina glauca</i>	2.0	1.5	Remove.
587	<i>Casuarina glauca</i>	2.0	1.5	Remove.
588	<i>Casuarina glauca</i>	2.0	1.5	Remove.
589	<i>Casuarina glauca</i>	2.0	1.5	Remove.
590	<i>Casuarina glauca</i>	2.0	1.5	Remove.

11.6 Tree protection Specifications: It is the responsibility of the principle contractor to install tree protection prior to works commencing at the site (prior to demolition works) and to ensure that the tree protection remains in adequate condition for the duration of the development. The tree protection must not be moved without prior agreement of the project Arborist. The project Arborist must inspect that the tree protection has been installed in accordance with this document and AS4970-2009 prior to works commencing.

11.6.1 Protective fencing: Site specific tree protection requirements are in section 11.5. Where it is not feasible to install fencing at the specified location due to factors such as restricting access to areas of the site or for constructing new structures, an alternative location and protection specification must be agreed with the project Arborist. Where the installation of fencing is unfeasible due to restrictions on space, trunk and branch protection will be required (see below). The protective fencing must be constructed of 1.8 metre 'cyclone chainmesh fence'. The fencing must only be removed for the landscaping phase and must be authorised by the project Arborist. Any modifications to the fencing locations must be approved by the project Arborist.

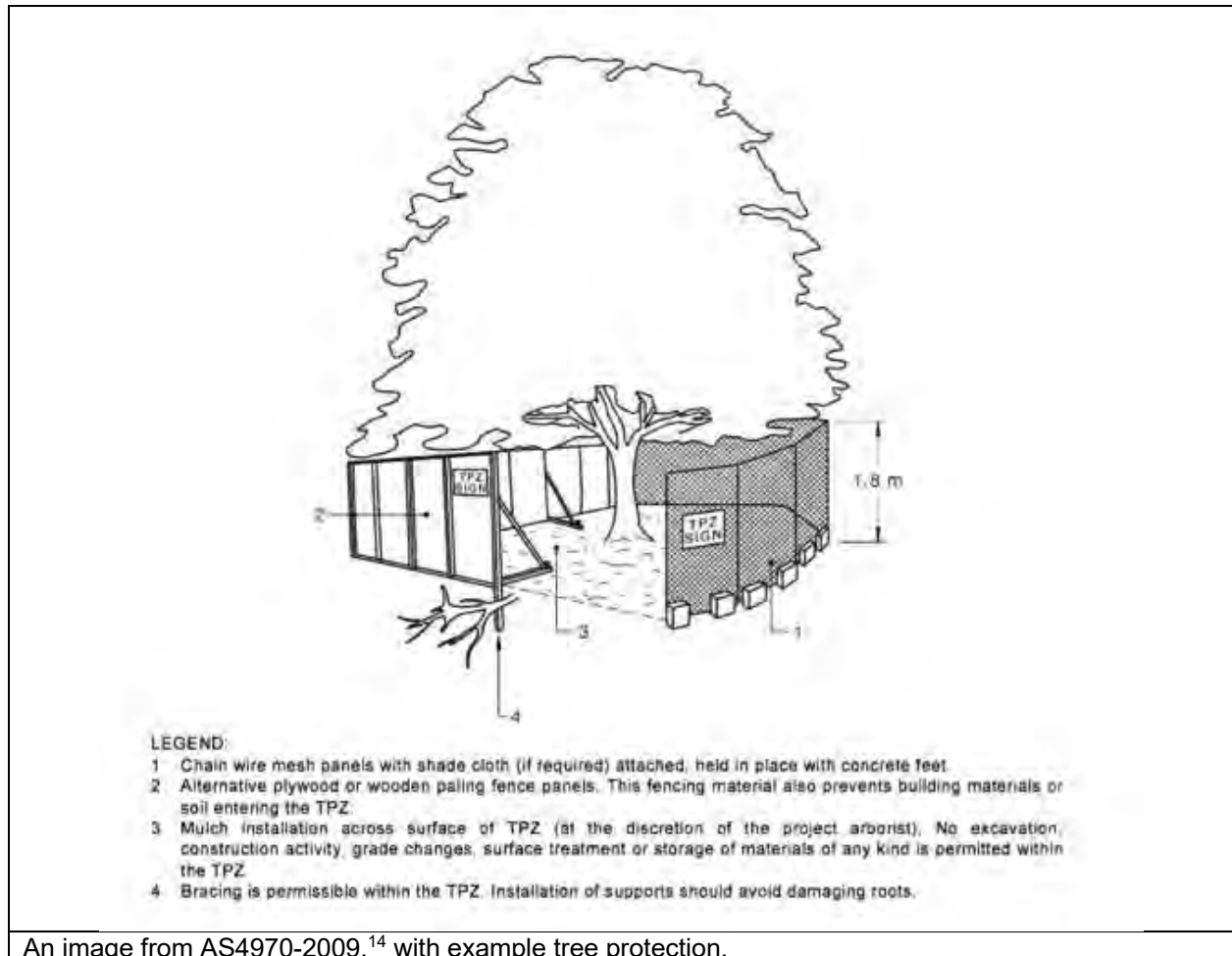
11.6.2 TPZ signage: Tree protection signage is to be attached to the protective fencing, displayed in a prominent position and the sign repeated at 10 metres intervals or closer where the fence changes direction. Each sign shall contain in a clearly legible form, the following information:

- Tree protection zone/No access.
- This fence has been installed to prevent damage to the tree/s and their growing environment both above and below ground. Do not move fencing or enter TPZ without the agreement of the project Arborist.
- The name, address, and telephone number of the developer/builder and project Arborist

11.6.3 Trunk and Branch Protection: The trunk must be protected by wrapped hessian or similar material to limit damage. Timber planks (50mm x 100mm or similar) should then be placed around tree trunk. The timber planks should be spaced at 100mm intervals, and must be fixed against the trunk with tie wire, or strapping and

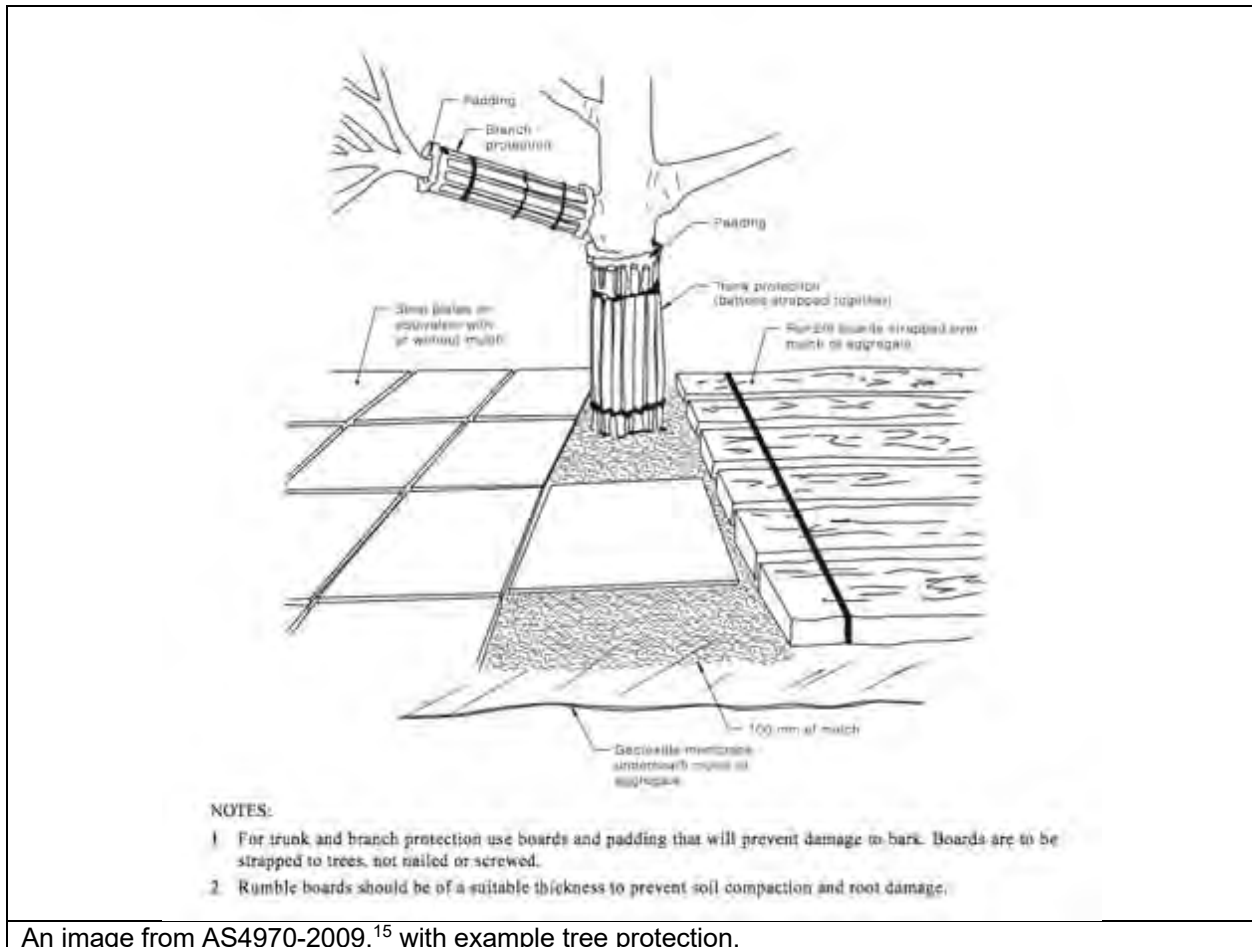
connections finished or covered to protect pedestrians from injury. The hessian and timber planks must not be fixed to the tree in any instance. The trunk and branch protection shall be installed prior to any work commencing on site and shall be maintained in good condition for the entire development period.

- 11.6.4 Mulch: Any areas of the TPZ located inside the subject site (only trees to be retained directly adjacent to site works must be mulched to a depth of 75mm with good quality composted wood chip/leaf mulch.
- 11.6.5 Ground Protection: Ground protection is required to protect the underlying soil structure and root system in areas where it is not practical to restrict access to whole TPZ, while allowing space for construction. Ground protection must consist of good quality composted wood chip/leaf mulch to a depth of between 150-300mm, laid on top of geo textile fabric. If vehicles are to be using the area, additional protection will be required such as rumble boards or track mats to spread the weight of the vehicle and avoid load points. Ground protection is to be specified by the project Arborist as required.
- 11.6.6 Temporary irrigation: Temporary irrigation should be set up in the TPZ of all trees to be retained, and should distribute water evenly throughout the area of the TPZ. The irrigation should be used for at minimum one hour daily throughout all stages of the development.



An image from AS4970-2009,¹⁴ with example tree protection.

¹⁴ Council Of Standards Australia, *AS4970 Protection of trees on development sites* (2009), page 16.



An image from AS4970-2009,¹⁵ with example tree protection.

11.7 Restricted activities inside TPZ: The following activities must be avoided inside the TPZ of all trees to be retained unless approved by the project Arborist. If at any time these activities cannot be avoided an alternative must be agreed in writing with the project Arborist to minimise the impact to the tree.

- A) Machine excavation.
- B) Ripping or cultivation of soil.
- C) Storage of spoil, soil or any such materials
- D) Preparation of chemicals, including preparation of cement products.
- E) Refueling.
- F) Dumping of waste.
- G) Wash down and cleaning of equipment.
- H) Placement of fill.
- I) Lighting of fires.
- J) Soil level changes.
- K) Any physical damage to the crown, trunk, or root system.
- L) Parking of vehicles.

¹⁵ Council Of Standards Australia, AS4970 Protection of trees on development sites (2009), page 17.

- 11.8 **Demolition:** The demolition of all existing structures inside or directly adjacent to the TPZ of trees to be retained must be undertaken in consultation with the project Arborist. Any machinery is to work from inside the footprint of the existing structures or outside the TPZ, reaching in to minimise soil disturbance and compaction. If it is not feasible to locate demolition machinery outside the TPZ of trees to be retained, ground protection will be required. The demolition should be undertaken inwards into the footprint of the existing structures, sometimes referred to as the ‘top down, pull back’ method.
- 11.9 **Excavations:** The project Arborist must supervise and certify that all excavations and root pruning are in accordance with AS4373-2007 and AS4970-2009. For continuous strip footings, first manual excavation is required along the edge of the structures closest to the subject trees. Manual excavation should be a depth of 1 metre (or to unfavourable root growth conditions such as bed rock or heavy clay, if agreed by project Arborist). Next roots must be pruned back in accordance with AS4373-2007. After all root pruning is completed, machine excavation is permitted within the footprint of the structure. For tree sensitive footings, such as pier and beam, all excavations inside the TPZ must be manual. Manual excavation may include the use of pneumatic and hydraulic tools, high-pressure air or a combination of high-pressure water and a vacuum device. No pruning of roots greater 30mm in diameter is to be carried out without approval of the project arborist. All pruning of roots greater than 30mm in diameter must be carried out by a qualified Arborist/Horticulturalist with a minimum AQF level 3. Root pruning is to be a clean cut with a sharp tool in accordance with AS4373 Pruning of amenity trees (2007).¹⁶ The tree root is to be pruned back to a branch root if possible. Make a clean cut and leave as small a wound as possible.
- 11.10 **Landscaping:** All landscaping works within the TPZ of trees to be retained are to be undertaken in consultation with a consulting Arborist to minimize the impact to trees. General guidance is provided below to minimise the impact of new landscaping to trees to be retained.
- Level changes should be minimised. The existing ground levels within the landscape areas should not be lowered by more than 100mm or increased by more than 100mm (300mm increase is acceptable if using a coarse free draining material) without assessment by a consulting Arborist.
 - New retaining walls should be avoided. Where new retaining walls are proposed inside the TPZ of trees to be retained, they should be constructed from tree sensitive material, such as timber sleepers, that require minimal footings/excavations. If brick retaining walls are proposed inside the TPZ, considerer pier and beam type footings to bridge significant roots that are critical to the trees condition. Retaining walls must be located outside the SRZ and sleepers/beams located above existing soil grades.

¹⁶ Council Of Standards Australia, *AS 4373 Pruning of amenity trees* (2007) page 18

- New footpaths and hard surfaces should be minimised, as they can limit the availability of water, nutrients and air to the trees root system. Where they are proposed, they should be constructed on or above existing soil grades to minimise root disturbance and consider using a permeable surface. Footpaths should be located outside the SRZ where possible.
 - Where fill/sub base is used inside the TPZ, fill material should be a coarse granular material that does not restrict the flow of water and air to the root system below. This type of material will also reduce the impact of soil compaction during construction.
 - The location of new plantings inside the TPZ of trees to be retained should be flexible to avoid unnecessary damage to tree roots greater than 30mm in diameter.
- 11.11 **Underground Services:** Where possible underground services should be located outside the TPZ of trees to be retained. All underground services located inside the TPZ of any tree to be retained must be installed via tree sensitive techniques. This should include either directional drilling methods or manual excavations to minimise the impact to trees identified for retention. No roots greater than 40mm in diameter should be severed during the installation of service pipes unless approved in writing by the project Arborist.
- 11.12 **Sediment and Contamination:** All contamination run off from the development such as but not limited to concrete, sediment and toxic wastes must be prevented from entering the TPZ at all times.
- 11.13 **Tree Wounding/Injury:** Any wounding or injury that occurs to a tree during the construction process will require the project Arborist to be contacted for an assessment of the injury and provide mitigation/remediation advice. It is generally accepted that trees may take many years to decline and eventually die from root damage. All repair work is to be carried out by the project Arborist, at the contractor's expense.
- 11.14 **Completion of Development Works:** After all construction works are complete the project Arborist should assess that the subject trees have been retained in the same condition and vigour. If changes to condition are identified the project Arborist should provide recommendations for remediation.

12. CONSTRUCTION HOLD POINTS FOR TREE PROTECTION

12.1 **Hold Points:** Below is a sequence of hold points requiring project Arborist certification throughout the development process. It provides a list of hold points that must be checked and certified. All certification must be provided in written format upon completion of the development. The final certification must include details of any instructions for remediation undertaken during the development. The principle contractor should be responsible for implementing all tree protection requirements.

Hold Point	Stage	Date Completed and Signature of Project Arborist Responsible
Project Arborist to hold pre construction site meeting with principal contractor to discuss methods and importance of tree protection measures and resolve any issues in relation to feasibility of tree protection requirements that may arise. Project Arborist to mark all trees approved for removal under DA consent.	Prior to development work commencing	
Project Arborist to assess and certify that tree protection has been installed in accordance with AS4970-2009 prior to works commencing at site.	Prior to development work commencing.	
In accordance with AS4970-2009 the project arborist should carryout regular site inspections to ensure works are carried out in accordance with the recommendations. Site inspections are recommended on a monthly frequency.	On-going throughout the development	
The removal of existing structures inside the TPZ of any tree to be retained, such as the existing buildings and hard surfaces must be supervised by the project Arborist.	Demolition	
Project Arborist to supervise all manual excavations and root pruning inside the TPZ of any tree to be retained. Project Arborist to approve all pruning of roots greater than 30mm inside TPZ. All root pruning of roots greater than 30mm in diameter must be carried out by a qualified Arborist/Horticulturalist with a minimum AQF level 3.	Construction	
Project Arborist to certify that all underground services including storm water inside TPZ of any tree to be retained have been installed in accordance with AS4970-2009.	Construction	
All landscaping works within the TPZ of trees to be retained are to be undertaken in consultation with the project Arborist to minimise the impact to trees.	Construction/ Landscape	
After all demolition, construction and landscaping works are complete the project Arborist should assess that the subject trees have been retained in the same condition and vigour. If changes to condition are identified the project Arborist should provide recommendations for remediation.	Upon completion of development	

13. BIBLIOGRAPHY/REFERENCES

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- *Marrickville Development Control Plan 2011*, <https://www.innerwest.nsw.gov.au/develop/planning-controls/current-development-control-plans-dcp/marrickville-dcp>.
- *Inner West Tree Management Development Control Plan 2020*, <https://www.innerwest.nsw.gov.au/live/information-for-residents/trees/trees-on-your-property-pruning-or-removing>.

14. LIST OF APPENDICES

The following are included in the appendices:

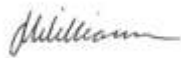
Appendix 1A: Proposed Landscape South

Appendix 1B: Proposed Landscape North

Appendix 1C: Proposed Service Building

Appendix 2 - Tree Inspection Schedule

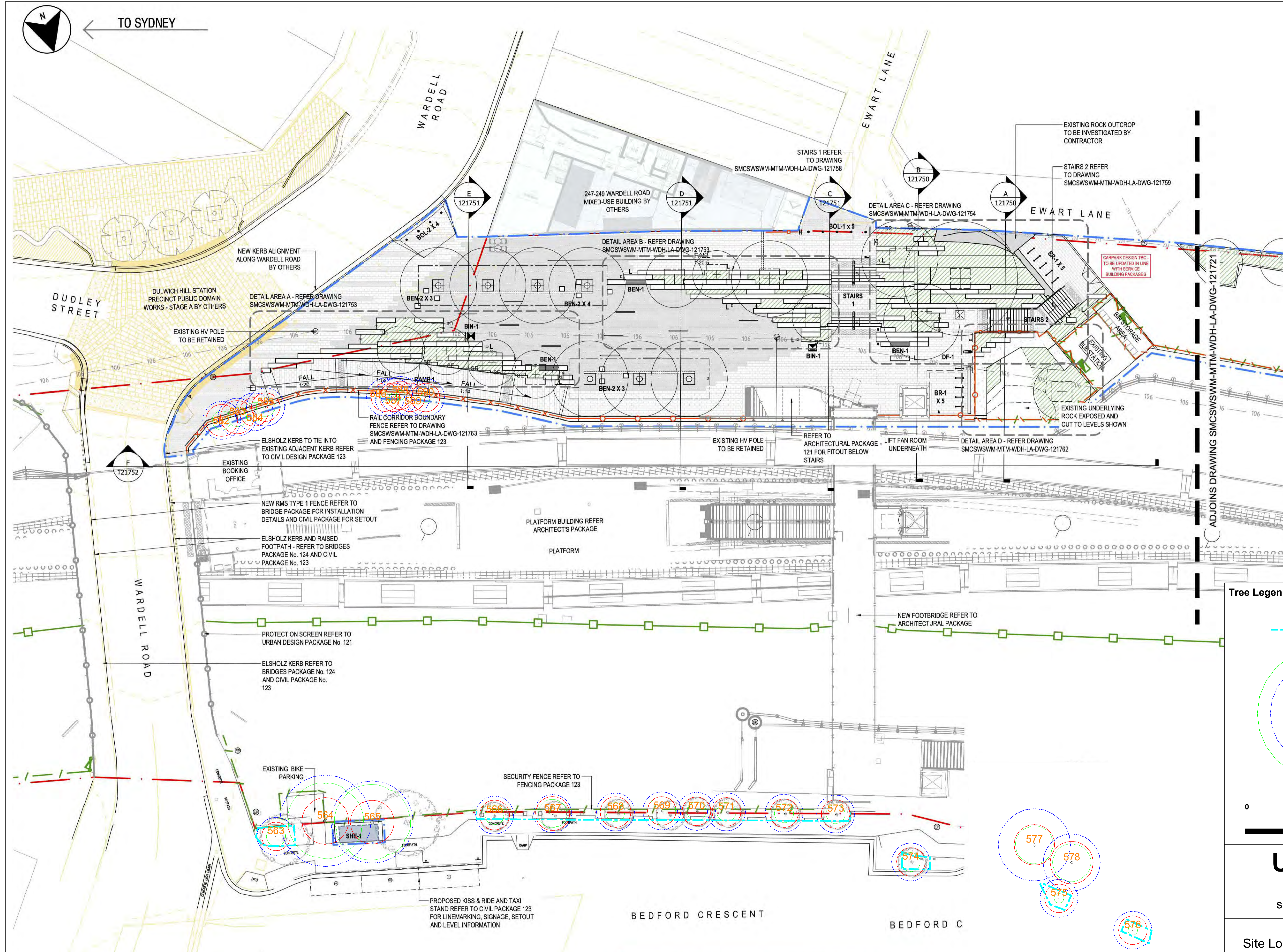
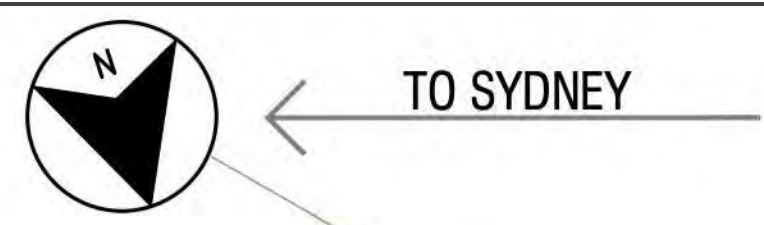
Appendix 3 - Further information of methodology



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ISA Tree Risk Assessment Qualification (TRAQ)

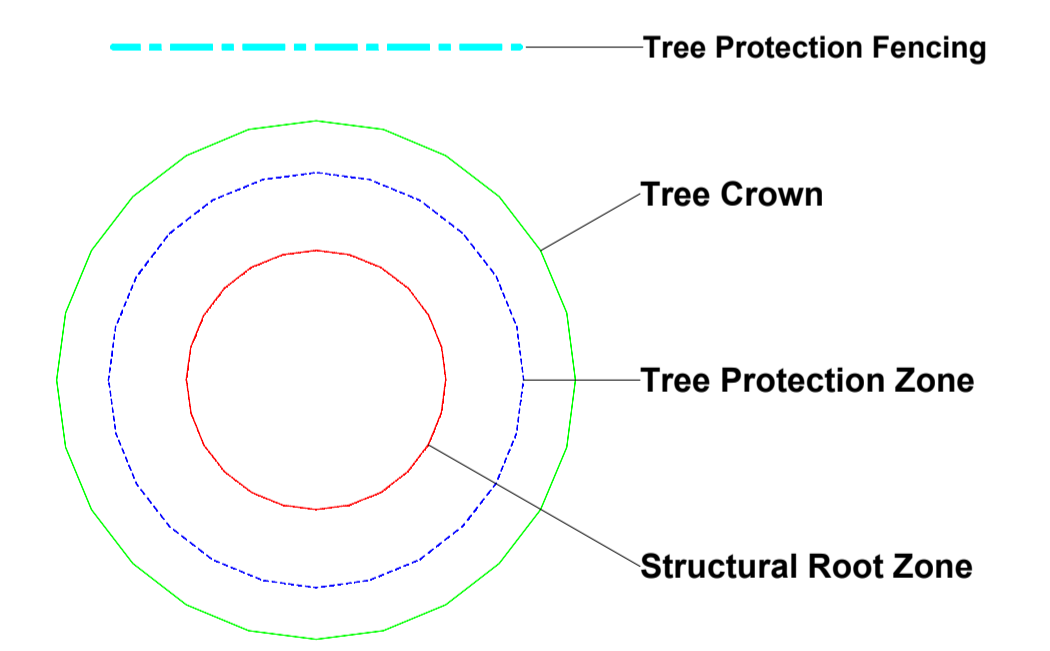


Bryce Claassens
Diploma of Arboriculture (AQF5)
Cert III Landscape Construction
Member Arboriculture Australia
QTRA
TRAQ



- LEGEND**
- RAILCORP PROPERTY BOUNDARY
 - EXTENT OF LANDSCAPE WORKS
 - EXISTING**
 - EXISTING TREES TO BE RETAINED
 - EXISTING ELECTRICITY POLE TO BE RETAINED
 - EXISTING OVERHEAD POWER LINE
 - PLANTING**
 - PROPOSED TREES REFER PLANTING PLAN
 - MASS PLANTING REFER PLANTING PLAN AND SCHEDULE FOR DETAILS
 - FENCEWALLS**
 - PLAZA FENCING REFER TO FENCING PLAN SMCSWSWM-MTM-WDH-LA-DWG-121723
 - PROTECTION SCREEN REFER TO URBAN DESIGN PACKAGE No. 121
 - RMS TYPE 1 FENCE REFER TO CIVIL PACKAGE 123
 - SECURITY FENCE REFER TO FENCING PACKAGE 123
 - SANDSTONE LOGS REFER TO DRAWING SMCSWSWM-MTM-WDH-LA-DWG-121753 TO 121754 AND MATERIAL SCHEDULE
 - PAVING**
 - NATURAL STONE PAVING. REFER TO MATERIALS SCHEDULE, PAVING PLAN AND DETAILS
 - TREE GRATES. REFER TO MATERIALS SCHEDULE
 - TACTILE INDICATORS - WARNING INDICATORS TO COMPLY WITH AS1428.4. REFER TO MATERIALS SCHEDULE
 - TRENCH DRAIN REFER TO CIVIL PACKAGE 123
 - FURNITURE**
 - SEAT 1 REFER TO DETAIL 03 /

Tree Legend



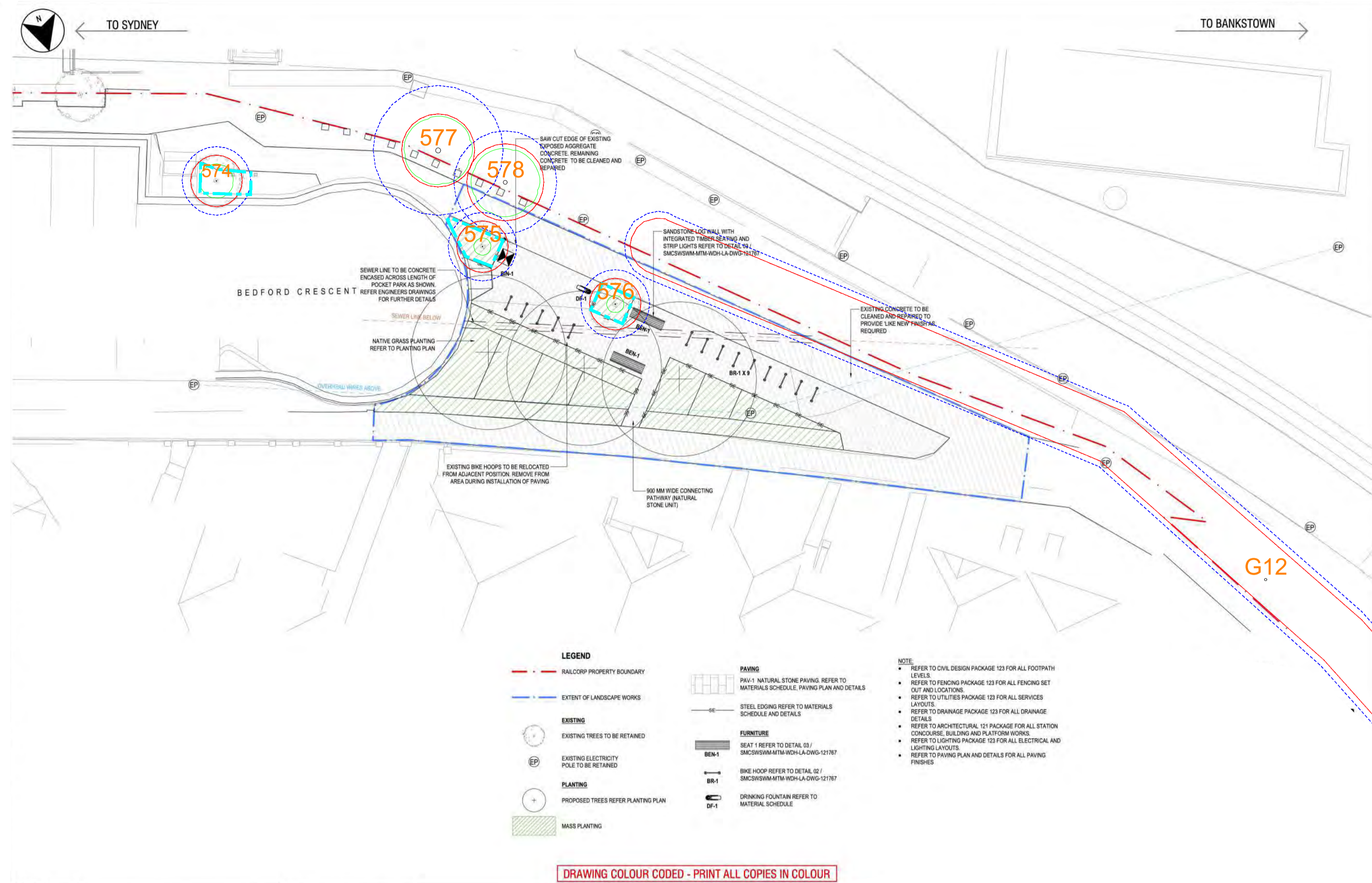
Urban Arbor Pty Ltd
 PO Box 450, Turrumurra, NSW, 2074
 sales@urbanarbor.com.au, (02) 8004 2802

Site Location: Dulwich Hill Station, Dulwich Hill NSW

SCALE : 1 : 200 @ A1	DATE : 22/12/2020	
Appendix 1A: Proposed Landscape South		

Prepared by: Bryce Claassens

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Tree Legend

- Tree Protection Fencing
- Tree Crown
- Tree Protection Zone
- Structural Root Zone

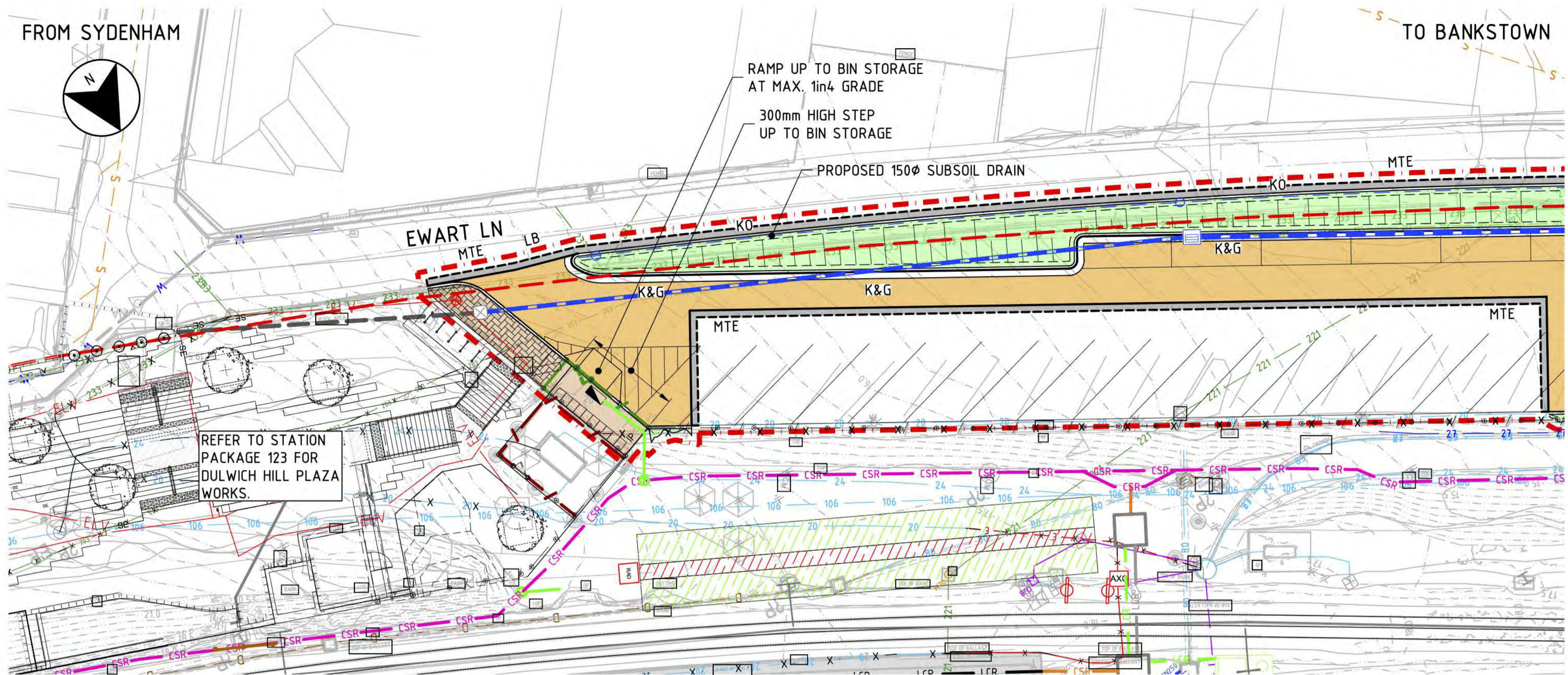
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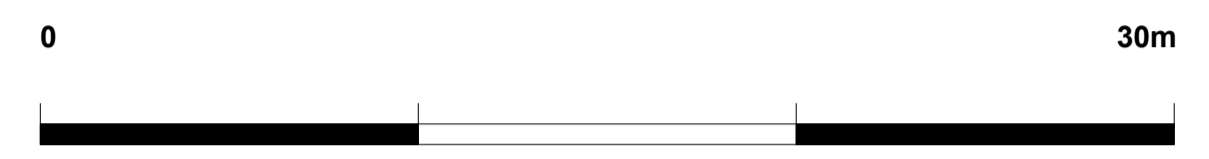
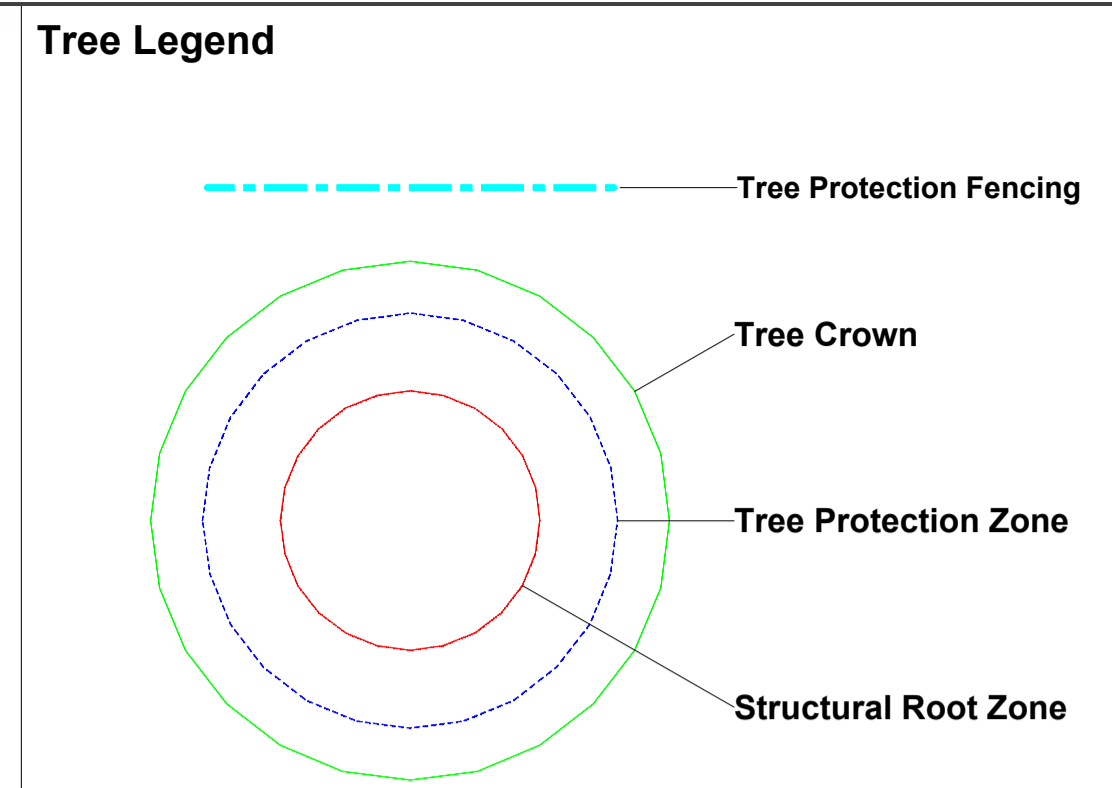
Site Location: Dulwich Hill Station, Dulwich Hill NSW

SCALE : 1 : 200 @ A1	DATE : 22/12/2020	
Appendix 1B: Proposed Landscape North		

Prepared by: Bryce Claassens



PLAN
SCALE 1:200



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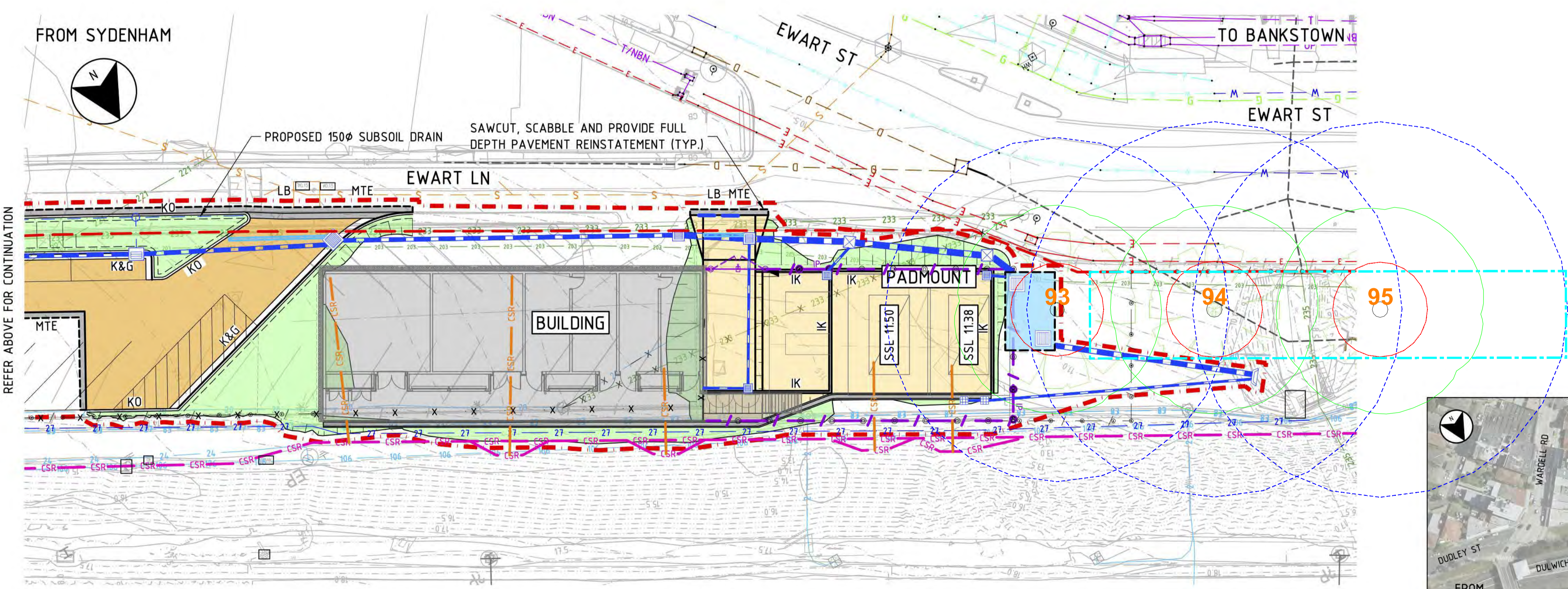
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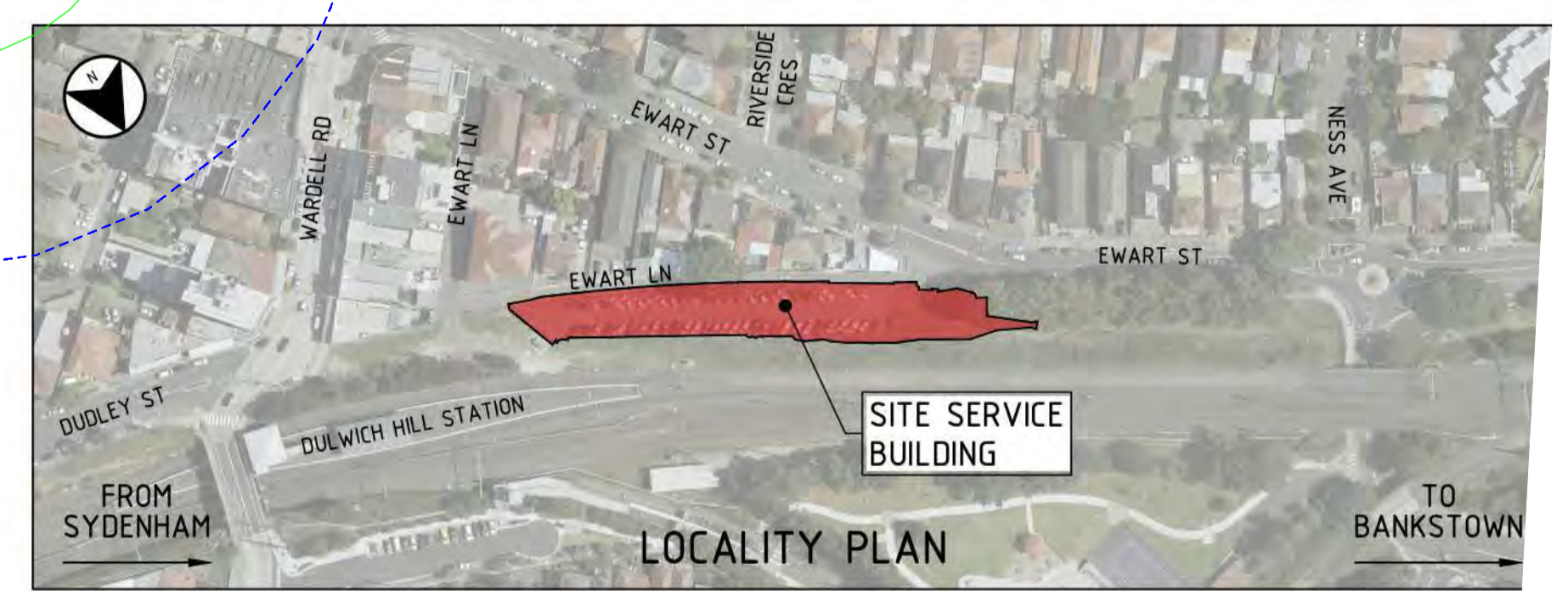


Appendix 1C: Proposed Service Building

Prepared by: Bryce Claassens



PLAN
SCALE 1:200



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Appendix 2 - Tree Inspection Schedule

Tree ID	Common Name	Botanical Name	Age Class	Height (m)	Canopy Spread Radius (m)	Stem 1	Stem 2	Stem 3	Stem 4	Stem 5	DBH (mm)	DAB (mm)	Health	Structure	Amenity Value	SULE	Retention Value	TPZ Radius (m)	SRZ Radius (m)	Notes
93	London Plane	<i>Platanus x hispanica</i>	Mature	21	8	1100					1100	1200	Good	Fair	High	2. Medium	A1	13.2	3.6	Located within corridor. Asymmetric crown shape due to power line clearance. Suckers at base.
94	London Plane	<i>Platanus x hispanica</i>	Mature	22	8	1200					1200	1300	Good	Fair	High	2. Medium	A1	14.4	3.7	Located within corridor. Asymmetric crown shape due to power line clearance.
95	London Plane	<i>Platanus x hispanica</i>	Mature	21	8	1200					1200	1250	Good	Fair	High	2. Medium	A1	14.4	3.6	Located within corridor. Asymmetric crown shape due to power line clearance.
563	Tuckeroo	<i>Cupaniopsis anacardioides</i>	Young	3	1	90					90	120	Good	Good	Low	5. Small/Young	Z1	2.0	1.5	None.
564	Tuckeroo	<i>Cupaniopsis anacardioides</i>	Mature	6	4	280	260	110			398	490	Good	Good	Medium	1. Long	A1	4.8	2.5	Multiple pruning wounds.
565	Tuckeroo	<i>Cupaniopsis anacardioides</i>	Mature	6	4	360					360	420	Good	Good	Medium	1. Long	A1	4.3	2.3	None.
566	Tuckeroo	<i>Cupaniopsis anacardioides</i>	Young	3	1	130					130	170	Good	Good	Low	5. Small/Young	Z1	2.0	1.6	None.
567	Tuckeroo	<i>Cupaniopsis anacardioides</i>	Semi-mature	4	1.5	160					160	230	Good	Good	Low	5. Small/Young	Z1	2.0	1.8	None.
568	Tuckeroo	<i>Cupaniopsis anacardioides</i>	Semi-mature	4	1	150					150	180	Good	Good	Low	5. Small/Young	Z1	2.0	1.6	None.
569	Tuckeroo	<i>Cupaniopsis anacardioides</i>	Semi-mature	4	1.5	120					120	150	Good	Good	Low	5. Small/Young	Z1	2.0	1.5	None.
570	Tuckeroo	<i>Cupaniopsis anacardioides</i>	Young	3	1	100					100	150	Good	Fair	Low	5. Small/Young	Z1	2.0	1.5	Multi stem tree.
571	Tuckeroo	<i>Cupaniopsis anacardioides</i>	Young	3	1	120					120	150	Good	Good	Low	5. Small/Young	Z1	2.0	1.5	None.
572	Tuckeroo	<i>Cupaniopsis anacardioides</i>	Young	3	1	90					90	100	Good	Good	Low	5. Small/Young	Z1	2.0	1.5	None.
573	Tuckeroo	<i>Cupaniopsis anacardioides</i>	Young	3	1	70					70	90	Good	Fair	Low	5. Small/Young	Z1	2.0	1.5	Trunk wound to N at 1m.
574	Tuckeroo	<i>Backhousia citriodora</i>	Young	2	1	50					50	80	Good	Good	Low	5. Small/Young	Z1	2.0	1.5	None.
575	Lemon Myrtle	<i>Backhousia citriodora</i>	Young	2	0.5	50					50	60	Good	Good	Low	5. Small/Young	Z1	2.0	1.5	None.
576	Lemon Myrtle	<i>Backhousia citriodora</i>	Young	2	0.5	50					50	60	Good	Good	Low	5. Small/Young	Z1	2.0	1.5	None.
577	Lemon Myrtle	<i>Cinnamomum camphora</i>	Semi-mature	4	2	150	180	150	150		316	350	Good	Fair	Low	3. Short	Z9	3.8	2.1	Topped for power lines. Within corridor. Exempt species.
578	Camphor Laurel	<i>Cinnamomum camphora</i>	Semi-mature	4	2	120	120	150	100		248	400	Good	Fair	Low	3. Short	Z9	3.0	2.3	Topped for power lines. Within corridor. Exempt species.
G12	Mixed Weed Species	<i>Mixed spp</i>	Semi-mature	6	2	150					150	180	Good	Fair	Very Low	2. Medium	Z3	2.0	1.6	Group of weed species located within corridor. Privet, lantana, Celtis, African olive, camphor, mulberry, loquat.
579	Chinese Tallo	<i>Triadica sebifera</i>	Semi-mature	7	2	170					170	200	Good	Fair	Medium	2. Medium	A1	2.0	1.7	Located within corridor.
580	Sweetgum	<i>Liquidambar styraciflua</i>	Semi-mature	9	3	180					180	200	Good	Good	Medium	1. Long	A1	2.2	1.7	Located within corridor.
581	Port Jackson Fig	<i>Ficus rubiginosa</i>	Semi-mature	9	4	150	200	200			320	450	Good	Fair	Medium	1. Long	A1	3.8	2.4	Located within corridor. Growing through existing fence.
582	Swamp Oak	<i>Casuarina glauca</i>	Young	5	1	140	80				161	200	Good	Fair	Low	5. Small/Young	Z1	2.0	1.7	None.
583	Swamp Oak	<i>Casuarina glauca</i>	Semi-mature	5	1	150	70				166	220	Good	Fair	Low	5. Small/Young	Z1	2.0	1.8	None.
584	Swamp Oak	<i>Casuarina glauca</i>	Semi-mature	5	1	100					100	150	Good	Fair	Low	5. Small/Young	Z1	2.0	1.5	None.
585	Swamp Oak	<i>Casuarina glauca</i>	Semi-mature	4.5	1	120					120	150	Good	Fair	Low	5. Small/Young	Z1	2.0	1.5	None.
586	Swamp Oak	<i>Casuarina glauca</i>	Young	2	0.5	50					50	80	Good	Fair	Low	5. Small/Young	Z1	2.0	1.5	None.
587	Swamp Oak	<i>Casuarina glauca</i>	Young	2	0.5	50					50	80	Good	Fair	Low	5. Small/Young	Z1	2.0	1.5	None.
588	Swamp Oak	<i>Casuarina glauca</i>	Young	2	0.5	50					50	80	Good	Fair	Low	5. Small/Young	Z1	2.0	1.5	None.
589	Swamp Oak	<i>Casuarina glauca</i>	Young	2	0.5	50					50	100	Good	Fair	Low	5. Small/Young	Z1	2.0	1.5	None.
590	Swamp Oak	<i>Casuarina glauca</i>	Young	2	0.5	50					50	90	Good	Fair	Low	5. Small/Young	Z1	2.0	1.5	None.

Explanatory Notes

Tree Species - Common name followed by botanical name. Where species is unknown it is indicated with an 'spp'.

Age Class - Over mature (OM), Mature (M), Early mature (EM), Semi mature (SM), Young (Y).

Diameter at Breast Height (DBH) - Measured with a DBH tape or estimated at approximately 1.4m above ground level.

Diameter Above root Buttresses (DAB) - Measured with a DBH tape or estimated above root buttresses (DAB) for calculating the SRZ.

Height - Height from ground level to top of crown. All heights are estimated unless otherwise indicated.

Spread - Radius of crown at widest section. All tree spreads are estimated unless otherwise indicated.

Tree Protection Zone (TPZ) - DBH x 12. Measured in radius from the centre of the trunk. Rounded to nearest 0.1m. For monocots, the TPZ is set at 1 metre outside the crown projection.

Structural Root Zone (SRZ) - (DAB x 50)^{0.42} x 0.64. Measured in radius from the centre of the trunk. Rounded up to nearest 0.1m.

Health - Good/Fair/Poor/Dead

Structure - Good/Fair/Poor

Safe Useful Life Expectancy (SULE) - 1. Long (40+years), 2. Medium (15 - 40 years), 3. Short (5 - 15 years), 4. Remove (under 5 years), 5. Small/young.

Amenity Value - Very High/High/Medium/Low/Very Low.

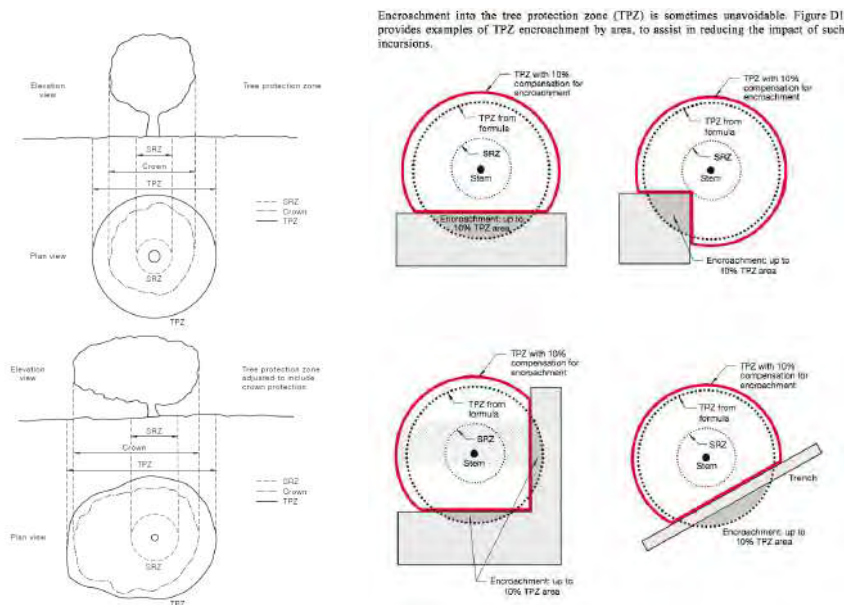
Retention Value: Tree AZ, see appendix 3 for categories.

Appendix 3 - Further Information of Methodology

1. **Tree Protection Zone:** The tree protection zone (TPZ) is the principle means of protecting trees on development sites. The TPZ is 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 radius of the TPZ is calculated for each tree by multiplying its DBH x 12. The derived value is measured in radius from the centre of the stem/trunk at ground level. A TPZ should not be less than 2.0 metres nor greater than 15 metres (except where crown protection is required). It is commonly observed that tree roots will extend significant further than the indicative TPZ, however the TPZ is an area identified AS4970-2009 to be extent where root loss or disturbance will generally not impact the viability of the tree. The TPZ is identified as a restricted area to prevent damage to trees either above or below ground during a development. Where trees are intended to be retained proposed developments must provide an adequate TPZ around trees. The TPZ is set aside for the tree's root zone, trunk and crown and it is essential for the stability and longevity of the tree. The tree protection also incorporates the SRZ (see below for more information about the SRZ). I have calculated the TPZ of palms, other monocots, cycads and tree ferns at one metre outside the crown projection. See appendices for additional information about the TPZ including information about calculating the TPZ and examples of TPZ encroachment.

Minor encroachment into TPZ: Sometimes encroachment into the TPZ is unavoidable. Encroachment includes but is not limited to activities such as excavation, compacted fill and machine trenching. Minor encroachment of up to 10% of the overall TPZ area is normally considered acceptable, providing there is space adjacent to the TPZ for the tree to compensate and the tree is displaying adequate vigour/health to tolerate changes to its growing environment.

Major encroachment into TPZ: Where encroachment of more than 10% of the overall TPZ area is proposed the project Arborist must investigate and demonstrate that the tree will remain in a viable condition. In some cases, tree sensitive construction methods such as pier and beam footings, suspended slabs, or cantilevered sections, can be utilised to allow additional encroachment into the TPZ by bridging over roots and minimising root disturbance. Major encroachment is only possible if it can be undertaken without severing significant size roots, or if it can be demonstrated that significant roots will not be impacted.



2. **Structural Root Zone:** This is the area around the base of a tree required for the trees stability in the ground. An area larger than the SRZ always need to be maintained to preserve a viable tree as it will only have a minor effect on the trees vigour and health. There are several factors that determine the SRZ which include height, crown area, soil type and soil moisture. It can also be influenced by other factors such as natural or built structures. Generally work within the SRZ should be avoided.

An indicative SRZ radius can be determined from the diameter of the trunk measured immediately above the root buttresses. Root investigation could provide more information about the extent of the SRZ. The following formula should be used to calculate the SRZ.

$$\text{SRZ radius} = (D \times 50)^{0.42} \times 0.64 \quad (D = \text{Diameter above root buttress}).$$

3. **Tree Age Class:** It can be difficult to determine the age of a tree without carrying out invasive tests that may damage the tree, so we have categorised there likely age class which is defined below;

- Young/Newly planted: Young or recently planted tree.
- Semi Mature: Up to 20% of the usual life expectancy for the species.
- Early mature/Mature: Between 20%-80% of the usual life expectancy for the species.
- Over mature: Over 80% of the usual life expectancy for the species.
- Dead: Tree is dead or almost dead.

4. **Health/Physiological Condition:** Below are examples conditions used when assigning a category for tree health.

<u>Category</u>	<u>Example condition</u>	<u>Summary</u>
Good	<ul style="list-style-type: none"> • Crown has good foliage density for species. • Tree shows no or minimal signs of pathogens that are unlikely to have an effect on the health of the tree. • Tree is displaying good vigour and reactive growth development. 	<ul style="list-style-type: none"> • The tree is in above average health and condition and no remedial works are required.
Fair	<ul style="list-style-type: none"> • The tree may be starting to dieback or have over 25% deadwood. • Tree may have slightly reduced crown density or thinning. • There may be some discolouration of foliage. • Average reactive growth development. • There may be early signs of pathogens which may further deteriorate the health of the tree. • There may be epicormic growth indicating increased levels of stress within the tree. 	<ul style="list-style-type: none"> • The tree is in below average health and condition and may require remedial works to improve the trees health.
Poor	<ul style="list-style-type: none"> • The tree may be in decline, have extensive dieback or have over 30% deadwood. • The canopy may be sparse or the leaves may be unusually small for species. • Pathogens or pests are having a significant detrimental effect on the tree health. 	<ul style="list-style-type: none"> • The tree is displaying low levels of health and removal or remedial works may be required.
Dead	<ul style="list-style-type: none"> • The tree is dead or almost dead. 	<ul style="list-style-type: none"> • The tree should generally be removed.

5. **Structural Condition:** Below are examples conditions used when assigning a category for structural condition.

<u>Category</u>	<u>Example condition</u>	<u>Summary</u>
Good	<ul style="list-style-type: none"> • Branch unions appear to be strong with no sign of defects. • There are no significant cavities. • The tree is unlikely to fail in usual conditions. • The tree has a balanced crown shape and form. 	<ul style="list-style-type: none"> • The tree is considered structurally good with well developed form.
Fair	<ul style="list-style-type: none"> • The tree may have minor structural defects within the structure of the crown that could potentially develop into more significant defects. • The tree may have a cavity that is currently unlikely to fail but may deteriorate in the future. • The tree is an unbalanced shape or leans significantly. • The tree may have minor damage to its roots. • The root plate may have moved in the past but the tree has now compensated for this. • Branches may be rubbing or crossing. 	<ul style="list-style-type: none"> • The identified defects are unlikely cause major failure. • Some branch failure may occur in usual conditions. • Remedial works can be undertaken to alleviate potential defects.
Poor	<ul style="list-style-type: none"> • The tree has significant structural defects. • Branch unions may be poor or weak. • The tree may have a cavity or cavities with excessive levels of decay that could cause catastrophic failure. • The tree may have root damage or is displaying signs of recent movement. • The tree crown may have poor weight distribution which could cause failure. 	<ul style="list-style-type: none"> • The identified defects are likely to cause either partial or whole failure of the tree.

6. **Amenity Value:** To determine the amenity value of a tree we assess a number of different factors, which include but are not limited to the information below.

- The visibility of the tree to adjacent sites.
- The relationship between the tree and the site.
- Whether the tree is protected by any statutory conditions.
- The habitat value of the tree.
- Whether the tree is considered a noxious weed species.

The amenity value is rated using one of the following values.

- Very High
- High
- Moderate
- Low
- Very Low

7. **Safe Useful Life Expectancy (SULE), (Barrel, 2001):** A trees safe useful life expectancy is determined by assessing a number of different factors including the health and vitality, estimated age in relation to expected life expectancy for the species, structural defects, and remedial works that could allow retention in the existing situation.

Category	Description
1. Long - Over 40 years	(a) Structurally sound trees located in positions that can accommodate future growth. (b) Trees that could be made suitable for retention in the long term by remedial tree care. (c) Trees of special significance for historical, commemorative or rarity reasons that would warrant extraordinary efforts to secure their long term retention.
2. Medium - 15 to 40 years	(a) Trees that may only live between 15 and 40 more years. (b) Trees that could live for more than 40 years but may be removed for safety or nuisance reasons. (c) Trees that could live for more than 40 years but may be removed to prevent interference with more suitable individuals or to provide space for new planting. (d) Trees that could be made suitable for retention in the medium term by remedial tree care.
3. Short - 5 to 15 years	(a) Trees that may only live between 5 and 15 more years. (b) Trees that could live for more than 15 years but may be removed for safety or nuisance reasons. (c) Trees that could live for more than 15 years but may be removed to prevent interference with more suitable individuals or to provide space for new planting. (d) Trees that require substantial remedial tree care and are only suitable for retention in the short term.
4. Remove - Under 5 years	(a) Dead, dying, suppressed or declining trees because of disease or inhospitable conditions. (b) Dangerous trees because of instability or recent loss of adjacent trees. (c) Dangerous trees because of structural defects including cavities, decay, included bark, wounds or poor form. (d) Damaged trees that are clearly not safe to retain. (e) Trees that could live for more than 5 years but may be removed to prevent interference with more suitable individuals or to provide space for new planting. (f) Trees that are damaging or may cause damage to existing structures within 5 years. (g) Trees that will become dangerous after removal of other trees for the reasons given in (a) to (f). (h) Trees in categories (a) to (g) that have a high wildlife habitat value and, with appropriate treatment, could be retained subject to regular review.
5. Small/Young	(a) Small trees less than 5m in height. (b) Young trees less than 15 years old but over 5m in height. (c) Formal hedges and trees intended for regular pruning to artificially control growth.

8. **Root investigations:** The root investigations should identify roots greater than 30mm in diameter that are located along the edge of the structures footprint or in the location of footings. Root investigations must be carried out using non-invasive methods (manual excavations). Any excavations for the root investigations must carried out manually to avoid damaging the roots during excavations. Manual excavation may include the use of a high-pressure air/air knife, or a combination of high-pressure water and a vacuum device. When hand excavating carefully work around roots retaining as many as possible. Take care to not fray, wound, or cause damage to any roots during excavations as this may cause decay or infection from pathogens. It is essential that exposed roots are kept moist and the excavation back filled as soon as possible. The root investigations should be carried out by a qualified Arborist minimum AQF3. Once roots are exposed, a visual assessment can be carried out by a consulting Arborist to evaluate the potential impact of the proposed root loss on the health and stability of the tree. A root map/report should be prepared identifying the findings of investigations, including photographs as supporting evidence in the report.

9. **Retention Value:** The system I have used to award the retention value is Tree AZ. Tree AZ is used to identify higher value trees worthy of being a constraint to development and lower value trees that should generally not be a constraint to the development. The table below provides a brief description of each category.

TreeAZ Categories (Version 10.04-ANZ)

CAUTION: TreeAZ assessments must be carried out by a competent person qualified and experienced in arboriculture. The following category descriptions are designed to be a brief field reference and are not intended to be self-explanatory. They must be read in conjunction with the most current explanations published at www.TreeAZ.com.

Category Z: Unimportant trees not worthy of being a material constraint

Local policy exemptions: Trees that are unsuitable for legal protection for local policy reasons including size, proximity and species

- Z1 Young or insignificant small trees, i.e. below the local size threshold for legal protection, etc
- Z2 Too close to a building, i.e. exempt from legal protection because of proximity, etc
- Z3 Species that cannot be protected for other reasons, i.e. scheduled noxious weeds, out of character in a setting of acknowledged importance, etc

High risk of death or failure: Trees that are likely to be removed within 10 years because of acute health issues or severe structural failure

- Z4 Dead, dying, diseased or declining
- Z5 Severe damage and/or structural defects where a high risk of failure cannot be satisfactorily reduced by reasonable remedial care, i.e. cavities, decay, included bark, wounds, excessive imbalance, overgrown and vulnerable to adverse weather conditions, etc
- Z6 Instability, i.e. poor anchorage, increased exposure, etc
- Z7 **Excessive nuisance:** Trees that are likely to be removed within 10 years because of unacceptable impact on people
- Z7 Excessive, severe and intolerable inconvenience to the extent that a locally recognized court or tribunal would be likely to authorize removal, i.e. dominance, debris, interference, etc
- Z8 Excessive, severe and intolerable damage to property to the extent that a locally recognized court or tribunal would be likely to authorize removal, i.e. severe structural damage to surfacing and buildings, etc

Good management: Trees that are likely to be removed within 10 years through responsible management of the tree population

- Z9 Severe damage and/or structural defects where a high risk of failure can be temporarily reduced by reasonable remedial care, i.e. cavities, decay, included bark, wounds, excessive imbalance, vulnerable to adverse weather conditions, etc
- Z10 Poor condition or location with a low potential for recovery or improvement, i.e. dominated by adjacent trees or buildings, poor architectural framework, etc
- Z11 Removal would benefit better adjacent trees, i.e. relieve physical interference, suppression, etc
- Z12 Unacceptably expensive to retain, i.e. severe defects requiring excessive levels of maintenance, etc

NOTE: Z trees with a high risk of death/failure (Z4, Z5 & Z6) or causing severe inconvenience (Z7 & Z8) at the time of assessment and need an urgent risk assessment can be designated as ZZ. ZZ trees are likely to be unsuitable for retention and at the bottom of the categorization hierarchy. In contrast, although Z trees are not worthy of influencing new designs, urgent removal is not essential and they could be retained in the short term, if appropriate.

Category A: Important trees suitable for retention for more than 10 years and worthy of being a material constraint

- A1 No significant defects and could be retained with minimal remedial care
- A2 Minor defects that could be addressed by remedial care and/or work to adjacent trees
- A3 Special significance for historical, cultural, commemorative or rarity reasons that would warrant extraordinary efforts to retain for more than 10 years
- A4 Trees that may be worthy of legal protection for ecological reasons (Advisory requiring specialist assessment)

NOTE: Category A1 trees that are already large and exceptional, or have the potential to become so with minimal maintenance, can be designated as AA at the discretion of the assessor. Although all A and AA trees are sufficiently important to be material constraints, AA trees are at the top of the categorization hierarchy and should be given the most weight in any selection process.

TreeAZ is designed by Barrell Tree Consultancy (www.barrelltreecare.co.uk) and is reproduced with their permission

Glossary of Terms

Abiotic - Pertaining to non-living agents; e.g. environmental factors

Adventitious shoots - Shoots that develop other than from apical, axillary or dormant buds; see also 'epicormic'

Anchorage - The system whereby a tree is fixed within the soil, involving cohesion between roots and soil and the development of a branched system of roots which withstands wind and gravitational forces transmitted from the aerial parts of the tree

Bark - A term usually applied to all the tissues of a woody plant lying outside the vascular cambium, thus including the phloem, cortex and periderm; occasionally applied only to the periderm or the phellem

Branch:

- **Primary**. A first order branch arising from a stem
- **Lateral**. A second order branch, subordinate to a primary branch or stem and bearing sub-lateral branches
- **Sub-lateral**. A third order branch, subordinate to a lateral or primary branch, or stem and usually bearing only twigs

Branch collar - A visible swelling formed at the base of a branch whose diameter growth has been disproportionately slow compared to that of the parent stem; a term sometimes applied also to the pattern of growth of the cells of the parent stem around the branch base

Brown-rot - A type of wood decay in which cellulose is degraded, while lignin is only modified

Buckling - An irreversible deformation of a structure subjected to a bending load

Buttress zone - The region at the base of a tree where the major lateral roots join the stem, with buttress-like formations on the upper side of the junctions

Cambium - Layer of dividing cells producing xylem (woody) tissue internally and phloem (bark) tissue externally

Canker - A persistent lesion formed by the death of bark and cambium due to colonisation by fungi or bacteria

Compartmentalisation - The confinement of disease, decay or other dysfunction within an anatomically discrete region of plant tissue, due to passive and/or active defences operating at the boundaries of the affected region

Compressive loading - Mechanical loading which exerts a positive pressure; the opposite to tensile loading

Condition - An indication of the physiological condition of the tree. Where the term 'condition' is used in a report, it should not be taken as an indication of the stability of the tree

Crown/Canopy - The main foliage bearing section of the tree

Crown lifting - The removal of limbs and small branches to a specified height above ground level

Crown thinning - The removal of a proportion of secondary branch growth throughout the crown to produce an even density of foliage around a well-balanced branch structure

Crown reduction/shaping - A specified reduction in crown size whilst preserving, as far as possible, the natural tree shape

DAB (Diameter Above Buttress) - Trunk diameter measured above the root buttress

Defect - In relation to tree hazards, any feature of a tree which detracts from the uniform distribution of mechanical stress, or which makes the tree mechanically unsuited to its environment

Dieback - The death of parts of a woody plant, starting at shoot-tips or root-tips

Disease - A malfunction in or destruction of tissues within a living organism, usually excluding mechanical damage; in trees, usually caused by pathogenic micro-organisms

Dominance - In trees, the tendency for a leading shoot to grow faster or more vigorously than the lateral shoots; also the tendency of a tree to maintain a taller crown than its neighbours

Dormant bud - An axial bud which does not develop into a shoot until after the formation of two or more annual wood increments; many such buds persist through the life of a tree and develop only if stimulated to do so

Dysfunction - In woody tissues, the loss of physiological function, especially water conduction, in sapwood

DBH (Diameter at Breast Height) - Stem diameter measured at a height of 1.4 metres or the nearest measurable point. Where measurement at a height of 1.4 metres is not possible, another height may be specified

Deadwood - Branch or stem wood bearing no live tissues. Retention of deadwood provides valuable habitat for a wide range of species and seldom represents a threat to the health of the tree. Removal of deadwood can result in the ingress of decay to otherwise sound tissues and climbing operations to access deadwood can cause significant damage to a tree. Removal of deadwood is generally recommended only where it represents an unacceptable level of hazard

Epicormic shoot - A shoot having developed from a dormant or adventitious bud and not having developed from a first year shoot

Flush-cut - A pruning cut which removes part of the branch bark ridge and or branch-collar

Girdling root - A root which circles and constricts the stem or roots possibly causing death of phloem and/or cambial tissue

Habit - The overall growth characteristics, shape of the tree and branch structure

Hazard beam - An upwardly curved part of a tree in which strong internal stresses may occur without being reduced by adaptive growth; prone to longitudinal splitting

Heartwood/false-heartwood - The dead central wood that has become dysfunctional as part of the aging processes and being distinct from the sapwood

Heave - A term mainly applicable to a shrinkable clay soil which expands due to re-wetting after the felling of a tree which was previously extracting moisture from the deeper layers; also the lifting of pavements and other structures by root diameter expansion; also the lifting of one side of a wind-rocked root-plate

Included bark (ingrown bark) - Bark of adjacent parts of a tree (usually forks, acutely joined branches or basal flutes) which is in face-to-face contact

Lever arm - A mechanical term denoting the length of the lever represented by a structure that is free to move at one end, such as a tree or an individual branch

Lignin - The hard, cement-like constituent of wood cells; deposition of lignin within the matrix of cellulose microfibrils in the cell wall is termed Lignification

Lions tailing - A term applied to a branch of a tree that has few if any side-branches except at its end, and is thus liable to snap due to end-loading

Loading - A mechanical term describing the force acting on a structure from a particular source; e.g. the weight of the structure itself or wind pressure

Mycelium - The body of a fungus, consisting of branched filaments (hyphae)

Occlusion - The process whereby a wound is progressively closed by the formation of new wood and bark around it

Pathogen - A micro-organism which causes disease in another organism

Photosynthesis - The process whereby plants use light energy to split hydrogen from water molecules, and combine it with carbon dioxide to form the molecular building blocks for synthesizing carbohydrates and other biochemical products

Probability - A statistical measure of the likelihood that a particular event might occur

Pruning - The removal or cutting back of twigs or branches, sometimes applied to twigs or small branches only, but often used to describe most activities involving the cutting of trees or shrubs

Radial - In the plane or direction of the radius of a circular object such as a tree stem

Reactive Growth/Reaction Wood - Production of woody tissue in response to altered mechanical loading; often in response to internal defect or decay and associated strength loss (cf. adaptive growth)

Ring-barking - The removal of a ring of bark and phloem around the circumference of a stem or branch, normally resulting in an inability to transport photosynthetic assimilates below the area of damage. Almost inevitably results in the eventual death of the affected stem or branch above the damage

Root-collar - The transitional area between the stem/s and roots

Sapwood - Living xylem tissues

Soft-rot - A kind of wood decay in which a fungus degrades cellulose within the cell walls, without any general degradation of the wall as a whole

Stem/s - Principle above-ground structural component(s) of a tree that supports its branches

Stress - In plant physiology, a condition under which one or more physiological functions are not operating within their optimum range, for example due to lack of water, inadequate nutrition or extremes of temperature

SRZ (Structural Root Zone) - The area around the base of the tree required for the trees stability in the ground

Subsidence - In relation to soil or structures resting in or on soil, a sinking due to shrinkage when certain types of clay soil dry out, sometimes due to extraction of moisture by tree roots

Taper - In stems and branches, the degree of change in girth along a given length

Targets - In tree risk assessment (with slight misuse of normal meaning) persons or property or other things of value which might be harmed by mechanical failure of the tree or by objects falling from it

Topping - In arboriculture, the removal of the crown of a tree, or of a major proportion of it

Transpiration - The evaporation of moisture from the surface of a plant, especially via the stomata of leaves; it exerts a suction which draws water up from the roots and through the intervening xylem cells

TPZ (Tree Protection Zone) - A specified area above and below ground and at a given distance from the trunk set aside for the protection of a tree's roots and crown to provide for the viability and stability of a tree to be retained where it is potentially subject to damage by development

Understory - This layer consists of younger individuals of the dominant trees, together with smaller trees and shrubs which are adapted to grow under lower light conditions

Veteran tree - Tree that, by recognised criteria, shows features of biological, cultural or aesthetic value that are characteristic of, but not exclusive to, individuals surviving beyond the typical age range for the species concerned. These characteristics might typically include a large girth, signs of crown retrenchment and hollowing of the stem

Vigour - The expression of carbohydrate expenditure to growth (in trees)

White-rot - A range of kinds of wood decay in which lignin, usually together with cellulose and other wood constituents, is degraded

Wind exposure - The degree to which a tree or other object is exposed to wind, both in terms of duration and velocity

Wind pressure - The force exerted by a wind on a particular object

Windthrow - The blowing over of a tree at its roots

APPENDIX 10 DULWICH HILL AIA (PLATEAU TREES)

Date: 19 March 2021

Re: Additional tree removals at Dulwich Hill Station as part of the Southwest Metro Package.

At the request of Downer Group an onsite inspection was undertaken at Dulwich Hill Station. It has been asked to identify and record additional tree removals beyond those recommended within the Arboricultural Impact Assessment (AIA) prepared by Urban Arbor, dated 12 December 2019, Ref 19/12/12/SWMMS. On the 19 March a site walkthrough was undertaken by myself under guidance of a representative from Downer Group. Additional tree removals were identified with respects to the proposed Southwest Metro Package works. The data for these additional trees can be found as Appendix 1 of this report. Photographs of each tree have been provided as Appendix 2.

Based upon the information, rationale and justification provided within the AIA Report I can confirm that trees 582, 583, 584, 585, 586, 587, 588, 589 and 590 shall require removal to accommodate the proposed works. Reference should be made to the AIA report for their respective tree data.

The additional tree removals consist of one *Platanus x acerifolia* (London Plane) tree 1, one *Cupaniopsis anacardioides* (Tuckeroo) tree 2 and four *Callistemon viminalis* (Bottlebrush) trees 4 to 7 where there is direct design clash and 100% impact to the TPZ and SRZ requiring removal. The Overall Arrangement Site Plan – Service Building, drawing SMCSWSWM-MTM-WDH-AT_DWG-421120 shows the position of the service building and associated features with respect to tree 1. The alignment of the Padmount and underground OSD tank pose a significant (35%) encroachment into its TPZ and SRZ requiring its removal, refer to Image 2.

One *Backhousia citriodora* (Lemon-scented Myrtle) tree 3, has been identified for transplanting and relocation on the site. As identified within the provided plans the Inner West Council is to advise of its relocation position. The locations of the additional assessed trees are shown within Image 1.



Image 1: Aerial image showing the approximate locations of additional trees. (Source six maps accessed 19/03/2021).

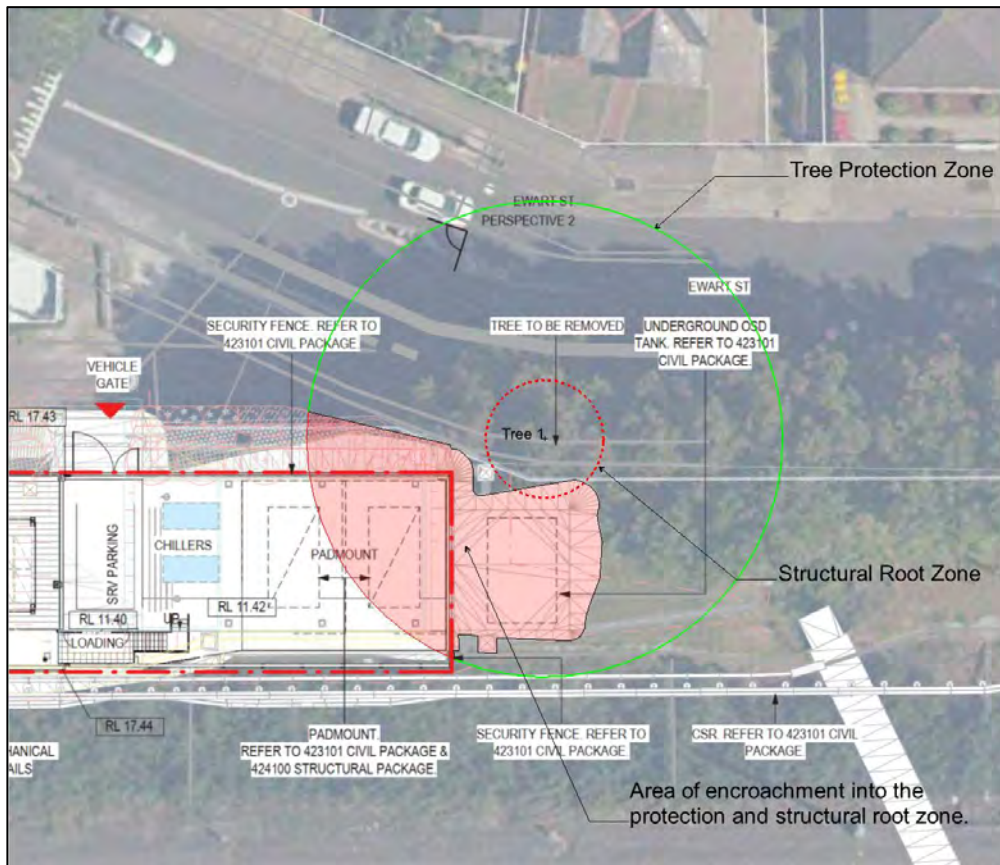


Image 2: Extract from Overall Arrangement Site Plan – Service Building showing the encroachment into the TPZ and SRZ of tree 1.

The assessed trees are not representative of an endangered or threatened species or ecological community.

All appropriate approvals and consents are to be obtained prior to tree and vegetation removal works commencing. All tree removal works are to be undertaken by suitably qualified tree workers and in accordance with Safe Work Australia's Guide to Managing Risks of Tree Trimming and Removal Works.

Please feel free to contact me should you require any further assistance regarding this matter.

Regards.

Owen Tebbutt



Consulting Arborist
Plateau Tree Service

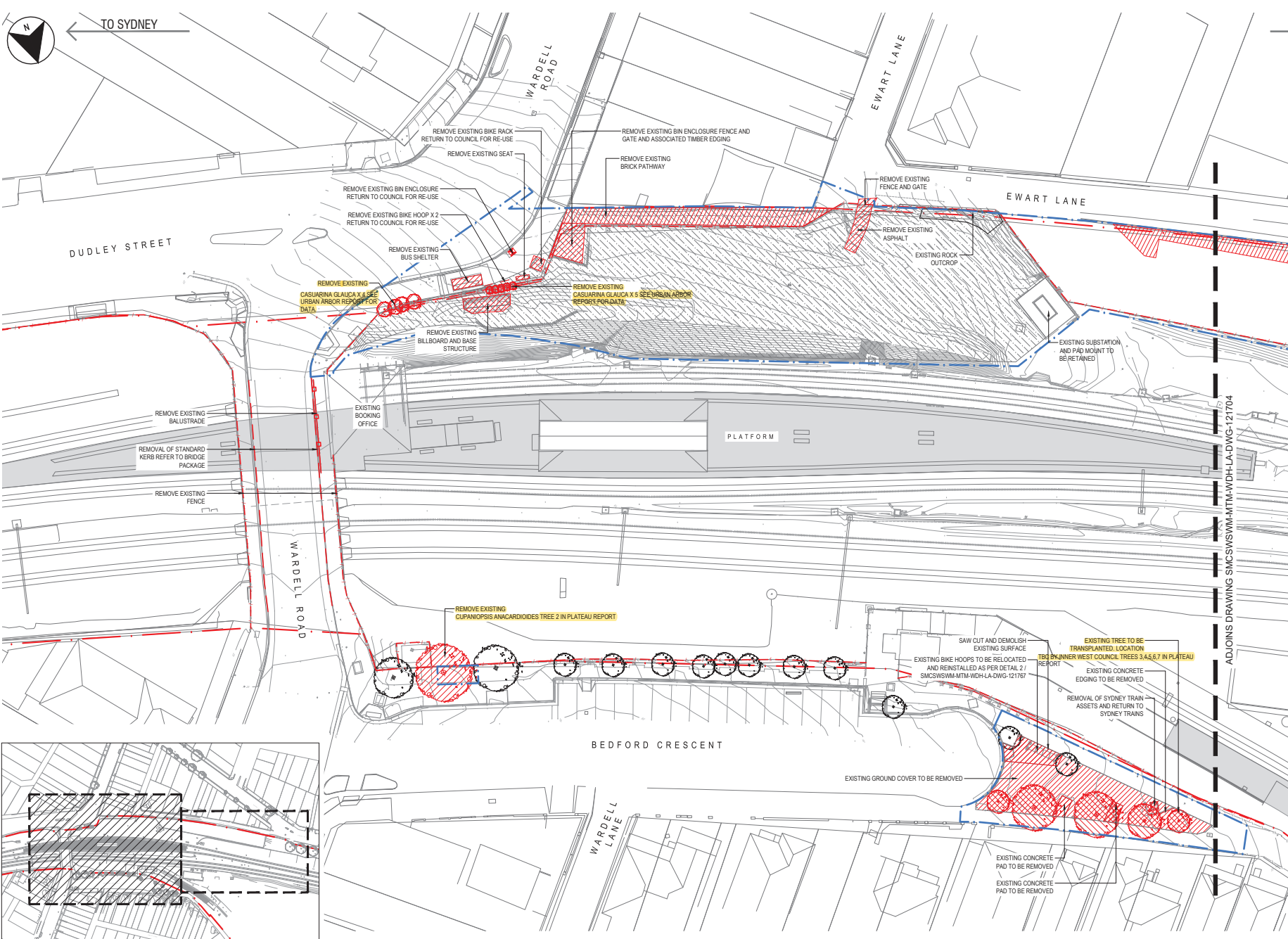
Appendix 1: Tree Assessment Schedule

Tree number	Tree name	Tree dimensions				Vigour	Condition	Age class	ULE	Amenity and Visual Value	Native or Exotic	TPZ (m)	SRZ (m)	Comments	Remove or Retain
	Botanical name Common name	Height (m)	Spread (m)	D.B.H. (mm)	D.A.B. (mm)										
1	<i>Platanus x acerifolia</i> (London Plane)	25-30	8x8	1200	1200	N	G	M	L	H	E	14.4	3.57	Significant landscape specimen – part of avenue planting adjacent Ewart Street. Previously lopped at approx. 5m height. Significant pruning to clear adjacent overhead wired has resulted in an asymmetrical canopy. Lifting of footpath adjacent tree – likely from roots. Direct clash with MSB	Remove
2	<i>Cupaniopsis anacardioides</i> (Tuckeroo)	5-10	4x4	270 280 150	400	N	G	M	M	M	N	5.04	2.25	Foliage appears slightly chlorotic. Direct clash with kiss and ride.	Remove
3	<i>Backhousia citriodora</i> (Lemon-scented Myrtle)	5-10	1x1	70 70	120	N	G	M	S	M	N	2	1.5	Tree to be transplanted. Consult IW council.	Relocate
4	<i>Callistemon viminalis</i> (Bottlebrush)	1-5	3x3	170	220	N	G	M	S	M	N	2.04	1.75	Part of line planting within landscape. Direct clash with street scape design.	Remove
5	<i>Callistemon viminalis</i> (Bottlebrush)	1-5	3x3	170	250	N	G	M	S	M	N	2.04	1.85	Part of line planting within landscape. Direct clash with street scape design.	Remove
6	<i>Callistemon viminalis</i> (Bottlebrush)	1-5	3x3	160 130	220	N	G	M	S	M	N	2.52	1.75	Part of line planting within landscape. Direct clash with street scape design.	Remove
7	<i>Callistemon viminalis</i> (Bottlebrush)	<2	0.5x0.5	30	40	N	G	M	S	L	N	2	1.5	Does not meet the criteria for being a tree under <i>Sydney Metro City & Southwest Sydenham to Bankstown Instrument of Approval</i> due to height. SAPLING until matured.	Remove



TO SYDNEY ←

→ TO BANKSTOWN



LEGEND

- RAILCORP PROPERTY BOUNDARY
- EXTENT OF LANDSCAPE WORKS
- EXISTING TREES TO BE PROTECTED AND RETAINED
- EXISTING TREES TO BE REMOVED
- EXISTING FENCE TO BE REMOVED
- PEDESTRIAN FENCE TO BE REMOVED
- STANDARD KERB TO BE REMOVED
- WORKS TO BE DEMOLISHED
- AREA TO BE PREPARED FOR LANDSCAPE CONSTRUCTION

- NOTES:
- THE DESIGN IS BASED ON SYDNEY METRO CHAINAGE. PLEASE REFER TO CIVIL DRAWINGS FOR SYDNEY METRO CHAINAGE ALIGNMENT (PACKAGE NO. 103).
 - ALL HOOP STYLE FENCING TO BE REMOVED.
 - ALL EXISTING TREES TO BE RETAIN UNLESS STATED ON DRAWINGS.
 - STRIP EXISTING TOPSOIL TO 200mm DEPTH WHERE VEGETATION IS BEING REMOVED.
 - WORKS TO STATION PLATFORMS, BUILDINGS AND CONCOURSE ARE INCLUDED IN THE ARCHITECTURAL PACKAGE - REFER TO ARCHITECTURAL DESIGN PACKAGE 121.
 - DEPTH OF ROCK BED TO BE CONFIRMED BY CONTRACTOR DURING SITE CLEARANCE.



KEY PLAN 1:2000

DRAWING COLOUR CODED - PRINT ALL COPIES IN COLOUR

NOT FOR CONSTRUCTION

REV	BY	DATE	DESCRIPTION	APPD.
C	IC	30/10/2020	UPDATED STAGE 3 ISSUE	LP
B	ME	17/06/2020	ISSUED FOR STAGE 3	LP
A	ME	04/05/2020	ISSUED FOR STAGE 3	LP

SCALES	
1:250	FULL SIZE A1

ALT. DRG No.	CLIENT
SMCSSWSM-MTM-WDH-LA-DWG-121703 P01	NSW GOVERNMENT sydney METRO

SERVICE PROVIDERS	
DESIGNED	J. HUANG 30/10/2020
DRG CHECK	M. ENOCH 30/10/2020
DESIGN CHECK	G. DAVIES 30/10/2020
APPROVAL	L. PALMER 30/10/2020

METRON T2M	
STATUS: STAGE 3	SHEET 4 of 47
DRG No. SMCSSWSM-MTM-WDH-LA-DWG-121703	REV. C

SYDNEY METRO	
DULWICH HILL (8.374km to 8.718km) LANDSCAPE DESIGN	
DEMOLITION PLAN	
STATUS: STAGE 3	SHEET 4 of 47
DRG No. SMCSSWSM-MTM-WDH-LA-DWG-121703	REV. C

Proj: 301020 - 1817
Cdr: J. Hu
Dwg: SMCSSWSM-MTM-WDH-LA-DWG-121703

10mm AT FULL SIZE

Appendix 2: Site Photographs



Photograph 1: Tree 1 *Platanus x acerifolia* (London Plane) to be removed.



Photograph 2: Tree 2 *Cupaniopsis anacardioides* (Tuckeroo) to be removed.



Photograph 3: Tree 3 *Backhousia citriodora* (Lemon-scented Myrtle). Tree is to be transplanted on the site.



Photograph 4: Tree 4 *Calistemon viminalis* (Bottlebrush) to be removed.



Photograph 5: Tree 5 *Calistemon viminalis* (Bottlebrush) to be removed.



Photograph 6: Tree 6 *Calistemon viminalis* (Bottlebrush) to be removed.



Photograph 7: Tree 7 *Calistemon viminalis* (Bottlebrush) to be removed. Does not meet the criteria for being a tree under *Sydney Metro City & Southwest Sydenham to Bankstown Instrument of Approval* due to height. Currently considered a sapling.

Appendix 3: Tree Assessment Criteria

Tree number: Identifying number given to individual (or group) trees.

Botanical Name: Latin name for tree showing genus and species.

Common Name: The common name given to the tree.

Tree Dimensions: The physical dimensions of the tree.

- **Height:** Estimated or measured height of tree in meters.
- **Spread:** Estimated or measured radial canopy spread of tree in meters.
- **Diameter at Breast Height (DBH):** The estimated or measured diameter of trunk given in mm measured at 1.4m from ground.
- **Diameter Above Base (DAB):** The estimated or measured diameter of trunk given in mm measured above the root flare. Used to calculate the structural root zone of the tree.

Age Class: An estimation of how old the tree is in relation to its life expectancy.

- **Young** – Age less than 20% of life expectancy of tree in situ
- **Mature** – Age 20% - 80% of life expectancy of tree in situ
- **Old** – Age greater than 80% of life expectancy of tree in situ
- **Dead** – Tree is dead

Vigour: Ability of a tree to sustain its life processes. This is independent of the condition of a tree but may impact upon it. Vigour can appear to alter rapidly with change of seasons (seasonality) e.g., dormant, deciduous or semi-deciduous trees. Vigour can be categorised as Dormant, Low, Normal and High.

- **Dormant Vigour** – Determined by the existing turgidity in the lower order branches in the outer extremity of the crown, with good bud set and formation, and where the last extension growth is distinct from those most recently preceding it, evident by bud scale scars. Normal vigour during dormancy is achieved when such growth is evident on a majority of branches throughout the crown.
- **Low Vigour** – Reduced ability of a tree to sustain its life processes. This may be evident by the atypical growth of leaves, reduced crown cover and reduced crown density, branches, roots and trunk, and a deterioration of their functions with reduced resistance to predation. This is independent of the condition of a tree but may impact upon it, and especially the ability of a tree to sustain itself against predation.
- **Normal Vigour** – Ability of a tree to maintain and sustain its life processes. This may be evident by the typical growth of leaves, crown cover and crown density, branches, roots and trunk and resistance to predation. This is independent of the condition of a tree but may impact upon it, and especially the ability of a tree to sustain itself against predation.
- **High Vigour** – Accelerated growth of a tree due to incidental or deliberate artificial changes to its growing environment that are seemingly beneficial, but may result in premature aging or failure if the favourable conditions cease, or promote prolonged senescence if the favourable conditions remain, e.g. water from a leaking pipe, water and nutrients from a leaking or disrupted sewer pipe, nutrients from animal waste, a tree growing next to a chicken coop, or a stock feed lot, or a regularly used stockyard, a tree subject to stringent watering and fertilisation program, or some trees may achieve an extended lifespan from continuous pollarding practices over the life of the tree.

Condition: A tree's crown form and growth habit, as modified by its environment (aspect, suppression by other trees, soils) the stability and viability of the root plate, trunk and structural branches (first (1st) and possibly (2nd) order branches), including structural defects such as wounds, cavities or hollows, crooked trunk or weak trunk/branch junctions and the effects of predation by pests and diseases. These may not be directly connected with vigour and it is possible for a tree to be of normal vigour but in poor condition. Condition can be categorised as Dead, Poor, Fair and Good.

- **Dead Condition** – Tree is no longer capable of performing any of the following processes or is exhibiting any of the following symptoms; Photosynthesis via its foliage crown (as indicated by the presence of moist, green or other coloured leaves), Osmosis (the ability of the roots system to take up water), Turgidity (the ability of the plant to sustain moisture pressure in its cells), Epicormic shoots or epicormic strands in Eucalypts (the production of new shoots as a response to stress, generated from latent or adventitious buds or from a lignotuber), Permanent leaf loss, Permanent leaf wilting (the loss of turgidity which is marked by desiccation of stems leaves and roots), Abscission of the epidermis (bark desiccates and peels off to the beginning of the sap wood).
- **Poor Condition** - Tree is of good habit or misshapen, a form that may be severely restricted for space and light, exhibits symptoms of advanced and irreversible decline such as fungal, or bacterial infestation, major die-back in the branch and foliage crown, structural deterioration from insect damage e.g. termite infestation, or storm damage or lightning strike, ring barking from borer activity in the trunk, root damage or instability of the tree, or damage from physical wounding impacts or abrasion, or from altered local environmental conditions and has been unable to adapt to such changes and may decline further to death regardless of remedial works or other modifications to the local environment that would normally be sufficient to provide for its basic survival if in good to fair condition. Deterioration physically, often characterised by a gradual and continuous reduction in vigour but may be independent of a change in vigour, but characterised by a proportionate increase in susceptibility to, and predation by pests and diseases against which the tree cannot be sustained. Such conditions may also be evident in trees of advanced senescence due to normal phenological processes, without modifications to the growing environment or physical damage having been inflicted upon the tree. This may be independent from, or contributed to by vigour.
- **Fair Condition** - Tree is of good habit or misshapen, a form not severely restricted for space and light, has some physical indication of decline due to the early effects of predation by pests and diseases, fungal, bacterial, or insect infestation, or has suffered physical injury to itself that may be contributing to instability or structural weaknesses, or is faltering due to the modification of the environment essential for its basic survival. Such a tree may recover with remedial works where appropriate, or without intervention may stabilise or improve over time, or in response to the implementation of beneficial changes to its local environment. This may be independent from, or contributed to by vigour.
- **Good Condition** - Tree is of good habit, with crown form not severely restricted for space and light, physically free from the adverse effects of predation by pests and diseases, obvious instability or structural weaknesses, fungal, bacterial or insect infestation and is expected to continue to live in much the same condition as at the time of inspection provided conditions around it for its basic survival do not alter greatly. This may be independent from, or contributed to by vigour.

Useful Life Expectancy (ULE) ULE is the length of time that the arborist assesses an individual tree can be retained with an acceptable level of risk based on the information available at the time of inspection. It is a snapshot in time of the potential an individual tree has for survival in the eyes of the assessor. ULE is not static – it is closely related to tree health and the surrounding conditions. Alterations in these variables may result in changes to the ULE assessment. Consequently, the reliability all ULE assessments have will decrease as time passes from the initial assessment and the potential for changes in variables increases.

- **Remove** – Trees that should be removed within the next 5 years
- **Short** – Trees that appear to be retainable at the time of the assessment for 5-15 years with an acceptable level of risk.
- **Medium** – Trees that appear to be retainable at the time of the assessment for 15-40 years with an acceptable level of risk.
- **Long** – Trees that appear to be retainable at the time of the assessment for 40+ years with an acceptable level of risk.

Amenity and Visual Value – For the purposes of assessing the visual and landscape value of each tree the IACA Significance of a Tree, Assessment Rating System (STARS) © (IACA 2010) © has been adopted. - The landscape significance of a tree is an essential criterion to establish the importance that a particular tree may have on a site. The system uses a scale of High, Medium and Low significance in the landscape.

High significance in landscape

- The tree is in good condition and good vigour
- The tree has a form typical for the species
- The tree is a remnant or is a planted locally indigenous specimen and/or is rare or uncommon in the local area or of botanical interest or of substantial age
- The tree is listed as a heritage item, threatened species or part of an endangered ecological community or listed on council's significant tree register
- The tree is visually prominent and visible from a considerable distance when viewed from most directions within the landscape due to its size and scale and makes a positive contribution to the local amenity
- The tree supports social and cultural sentiments or spiritual associations, reflected by the broader population or community group or has commemorative values
- The tree's growth is unrestricted by above and below ground influences, supporting its ability to reach dimensions typical for the taxa in situ – tree is appropriate to the site conditions

Medium significance in landscape

- The tree is in fair-good condition and good or low vigour
- The tree has form typical or atypical of the species
- The tree is a planted locally indigenous or a common species with its taxa commonly planted in the local area
- The tree is visible from surrounding properties, although not visually prominent as partially obstructed by other vegetation or buildings when viewed from the street
- The tree provides a fair contribution to the visual character and amenity of the local area
- The tree's growth is moderately restricted by above or below ground influences, reducing its ability to reach dimensions typical for the taxa in situ

Low significance in landscape

- The tree is in fair-poor condition and good or low vigour
- The tree has form atypical of the species
- The tree is not visible or is partly visible from the surrounding properties as obstructed by other vegetation or buildings
- The tree provides a minor contribution or has a negative impact on the visual character and amenity of the local area
- The tree is a young specimen which may or may not have reached dimensions to be protected by local Tree Preservation Orders or similar protection mechanisms and can easily be replaced with a suitable specimen
- The tree's growth is severely restricted by above or below ground influences, unlikely to reach dimensions typical for the taxa in situ – tree is inappropriate to the site conditions
- The tree is listed as exempt under the provisions of the local Council Tree Preservation Order or similar protection mechanisms
- The tree has a wound or defect that has the potential to become structurally unsound
- **Environmental Pest / Noxious Weed Species**
- The tree is an environmental pest species due to its invasiveness or poisonous/allergenic properties.
- The tree is a declared noxious weed by legislation
- **Hazardous / Irreversible Decline**
- The tree is structurally unsound and/or unstable and is considered potentially dangerous
- The tree is dead, or is in irreversible decline, or has the potential to fail or collapse in full or in part in the immediate to short term

The tree is to have a minimum of three (3) criteria in a category to be classified in that group.

In the development of this document IACA acknowledges the contribution and original concept of the Footprint Green Tree Significance & Retention Value Matrix, developed by Footprint Green Pty Ltd in June 2010.

The Australian Standard 4970-2009 Protection of Trees on Development Sites defines the requirements for assessing trees with respect to development. It provides the guidance on how to decide which trees are appropriate for retention and on the means of protecting them during construction works. It describes the areas and offsets, referred to as the Tree Protection Zone (TPZ) and Structural Root Zone (SRZ) required to be free from development works to maintain tree vitality and stability. This report has been prepared in accordance with the conditions set out within the standard.

- **Tree Protection Zone** – The tree protection zone is defined as a specified area above and below ground set aside for the protection of the tree's roots and crown. It is expressed as a radial measurement taken from the centre of the trunk at ground level.
- **Structural Root Zone** – The structural root zone is defined as a specified area around the base of a tree required to maintain its stability within the ground. It is expressed as a radial measurement taken from the center of the trunk at ground level. Excavation and development works are not recommended within the structural root zone unless additional investigation as to root size and location is undertaken

APPENDIX 10.1 DULWICH HILL AIA (PLATEAU TREES)

Date: 25 May 2021

Re: Additional tree removals at Dulwich Hill Station as part of the Southwest Metro Package.

At the request of Downer Group an onsite arboricultural inspection at Dulwich Hill Station was conducted on the 18th May 2021. Weather conditions were fine.

The reason for this inspection was to assess and identify additional trees within the area proposed for the construction of New Bridge Footing Abutment.

A walkthrough the site was conducted in the presence of a Downer Group representative.

Upon inspection it was concluded that the that all trees shown within the attached images (and Appendix 1) will require removal to facilitate the proposed construction to take place.

All vegetation has been assessed as being insignificant.

Best Regards

Colin Curtis



Level 5 Consulting Arborist

Tree Risk Assessment Qualification (TRAQ)

Member of Arboriculture Australia #2332

Member of the International Society of Arboriculture (ISA) # 228182



Image 1: Metro map (2021).



Image 2: Tree A circled in red.



Images 3 & 4: Trees B-F displayed.

Appendix 1: Tree Assessment Schedule

Tree number	Tree name	Tree dimensions				Vigour	Condition	Age class	ULE	Amenity and Visual	Native or	TPZ (m)	SRZ (m)	Comments	Remove or Retain
	Botanical name Common name	Height (m)	Spread (m)	D.B.H. (mm)	D.A.B. (mm)										
A	<i>Cupaniopsis anacardioides</i> (Tuckeroo)	3	2	8	10	N	F	Y	M	L	N	2	1.5	Clash with permanent fencing at Bedford Crescent.	Remove
B	<i>Cinnamomum camphora</i> (Camphor Laurel)	3	2	<10	<10	N	F	Y	S	L	E	2	1.5	Clash with permanent footbridge.	Remove
C	<i>Olea europaea</i> (African Olive)	<2	2	<10	<10	N	F	Y	S	L	E	2	1.5	Clash with permanent footbridge. Accounted for only within vegetation clearance total.	Remove
D	(<i>Ligustrum sp.</i>) (Privet)	<2	2	<10	<10	N	F	Y	S	L	E	2	1.5	Clash with permanent footbridge. Accounted for only within vegetation clearance total.	Remove
E	(<i>Cotoneaster sp.</i>) Cotoneaster	<2	2	<10	<10	N	F	Y	S	L	E	2	1.5	Clash with permanent footbridge. Accounted for only within vegetation clearance total.	Remove
F	(<i>Pittosporum undulatum</i>) Sweet Daphne	<2	2	<10	<10	N	F	Y	S	L	N	2	1.5	Clash with permanent footbridge. Accounted for only within vegetation clearance total.	Remove

Appendix 3: Tree Assessment Criteria

Tree number: Identifying number given to individual (or group) trees.

Botanical Name: Latin name for tree showing genus and species.

Common Name: The common name given to the tree.

Tree Dimensions: The physical dimensions of the tree.

- **Height:** Estimated or measured height of tree in meters.
- **Spread:** Estimated or measured radial canopy spread of tree in meters.
- **Diameter at Breast Height (DBH):** The estimated or measured diameter of trunk given in mm measured at 1.4m from ground.
- **Diameter Above Base (DAB):** The estimated or measured diameter of trunk given in mm measured above the root flare. Used to calculate the structural root zone of the tree.

Age Class: An estimation of how old the tree is in relation to its life expectancy.

- **Young** – Age less than 20% of life expectancy of tree in situ
- **Mature** – Age 20% - 80% of life expectancy of tree in situ
- **Old** – Age greater than 80% of life expectancy of tree in situ
- **Dead** – Tree is dead

Vigour: Ability of a tree to sustain its life processes. This is independent of the condition of a tree but may impact upon it. Vigour can appear to alter rapidly with change of seasons (seasonality) e.g., dormant, deciduous or semi-deciduous trees. Vigour can be categorised as Dormant, Low, Normal and High.

- **Dormant Vigour** – Determined by the existing turgidity in the lower order branches in the outer extremity of the crown, with good bud set and formation, and where the last extension growth is distinct from those most recently preceding it, evident by bud scale scars. Normal vigour during dormancy is achieved when such growth is evident on a majority of branches throughout the crown.
- **Low Vigour** – Reduced ability of a tree to sustain its life processes. This may be evident by the atypical growth of leaves, reduced crown cover and reduced crown density, branches, roots and trunk, and a deterioration of their functions with reduced resistance to predation. This is independent of the condition of a tree but may impact upon it, and especially the ability of a tree to sustain itself against predation.
- **Normal Vigour** – Ability of a tree to maintain and sustain its life processes. This may be evident by the typical growth of leaves, crown cover and crown density, branches, roots and trunk and resistance to predation. This is independent of the condition of a tree but may impact upon it, and especially the ability of a tree to sustain itself against predation.
- **High Vigour** – Accelerated growth of a tree due to incidental or deliberate artificial changes to its growing environment that are seemingly beneficial, but may result in premature aging or failure if the favourable conditions cease, or promote prolonged senescence if the favourable conditions remain, e.g. water from a leaking pipe, water and nutrients from a leaking or disrupted sewer pipe, nutrients from animal waste, a tree growing next to a chicken coop, or a stock feed lot, or a regularly used stockyard, a tree subject to stringent watering and fertilisation program, or some trees may achieve an extended lifespan from continuous pollarding practices over the life of the tree.

Condition: A tree's crown form and growth habit, as modified by its environment (aspect, suppression by other trees, soils) the stability and viability of the root plate, trunk and structural branches (first (1st) and possibly (2nd) order branches), including structural defects such as wounds, cavities or hollows, crooked trunk or weak trunk/branch junctions and the effects of predation by pests and diseases. These may not be directly connected with vigour and it is possible for a tree to be of normal vigour but in poor condition. Condition can be categorised as Dead, Poor, Fair and Good.

- **Dead Condition** – Tree is no longer capable of performing any of the following processes or is exhibiting any of the following symptoms: Photosynthesis via its foliage crown (as indicated by the presence of moist, green or other coloured leaves), Osmosis (the ability of the roots system to take up water), Turgidity (the ability of the plant to sustain moisture pressure in its cells), Epicormic shoots or epicormic strands in Eucalypts (the production of new shoots as a response to stress, generated from latent or adventitious buds or from a lignotuber), Permanent leaf loss, Permanent leaf wilting (the loss of turgidity which is marked by desiccation of stems leaves and roots), Abscission of the epidermis (bark desiccates and peels off to the beginning of the sap wood).
- **Poor Condition** - Tree is of good habit or misshapen, a form that may be severely restricted for space and light, exhibits symptoms of advanced and irreversible decline such as fungal, or bacterial infestation, major die-back in the branch and foliage crown, structural deterioration from insect damage e.g. termite infestation, or storm damage or lightning strike, ring barking from borer activity in the trunk, root damage or instability of the tree, or damage from physical wounding impacts or abrasion, or from altered local environmental conditions and has been unable to adapt to such changes and may decline further to death regardless of remedial works or other modifications to the local environment that would normally be sufficient to provide for its basic survival if in good to fair condition. Deterioration physically, often characterised by a gradual and continuous reduction in vigour but may be independent of a change in vigour, but characterised by a proportionate increase in susceptibility to, and predation by pests and diseases against which the tree cannot be sustained. Such conditions may also be evident in trees of advanced senescence due to normal phenological processes, without modifications to the growing environment or physical damage having been inflicted upon the tree. This may be independent from, or contributed to by vigour.
- **Fair Condition** - Tree is of good habit or misshapen, a form not severely restricted for space and light, has some physical indication of decline due to the early effects of predation by pests and diseases, fungal, bacterial, or insect infestation, or has suffered physical injury to itself that may be contributing to instability or structural weaknesses, or is faltering due to the modification of the environment essential for its basic survival. Such a tree may recover with remedial works where appropriate, or without intervention may stabilise or improve over time, or in response to the implementation of beneficial changes to its local environment. This may be independent from, or contributed to by vigour.
- **Good Condition** - Tree is of good habit, with crown form not severely restricted for space and light, physically free from the adverse effects of predation by pests and diseases, obvious instability or structural weaknesses, fungal, bacterial or insect infestation and is expected to continue to live in much the same condition as at the time of inspection provided conditions around it for its basic survival do not alter greatly. This may be independent from, or contributed to by vigour.

Useful Life Expectancy (ULE) ULE is the length of time that the arborist assesses an individual tree can be retained with an acceptable level of risk based on the information available at the time of inspection. It is a snapshot in time of the potential an individual tree has for survival in the eyes of the assessor. ULE is not static – it is closely related to tree health and the surrounding conditions. Alterations in these variables may result in changes to the ULE assessment. Consequently, the reliability all ULE assessments have will decrease as time passes from the initial assessment and the potential for changes in variables increases.

- **Remove** – Trees that should be removed within the next 5 years
- **Short** – Trees that appear to be retainable at the time of the assessment for 5-15 years with an acceptable level of risk.
- **Medium** – Trees that appear to be retainable at the time of the assessment for 15-40 years with an acceptable level of risk.
- **Long** – Trees that appear to be retainable at the time of the assessment for 40+ years with an acceptable level of risk.

Amenity and Visual Value – For the purposes of assessing the visual and landscape value of each tree the IACA Significance of a Tree, Assessment Rating System (STARS) © (IACA 2010) © has been adopted. - The landscape significance of a tree is an essential criterion to establish the importance that a particular tree may have on a site. The system uses a scale of High, Medium and Low significance in the landscape.

High significance in landscape

- The tree is in good condition and good vigour
- The tree has a form typical for the species
- The tree is a remnant or is a planted locally indigenous specimen and/or is rare or uncommon in the local area or of botanical interest or of substantial age
- The tree is listed as a heritage item, threatened species or part of an endangered ecological community or listed on council's significant tree register
- The tree is visually prominent and visible from a considerable distance when viewed from most directions within the landscape due to its size and scale and makes a positive contribution to the local amenity
- The tree supports social and cultural sentiments or spiritual associations, reflected by the broader population or community group or has commemorative values
- The tree's growth is unrestricted by above and below ground influences, supporting its ability to reach dimensions typical for the taxa in situ – tree is appropriate to the site conditions

Medium significance in landscape

- The tree is in fair-good condition and good or low vigour
- The tree has form typical or atypical of the species
- The tree is a planted locally indigenous or a common species with its taxa commonly planted in the local area
- The tree is visible from surrounding properties, although not visually prominent as partially obstructed by other vegetation or buildings when viewed from the street
- The tree provides a fair contribution to the visual character and amenity of the local area
- The tree's growth is moderately restricted by above or below ground influences, reducing its ability to reach dimensions typical for the taxa in situ

Low significance in landscape

- The tree is in fair-poor condition and good or low vigour
- The tree has form atypical of the species
- The tree is not visible or is partly visible from the surrounding properties as obstructed by other vegetation or buildings
- The tree provides a minor contribution or has a negative impact on the visual character and amenity of the local area
- The tree is a young specimen which may or may not have reached dimensions to be protected by local Tree Preservation Orders or similar protection mechanisms and can easily be replaced with a suitable specimen
- The tree's growth is severely restricted by above or below ground influences, unlikely to reach dimensions typical for the taxa in situ – tree is inappropriate to the site conditions
- The tree is listed as exempt under the provisions of the local Council Tree Preservation Order or similar protection mechanisms
- The tree has a wound or defect that has the potential to become structurally unsound
- **Environmental Pest / Noxious Weed Species**
- The tree is an environmental pest species due to its invasiveness or poisonous/allergenic properties.
- The tree is a declared noxious weed by legislation
- **Hazardous / Irreversible Decline**
- The tree is structurally unsound and/or unstable and is considered potentially dangerous
- The tree is dead, or is in irreversible decline, or has the potential to fail or collapse in full or in part in the immediate to short term

The tree is to have a minimum of three (3) criteria in a category to be classified in that group.

In the development of this document IACA acknowledges the contribution and original concept of the Footprint Green Tree Significance & Retention Value Matrix, developed by Footprint Green Pty Ltd in June 2010.

The Australian Standard 4970-2009 Protection of Trees on Development Sites defines the requirements for assessing trees with respect to development. It provides the guidance on how to decide which trees are appropriate for retention and on the means of protecting them during construction works. It describes the areas and offsets, referred to as the Tree Protection Zone (TPZ) and Structural Root Zone (SRZ) required to be free from development works to maintain tree vitality and stability. This report has been prepared in accordance with the conditions set out within the standard.

- **Tree Protection Zone** – The tree protection zone is defined as a specified area above and below ground set aside for the protection of the tree's roots and crown. It is expressed as a radial measurement taken from the centre of the trunk at ground level.
- **Structural Root Zone** – The structural root zone is defined as a specified area around the base of a tree required to maintain its stability within the ground. It is expressed as a radial measurement taken from the center of the trunk at ground level. Excavation and development works are not recommended within the structural root zone unless additional investigation as to root size and location is undertaken

APPENDIX 10.2 DULWICH HILL AIA (PLATEAU TREES)

Date: 2nd July 2021

Arborist Assessment Dulwich Hill Station

At the request of Downer Group an onsite Visual Tree Assessment (VTA) inspection at Dulwich Hill Station (within the rail corridor) was conducted on the 15th June 2021. Weather conditions were fine.

The reason for this inspection was to provide an arboricultural opinion regarding possible impact that may be resultant from the installation of drainage services that will be placed within the Tree Protection Zone (TPZ), bordering the Structural Root Zone (SRZ), of one (1) x London Plane (*Platanus x Hybrida*).

At the time of inspection, it was observed that multiple roots ranging between 100-400mm in diameter will require to be cut/pruned to allow for the proposed drainage infrastructure to be installed. No options for re direction of this service was apparent without huge design changes.

It was concluded that pruning of such root sizes (within the TPZ, bordering the SRZ) in all likelihood has the potential to result in decline/and or whole tree failure.

If whole tree failure occurred, it could be deemed to be foreseeable that excavation for drainage could/may be responsible.

This is not read as/or intended to be a risk assessment.

Best Regards

Colin Curtis



Level 5 Consulting Arborist

Tree Risk Assessment Qualification (TRAQ)

Member of Arboriculture Australia #2332

Member of the International Society of Arboriculture (ISA) # 228182

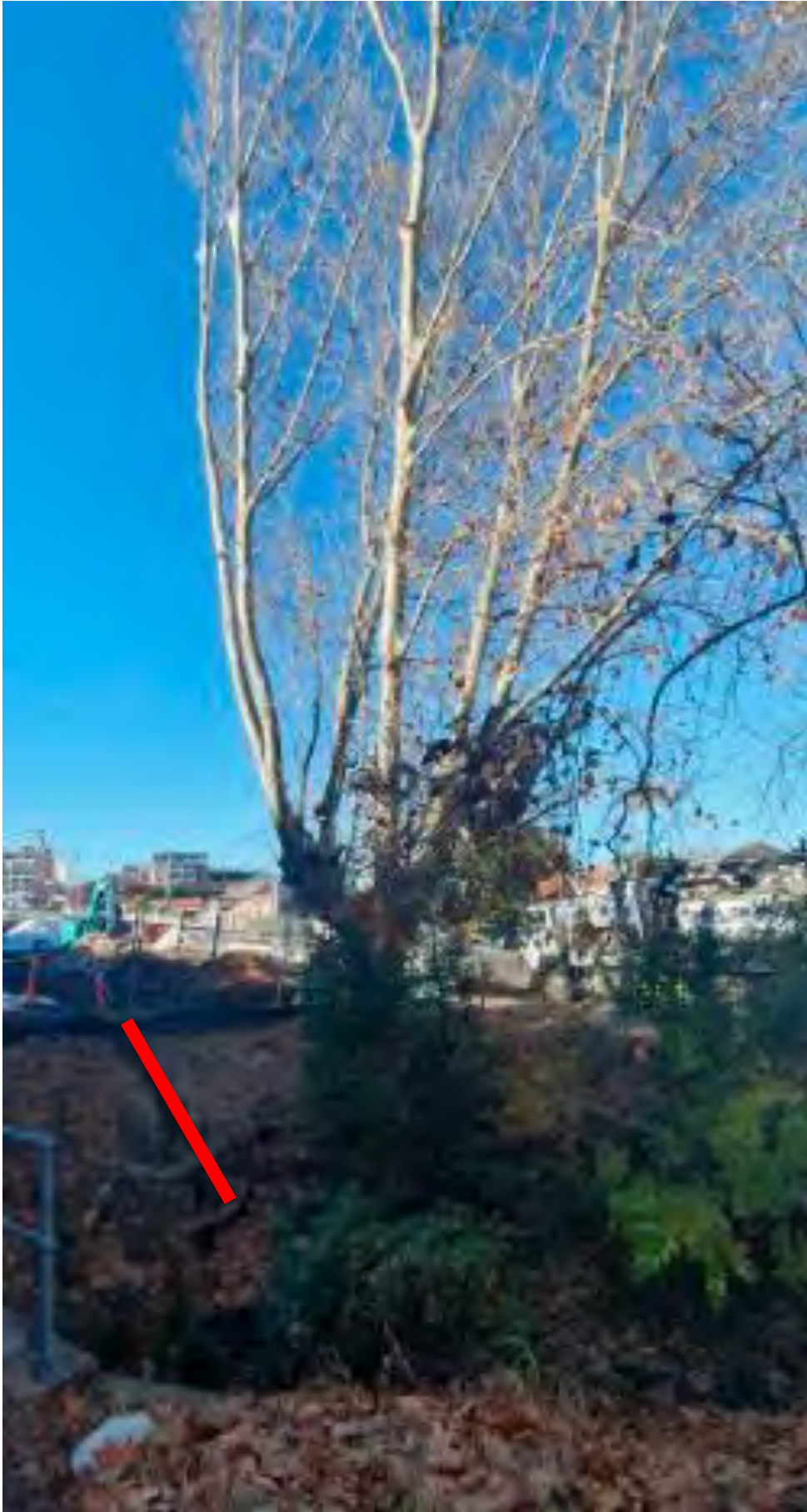


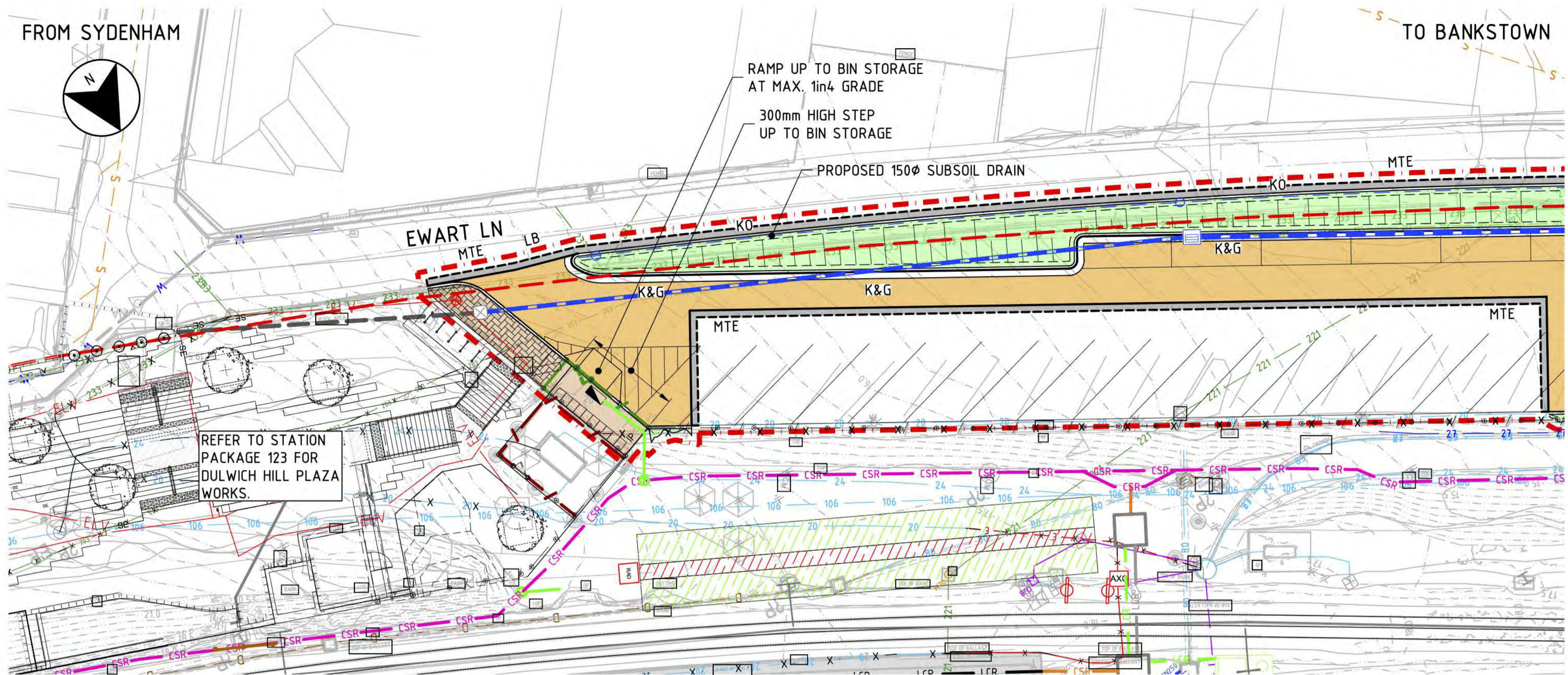
Image of the subject tree (Tree 94) taken on the 15th June 2021 (red line shows approximate location of required excavations).



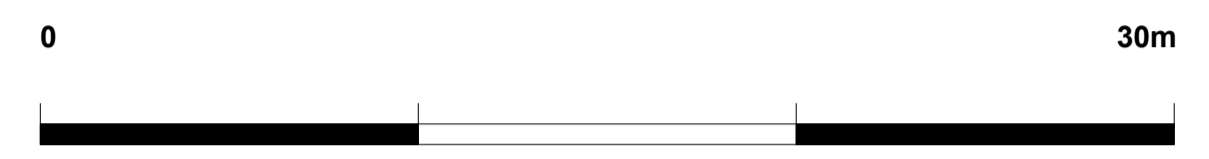
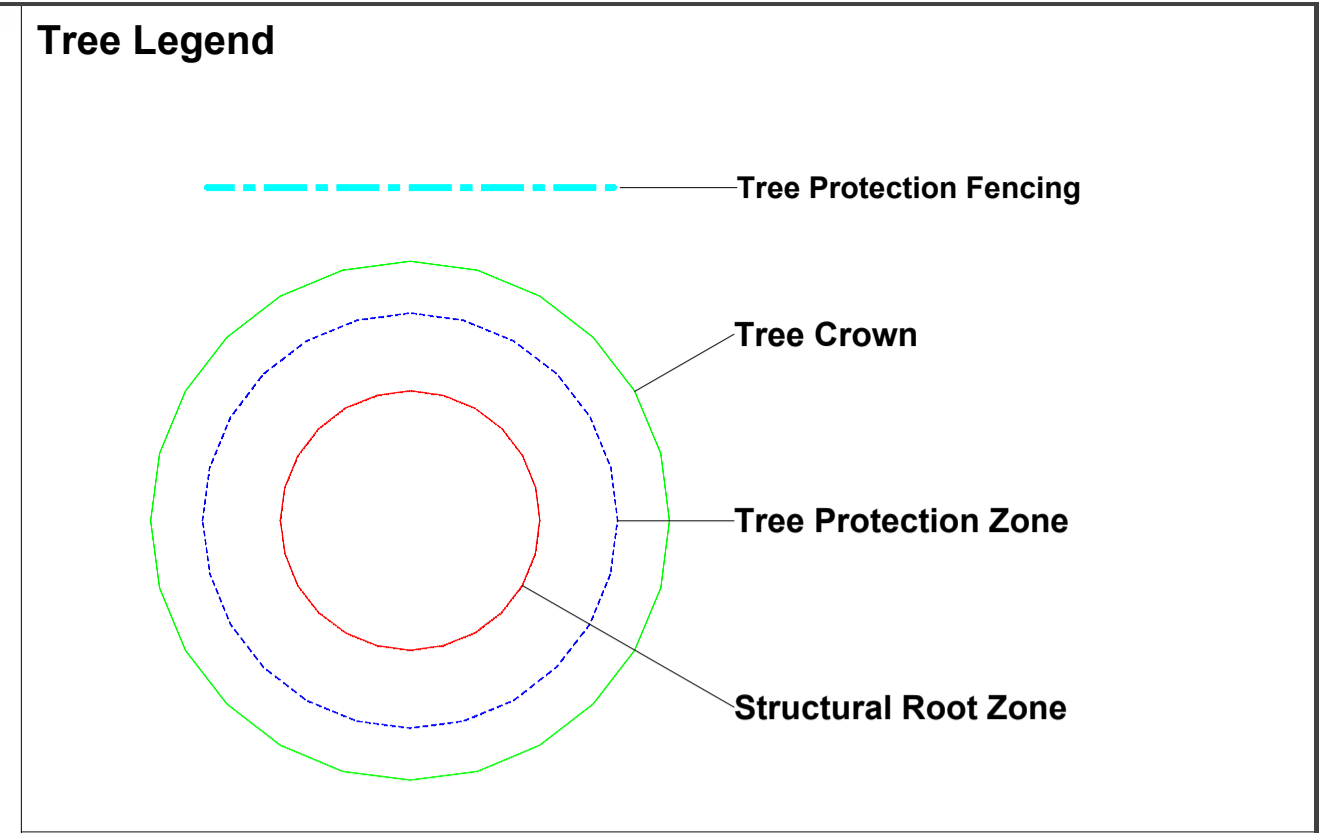
Location of the subject tree (tree 94) circled in red (*Metromap 2021*).

Appendix 1: Tree Assessment Schedule

Tree number	Tree name	Tree dimensions				Vigour	Condition	Age class	ULE	Amenity and Visual Value	Native or Exotic	TPZ (m)	SRZ (m)	Comments	Remove or Retain
	<i>Botanical name</i> Common name	Height (m)	Spread (m)	DBH (cm)	DAB (cm)										
94	<i>Platanus x Hybrida</i> London Plane	20	12	100	120	NV	F	M	M	M	E	15	3.57	To be removed due to a clash with the permanent drainage design.	Remove



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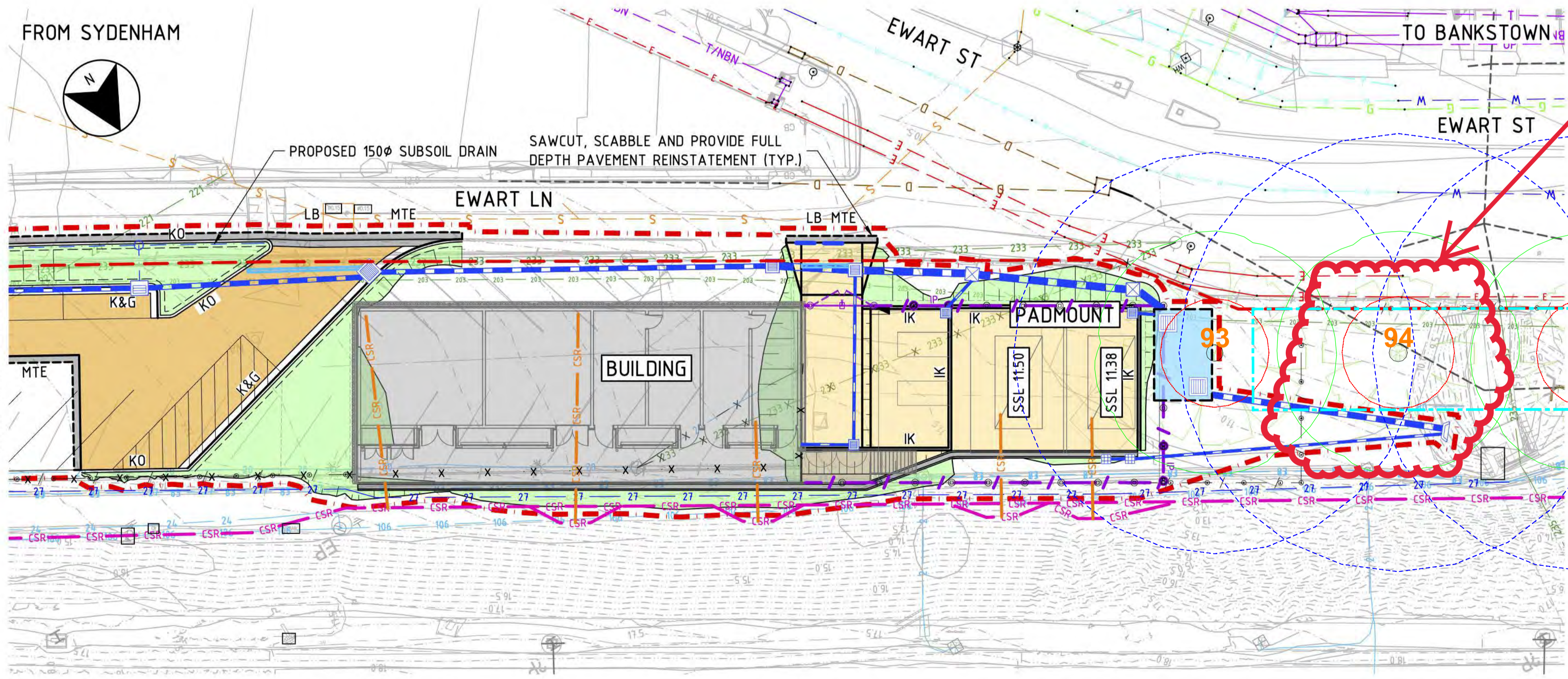


Urban Arbor Pty Ltd
 PO Box 450, Turrumurra, NSW, 2074
 sales@urbanarbor.com.au, (02) 8004 2802

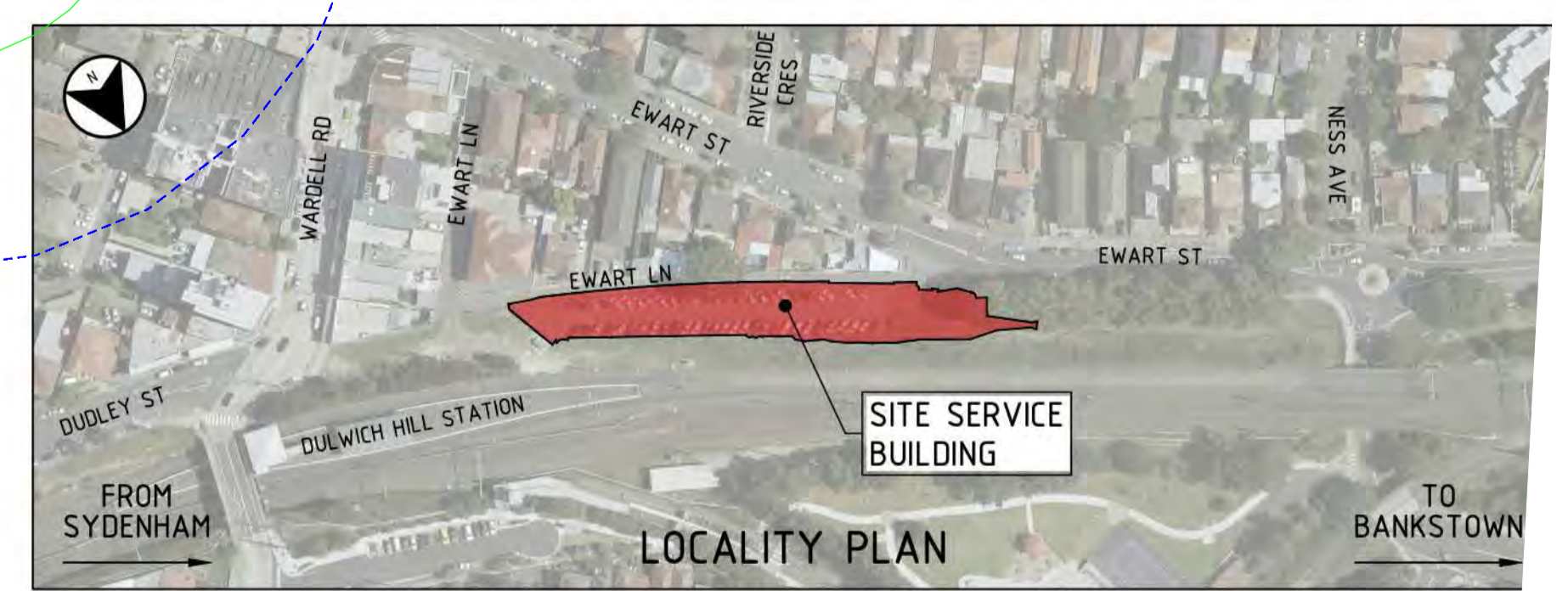
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To be cleared due to clash with permanent drainage design. Drainage design indicted by blue and white dotted line.

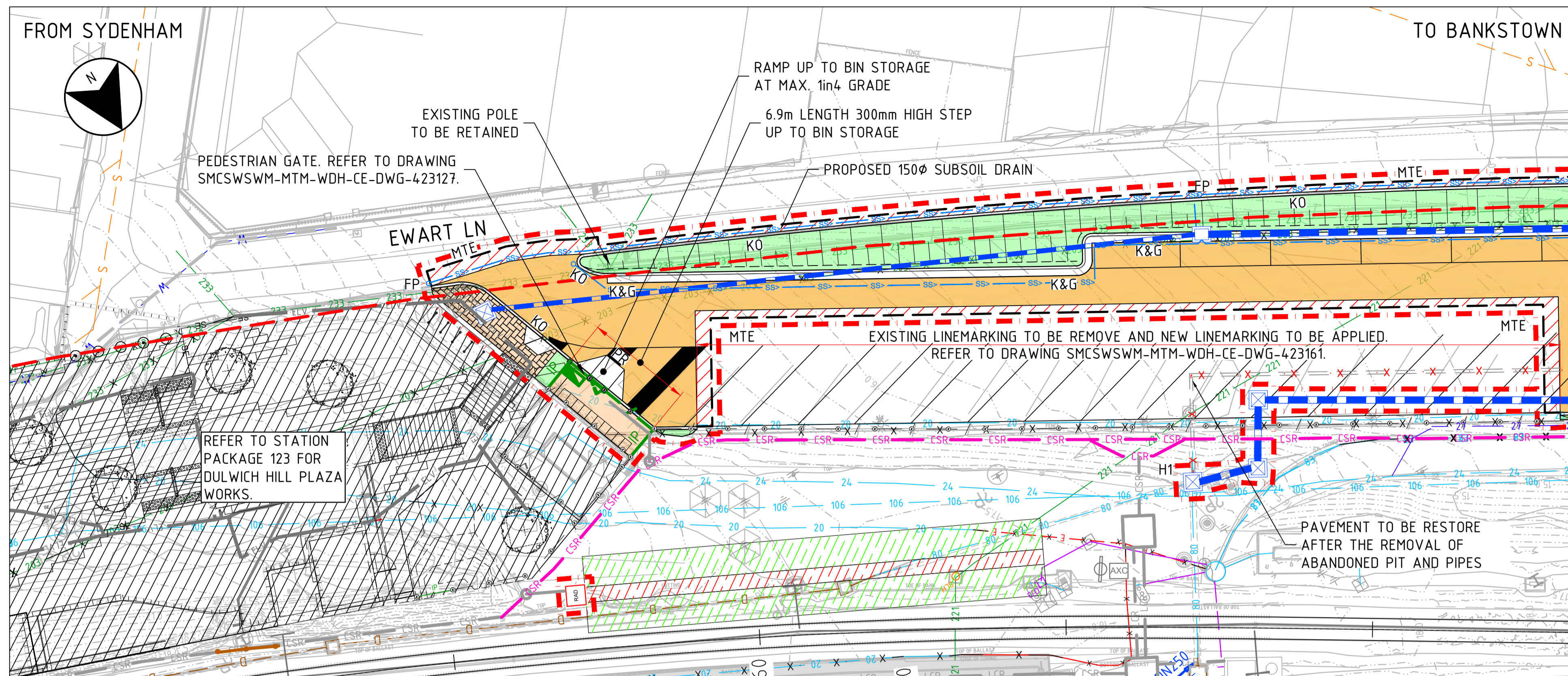
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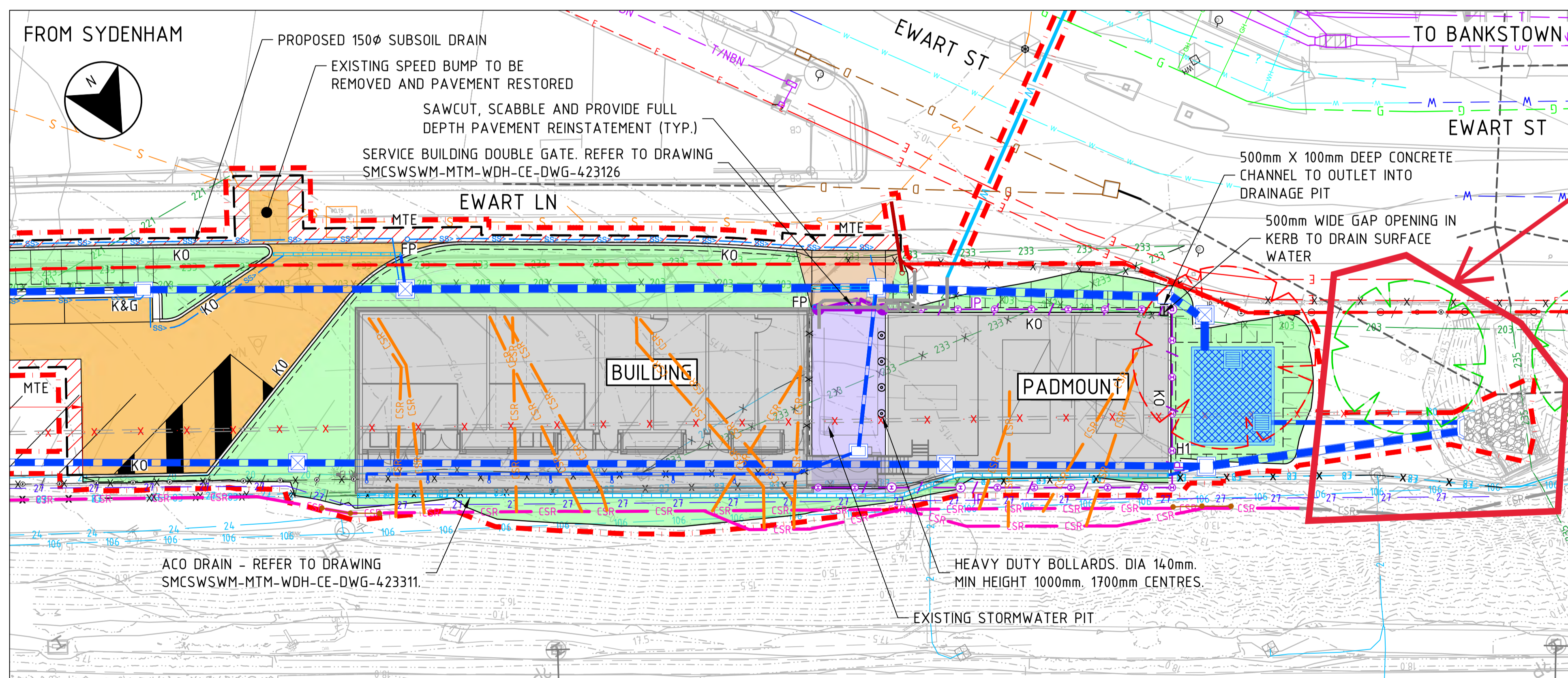


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NOTES

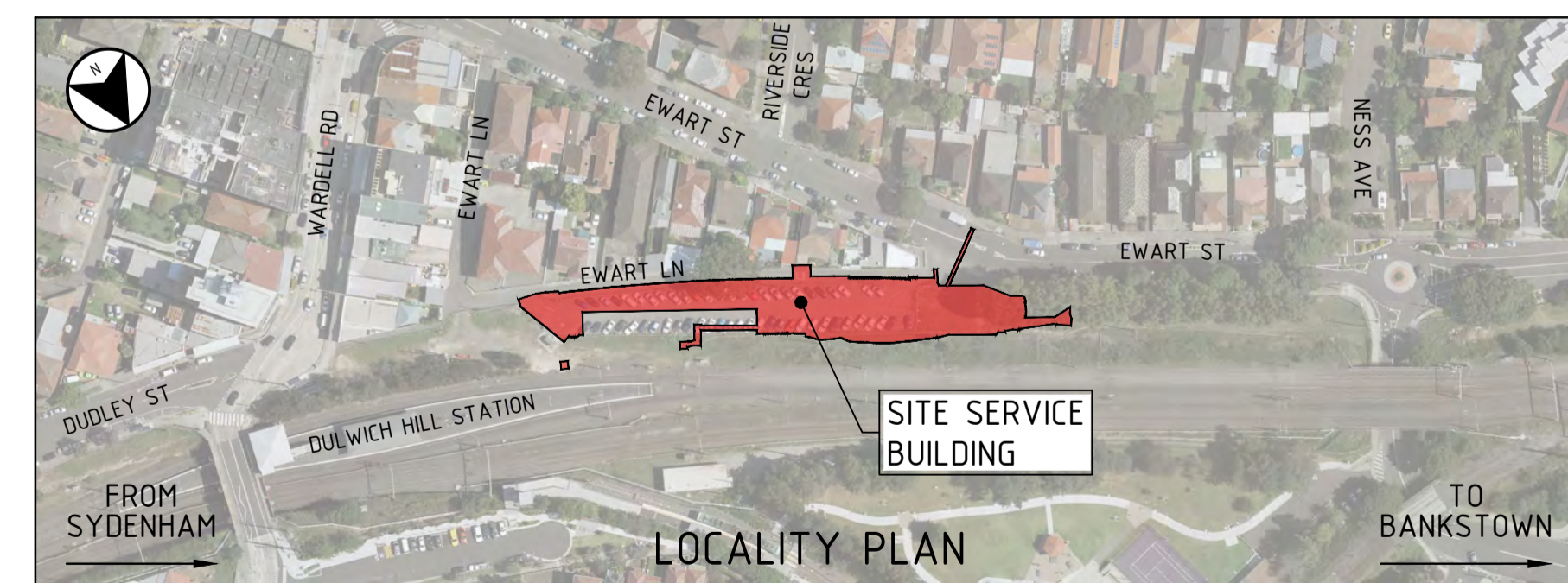
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2. FOR LEGEND REFER TO DRAWINGS SMCSWSWM-MTM-WDH-CE-DWG-423108 TO 423109.
3. REFER TO STATION DESIGN PACKAGES FOR PLATFORM AND BUILDING WORKS.
4. FOR PAVEMENT PLAN REFER TO DRAWINGS SMCSWSWM-MTM-WDH-CE-DWG-423161 TO 423162.
5. FOR BULK EARTHWORKS CUT AND FILL PLAN REFER TO DRAWING SMCSWSWM-MTM-WDH-CE-DWG-423201.
6. FOR BULK EARTHWORKS PLAN AND LONGITUDINAL SECTION REFER TO DRAWING SMCSWSWM-MTM-WDH-CE-DWG-423206.
7. FOR DRAINAGE GENERAL ARRANGEMENT PLAN REFER TO DRAWING SMCSWSWM-MTM-WDH-CE-DWG-423301.
8. FOR CSR GENERAL ARRANGEMENT PLAN REFER TO DRAWING SMCSWSWM-MTM-WDH-CE-DWG-423411. DO NOT REFER TO ANY OTHER GENERAL ARRANGEMENT PLANS FOR THE DESIGN AND EXTENTS OF CSR WORKS.
9. FOR UTILITIES GENERAL ARRANGEMENT PLAN REFER TO DRAWING SMCSWSWM-MTM-WDH-CE-DWG-423501.
10. FOR GATE AND FENCE SETOUT, REFER TO DRAWINGS SMCSWSWM-MTM-WDH-CE-DWG-423138 TO 423139.
11. FOR LANDSCAPE TREATMENT REFER TO LANDSCAPE DESIGN PACKAGE 121.

REFER BELOW FOR CONTINUATION



PLAN
SCALE 1:200

To be cleared due to clash with permanent drainage design. Drainage design indicated by blue and white dotted line.

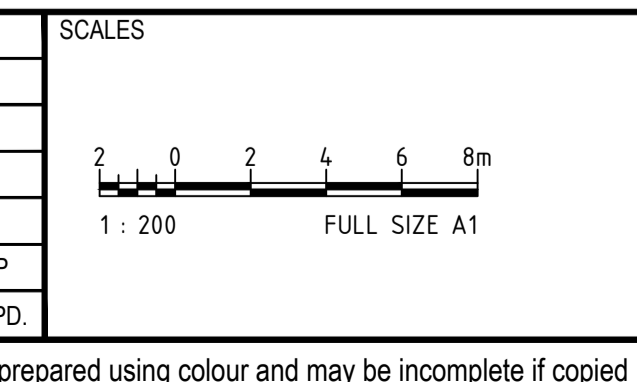


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100mm AT FULL SIZE

A1 Original

REV.	BY	DATE	DESCRIPTION	APPD.
00	MC	21.04.2021	APPROVED FOR CONSTRUCTION	LP



NOTE: Do not scale from this drawing. ALT. DRG No SMCSWSWM-MTM-WDH-CE-DWG-423111 0



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METRON T2M

DRAWN: M. FORTU
DESIGNED: G. LUO
DRG CHECK: P. ALFORD
DESIGN CHECK: T. LEE
APPROVED: L. PALMER

21.04.2021

SYDNEY METRO
DULWICH HILL STATION - SERVICE BUILDING
CIVIL ENGINEERING
SERVICE BUILDING - CIVIL
GENERAL ARRANGEMENT PLAN

STATUS: FOR CONSTRUCTION SHEET 1 OF 1 ©
DRG No SMCSWSWM-MTM-WDH-CE-DWG-423111 REV. 00

Appendix 2: Tree Assessment Criteria

Tree number: Identifying number given to individual (or group) trees.

Botanical Name: Latin name for tree showing genus and species.

Common Name: The common name given to the tree.

Tree Dimensions: The physical dimensions of the tree.

- **Height:** Estimated or measured height of tree in meters.
- **Spread:** Estimated or measured radial canopy spread of tree in meters.
- **Diameter at Breast Height (DBH):** The estimated or measured diameter of trunk given in mm measured at 1.4m from ground.
- **Diameter Above Base (DAB):** The estimated or measured diameter of trunk given in mm measured above the root flare. Used to calculate the structural root zone of the tree.

Age Class: An estimation of how old the tree is in relation to its life expectancy.

- **Young** – Age less than 20% of life expectancy of tree in situ
- **Mature** – Age 20% - 80% of life expectancy of tree in situ
- **Old** – Age greater than 80% of life expectancy of tree in situ
- **Dead** – Tree is dead

Vigour: Ability of a tree to sustain its life processes. This is independent of the condition of a tree but may impact upon it. Vigour can appear to alter rapidly with change of seasons (seasonality) e.g., dormant, deciduous or semi-deciduous trees. Vigour can be categorized as Dormant, Low, Normal and High.

- **Dormant Vigour** – Determined by the existing turgidity in the lower order branches in the outer extremity of the crown, with good bud set and formation, and where the last extension growth is distinct from those most recently preceding it, evident by bud scale scars. Normal vigour during dormancy is achieved when such growth is evident on a majority of branches throughout the crown.
- **Low Vigour** – Reduced ability of a tree to sustain its life processes. This may be evident by the atypical growth of leaves, reduced crown cover and reduced crown density, branches, roots and trunk, and a deterioration of their functions with reduced resistance to predation. This is independent of the condition of a tree but may impact upon it, and especially the ability of a tree to sustain itself against predation.
- **Normal Vigour** – Ability of a tree to maintain and sustain its life processes. This may be evident by the typical growth of leaves, crown cover and crown density, branches, roots and trunk and resistance to predation. This is independent of the condition of a tree but may impact upon it, and especially the ability of a tree to sustain itself against predation.
- **High Vigour** – Accelerated growth of a tree due to incidental or deliberate artificial changes to its growing environment that are seemingly beneficial, but may result in premature aging or failure if the favourable conditions cease, or promote prolonged senescence if the favourable conditions remain, e.g. water from a leaking pipe, water and nutrients from a leaking or disrupted sewer pipe, nutrients from animal waste, a tree growing next to a chicken coop, or a stock feed lot, or a regularly used stockyard, a tree subject to stringent watering and fertilisation program, or some trees may achieve an extended lifespan from continuous pollarding practices over the life of the tree.

Condition: A tree's crown form and growth habit, as modified by its environment (aspect, suppression by other trees, soils) the stability and viability of the root plate, trunk and structural branches (first (1st) and possibly (2nd) order branches), including structural defects such as wounds, cavities or hollows, crooked trunk or weak trunk/branch junctions and the effects of predation by pests and diseases. These may not be directly connected with vigour, and it is possible for a tree to be of normal vigour but in poor condition. Condition can be categorized as Dead, Poor, Fair and Good.

- **Dead Condition** – Tree is no longer capable of performing any of the following processes or is exhibiting any of the following symptoms; Photosynthesis via its foliage crown (as indicated by the presence of moist, green or other coloured leaves), Osmosis (the ability of the roots system to take up water), Turgidity (the ability of the plant to sustain moisture pressure in its cells), Epicormic shoots or epicormic strands in Eucalypts (the production of new shoots as a response to stress, generated from latent or adventitious buds or from a lignotuber), Permanent leaf loss, Permanent leaf wilting (the loss of turgidity which is marked by desiccation of stems leaves and roots), Abscission of the epidermis (bark desiccates and peels off to the beginning of the sap wood).
- **Poor Condition** - Tree is of good habit or misshapen, a form that may be severely restricted for space and light, exhibits symptoms of advanced and irreversible decline such as fungal, or bacterial infestation, major die-back in the branch and foliage crown, structural deterioration from insect damage e.g. termite infestation, or storm damage or lightning strike, ring barking from borer activity in the trunk, root damage or instability of the tree, or damage from physical wounding impacts or abrasion, or from altered local environmental conditions and has been unable to adapt to such changes and may decline further to death regardless of remedial works or other modifications to the local environment that would normally be sufficient to provide for its basic survival if in good to fair condition. Deterioration physically, often characterised by a gradual and continuous reduction in vigour but may be independent of a change in vigour, but characterised by a proportionate increase in susceptibility to, and predation by pests and diseases against which the tree cannot be sustained. Such conditions may also be evident in trees of advanced senescence due to normal phenological processes, without modifications to the growing environment or physical damage having been inflicted upon the tree. This may be independent from or contributed to by vigour.

- **Fair Condition** - Tree is of good habit or misshapen, a form not severely restricted for space and light, has some physical indication of decline due to the early effects of predation by pests and diseases, fungal, bacterial, or insect infestation, or has suffered physical injury to itself that may be contributing to instability or structural weaknesses, or is faltering due to the modification of the environment essential for its basic survival. Such a tree may recover with remedial works where appropriate, or without intervention may stabilise or improve over time, or in response to the implementation of beneficial changes to its local environment. This may be independent from or contributed to by vigour.
- **Good Condition** - Tree is of good habit, with crown form not severely restricted for space and light, physically free from the adverse effects of predation by pests and diseases, obvious instability or structural weaknesses, fungal, bacterial or insect infestation and is expected to continue to live in much the same condition as at the time of inspection provided conditions around it for its basic survival do not alter greatly. This may be independent from or contributed to by vigour.

Useful Life Expectancy (ULE) ULE is the length of time that the arborist assesses an individual tree can be retained with an acceptable level of risk based on the information available at the time of inspection. It is a snapshot in time of the potential an individual tree has for survival in the eyes of the assessor. ULE is not static – it is closely related to tree health and the surrounding conditions. Alterations in these variables may result in changes to the ULE assessment. Consequently, the reliability all ULE assessments have will decrease as time passes from the initial assessment and the potential for changes in variables increases.

- **Remove** – Trees that should be removed within the next 5 years
- **Short** – Trees that appear to be retainable at the time of the assessment for 5-15 years with an acceptable level of risk.
- **Medium** – Trees that appear to be retainable at the time of the assessment for 15-40 years with an acceptable level of risk.
- **Long** – Trees that appear to be retainable at the time of the assessment for 40+ years with an acceptable level of risk.

Amenity and Visual Value – For the purposes of assessing the visual and landscape value of each tree the IACA Significance of a Tree, Assessment Rating System (STARS) © (IACA 2010) © has been adopted. - The landscape significance of a tree is an essential criterion to establish the importance that a particular tree may have on a site. The system uses a scale of High, Medium and Low significance in the landscape.

High significance in landscape

- The tree is in good condition and good vigour
- The tree has a form typical for the species
- The tree is a remnant or is a planted locally indigenous specimen and/or is rare or uncommon in the local area or of botanical interest or of substantial age
- The tree is listed as a heritage item, threatened species or part of an endangered ecological community or listed on council's significant tree register
- The tree is visually prominent and visible from a considerable distance when viewed from most directions within the landscape due to its size and scale and makes a positive contribution to the local amenity
- The tree supports social and cultural sentiments or spiritual associations, reflected by the broader population or community group or has commemorative values
- The tree's growth is unrestricted by above and below ground influences, supporting its ability to reach dimensions typical for the taxa in situ – tree is appropriate to the site conditions

Medium significance in landscape

- The tree is in fair-good condition and good or low vigour
- The tree has form typical or atypical of the species
- The tree is a planted locally indigenous or a common species with its taxa commonly planted in the local area
- The tree is visible from surrounding properties, although not visually prominent as partially obstructed by other vegetation or buildings when viewed from the street
- The tree provides a fair contribution to the visual character and amenity of the local area
- The tree's growth is moderately restricted by above or below ground influences, reducing its ability to reach dimensions typical for the taxa in situ

Low significance in landscape

- The tree is in fair-poor condition and good or low vigour
- The tree has form atypical of the species
- The tree is not visible or is partly visible from the surrounding properties as obstructed by other vegetation or buildings
- The tree provides a minor contribution or has a negative impact on the visual character and amenity of the local area
- The tree is a young specimen which may or may not have reached dimensions to be protected by local Tree Preservation Orders or similar protection mechanisms and can easily be replaced with a suitable specimen
- The tree's growth is severely restricted by above or below ground influences, unlikely to reach dimensions typical for the taxa in situ – tree is inappropriate to the site conditions
- The tree is listed as exempt under the provisions of the local Council Tree Preservation Order or similar protection mechanisms
- The tree has a wound or defect that has the potential to become structurally unsound
- **Environmental Pest / Noxious Weed Species**
- The tree is an environmental pest species due to its invasiveness or poisonous/allergenic properties.
- The tree is a declared noxious weed by legislation
- **Hazardous / Irreversible Decline**

- The tree is structurally unsound and/or unstable and is considered potentially dangerous
- The tree is dead, or is in irreversible decline, or has the potential to fail or collapse in full or in part in the immediate to short term

The tree is to have a minimum of three (3) criteria in a category to be classified in that group.

In the development of this document IACA acknowledges the contribution and original concept of the Footprint Green Tree Significance & Retention Value Matrix, developed by Footprint Green Pty Ltd in June 2010.

The Australian Standard 4970-2009 Protection of Trees on Development Sites defines the requirements for assessing trees with respect to development. It provides the guidance on how to decide which trees are appropriate for retention and on the means of protecting them during construction works. It describes the areas and offsets, referred to as the Tree Protection Zone (TPZ) and Structural Root Zone (SRZ) required to be free from development works to maintain tree vitality and stability. This report has been prepared in accordance with the conditions set out within the standard.

- **Tree Protection Zone** – The tree protection zone is defined as a specified area above and below ground set aside for the protection of the tree's roots and crown. It is expressed as a radial measurement taken from the centre of the trunk at ground level.
- **Structural Root Zone** – The structural root zone is defined as a specified area around the base of a tree required to maintain its stability within the ground. It is expressed as a radial measurement taken from the centre of the trunk at ground level. Excavation and development works are not recommended within the structural root zone unless additional investigation as to root size and location is undertaken

APPENDIX 10.3 INNER WEST COUNCIL APPROVAL FOR TREE REMOVAL AT DULWICH HILL

Mark Trethewy

From: Luke Fraser
Sent: Friday, 28 May 2021 12:01 PM
To: David Crosby
Cc: Mark Trethewy; Gareth O'Brien
Subject: RE: Tree removal - Dulwich Hill Station
Attachments: Pages from # SMCSWSWM-MTM-WDH-LA-DWG-121_STN Landscaping AFC-2.pdf; Pages from # SMCSWSWM-MTM-WDH-LA-DWG-121_STN Landscaping AFC.pdf

David,

Unfortunately the removal of the tree is required to facilitate construction of the new Bedford Crescent precinct (hard/soft landscaping and street furniture installation). As mentioned, there will be a significant beautification/urban design works undertaken on both sides of Dulwich Station including where the current construction compound is located. Community consultation has been undertaken during the T2M design development process and the Conditions for the project have been completed. I have attached plan view drawings of both precincts for your future reference.

For completeness, Downer will remove and dispose the tree nominated to be transplanted in Bedford Crescent after consultation with Inner West Council and confirms that it will be included into the tree offset planting requirements for the project.

Regards,

Luke Fraser
Interface Manager
Infrastructure Projects



M | 0437495678
E | Luke.Fraser@Downergroup.com
Unit 2, 6-16 Gallegghan Street
Hexham NSW 2322

From: David Crosby <david.crosby@innerwest.nsw.gov.au>
Sent: Friday, 28 May 2021 10:32 AM
To: Luke Fraser <Luke.Fraser@Downergroup.com>
Subject: RE: Tree removal - Dulwich Hill Station

[External Email] This email was sent from outside the organisation – be cautious, particularly with links and attachments.

Hi Luke

Our preference is to keep this established tree, however, if this can't be avoided, we'll let you proceed if you offset that tree under your replacement tree planting requirements. There should also be consultation with the residents on removing this tree.

What's the urban design and landscaping doing through this area? Are more trees being planted anyway?

Regards

David Crosby
Road Access Project Engineer



Council acknowledges the Traditional Custodians of these lands, the Gadigal-Wangal people of the Eora Nation.



From: Luke Fraser <Luke.Fraser@Downergroup.com>
Sent: Friday, 28 May 2021 8:22 AM
To: David Crosby <david.crosby@innerwest.nsw.gov.au>
Subject: RE: Tree removal - Dulwich Hill Station

David,

Just a follow up as we a yet to receive formal advise on the below.

During the phone call with your colleague, it was noticed that the original photo was actually the wrong tree nominated to be relocated (refer to below correct image). Irrespective, the below correspondence is still relevant and we are seeking advise from Inner West Council whether they wish to retain the tree and transplant locally or shall the project add it to the tree offset planting requirements.



Regards,

Luke Fraser
Interface Manager
Infrastructure Projects



M | 0437495678
E | Luke.Fraser@Downergroup.com
Unit 2, 6-16 Gallegghan Street
Hexham NSW 2322

From: Luke Fraser
Sent: Tuesday, 25 May 2021 2:50 PM
To: david.crosby@innerwest.nsw.gov.au
Cc: Julie Henderson <Julie.Henderson@Downergroup.com>; Mark Trethewy <Mark.Trethewy@Downergroup.com>; Gareth O'Brien <Gareth.O'Brien@Downergroup.com>
Subject: Tree removal - Dulwich Hill Station

David,

I'm fresh to the Metro project and have been provided your contact details to discuss a required tree relocation at Dulwich Hill Station. (Please point me in another direction if there is a more suitable recipient from IW Council to liaise with.)

In short, the design has nominated a singular tree at Dulwich Hill Station to be relocated (see below design excerpt and street view image of tree circled in red). The tree is quite young and doesn't offer any significant value which leads me to ask whether IWC actually wish to retain the tree. Relocating the tree will pose a few logistical issues given that we (Downer) will need to remove the tree being in our PC and the transplant/ relocation works would need to be undertaken by IW Council given that the new location is likely to be outside of the project boundary.

The alternative to transplanting is for the project to remove the tree along with the remaining vegetation (separate tree clearance request) and add to the project tree offset planting. I believe this would be the most favourable option for both parties, however am seeking initial input from Inner West Council.





Feel free to give me a call to discuss if it makes things easier.

Regards,

Luke Fraser
Interface Manager
Infrastructure Projects



M | 0437495678
E | Luke.Fraser@Downergroup.com
Unit 2, 6-16 Gallegan Street
Hexham NSW 2322

Downer

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Mark Trethewy

From: David Crosby <david.crosby@innerwest.nsw.gov.au>
Sent: Tuesday, 15 June 2021 4:24 PM
To: Mark Trethewy
Cc: Luke Fraser; Julie Henderson; Rachel Leet
Subject: RE: Tree removal - Dulwich Hill Station

[External Email] This email was sent from outside the organisation – be cautious, particularly with links and attachments.

Hi Mark

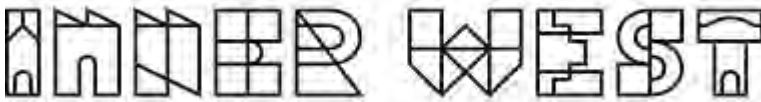
Thanks for sending that through. We're happy with that excerpt of the tree removal and replacement policy.

With regards to the trees being removed, we are happy for trees A, 4, 5, 6 & 7 to be removed as part of this project, but we contest the removal of tree 2. It looks as though this tree would be removed to make way for a shelter, and our Trees co-ordinator has said that in the coming years, this tree will provide a natural umbrella with the adjacent trees from the elements anyway.

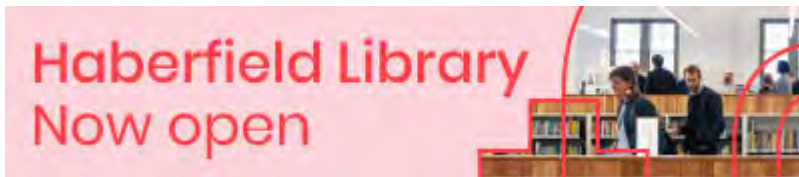
Is there another location this shelter could be located, or is there a need for a shelter at all?

Regards

David Crosby
Road Access Project Engineer
p +61 2 9392 5650 e david.crosby@innerwest.nsw.gov.au



Council acknowledges the Traditional Custodians of these lands, the Gadigal-Wangal people of the Eora Nation.



From: Mark Trethewy <Mark.Trethewy@downergroup.com>
Sent: Tuesday, 15 June 2021 11:22 AM
To: David Crosby <david.crosby@innerwest.nsw.gov.au>
Cc: Luke Fraser <Luke.Fraser@Downergroup.com>; Julie Henderson <Julie.Henderson@Downergroup.com>; Rachel Leet <Rachel.Leet@Downergroup.com>
Subject: [Marketing Mail] RE: Tree removal - Dulwich Hill Station

Hi David,

Do you require anything further on this matter?

Regards,

Mark Trethewy
Environment and Sustainability Advisor
Infrastructure Projects



T | +61 427 299 517
E | Mark.Trethewy@downergroup.com
T3, Trinit Business Campus, 39 Delhi Road
North Ryde NSW 2113

From: Mark Trethewy
Sent: Thursday, 10 June 2021 4:30 PM
To: David Crosby <david.crosby@innerwest.nsw.gov.au>
Cc: Luke Fraser <Luke.Fraser@Downergroup.com>; Julie Henderson <Julie.Henderson@Downergroup.com>; Rachel Leet <Rachel.Lee@Downergroup.com>
Subject: RE: Tree removal - Dulwich Hill Station

Hi David,

Please find attached the Project conditions of approval, the specific section of relevance is E4 (depicted below):

BIODIVERSITY

Biodiversity offsetting

E3 Where impacts to threatened ecological communities or endangered species cannot be avoided, they must be offset in accordance with the requirements of the *NSW Biodiversity Offsets Policy for Major Projects* (OEH, 2014) in agreement with OEH

Note: the SPIR proposal does not require offsetting under the Framework for Biodiversity Assessment as it does not have any impacts to threatened ecological communities or threatened species.

TREE REMOVAL AND REPLACEMENT

E4 The CSSI must be designed to retain as many trees as possible. Where trees are to be removed, the Proponent must provide a 2:1 ratio replacement of trees. Replacement trees must be planted within the project boundary or on public land up to 500 metres from the project boundary. Replacement tree plantings can be undertaken beyond 500 metres on public land within the local government areas to which the CSSI approval applies if requested by the relevant council(s) or where no more practicable land for planting can be found within and up to 500 metres from the CSSI boundary. The location of replacement trees must be determined in consultation with the relevant council(s).

E5 The Proponent must commission an independent experienced and suitably qualified arborist, to prepare a comprehensive Tree Report(s) before removing any trees as detailed in the documents listed in **Condition A1**. The Tree Report may be prepared for the entire CSSI or separate reports may be prepared for individual areas where trees are required to be removed. The report(s) must identify the impacts of the CSSI on trees and vegetation within and adjacent to the Construction footprint. The report(s) must include:

- (a) assess compliance with the requirements of this approval;
- (b) a description of the conditions of the tree(s) and its amenity and visual value;
- (c) consideration of all options to avoid tree removal, including relocation of services, redesign or relocation of ancillary components (such as substations, fencing etc.) and reduction of standard offsets to underground services; and
- (d) measures to avoid the removal of trees or minimise damage to existing trees and ensure the health and stability of those trees to be protected. This includes details of any proposed

Regards,

Mark Trethewy
Environment and Sustainability Advisor
Infrastructure Projects

Mark Trethewy

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Sent: Tuesday, 15 June 2021 4:24 PM
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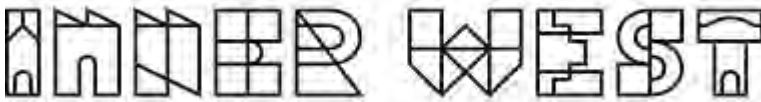
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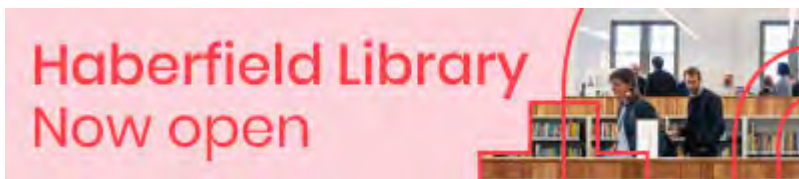
Is there another location this shelter could be located, or is there a need for a shelter at all?

Regards

David Crosby
Road Access Project Engineer
p +61 2 9392 5650 e david.crosby@innerwest.nsw.gov.au



Council acknowledges the Traditional Custodians of these lands, the Gadigal-Wangal people of the Eora Nation.



From: Mark Trethewy <Mark.Trethewy@downergroup.com>
Sent: Tuesday, 15 June 2021 11:22 AM
To: David Crosby <david.crosby@innerwest.nsw.gov.au>
Cc: Luke Fraser <Luke.Fraser@Downergroup.com>; Julie Henderson <Julie.Henderson@Downergroup.com>; Rachel Leet <Rachel.Leet@Downergroup.com>
Subject: [Marketing Mail] RE: Tree removal - Dulwich Hill Station

Hi David,

Do you require anything further on this matter?

Regards,

Mark Trethewy
Environment and Sustainability Advisor
Infrastructure Projects



T | +61 427 299 517
E | Mark.Trethewy@downergroup.com
T3, Trinit Business Campus, 39 Delhi Road
North Ryde NSW 2113

From: Mark Trethewy
Sent: Thursday, 10 June 2021 4:30 PM
To: David Crosby <david.crosby@innerwest.nsw.gov.au>
Cc: Luke Fraser <Luke.Fraser@Downergroup.com>; Julie Henderson <Julie.Henderson@Downergroup.com>; Rachel Leet <Rachel.Lee@Downergroup.com>
Subject: RE: Tree removal - Dulwich Hill Station

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Biodiversity offsetting

E3 Where impacts to threatened ecological communities or endangered species cannot be avoided, they must be offset in accordance with the requirements of the *NSW Biodiversity Offsets Policy for Major Projects* (OEH, 2014) in agreement with OEH

Note: the SPIR proposal does not require offsetting under the Framework for Biodiversity Assessment as it does not have any impacts to threatened ecological communities or threatened species.

TREE REMOVAL AND REPLACEMENT

E4 The CSSI must be designed to retain as many trees as possible. Where trees are to be removed, the Proponent must provide a 2:1 ratio replacement of trees. Replacement trees must be planted within the project boundary or on public land up to 500 metres from the project boundary. Replacement tree plantings can be undertaken beyond 500 metres on public land within the local government areas to which the CSSI approval applies if requested by the relevant council(s) or where no more practicable land for planting can be found within and up to 500 metres from the CSSI boundary. The location of replacement trees must be determined in consultation with the relevant council(s).

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- (a) assess compliance with the requirements of this approval;
- (b) a description of the conditions of the tree(s) and its amenity and visual value;
- (c) consideration of all options to avoid tree removal, including relocation of services, redesign or relocation of ancillary components (such as substations, fencing etc.) and reduction of standard offsets to underground services; and
- (d) measures to avoid the removal of trees or minimise damage to existing trees and ensure the health and stability of those trees to be protected. This includes details of any proposed

Regards,

Mark Trethewy
Environment and Sustainability Advisor
Infrastructure Projects



T | +61 427 299 517
E | Mark.Trethewy@downergroup.com
T3, Trinita Business Campus, 39 Delhi Road
North Ryde NSW 2113

From: David Crosby <david.crosby@innerwest.nsw.gov.au>
Sent: Thursday, 10 June 2021 11:19 AM
To: Mark Trethewy <Mark.Trethewy@downergroup.com>
Cc: Luke Fraser <Luke.Fraser@Downergroup.com>; Julie Henderson <Julie.Henderson@Downergroup.com>; Rachel Leet <Rachel.Lee@Downergroup.com>
Subject: RE: Tree removal - Dulwich Hill Station

[External Email] This email was sent from outside the organisation – be cautious, particularly with links and attachments.

Hi Mark

Is there a document for the conditions on replanting trees that you could send me?

Regards

David Crosby
Road Access Project Engineer
p +61 2 9392 5650 e david.crosby@innerwest.nsw.gov.au



Council acknowledges the Traditional Custodians of these lands, the Gadigal-Wangal people of the Eora Nation.



From: Mark Trethewy <Mark.Trethewy@downergroup.com>
Sent: Wednesday, 9 June 2021 12:26 PM
To: David Crosby <david.crosby@innerwest.nsw.gov.au>
Cc: Luke Fraser <Luke.Fraser@Downergroup.com>; Julie Henderson <Julie.Henderson@Downergroup.com>; Rachel Leet <Rachel.Lee@Downergroup.com>
Subject: [Marketing Mail] Tree removal - Dulwich Hill Station

Hi David,

I'm currently working as the Environment & Sustainability Advisor for the Package 5 & 6 Metro Project. Previously Luke Fraser has been in contact with you regarding clearing on council land at this station.

Would you be able to please provide confirmation that we can proceed in removing Tree A and Trees 2, 4, 5, 6 & 7 (Tree 3 previously confirmed for removal with yourself) depicted beneath, as the identified trees are within the final design scope for the station?

In the trees place will be the final landscaping design previously provided by Luke. Downer will offset all relevant trees under the Project conditions of approval for replanting.

Please find attached the completed arborist reports for these trees attached.

Tree A:



Image 2: Tree A circled in red.

Tree 2, & 4-7 (Tree 3 was previously confirmed for clearing by yourself):



Image 1: Aerial image showing the approximate locations of additional trees. (Source six maps accessed 19/03/2021).

Regards,

Mark Trethewy
Environment and Sustainability Advisor
Infrastructure Projects



T | +61 427 299 517
E | Mark.Trethewy@downergroup.com

Downer

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APPENDIX 11 PUNCHBOWL AIA (URBAN ARBOR)



Arboricultural Impact Assessment Report

Site location:

South West Metro
Punchbowl Station
Punchbowl NSW

Prepared for:

Metron T2M

Prepared by: Jack Williams and
Bryce Claassens

Urban Arbor Pty Ltd

Date: 27 October 2021

Ref: 211027-SWMPS-AIA

Rev: C

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Document No:

SMCSWSWM-MTM-WPS-LA-REP-241000

Revision: 00

Status: AFC

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Site Address: Punchbowl Station, Wiley Park, NSW.

Prepared for: Metron T2M.

Prepared by: Bryce Claassens, Urban Arbor Pty Ltd, sales@urbanarbor.com.au, (02) 8004 2802.

Date of prepared: 27 October 2021, Rev: C.

1. INTRODUCTION

- 1.1 Urban Arbor have been instructed by Metron T2M to provide an Arboricultural Impact Assessment Report for trees located within the site and adjoining sites in relation to a proposed development.
- 1.2 Below is a list of all documents and information provided to Urban Arbor to assist in preparing this report.
 - A) Punchbowl Landscape Drawings, Metron T2M, Rev E, Including Sheet No: 4, 5 and 6, 6 November 2020.
 - B) Punchbowl Landscape Drawings, Metron T2M, Rev 00, Including Sheet No: 3, 4 and 6, 14 April 2021.
 - C) Civil Engineering Package No. 243, Metron T2M, Rev C, 169 Pages in total, 19 June 2020.
 - D) Punchbowl Station Service Building, Metron T2M, Rev C, 2 December 2020.
- 1.3 The trees were inspected on 16 December 2019 and 17 December 2020. Access was available to the subject site and the adjoining public areas only. All tree data contained in this report was collected during these site inspections.

2. SCOPE OF THE REPORT

- 2.1 This report has been undertaken to meet the following objectives.
 - 2.1.1 Conduct a visual assessment of all significant trees located within 10 metres of development works from ground level. For the purpose of this report, a significant tree is a tree with a height equal to or greater than 5 metres.
 - 2.1.2 Determine the trees estimated contribution years and remaining, useful life expectancy and award the trees a retention value.
 - 2.1.3 Provide an assessment of the potential impact the proposed development is likely to cause to the condition of the subject trees in accordance with AS4970 Protection of trees on development sites (2009).
 - 2.1.4 Specify tree protection measures for trees to be retained in accordance with AS4970-2009.

3. LIMITATIONS

- 3.1 The observations and recommendations are based on the site inspections identified in the introduction (section 1) and the access available at the time of inspection. Findings of this report are based on the observations and site conditions at the time inspection.
- 3.2 All of the observations were carried out from ground level and none of the surrounding surfaces were lifted or removed during the inspection. No tests were carried out to the subject trees or surrounding area during the inspection.
- 3.3 Root decay can sometimes be present with no visual indication above ground. It is also impossible to know the extent of any root damage caused by mechanical damage such as underground root cutting during the installation of services without undertaking detailed root investigation. Any form of tree failure due to these activities is beyond the scope of this assessment.
- 3.4 The report reflects the subject tree(s) as found on the day of inspection. Any changes to the growing environment of the subject tree, or tree management works beyond those recommended in this report may alter the findings of the report. There is no warranty, expressed or implied, that problems or deficiencies relating to the subject tree, or subject site may not arise in the future.
- 3.5 Tree identification is based on accessible visual characteristics at the time of inspection. As key identifying features are not always available the accuracy of identification is not guaranteed. Where tree species is unknown, it is indicated with an *spp.*
- 3.6 All diagrams, plans and photographs included in this report are visual aids only, and are not to scale unless otherwise indicated.
- 3.7 Urban Arbor neither guarantees, nor is it responsible for, the accuracy of information provided by others that is contained within this report.
- 3.8 While an assessment of the subject trees estimated useful life expectancy is included in this report, no specific tree risk assessment has been undertaken for any of trees at the site.
- 3.9 The ultimate safety of any tree cannot be categorically guaranteed. Even trees apparently free of defects can collapse or partially collapse in extreme weather conditions. Trees are dynamic, biological entities subject to changes in their environment, the presence of pathogens and the effects of ageing. These factors reinforce the need for regular inspections. It is generally accepted that hazards can only be identified from distinct defects or from other failure-prone characteristics of a tree or its locality.
- 3.10 Alteration of this report invalidates the entire report.

4. METHODOLOGY

- 4.1 The following information was collected during the assessment of the subject tree(s).
- 4.1.1 Tree common name
 - 4.1.2 Tree botanical name
 - 4.1.3 Tree age class
 - 4.1.4 DBH (Trunk/Stem diameter at breast height/1.4m above ground level) - millimetres.
 - 4.1.5 Estimated height - metres
 - 4.1.6 Estimated crown spread (diameter of crown) - metres
 - 4.1.7 Health
 - 4.1.8 Structural condition
 - 4.1.9 Amenity value
 - 4.1.10 Estimated remaining contribution years (SULE)¹
 - 4.1.11 Retention value (Tree AZ)²
 - 4.1.12 Notes/comments
- 4.2 An assessment of the trees condition was made using the visual tree assessment (VTA) model (Mattheck & Breloer, 1994).³
- 4.3 Tree diameter was measured using a DBH tape or in some cases estimated. Tree height and tree canopy spread was measured with a clinometer or in some cases estimated. All other measurements were estimations unless otherwise stated. The other tools used during the assessment were a nylon mallet, compass, camera and a steel probe.
- 4.4 All information was imported into our computerised geographical information system (GIS) PT-mapper pro. This software was used to measure/calculate all encroachment estimates included in this report.
- 4.5 All DBH measurements, tree protection zones, and structural root zones were calculated in accordance with methods set out in AS4970 Protection of trees on development sites (2009) ⁴ and in some cases estimated. See appendices for information.
- 4.6 Details of how the observations in this report have been assessed are listed in the appendices.

¹ Barrell Tree Consultancy, *SULE: Its use and status into the New Millennium*, TreeAZ/03/2001, <http://www.treeaz.com/>.

² Barrell Tree Consultancy, *Tree AZ version 10.04-ANZ*, <http://www.treeaz.com/>.

³ Mattheck, C. & Breloer, H., *The body language of trees - A handbook for failure analysis*, The Stationary Office, London, England (2015).

⁴ Council Of Standards Australia, *AS4970 Protection of trees on development sites* (2009).

5. SITE LOCATION AND BRIEF DESCRIPTION

- 5.1 The site is located in the Canterbury Bankstown Local Government Area (LGA). The trees are subject to protection under the Canterbury Local Environmental Plan (LEP) 2012⁵ and Development Control Plan (DCP) 2012.⁶ The site is identified as a heritage item (number I155) in the LEP heritage maps.⁷

6. GENERAL INFORMATION IN RELATION TO PROTECTING TREES ON DEVELOPMENT SITES

- 6.1 **Tree protection zone (TPZ):** The TPZ is the principle means of protecting trees on development sites and is an area required to maintain the viability of trees during development. It is commonly observed that tree roots will extend significantly further than the indicative TPZ, however the TPZ is an area identified in AS4970-2009 to be the area where root loss or disturbance will generally impact the viability of the tree. The TPZ is identified as a restricted area to prevent damage to trees either above or below ground during a development. Where trees are intended to be retained proposed developments must provide an adequate TPZ around trees. The TPZ is set aside for the tree's root zone, trunk and crown and it is essential for the stability and longevity of the tree. The TPZ also incorporates the SRZ (see below for more information about the SRZ). The TPZ is calculated by multiplying the DBH by twelve, with the exception of palms, other monocots, cycads and tree ferns, the TPZ of which have been calculated at one metre outside the crown projection. Additional information about the TPZ is included in Appendix 3.
- 6.2 **Structural Root Zone (SRZ):** This is the area around the base of a tree required for the trees stability in the ground. An area larger than the SRZ always needs to be maintained to preserve a viable tree. The SRZ is calculated using the following formula; $(DAB \times 50)^{0.42} \times 0.64$. There are several factors that can vary the SRZ which include height, crown area, soil type and soil moisture. It can also be influenced by other factors such as natural or built structures. Generally, work within the SRZ should be avoided. Soil level changes should also generally be avoided inside the SRZ of trees to be retained. Palms, other monocots, cycads and tree ferns do not have an SRZ. See the appendices for more information about the SRZ.

⁵ Canterbury Local Environmental Plan 2012, <https://www.legislation.nsw.gov.au/#/view/EPI/2012/673>, accessed 23 December 2020.

⁶ Canterbury Development Control Plan 2012, <https://www.cbcity.nsw.gov.au/development/planning-control-policies/canterbury-development-control-plan-2012>, accessed 23 December 2020.

⁷ Canterbury Local Environmental Plan Heritage Map - Sheet HER_001, https://www.legislation.nsw.gov.au/maps/ecdec04-2dcb-cdf6-9473-8ead35532c54/1550_COM_HER_001_010_20121105.pdf, 23 December 2020.

6.3 Minor encroachment into TPZ: Sometimes encroachment into the TPZ is unavoidable. Encroachment includes but is not limited to activities such as excavation, compacted fill and machine trenching. Minor encroachment of up to 10% of the overall TPZ area is normally considered acceptable, providing there is space adjacent to the TPZ for the tree to compensate and the tree is displaying adequate vigour/health to tolerate changes to its growing environment.

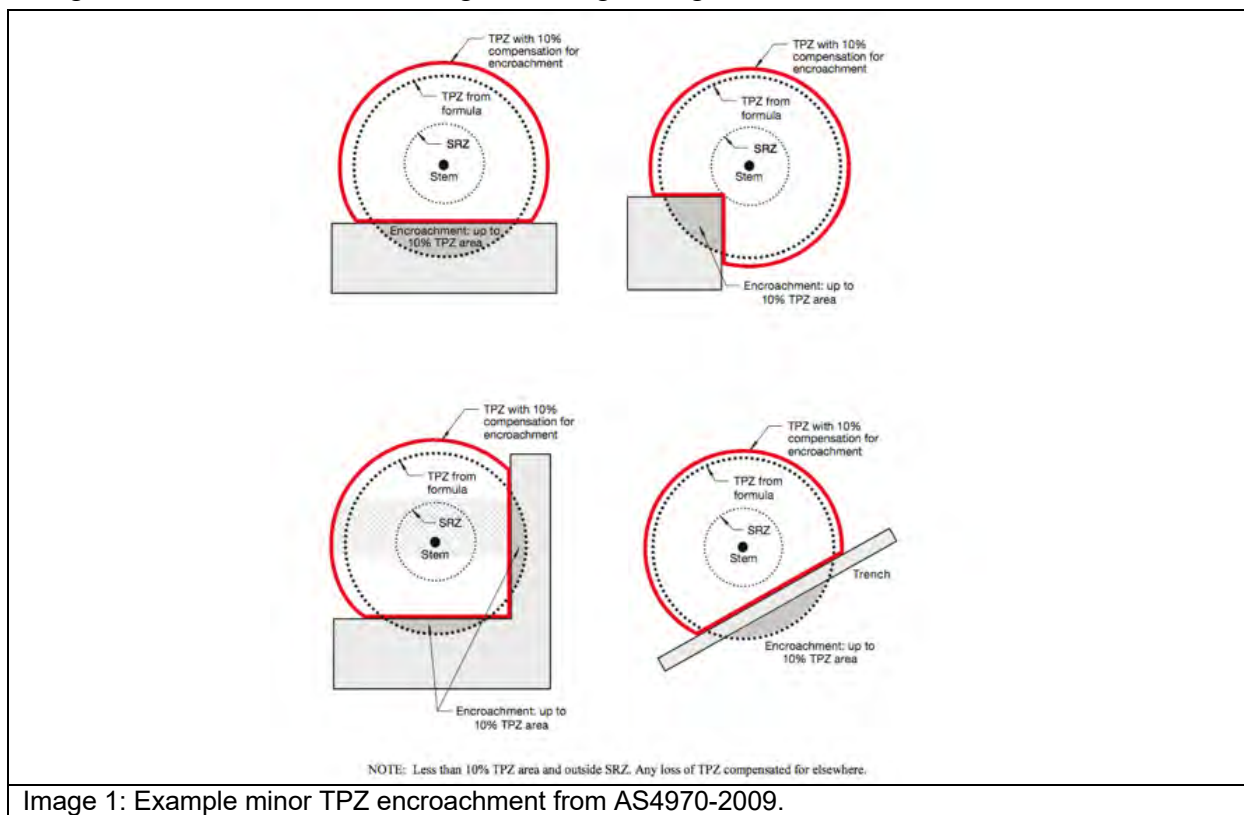


Image 1: Example minor TPZ encroachment from AS4970-2009.

6.4 Major encroachment into TPZ: Where encroachment of more than 10% of the overall TPZ area is proposed the project Arborist must investigate and demonstrate that the tree will remain in a viable condition. In some cases, tree sensitive construction methods such as pier and beam footings, suspended slabs, or cantilevered sections, can be utilised to allow additional encroachment into the TPZ by bridging over roots and minimising root disturbance. Major encroachment is only possible if it can be undertaken without severing significant size roots, or if it can be demonstrated that significant roots will not be impacted. Root investigations may be required to identify roots that will be impacted during major TPZ encroachment (see Appendix 3 for more information in relation to root investigations).

7. OBSERVATIONS

- 7.1 **Tree information:** Details of each individual tree assessed, including the observations taken during the site inspection can be found in the tree inspection schedule in Appendix 2, where the indicative tree protection zone (TPZ) for the subject trees has been calculated. The TPZ and SRZ should be measured in radius from the centre of the trunk. The subject trees have been awarded a retention value based on the observations during the site inspection. The system used to award the retention value is Tree AZ. Tree AZ is used to identify higher value trees worthy of being a constraint to development and lower value trees that should generally not be a constraint to the development. The Tree AZ categories sheet (Barrell Tree Consultancy) has been included in the appendices to assist with understanding the retention values. The retention value that has been allocated to the subject trees in this report is not definitive and should only be used as a guideline. This information has been summarised below.
- 7.2 **Site Plan:** Three site plans have been included in Appendix 1, where the indicative TPZ and SRZ have been overlaid onto the proposed plans provided by the client. The following plans are included in Appendix 1;
- Appendix 1A: Proposed Site Plan North
 - Appendix 1B: Proposed Site Plan South
 - Appendix 1C: Proposed Service Building

8. ASSESSMENT OF CONSTRUCTION IMPACTS

8.1 Table 1: In the table below, the impact of the proposed development has been assessed for all trees included in the report. The assessed TPZ encroachments include proposed structures and hard landscaping only. All soft landscaping should be completed in accordance with section 11.10.

Tree ID	Species	Retention value	TPZ radius (m)	TPZ area (m ²)	SRZ radius (m)	TPZ encroachment	Discussion/ Conclusion	Recommendation
722	<i>Corymbia maculata</i>	A1	4.8	72.4	2.4	None	No encroachment into the TPZ.	Retain and protect
723	<i>Corymbia citriodora</i>	A1	3.6	40.7	2.2	None	No encroachment into the TPZ.	Retain and protect
724	<i>Lophostemon confertus</i>	A1	4.9	76.0	2.4	None	No encroachment into the TPZ.	Retain and protect
725	<i>Corymbia citriodora</i>	A1	4.1	52.3	2.3	None	No encroachment into the TPZ.	Retain and protect
726	<i>Lophostemon confertus</i>	A1	5.4	91.6	2.5	None	No encroachment into the TPZ.	Retain and protect
727	<i>Corymbia citriodora</i>	Z10	3.9	46.9	2.4	Major	Proposed plaza paving encroaches into the TPZ by 11% (5.4m ²) but not into the SRZ. This is 1% over the threshold for minor TPZ encroachment and the proposed works will not significantly impact the tree.	Retain and protect
728	<i>Corymbia citriodora</i>	A1	4.0	49.3	2.2	None	No encroachment into the TPZ.	Retain and protect
729	<i>Callistemon viminalis</i>	Z1	2.0	12.6	1.5	Major	The existing concrete/hard surface is to be removed and replaced with new plaza paving in the TPZ and SRZ. Providing that the new hard surfacing is constructed on the existing soil grades in accordance with section 9.2, the tree can be retained in a viable condition.	Retain and protect*
730	<i>Callistemon viminalis</i>	Z1	2.0	12.6	1.5	Major	The tree has been identified for removal on the received plans. The proposed plaza paving will encroach significantly into the TPZ and SRZ, indicating the condition and stability of the tree will be impacted. The tree is recommended for removal due to impacts from the proposed development.	Remove

Tree ID	Species	Retention value	TPZ radius (m)	TPZ area (m ²)	SRZ radius (m)	TPZ encroachment	Discussion/ Conclusion	Recommendation
731	<i>Lophostemon confertus</i>	A1	6.1	117.7	2.6	Footprint	The trunk of the tree is located within the footprint of the proposed hard surfacing.	Remove
G15	<i>Elaeocarpus reticulatus</i>	Z1	2.0	12.6	1.5	Footprint	Group of trees. The tree to the West of the group will be located within the footprint of the proposed hard surfacing. Therefore, the tree to the West of the group is recommended for removal due to impacts from the proposed development. The remaining trees within the group can be retained.	Remove
732	<i>Corymbia citriodora</i>	A1	5.3	87.6	2.5	Major	The existing concrete/hard surface is to be removed and replaced with new plaza paving and an elevated walk way in the TPZ and SRZ. Providing that the new hard surfacing is constructed on the existing soil grades in accordance with section 9.2, the tree can be retained in a viable condition.	Retain and protect*
733	<i>Eucalyptus moluccana</i>	A1	4.9	76.0	2.3	Major	The existing concrete/hard surfacing to the West is to be removed and replaced with new plaza paving in the TPZ and SRZ. Providing that the new hard surfacing is constructed on the existing soil grades in accordance with section 9.2, the new plaza paving will not significantly impact the tree. The proposed retaining wall will encroach into the TPZ by 23% (17.2m ²) and into the SRZ. This is considered to be a major TPZ encroachment. Section 3.3.4 of AS4970-2009 discusses that the presence of existing or past structures or obstacles affecting root growth should be considered when assessing the impact of TPZ encroachments. There is an existing retaining wall located between the trunk of the tree and the area of the proposed retaining wall. The existing retaining wall has potentially limited or restricted root growth from entering the area where the new wall is proposed. Therefore, the proposed retaining wall should not significantly impact the tree. To ensure the tree is not significantly impacted, the proposed retaining wall footings must be installed in accordance with the tree sensitive construction specifications in section 9.2.3 of this report.	Retain and protect*
734	<i>Eucalyptus spp</i>	A1	3.6	40.7	2.3	Footprint	The trunk is within the footprint of proposed retaining wall.	Remove

Tree ID	Species	Retention value	TPZ radius (m)	TPZ area (m ²)	SRZ radius (m)	TPZ encroachment	Discussion/ Conclusion	Recommendation
735	<i>Grevillea spp</i>	Z1	2.0	12.6	1.5	Major	Tree not marked on plans provided. A proposed retaining wall and plaza paving encroaches into the TPZ by 14% (1.8m ²) and into the SRZ. If significant roots are severed to construct the retaining wall, the condition and stability of the tree will potentially be impacted.	Remove
736	<i>Grevillea spp</i>	Z1	2.0	12.6	1.5	Major	Tree not marked on plans provided. A proposed retaining wall and plaza paving encroach into the TPZ by 14% (1.8m ²) and into the SRZ. If significant roots are severed to construct the retaining wall, the condition and stability of the tree will potentially be impacted.	Remove
737	<i>Callistemon viminalis</i>	A1	3.6	40.7	2.1	Minor	A proposed security fence will encroach into the TPZ by less than 5% but not into the SRZ. This is considered to be a minor and acceptable TPZ encroachment, the proposed works will not significantly impact the tree.	Retain and protect
738	<i>Callistemon viminalis</i>	A1	3.6	40.7	2.1	Minor	A proposed security fence will encroach into the TPZ by less than 5% but not into the SRZ. This is considered to be a minor and acceptable TPZ encroachment, the proposed works will not significantly impact the tree.	Retain and protect
739	<i>Callistemon viminalis</i>	A1	4.2	55.4	2.3	Minor	A proposed security fence will encroach into the TPZ by less than 5% but not into the SRZ. This is considered to be a minor and acceptable TPZ encroachment, the proposed works will not significantly impact the tree.	Retain and protect
3346	<i>Eucalyptus scoparia</i>	Z3	4.2	55.4	2.4	Major	The proposed service building crossover, fence and services into the TPZ by 36% (19.9m ²) and into the SRZ. This is considered to be a major TPZ encroachment and the proposed works could potentially impact the condition and stability of the tree. The tree is recommended for removal due to development impacts.	Remove
3347	<i>Cinnamomum camphora</i>	Z3	8.4	221.7	2.8	Footprint	The trunk of the tree is located within the footprint of the proposed service building construction area.	Remove
3348	<i>Eucalyptus pilularis</i>	A1	3.2	32.2	2.1	Major	A proposed security fence encroaches into the TPZ by 29% (9.3m ²) and into the SRZ. If significant roots are severed in the TPZ and SRZ, the condition and stability of the tree could be impacted. To retain the tree in a viable condition, the fence must be installed in accordance with section 9.2.	Retain and protect*
3349	<i>Cinnamomum camphora</i>	Z4	8.4	221.7	3.0	Footprint	The trunk of the tree is located within the footprint of the proposed service building construction area.	Remove

Site Address: Punchbowl Station, Wiley Park, NSW.

Prepared for: Metron T2M.

Prepared by: Bryce Claassens, Urban Arbor Pty Ltd, sales@urbanarbor.com.au, (02) 8004 2802.

Date of prepared: 27 October 2021, Rev: C.

Tree ID	Species	Retention value	TPZ radius (m)	TPZ area (m ²)	SRZ radius (m)	TPZ encroachment	Discussion/ Conclusion	Recommendation
3350	<i>Olea europaea subsp. cuspidata</i>	Z3	4.8	72.4	2.3	Footprint	The trunk of the tree is located within the footprint of the proposed service building construction area.	Remove
3351	<i>Eucalyptus botryoides</i>	A2	5.9	109.4	2.6	Major	A proposed security fence encroaches into the TPZ by 37% (40.8m ²) and into the SRZ. If significant roots are severed in the TPZ and SRZ, the condition and stability of the tree could be impacted. To retain the tree in a viable condition, the fence must be installed in accordance with section 9.2.	Retain and protect*
3352	<i>Cinnamomum camphora</i>	Z3	5.4	91.6	2.7	Footprint	The trunk of the tree is located within the footprint of the proposed service building construction area.	Remove
3353	<i>Eucalyptus scoparia</i>	Z3	7.0	153.9	2.8	Major	A proposed security fence encroaches into the TPZ by 39% (60.4m ²) and into the SRZ. If significant roots are severed in the TPZ and SRZ, the condition and stability of the tree could be impacted. To retain the tree in a viable condition, the fence must be installed in accordance with section 9.2.	Retain and protect*
3354	<i>Cinnamomum camphora</i>	Z3	3.2	32.2	2.4	Major	A proposed security fence encroaches into the TPZ by 35% (11.4m ²) and into the SRZ. If significant roots are severed in the TPZ and SRZ, the condition and stability of the tree could be impacted. To retain the tree in a viable condition, the fence must be installed in accordance with section 9.2.	Retain and protect*
3355	<i>Pittosporum undulatum</i>	Z1	2.0	12.6	1.5	Footprint	The trunk of the tree is located within the footprint of the proposed service building construction area.	Remove
3356	<i>Cinnamomum camphora</i>	A1	7.2	162.9	2.8	Footprint	The trunk of the tree is located within the footprint of the proposed service building construction area.	Remove
3357	<i>Cinnamomum camphora</i>	Z3	2.5	19.6	2.1	Major	A proposed security fence encroaches into the TPZ by 35% (6.8m ²) and into the SRZ. If significant roots are severed in the TPZ and SRZ, the condition and stability of the tree could be impacted. To retain the tree in a viable condition, the fence must be installed in accordance with section 9.2.	Retain and protect*
3358	<i>Eucalyptus pilularis</i>	A1	2.8	24.6	1.9	Major	A proposed security fence encroaches into the TPZ by 25% (6.3m ²) and into the SRZ. If significant roots are severed in the TPZ and SRZ, the condition and stability of the tree could be impacted. To retain the tree in a viable condition, the fence must be installed in accordance with section 9.2.	Retain and protect*

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Date of prepared: 27 October 2021, Rev: C.

Tree ID	Species	Retention value	TPZ radius (m)	TPZ area (m ²)	SRZ radius (m)	TPZ encroachment	Discussion/ Conclusion	Recommendation
3359	<i>Acacia spp</i>	Z1	2.0	12.6	1.5	Footprint	The trunk of the tree is located within the footprint of the proposed service building construction area.	Remove
3360	<i>Cinnamomum camphora</i>	A1	11.4	408.3	3.4	Footprint	The trunk of the tree is located within the footprint of the proposed service building construction area.	Remove
3361	<i>Phoenix canariensis</i>	Z3	4.0	50.3	NA	Footprint	The trunk of the tree is located within the footprint of the proposed service building construction area.	Remove
3362	<i>Cinnamomum camphora</i>	Z3	3.0	28.3	2.3	Major	A proposed security fence encroaches into the TPZ by 45% (12.6m ²) and into the SRZ. If significant roots are severed in the TPZ and SRZ, the condition and stability of the tree could be impacted. To retain the tree in a viable condition, the fence must be installed in accordance with section 9.2.	Retain and protect*
3363	<i>Phoenix canariensis</i>	Z3	4.0	50.3	NA	Footprint	The trunk of the tree is located within the footprint of the proposed service building construction area.	Remove
3364	<i>Eucalyptus pilularis</i>	A1	4.0	50.3	2.3	Major	A proposed security fence encroaches into the TPZ by 33% (16.8m ²) and into the SRZ. If significant roots are severed in the TPZ and SRZ, the condition and stability of the tree could be impacted. To retain the tree in a viable condition, the fence must be installed in accordance with section 9.2.	Retain and protect*
3365	<i>Cinnamomum camphora</i>	A1	12.0	452.4	3.6	Footprint	The trunk of the tree is located within the footprint of the proposed service building construction area.	Remove
3366	<i>Eucalyptus botryooides</i>	A1	10.0	314.2	3.3	Major	A proposed security fence will encroach into the TPZ and SRZ. If significant roots are severed in the TPZ and SRZ, the condition and stability of the tree could be impacted. To retain the tree in a viable condition, the fence must be installed in accordance with section 9.2.	Retain and protect*
3367	<i>Cinnamomum camphora</i>	Z3	2.3	16.6	2.4	Major	A proposed security fence will encroach into the TPZ and SRZ. If significant roots are severed in the TPZ and SRZ, the condition and stability of the tree could be impacted. To retain the tree in a viable condition, the fence must be installed in accordance with section 9.2.	Retain and protect*

Tree ID	Species	Retention value	TPZ radius (m)	TPZ area (m ²)	SRZ radius (m)	TPZ encroachment	Discussion/ Conclusion	Recommendation
3368	<i>Cinnamomum camphora</i>	Z3	2.8	24.6	2.2	Major	A proposed security fence will encroach into the TPZ and SRZ. If significant roots are severed in the TPZ and SRZ, the condition and stability of the tree could be impacted. To retain the tree in a viable condition, the fence must be installed in accordance with section 9.2.	Retain and protect*
3369	<i>Cinnamomum camphora</i>	Z3	3.0	28.3	2.0	Major	A proposed security fence will encroach into the TPZ and SRZ. If significant roots are severed in the TPZ and SRZ, the condition and stability of the tree could be impacted. To retain the tree in a viable condition, the fence must be installed in accordance with section 9.2.	Retain and protect*
3370	<i>Cinnamomum camphora</i>	Z3	2.0	12.6	1.6	Major	A proposed security fence will encroach into the TPZ and SRZ. If significant roots are severed in the TPZ and SRZ, the condition and stability of the tree could be impacted. To retain the tree in a viable condition, the fence must be installed in accordance with section 9.2.	Retain and protect*
3371	<i>Eucalyptus botryoides</i>	A1	5.3	88.2	2.5	Major	A proposed security fence will encroach into the TPZ and SRZ. If significant roots are severed in the TPZ and SRZ, the condition and stability of the tree could be impacted. To retain the tree in a viable condition, the fence must be installed in accordance with section 9.2.	Retain and protect*
3372	<i>Cinnamomum camphora</i>	Z3	4.8	72.4	2.3	Major	A proposed security fence will encroach into the TPZ and SRZ. If significant roots are severed in the TPZ and SRZ, the condition and stability of the tree could be impacted. To retain the tree in a viable condition, the fence must be installed in accordance with section 9.2.	Retain and protect*
3373	<i>Populus nigra 'Italica'</i>	Z3	5.9	109.4	2.6	Major	A proposed security fence will encroach into the TPZ and SRZ. If significant roots are severed in the TPZ and SRZ, the condition and stability of the tree could be impacted. To retain the tree in a viable condition, the fence must be installed in accordance with section 9.2.	Retain and protect*

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Tree ID	Species	Retention value	TPZ radius (m)	TPZ area (m ²)	SRZ radius (m)	TPZ encroachment	Discussion/ Conclusion	Recommendation
3374	<i>Populus nigra</i> 'Italica'	Z3	4.0	50.3	2.3	Major	A proposed security fence will encroach into the TPZ and SRZ. If significant roots are severed in the TPZ and SRZ, the condition and stability of the tree could be impacted. To retain the tree in a viable condition, the fence must be installed in accordance with section 9.2.	Retain and protect*

Notes

TPZ Encroachment Percentage: TPZ encroachment percentages are based on new structures and hard surfaces only. New soft landscaping, such as turf or amenity planting areas have not been included in the calculation for TPZ encroachment.

Retain and protect*: The proposed construction must be completed in accordance with section 9.2 to reduce the impact to the tree.

9. CONCLUSIONS

9.1 **Table 2:** Summary of the impact to trees during the development;

Impact	Reason	Category A	Category Z	Total
		A	Z	
Trees to be removed	Building construction, new surfacing and/or proximity, or trees in poor condition.	731, 734, 3356, 3360, 3365 (Five trees)	730, G15, 735, 736, 3346, 3347, 3349, 3350, 3352, 3355, 3359, 3361, 3363 (Twelve trees + One group)	17 trees + 1 group
Trees subject to TPZ encroachment greater than 10% requiring tree sensitive design and construction to be retained	Removal of existing surfacing/structures and/or installation of new surfacing/structures.	732, 733, 3348, 3351, 3358, 3364, 3366, 3371 (Eight trees)	729, 3353, 3354, 3357, 3362, 3367, 3368, 3369, 3370, 3372, 3373, 3374 (Twelve trees)	20 trees
Retained trees subject to TPZ encroachment of 10% or less	Removal of existing surfacing/structures and/or installation of new surfacing/structures.	722, 723, 724, 725, 726, 728, 737, 738, 739, (Nine trees)	727 (One tree)	10 trees

- 9.2 Construction Design/Specification Requirements:** The proposed construction will encroach into the TPZ and SRZ of seven trees, including tree 729, 732, 733, 3348, 3351, 3353, 3354, 3357, 3358, 3362, 3364, 3366, 3367, 3368, 3369, 3370, 3371, 3372, 3373 and 3374. To ensure the trees are not adversely impacted by the construction, it must be demonstrated the following design and construction specifications can be implemented within the TPZ of the trees. If the construction cannot be completed in accordance with these specifications, the trees may not be viable for retention.
- 9.2.1 Security Fence:** The proposed security fence will be installed using the tree sensitive method of post and rail type construction. To ensure the trees are not significantly impacted by the works, all post holes must be excavated manually. The post location must be flexible to avoid the severance of significant roots 40mm and greater in diameter. No posts are to be located within the SRZ or root investigations will be required to determine the post location. See Appendix 3 for more information in regard to root investigations. All rails/horizontal materials are to be located on or above existing soil grades. This will allow for the majority of the root system to be retained between the posts, minimising root loss.
- 9.2.2 Hard Surfacing:** Areas of the proposed hard surfacing will be replacing the existing hard surfacing. To ensure that tree root systems are not significantly impacted, the proposed hard surfacing must be constructed on or above the existing sub base of the existing hard surfacing. Where the proposed hard surfacing is located outside the footprint of the existing hard surfacing, it should be constructed above existing soil grades. Compaction of lowest sub base materials must be minimised, as this can cause soil compaction and impact the health of trees. The diagram below (Image A) gives an example of a no-dig method for constructing hard surfacing close to trees, retaining pegs avoiding significant roots.
- If excavations are essential, they must not exceed 100mm below the existing grades. The excavations should be supervised by a project Arborist with a minimum AQF level 5 qualification. All excavations for the hard surfacing should be carried out manually to avoid impacting retained tree roots. All tree roots greater than 40mm in diameter should be retained unless the project arborist has assessed and advised that the pruning/severing of the root will not impact the condition or stability of the tree. Manual excavation may include the use of pneumatic and hydraulic tools, high-pressure air or a combination of high-pressure water and a vacuum device.
- Where tree roots greater than 40mm are encountered that must be retained, the hard surfacing should be elevated over the individual tree root to allow for its retention. Examples of methods that can be used to bridge individual tree roots have been included below (Image B and C). Using pier and beam bridges as per image C is the recommended/preferred method, as it will allow for future growth of the tree roots, reducing future damage to the pavement from the roots.

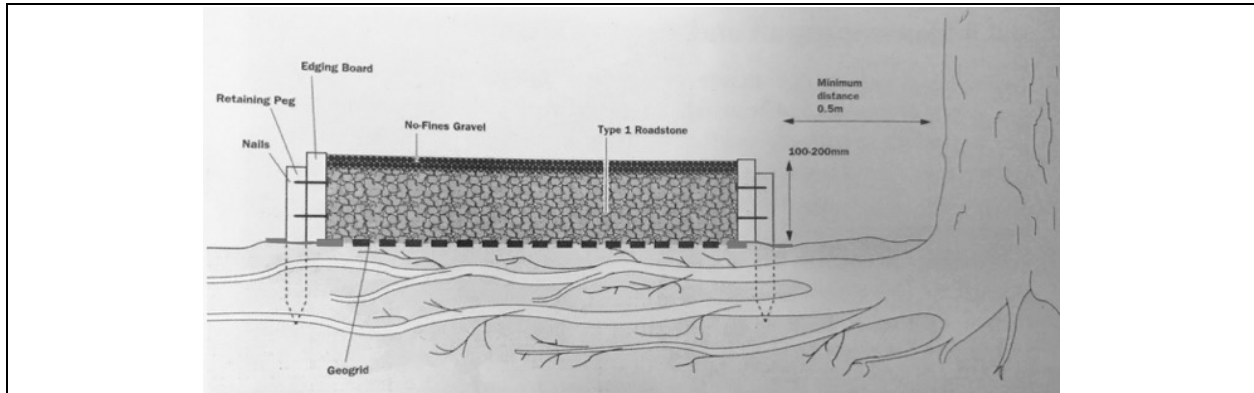


Image A: An image from 'Tree Roots in the Built Environment'⁸, showing how to construct hard surfacing above a trees root system without excavation. Type 1 Roadstones are an example of blue metal or crushed sandstone.

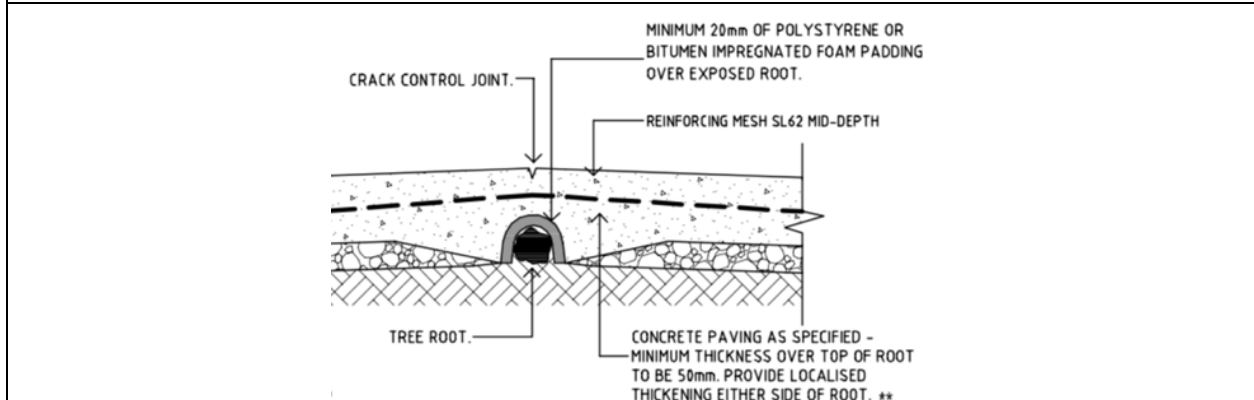


Image B: Example method for bridging concrete footpaths over tree roots provided in the Canterbury Bankstown Council standard drawings.⁹

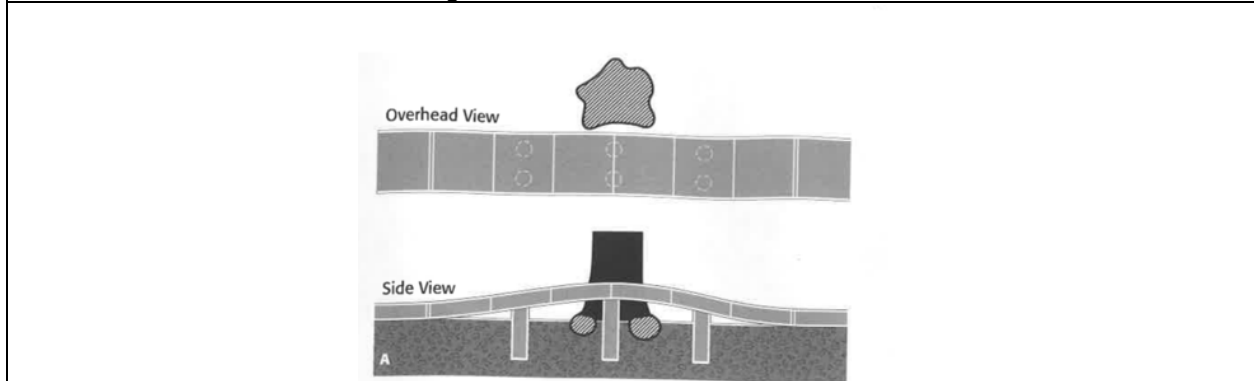


Image C: Example method from Reducing infrastructure damage by tree roots: A compendium of strategies.¹⁰

⁸ Roberts, J., Jackson, N., & Smith, M., *Tree Roots in the Built Environment*, The Stationary Office, London, England (2006). Page 305 & 306.

⁹ Canterbury Bankstown Council standard drawing S-209 Existing street tree treatments, <https://www.cbccity.nsw.gov.au/development/planning-control-policies/council-standard-drawings>, accessed 3 October 2019.

¹⁰ Costello, L. R., & Jones, K. S., *Reducing infrastructure damage by tree roots: A compendium of strategies*, Western Chapter of the International Society of Arboriculture, 31883 Success Valley Drive, Porterville, CA (2003), page 27.

9.2.3 Tree Sensitive Retaining Wall Footings – tree 733: To minimise root loss in the TPZ of the tree, the footings of the proposed retaining wall should be pier and beam/suspended slab style footings to bridge over significant tree roots and minimise root loss. To ensure that significant tree roots are retained, it must be demonstrated by the project engineer that the following construction methods can be implemented;

- All excavations for piers must be carried out manually under the supervision of the project Arborist (see section 11 for details of manual excavation and project Arborist).
- The location of piers must be flexible to avoid significant roots (roots greater than 40mm in diameter). All roots greater than 40mm in diameter must be retained unless the project arborist has assessed and approved in writing that severing the root will not impact the condition or stability of the tree.
- Cross beams/slabs must be located on or above the existing soil grades.
- The piers should be located a minimum of 200mm from any root to be retained that is greater than 40mm in diameter.

10. RECOMMENDATIONS

- 10.1 This report assesses the impact of a proposed development at the subject site to forty-seven (47) trees and one group (1) located within the site and adjoining sites, in accordance with AS4970 Protection of trees on development sites (2009).
- 10.2 Three site plans have been included in Appendix 1, where the indicative TPZ and SRZ have been overlaid onto the proposed plans provided by the client. The following plans are included in Appendix 1;
- Appendix 1A: Proposed Site Plan North
 - Appendix 1B: Proposed Site Plan South
 - Appendix 1C: Proposed Service Building
- 10.3 Seventeen (17) trees and one group (1) of trees have been recommended for removal within this report, including tree 730, 731, G15, 734, 735, 736, 3346, 3347, 3349, 3350, 3352, 3355, 3356, 3359, 3360, 3361, 3363 and 3365. Tree 731, 734, 3356, 3360 and 3365 are higher value category A retention value trees. Tree 730, G15, 735, 736, 3346, 3347, 3349, 3350, 3352, 3355, 3359, 3361 and 3363 are lower value category Z retention value trees that generally should not be a constraint to the development. Note that only the Western most tree within G15 is to be removed, the remaining trees within G15 can be retained in a viable condition.
- 10.4 Twenty (20) trees have been recommended to be retained that will be subject to TPZ encroachments greater than 10%, including tree 729, 732, 733, 3348, 3351, 3353, 3354, 3357, 3358, 3362, 3364, 3366, 3367, 3368, 3369, 3370, 3371, 3372, 3373 and 3374. To reduce the impact to the trees, the proposed construction within the TPZ of the trees must be completed in accordance with section 9.2 of this report.
- 10.5 The remaining ten (10) trees will be subject to minor and acceptable TPZ encroachments of 10% or less and can be retained in a viable condition, including tree 722, 723, 724, 725, 726, 727, 728, 737, 738 and 739.
- 10.6 All trees to be retained must be protected for the duration of development, (including demolition and landscaping, in accordance with AS4970-2009). See section 11 for more information.
- 10.7 See section 11.10 for general landscape guidance when working within the TPZ of trees to be retained.
- 10.8 Where possible underground services must be located outside the TPZ of trees to be retained. All underground services located inside the TPZ of any tree to be retained must be installed in accordance with section 11.11.
- 10.9 This report does not provide approval for tree removal or pruning works. All recommendations in this report are subject to approval by the relevant authorities and/or tree owners. This report should be submitted as supporting evidence with any tree removal/pruning or development application.

11. TREE PROTECTION REQUIREMENTS

- 11.1 **Use of this report:** All contractors must be made aware of the tree protection requirements prior to commencing works at the site. This report and a copy of the site plan (Appendix 1) drawings must also be made available to any contractor prior to works commencing and during any on site operations.
- 11.2 **Project Arborist:** Prior to any works commencing at the site a project Arborist should be appointed. The project Arborist should be qualified to a minimum AQF level 5 and/or equivalent qualifications and experience, and should assist with any development issues relating to trees that may arise. If at any time it is not feasible to carryout works in accordance with this, an alternative must be agreed in writing with the project Arborist.
- 11.3 **Tree work:** All tree work must be carried out by a qualified and experienced Arborist with a minimum of AQF level 2 in arboriculture, in accordance with NSW Work Cover Code of Practice for the Amenity Tree Industry (1998) and AS4373 Pruning of amenity trees (2007).
- 11.4 **Initial site meeting/on-going regular inspections:** The project Arborist is to hold a pre-construction site meeting with principal contractor to discuss methods and importance of tree protection measures and resolve any issues in relation to tree protection that may arise. In accordance with AS4970-2009, the project Arborist should carryout regular site inspections to ensure works are carried out in accordance with this document throughout the development process. Site inspections are recommended on a one-month frequency.
- 11.5 **Site Specific Tree Protection Recommendations:** The table below provides recommendations for each tree, including site specific tree protection requirements. All trees to be retained must be protected in accordance with general requirements of AS4970-2009 for the duration of the development, details of which are discussed in further details in this section of the report.

Tree ID	Tree Species	TPZ Radius (m)	SRZ Radius (m)	Recommendations
722	<i>Corymbia maculata</i>	4.8	2.4	Retain. Set back from works, no tree protection required.
723	<i>Corymbia citriodora</i>	3.6	2.2	Retain. Set back from works, no tree protection required.
724	<i>Lophostemon confertus</i>	4.9	2.4	Retain. Set back from works, no tree protection required.
725	<i>Corymbia citriodora</i>	4.1	2.3	Retain. Set back from works, no tree protection required.
726	<i>Lophostemon confertus</i>	5.4	2.5	Retain and protect. Tree protection fencing is to create a combined exclusion zone for tree 726, 727 and 728. The fencing is to encompass as much of the TPZ area as practical whilst allowing space for construction works. TPZ signage is required on the fencing.

Site Address: Punchbowl Station, Wiley Park, NSW.

Prepared for: Metron T2M.

Prepared by: Bryce Claassens, Urban Arbor Pty Ltd, sales@urbanarbor.com.au, (02) 8004 2802.

Date of prepared: 27 October 2021, Rev: C.

727	<i>Corymbia citriodora</i>	3.9	2.4	Retain and protect. See tree protection recommendations for tree 726.
728	<i>Corymbia citriodora</i>	4.0	2.2	Retain and protect. See tree protection recommendations for tree 726.
729	<i>Callistemon viminalis</i>	2.0	1.5	Retain and protect. Tree protection fencing is to encompass as much of the TPZ area as practical whilst allowing space for construction works. TPZ signage is required on the fencing.
730	<i>Callistemon viminalis</i>	2.0	1.5	Remove.
731	<i>Lophostemon confertus</i>	6.1	2.6	Remove.
G15	<i>Elaeocarpus reticulatus</i>	2.0	1.5	Remove.
732	<i>Corymbia citriodora</i>	5.3	2.5	Retain and protect. Tree protection fencing is to encompass as much of the TPZ area as practical whilst allowing space for construction works. TPZ signage is required on the fencing.
733	<i>Eucalyptus moluccana</i>	4.9	2.3	Retain and protect. Tree protection fencing is to encompass as much of the TPZ area as practical whilst allowing space for construction works. TPZ signage is required on the fencing.
734	<i>Eucalyptus spp</i>	3.6	2.3	Remove.
735	<i>Grevillea spp</i>	2.0	1.5	Remove.
736	<i>Grevillea spp</i>	2.0	1.5	Remove.
737	<i>Callistemon viminalis</i>	3.6	2.1	Retain and protect. Tree protection fencing is to create a combined exclusion zone for tree 737, 738 and 739. The fencing is to encompass as much of the TPZ area as practical whilst allowing space for construction works. TPZ signage is required on the fencing.
738	<i>Callistemon viminalis</i>	3.6	2.1	Retain and protect. See tree protection recommendations for tree 737.
739	<i>Callistemon viminalis</i>	4.2	2.3	Retain and protect. See tree protection recommendations for tree 737.
3346	<i>Eucalyptus scoparia</i>	4.2	2.4	Remove.
3347	<i>Cinnamomum camphora</i>	8.4	2.8	Remove.
3348	<i>Eucalyptus pilularis</i>	3.2	2.1	Retain and protect. Tree protection fencing is to create a combined exclusion zone for tree 3348, 3351, 3353, 3354, 3357, 3358, 3362 and 3364. The fencing is to encompass the grass area of the nature strip and is to encompass as much of the TPZ area as practical while allowing space for construction works. TPZ signage is required on the fencing.
3349	<i>Cinnamomum camphora</i>	8.4	3.0	Remove.
3350	<i>Olea europaea subsp. cuspidata</i>	4.8	2.3	Remove.
3351	<i>Eucalyptus botryoides</i>	5.9	2.6	Retain and protect. See tree protection recommendations for tree 3348.
3352	<i>Cinnamomum camphora</i>	5.4	2.7	Remove.

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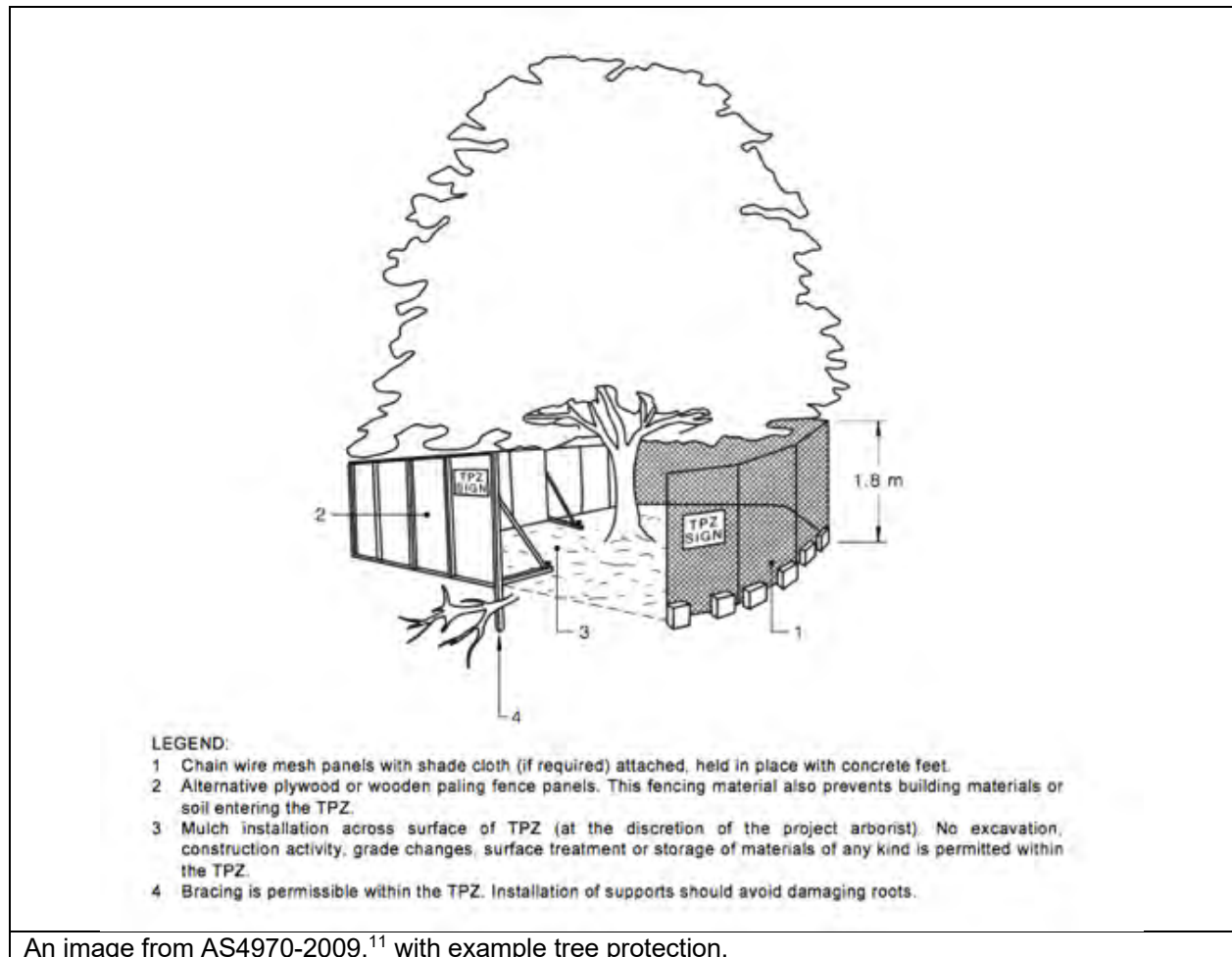
Date of prepared: 27 October 2021, Rev: C.

3353	<i>Eucalyptus scoparia</i>	7.0	2.8	Retain and protect. See tree protection recommendations for tree 3348.
3354	<i>Cinnamomum camphora</i>	3.2	2.4	Retain and protect. See tree protection recommendations for tree 3348.
3355	<i>Pittosporum undulatum</i>	2.0	1.5	Remove.
3356	<i>Cinnamomum camphora</i>	7.2	2.8	Remove.
3357	<i>Cinnamomum camphora</i>	2.5	2.1	Retain and protect. See tree protection recommendations for tree 3348.
3358	<i>Eucalyptus pilularis</i>	2.8	1.9	Retain and protect. See tree protection recommendations for tree 3348.
3359	<i>Acacia spp</i>	2.0	1.5	Remove.
3360	<i>Cinnamomum camphora</i>	11.4	3.4	Remove.
3361	<i>Phoenix canariensis</i>	4.0	NA	Remove.
3362	<i>Cinnamomum camphora</i>	3.0	2.3	Retain and protect. See tree protection recommendations for tree 3348.
3363	<i>Phoenix canariensis</i>	4.0	NA	Remove.
3364	<i>Eucalyptus pilularis</i>	4.0	2.3	Retain and protect. See tree protection recommendations for tree 3348.
3365	<i>Cinnamomum camphora</i>	12.0	3.6	Remove.
3366	<i>Eucalyptus botryoides</i>	10.0	3.3	Retain and protect. Tree protection fencing is to create a combined exclusion zone for tree 3366, 3367, 3368, 3369, 3370, 3371, 3372, 3373 and 3374. The fencing is to encompass as much of the TPZ area as practical while allowing space for construction works. TPZ signage is required on the fencing.
3367	<i>Cinnamomum camphora</i>	2.3	2.4	Retain and protect. See tree protection recommendations for tree 3366.
3368	<i>Cinnamomum camphora</i>	2.8	2.2	Retain and protect. See tree protection recommendations for tree 3366.
3369	<i>Cinnamomum camphora</i>	3.0	2.0	Retain and protect. See tree protection recommendations for tree 3366.
3370	<i>Cinnamomum camphora</i>	2.0	1.6	Retain and protect. See tree protection recommendations for tree 3366.
3371	<i>Eucalyptus botryoides</i>	5.3	2.5	Retain and protect. See tree protection recommendations for tree 3366.
3372	<i>Cinnamomum camphora</i>	4.8	2.3	Retain and protect. See tree protection recommendations for tree 3366.
3373	<i>Populus nigra 'Italica'</i>	5.9	2.6	Retain and protect. See tree protection recommendations for tree 3366.
3374	<i>Populus nigra 'Italica'</i>	4.0	2.3	Retain and protect. See tree protection recommendations for tree 3366.

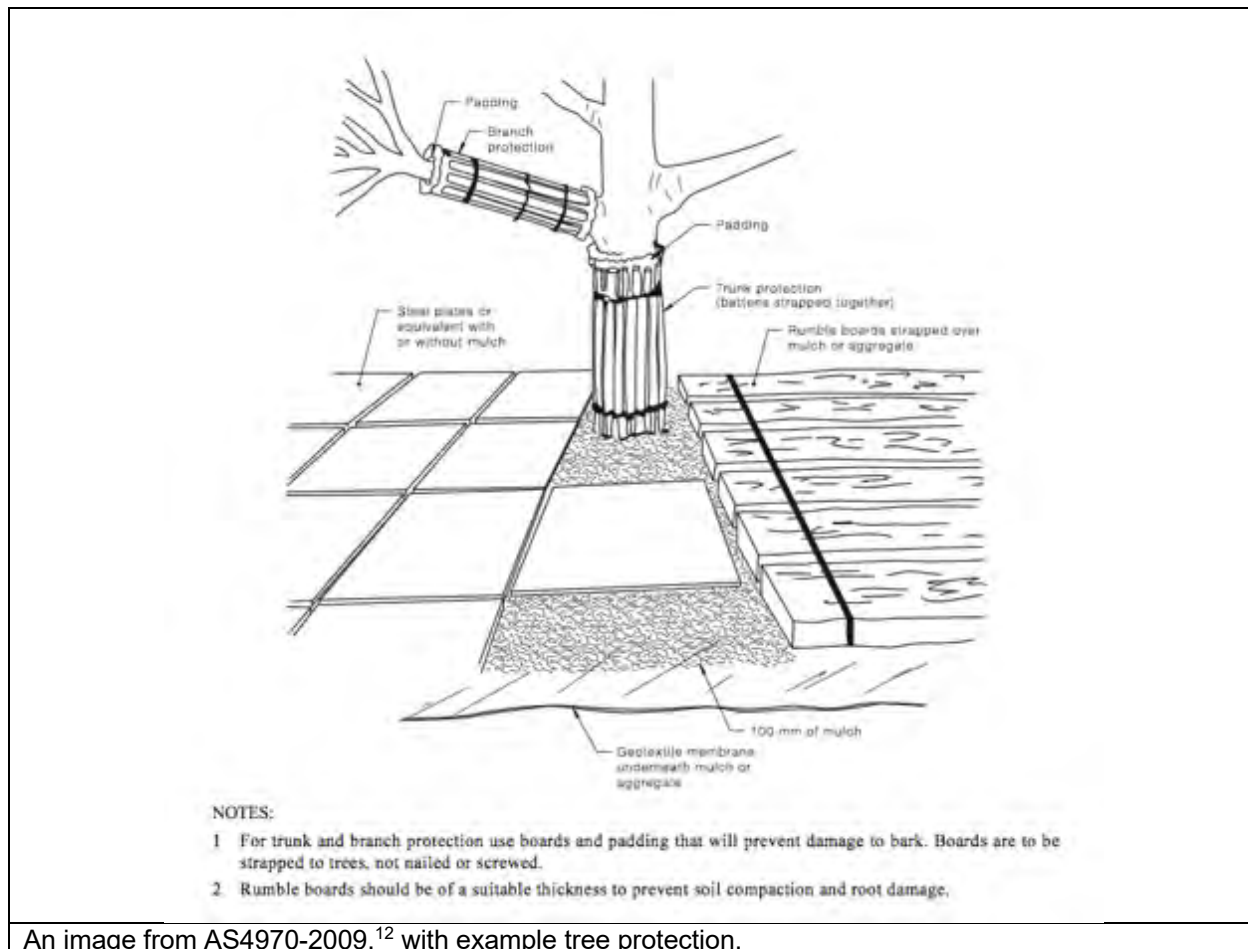
- 11.6 Tree protection Specifications:** It is the responsibility of the principal contractor to install tree protection prior to works commencing at the site (prior to demolition works) and to ensure that the tree protection remains in adequate condition for the duration of the development. The tree protection must not be moved without prior agreement of the project Arborist. The project Arborist must inspect that the tree protection has been installed in accordance with this document and AS4970-2009 prior to works commencing.
- 11.6.1 Protective fencing:** Site specific tree protection requirements are in section 11.5. Where it is not feasible to install fencing at the specified location due to factors such as restricting access to areas of the site or for constructing new structures, an alternative location and protection specification must be agreed with the project Arborist. Where the installation of fencing is unfeasible due to restrictions on space, trunk and branch protection will be required (see below). The protective fencing must be constructed of 1.8 metre 'cyclone chainmesh fence'. The fencing must only be removed for the landscaping phase and must be authorised by the project Arborist. Any modifications to the fencing locations must be approved by the project Arborist.
- 11.6.2 TPZ signage:** Tree protection signage is to be attached to the protective fencing, displayed in a prominent position and the sign repeated at 10 metres intervals or closer where the fence changes direction. Each sign shall contain in a clearly legible form, the following information:
- Tree protection zone/No access.
 - This fence has been installed to prevent damage to the tree/s and their growing environment both above and below ground. Do not move fencing or enter TPZ without the agreement of the project Arborist.
 - The name, address, and telephone number of the developer/builder and project Arborist
- 11.6.3 Trunk and Branch Protection:** The trunk must be protected by wrapped hessian or similar material to limit damage. Timber planks (50mm x 100mm or similar) should then be placed around tree trunk. The timber planks should be spaced at 100mm intervals, and must be fixed against the trunk with tie wire, or strapping and connections finished or covered to protect pedestrians from injury. The hessian and timber planks must not be fixed to the tree in any instance. The trunk and branch protection shall be installed prior to any work commencing on site and shall be maintained in good condition for the entire development period.
- 11.6.4 Mulch:** Any areas of the TPZ located inside the subject site (only trees to be retained directly adjacent to site works must be mulched to a depth of 75mm with good quality composted wood chip/leaf mulch.
- 11.6.5 Ground Protection:** Ground protection is required to protect the underlying soil structure and root system in areas where it is not practical to restrict access to whole TPZ, while allowing space for construction. Ground protection must consist of good quality composted wood chip/leaf mulch to a depth of between 150-300mm,

laid on top of geo textile fabric. If vehicles are to be using the area, additional protection will be required such as rumble boards or track mats to spread the weight of the vehicle and avoid load points. Ground protection is to be specified by the project Arborist as required.

- 11.6.6 Temporary irrigation: Temporary irrigation should be set up in the TPZ of all trees to be retained, and should distribute water evenly throughout the area of the TPZ. The irrigation should be used for at minimum one hour daily throughout all stages of the development.



¹¹ Council Of Standards Australia, *AS4970 Protection of trees on development sites* (2009), page 16.



An image from AS4970-2009,¹² with example tree protection.

11.7 Restricted activities inside TPZ: The following activities must be avoided inside the TPZ of all trees to be retained unless approved by the project Arborist. If at any time these activities cannot be avoided an alternative must be agreed in writing with the project Arborist to minimise the impact to the tree.

- A) Machine excavation.
- B) Ripping or cultivation of soil.
- C) Storage of spoil, soil or any such materials
- D) Preparation of chemicals, including preparation of cement products.
- E) Refuelling.
- F) Dumping of waste.
- G) Wash down and cleaning of equipment.
- H) Placement of fill.
- I) Lighting of fires.
- J) Soil level changes.
- K) Any physical damage to the crown, trunk, or root system.
- L) Parking of vehicles.

¹² Council Of Standards Australia, *AS4970 Protection of trees on development sites* (2009), page 17.

- 11.8 **Demolition:** The demolition of all existing structures inside or directly adjacent to the TPZ of trees to be retained must be undertaken in consultation with the project Arborist. Any machinery is to work from inside the footprint of the existing structures or outside the TPZ, reaching in to minimise soil disturbance and compaction. If it is not feasible to locate demolition machinery outside the TPZ of trees to be retained, ground protection will be required. The demolition should be undertaken inwards into the footprint of the existing structures, sometimes referred to as the ‘top down, pull back’ method.
- 11.9 **Excavations:** The project Arborist must supervise and certify that all excavations and root pruning are in accordance with AS4373-2007 and AS4970-2009. For continuous strip footings, first manual excavation is required along the edge of the structures closest to the subject trees. Manual excavation should be a depth of 1 metre (or to unfavourable root growth conditions such as bed rock or heavy clay, if agreed by project Arborist). Next roots must be pruned back in accordance with AS4373-2007. After all root pruning is completed, machine excavation is permitted within the footprint of the structure. For tree sensitive footings, such as pier and beam, all excavations inside the TPZ must be manual. Manual excavation may include the use of pneumatic and hydraulic tools, high-pressure air or a combination of high-pressure water and a vacuum device. No pruning of roots greater 30mm in diameter is to be carried out without approval of the project arborist. All pruning of roots greater than 30mm in diameter must be carried out by a qualified Arborist/Horticulturalist with a minimum AQF level 3. Root pruning is to be a clean cut with a sharp tool in accordance with AS4373 Pruning of amenity trees (2007).¹³ The tree root is to be pruned back to a branch root if possible. Make a clean cut and leave as small a wound as possible.
- 11.10 **Landscaping:** All landscaping works within the TPZ of trees to be retained are to be undertaken in consultation with a consulting Arborist to minimize the impact to trees. General guidance is provided below to minimise the impact of new landscaping to trees to be retained.
- Level changes should be minimised. The existing ground levels within the landscape areas should not be lowered by more than 100mm or increased by more than 100mm (300mm increase is acceptable if using a coarse free draining material) without assessment by a consulting Arborist.
 - New retaining walls should be avoided. Where new retaining walls are proposed inside the TPZ of trees to be retained, they should be constructed from tree sensitive material, such as timber sleepers, that require minimal footings/excavations. If brick retaining walls are proposed inside the TPZ, considerer pier and beam type footings to bridge significant roots that are critical to the trees condition. Retaining walls must be located outside the SRZ and sleepers/beams located above existing soil grades.

¹³ Council Of Standards Australia, AS 4373 Pruning of amenity trees (2007) page 18

- New footpaths and hard surfaces should be minimised, as they can limit the availability of water, nutrients and air to the trees root system. Where they are proposed, they should be constructed on or above existing soil grades to minimise root disturbance and consider using a permeable surface. Footpaths should be located outside the SRZ where possible.
- Where fill/sub base is used inside the TPZ, fill material should be a coarse granular material that does not restrict the flow of water and air to the root system below. This type of material will also reduce the impact of soil compaction during construction.
- The location of new plantings inside the TPZ of trees to be retained should be flexible to avoid unnecessary damage to tree roots greater than 30mm in diameter.

- 11.11 **Underground Services:** Where possible underground services should be located outside the TPZ of trees to be retained. All underground services located inside the TPZ of any tree to be retained must be installed via tree sensitive techniques. This should include either directional drilling methods or manual excavations to minimise the impact to trees identified for retention. No roots greater than 40mm in diameter should be severed during the installation of service pipes unless approved in writing by the project Arborist.
- 11.12 **Sediment and Contamination:** All contamination run off from the development such as but not limited to concrete, sediment and toxic wastes must be prevented from entering the TPZ at all times.
- 11.13 **Tree Wounding/Injury:** Any wounding or injury that occurs to a tree during the construction process will require the project Arborist to be contacted for an assessment of the injury and provide mitigation/remediation advice. It is generally accepted that trees may take many years to decline and eventually die from root damage. All repair work is to be carried out by the project Arborist, at the contractor's expense.
- 11.14 **Completion of Development Works:** After all construction works are complete the project Arborist should assess that the subject trees have been retained in the same condition and vigour. If changes to condition are identified the project Arborist should provide recommendations for remediation.

12. CONSTRUCTION HOLD POINTS FOR TREE PROTECTION

12.1 **Hold Points:** Below is a sequence of hold points requiring project Arborist certification throughout the development process. It provides a list of hold points that must be checked and certified. All certification must be provided in written format upon completion of the development. The final certification must include details of any instructions for remediation undertaken during the development. The principal contractor should be responsible for implementing all tree protection requirements.

Hold Point	Stage	Date Completed and Signature of Project Arborist Responsible
Project Arborist to hold pre construction site meeting with principal contractor to discuss methods and importance of tree protection measures and resolve any issues in relation to feasibility of tree protection requirements that may arise. Project Arborist to mark all trees approved for removal under DA consent.	Prior to development work commencing	
Project Arborist to assess and certify that tree protection has been installed in accordance with AS4970-2009 prior to works commencing at site.	Prior to development work commencing.	
In accordance with AS4970-2009 the project arborist should carryout regular site inspections to ensure works are carried out in accordance with the recommendations. Site inspections are recommended on a monthly frequency.	On-going throughout the development	
The removal of existing structures inside the TPZ of any tree to be retained, such as the existing buildings and hard surfaces must be supervised by the project Arborist.	Demolition	
Project Arborist to supervise all manual excavations and root pruning inside the TPZ of any tree to be retained. Project Arborist to approve all pruning of roots greater than 30mm inside TPZ. All root pruning of roots greater than 30mm in diameter must be carried out by a qualified Arborist/Horticulturalist with a minimum AQF level 3.	Construction	
Project Arborist to certify that all underground services including storm water inside TPZ of any tree to be retained have been installed in accordance with AS4970-2009.	Construction	
All landscaping works within the TPZ of trees to be retained are to be undertaken in consultation with the project Arborist to minimise the impact to trees.	Construction/ Landscape	
After all demolition, construction and landscaping works are complete the project Arborist should assess that the subject trees have been retained in the same condition and vigour. If changes to condition are identified the project Arborist should provide recommendations for remediation.	Upon completion of development	

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14. LIST OF APPENDICES

The following are included in the appendices:

- Appendix 1A - Proposed Site Plan North
- Appendix 1B - Proposed Site Plan South
- Appendix 1C - Proposed Service Building
- Appendix 2 - Tree Inspection Schedule
- Appendix 3 - Further information of methodology



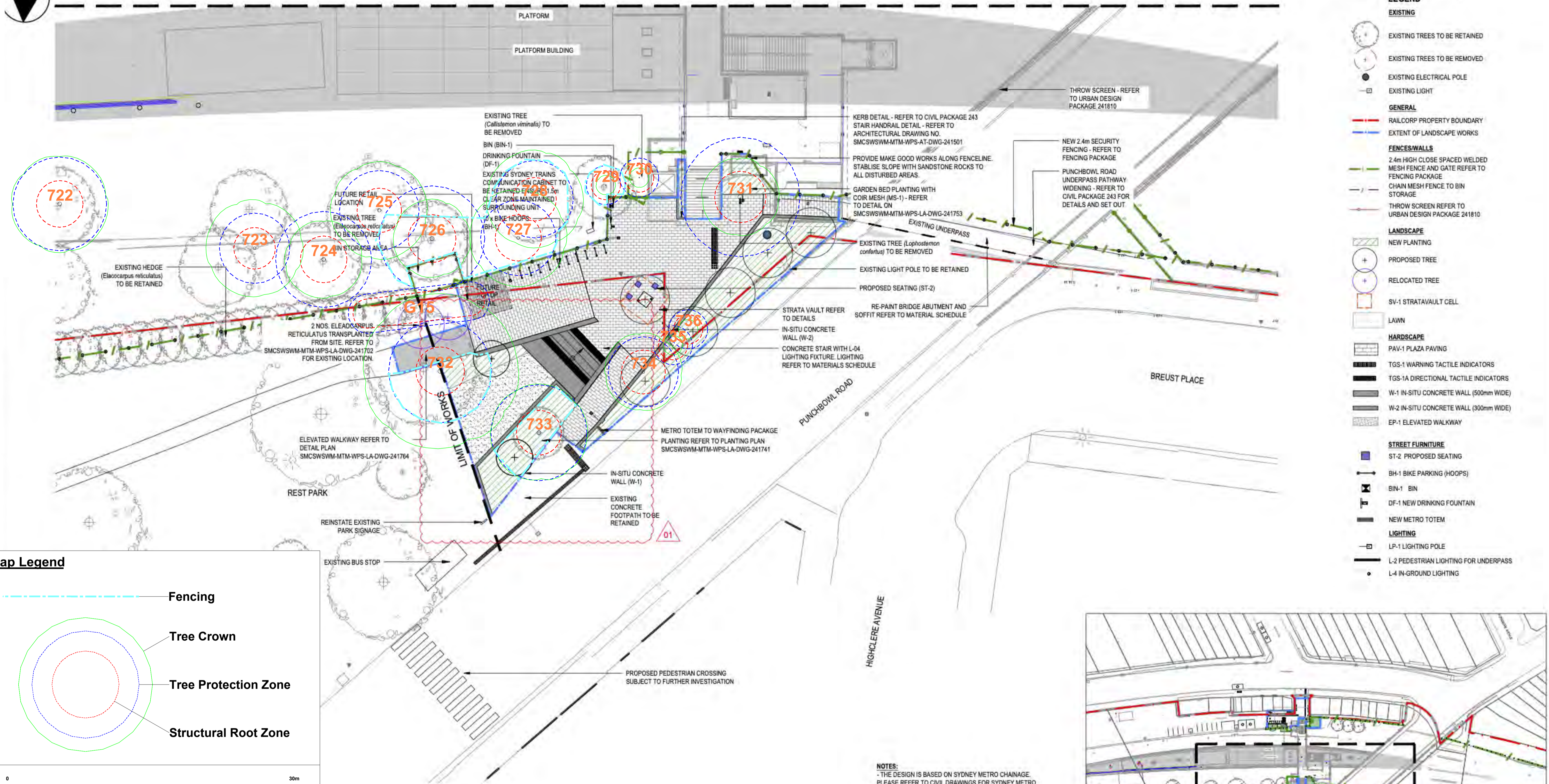
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Diploma of Arboriculture (AQF5)
Cert III Landscape Construction
Member Arboriculture Australia
Quantified Tree Risk Assessment (QTRA)
ISA Tree Risk Assessment Qualification (TRAQ)



TO SYDNEY

ADJOINS DRAWINGS SMCSWSWM-MTM-WPS-LA-DG-241720

TO BANKSTOWN

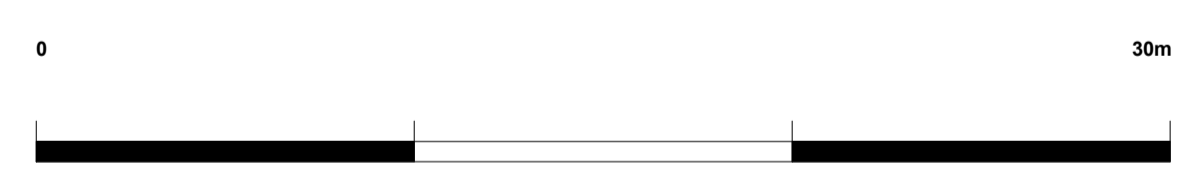


LEGEND

- EXISTING**
 - EXISTING TREES TO BE RETAINED
 - EXISTING TREES TO BE REMOVED
 - EXISTING ELECTRICAL POLE
 - EXISTING LIGHT
- GENERAL**
 - RAILCORP PROPERTY BOUNDARY
 - EXTENT OF LANDSCAPE WORKS
- FENCES/WALLS**
 - 2.4m HIGH CLOSE SPACED WELDED MESH FENCE AND GATE REFER TO FENCING PACKAGE
 - CHAIN MESH FENCE TO BIN STORAGE
 - THROW SCREEN REFER TO URBAN DESIGN PACKAGE 241810
- LANDSCAPE**
 - NEW PLANTING
 - PROPOSED TREE
 - RELOCATED TREE
 - SV-1 STRATAVAULT CELL
 - LAWN
- HARDSCAPE**
 - PAV-1 PLAZA PAVING
 - TGS-1 WARNING TACTILE INDICATORS
 - TGS-1A DIRECTIONAL TACTILE INDICATORS
 - W-1 IN-SITU CONCRETE WALL (500mm WIDE)
 - W-2 IN-SITU CONCRETE WALL (300mm WIDE)
 - EP-1 ELEVATED WALKWAY
- STREET FURNITURE**
 - ST-2 PROPOSED SEATING
 - BH-1 BIKE PARKING (HOOPS)
 - BN-1 BIN
 - DF-1 NEW DRINKING FOUNTAIN
 - NEW METRO TOTEM
- LIGHTING**
 - LP-1 LIGHTING POLE
 - L-2 PEDESTRIAN LIGHTING FOR UNDERPASS
 - L-4 IN-GROUND LIGHTING

Map Legend

- Fencing
- Tree Crown
- Tree Protection Zone
- Structural Root Zone



Urban Arbor Pty Ltd

PO Box 450 Turrumurra NSW 2074
 sales@urbanarbor.com.au

Site Location: Punchbowl Station
 Punchbowl NSW

SCALE : 1 : 200 @ A1 DATE : 10/27/2021

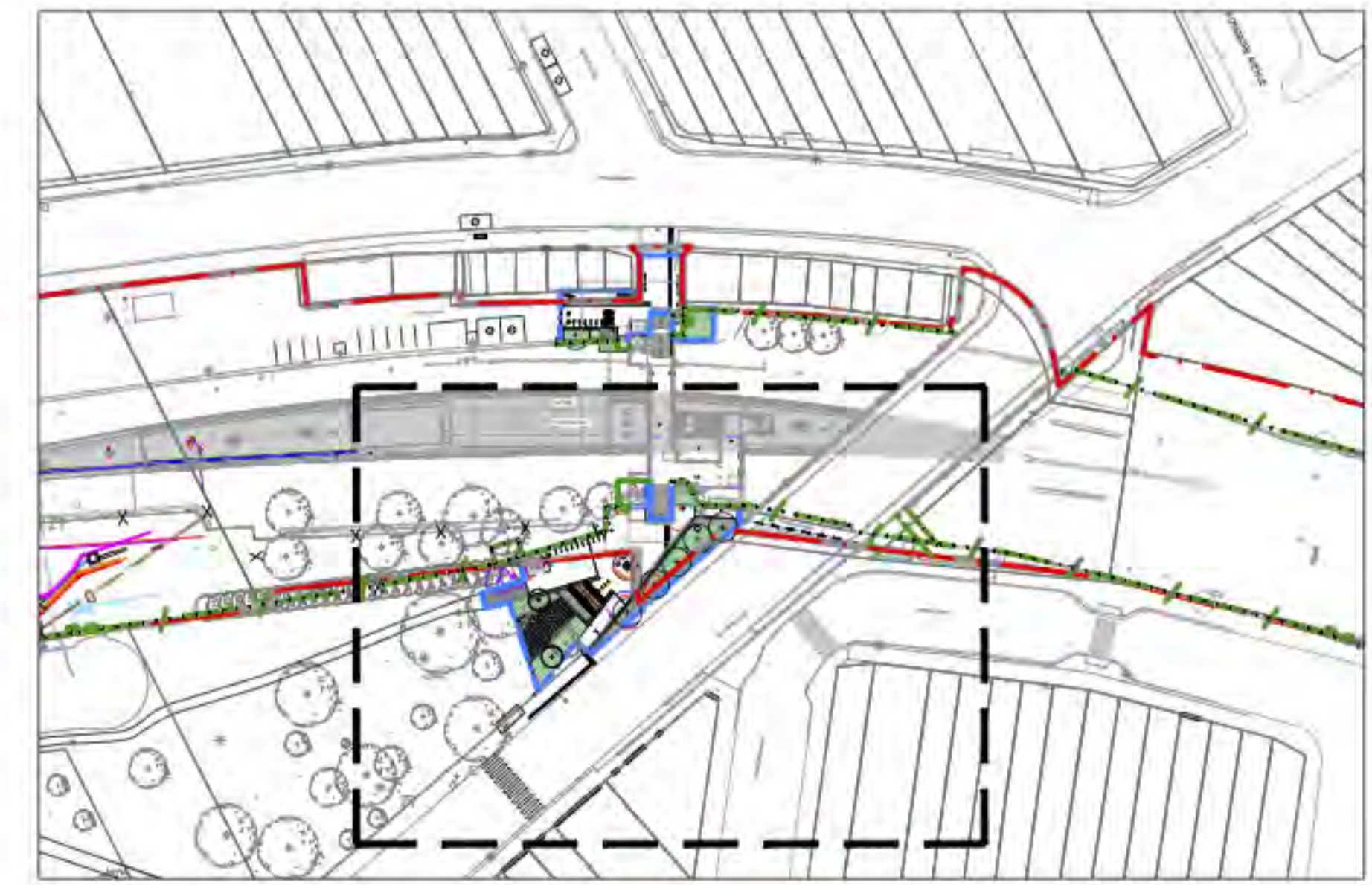


Appendix 1A - Proposed Site Plan North

Prepared by: Bryce Claasens, Urban Arbor Pty Ltd

NOTES:

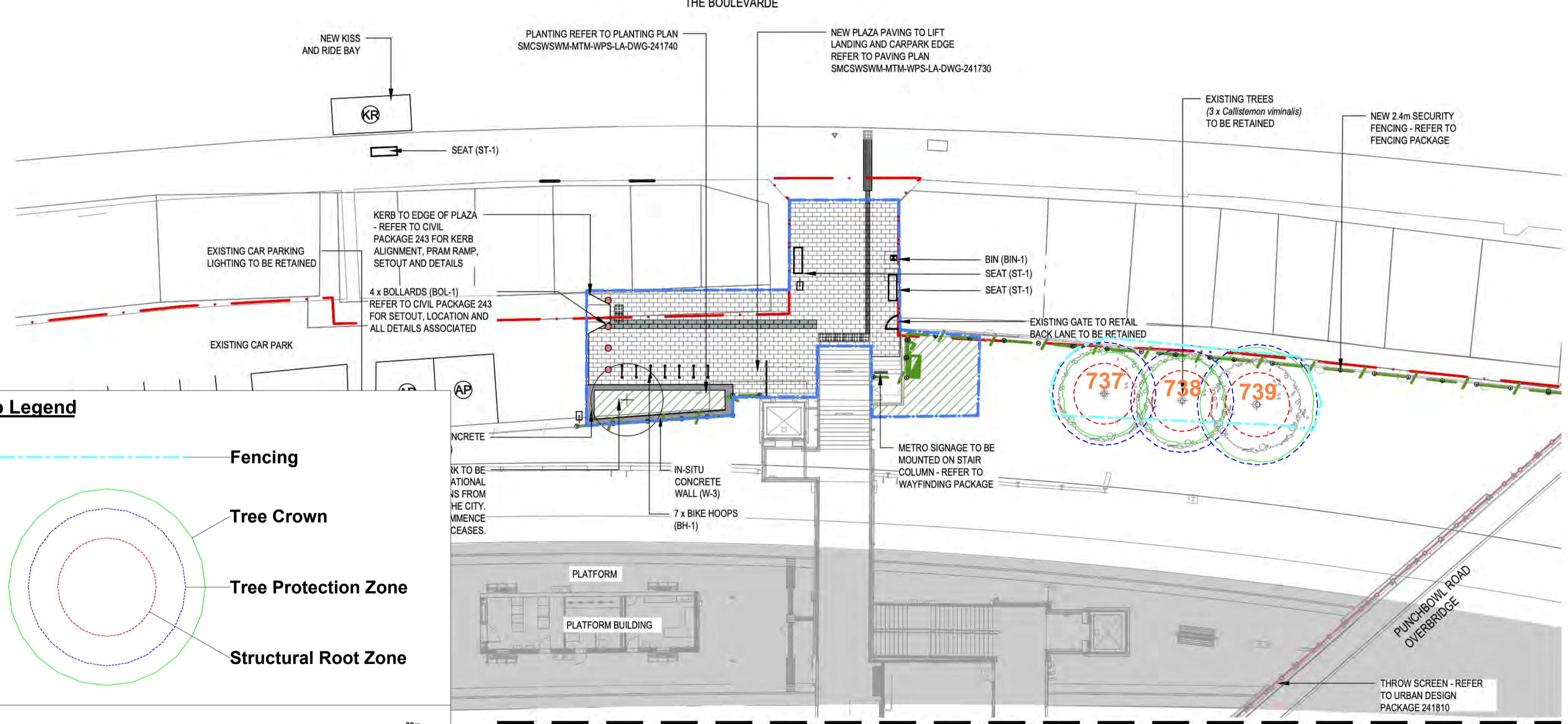
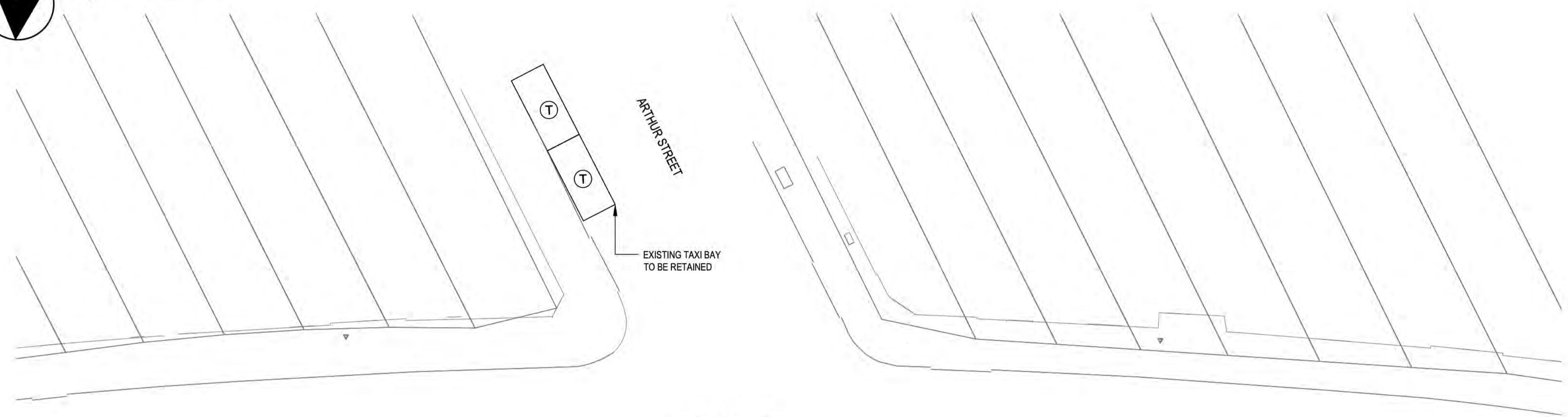
- THE DESIGN IS BASED ON SYDNEY METRO CHAINAGE. PLEASE REFER TO CIVIL DRAWINGS FOR SYDNEY METRO CHAINAGE ALIGNMENT (PACKAGE NO. 103).
- REFER TO CIVIL DESIGN PACKAGE 243 FOR ALL FOOTPATH LEVELS.
- REFER TO FENCING PACKAGE 243 FOR ALL FENCING SET OUT AND LOCATIONS.
- REFER TO UTILITIES PACKAGE 243 FOR ALL SERVICES LAYOUTS.
- REFER TO ARCHITECTURAL PACKAGE 241 FOR ALL STATION CONCOURSE, BUILDING AND PLATFORM WORKS.
- REFER TO LIGHTING PACKAGE 243 FOR ALL ELECTRICAL AND LIGHTING LAYOUTS.
- REFER TO ARBORIST'S ARBORICULTURAL IMPACT ASSESSMENT REPORT FOR TREE PROTECTION WORKS
- REFER TO MITIGATION MEASURES DETAILED IN THE HERITAGE REPORT FOR WORKS AROUND PUNCHBOWL STATION WITHIN PAD02.





TO SYDNEY ←

TO BANKSTOWN →



- LEGEND**
- EXISTING**
- EXISTING TREES TO BE RETAINED
 - EXISTING TREES TO BE REMOVED
 - EXISTING ACCESSIBLE PARKING
 - EXISTING LIGHT
- GENERAL**
- RAILCORP PROPERTY BOUNDARY
 - EXTENT OF LANDSCAPE WORKS
- FENCES/WALLS**
- 2.4m HIGH CLOSE SPACED WELDED MESH FENCE AND GATE REFER TO FENCING PACKAGE
 - THROW SCREEN REFER TO URBAN DESIGN PACKAGE 241810
- LANDSCAPE**
- NEW PLANTING
 - PROPOSED TREE
- HARDSCAPE**
- PAV-1 NEW PAVING ON PLAZA
 - PAV-2 ADELAIDE BLACK (EXFOLIATED)
 - TGS-1 WARNING TACTILE INDICATORS
 - TGS-1A DIRECTIONAL TACTILE INDICATORS
 - W-3 IN-SITU CONCRETE WALL (550mm WIDE)
 - W-3 IN-SITU CONCRETE WALL (400mm WIDE)
- STREET FURNITURE**
- BH-1 BIKE PARKING (HOOPS)
 - BOL-1 BOLLARDS
 - BIN-1 BIN
 - ST-1 SEAT
 - NEW METRO TOTEM
- STREETSCAPE**
- KISS AND RIDE PARKING
 - TAXI PARKING
- LIGHTING**
- LP-2 LIGHTING POLE

NOTES:

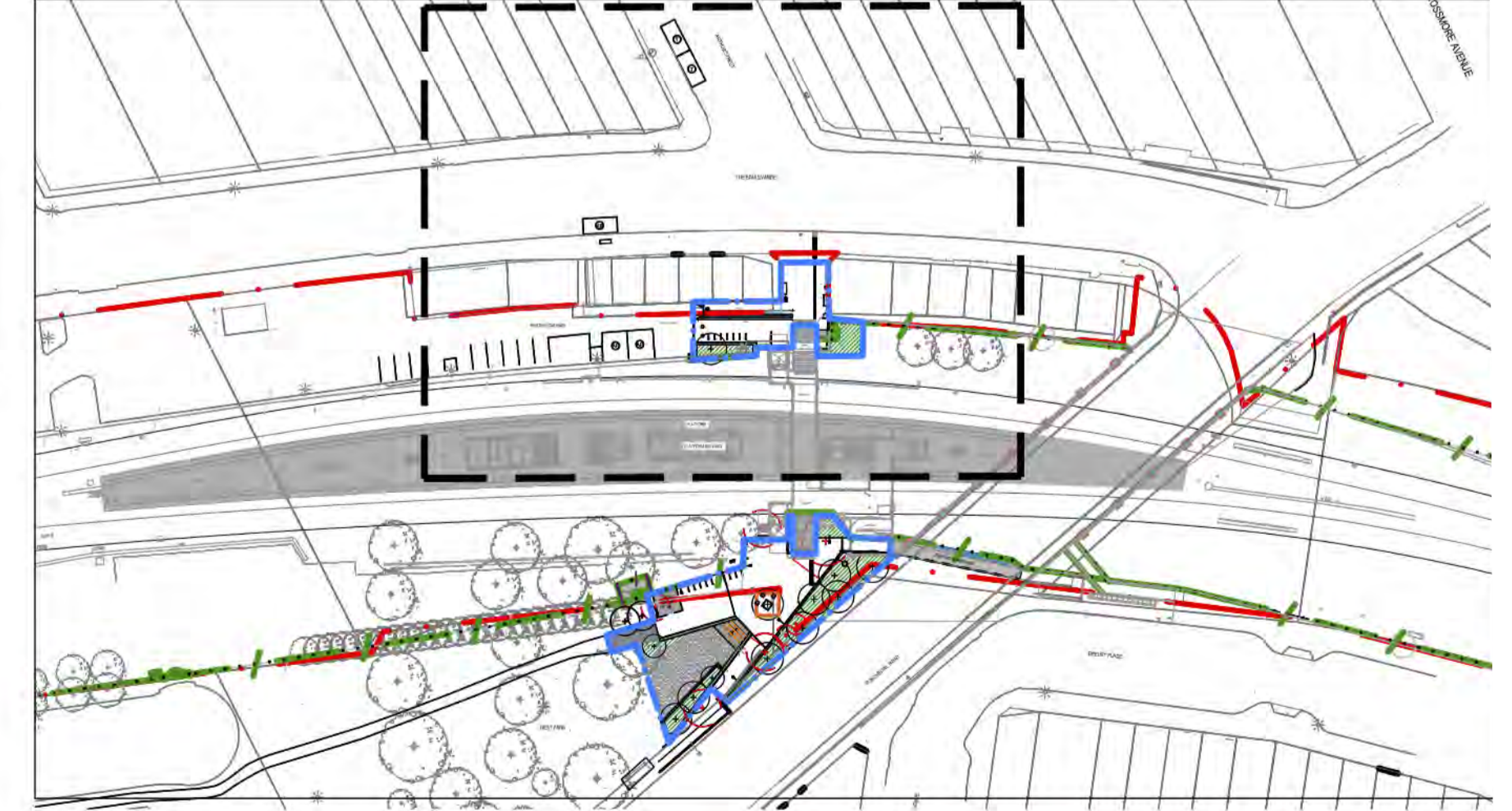
- THE DESIGN IS BASED ON SYDNEY METRO CHAINAGE. PLEASE REFER TO CIVIL DRAWINGS FOR SYDNEY METRO CHAINAGE ALIGNMENT (PACKAGE NO. 103).
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- REFER TO ARBORIST'S ARBORICULTURAL IMPACT ASSESSMENT REPORT FOR TREE PROTECTION WORKS
- REFER TO MITIGATION MEASURES DETAILED IN THE HERITAGE REPORT FOR WORKS AROUND PUNCHBOWL STATION WITHIN PAD02.

Map Legend

- Fencing
- Tree Crown
- Tree Protection Zone
- Structural Root Zone

0 30m

ADJOINS DRAWINGS SMCSWSWM-MTM-WPS-LA-DWG-241721



KEY PLAN 1:1000

DRAWING COLOUR CODED - PRINT ALL COPIES IN COLOUR

NOT FOR CONSTRUCTION

Urban Arbor Pty Ltd
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Site Location: Punchbowl Station
 Punchbowl NSW

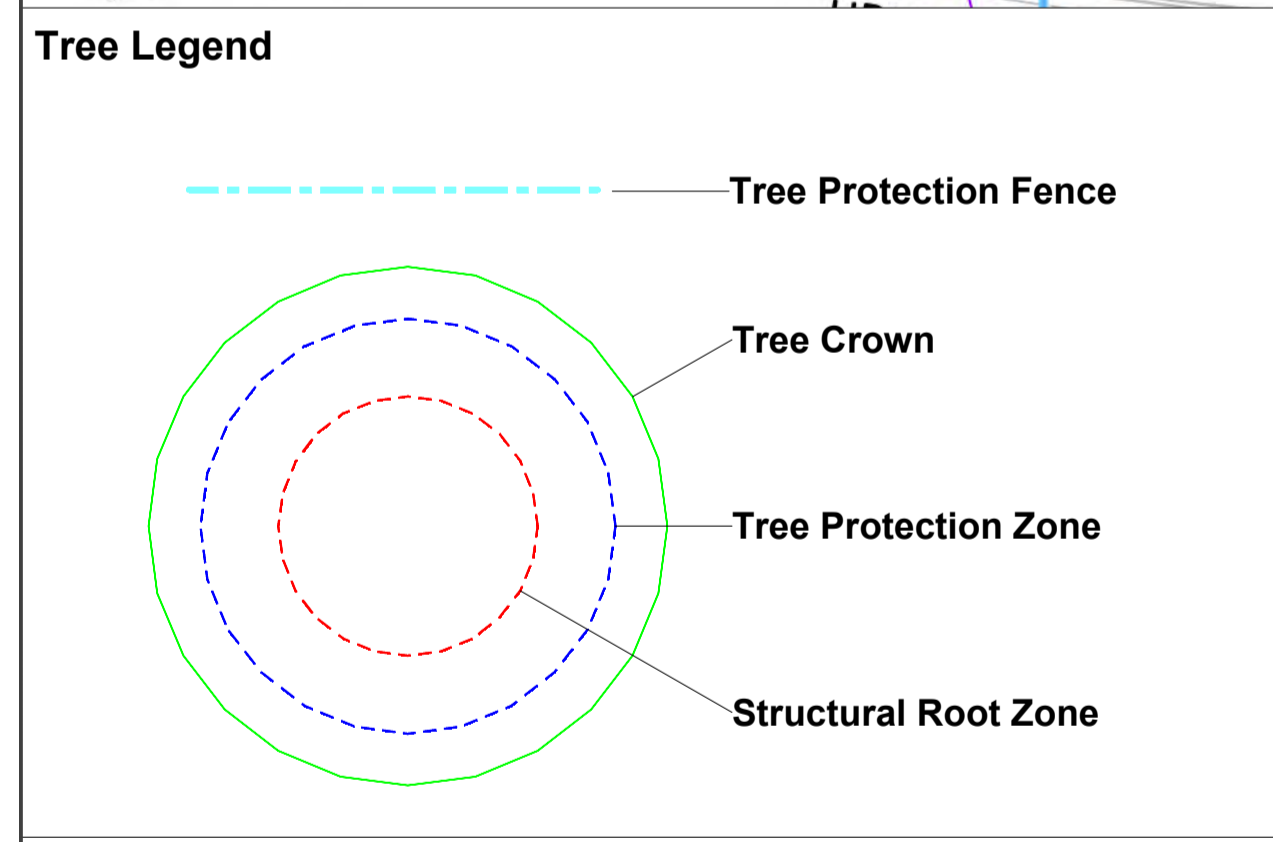
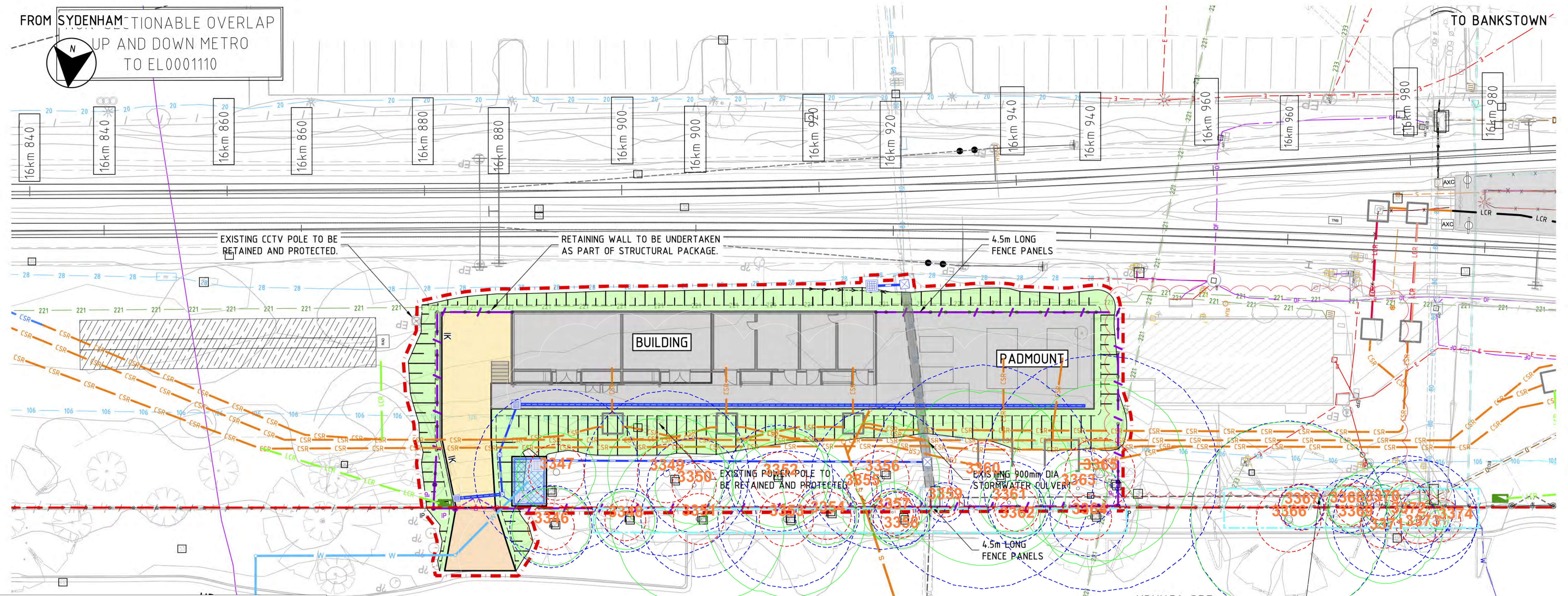
SCALE : 1:200 @ A1 DATE : 23/12/2020



Appendix 1B - Proposed Site Plan South

Prepared by: Bryce Claassens, Urban Arbor Pty Ltd

FROM SYDENHAM TO BANKSTOWN
 UP AND DOWN METRO
 TO EL0001110



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Site Location: Punchbowl Station, Punchbowl, NSW

SCALE : 1 : 200 @ A1 DATE : 23/12/2020

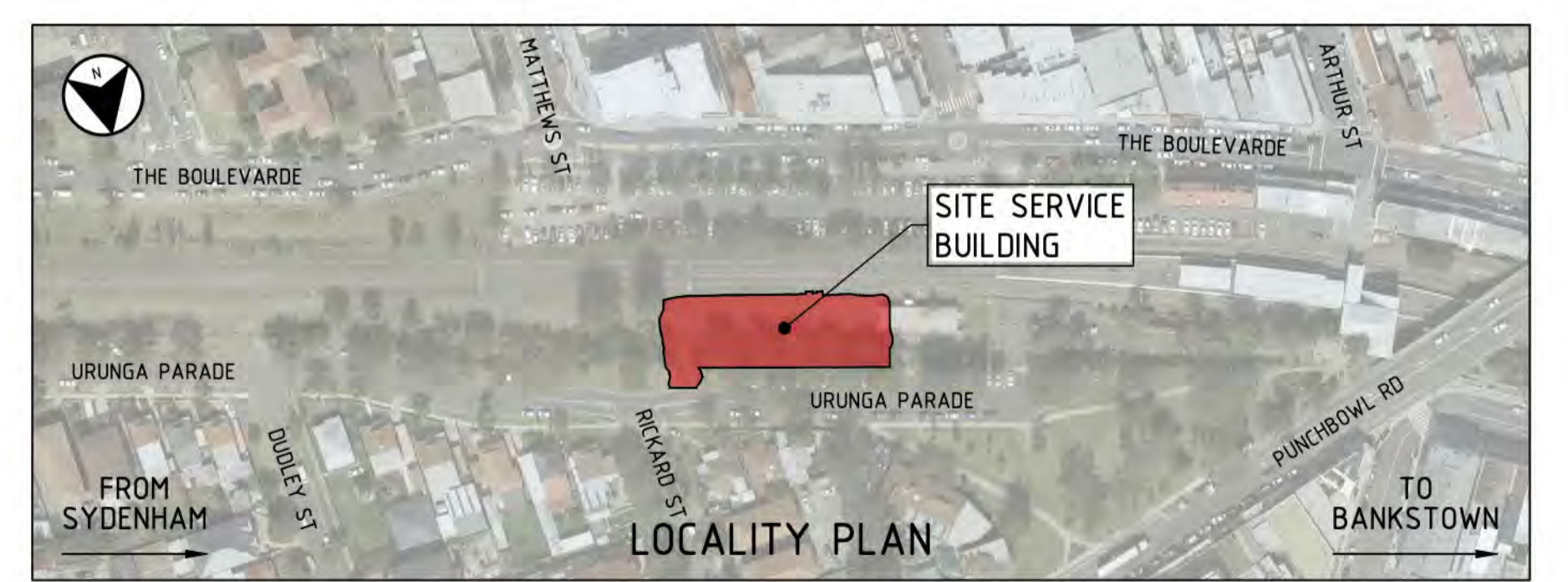


Appendix 1C: Proposed Service Building

Prepared by: Bryce Claassens

PLAN
 SCALE 1:200

SYDNEY METRO TO DEMOLISH THE BUILDING AND PROVIDE AN AREA SUITABLE FOR CRANE MANOEUVRING AND OPERATING. THIS NEEDS TO BE ESTABLISHED BEFORE CRANE PROGRESS WITH INSTALLATION OF PADMOUNT, CHILLERS AND OTHER EQUIPMENTS.



DRAWING COLOUR CODED - PRINT ALL COPIES IN COLOUR CHECK PRINT

Appendix 2 - Tree Inspection Schedule

Tree ID	Common Name	Botanical Name	Age Class	Height (m)	Canopy Spread Radius (m)	Stem 1	Stem 2	Stem 3	Stem 4	Stem 5	DBH (mm)	DAB (mm)	Health	Structure	Amenity Value	SULE	Retention Value	TPZ Radius (m)	SRZ Radius (m)	Notes
722	Spotted Gum	<i>Corymbia maculata</i>	Mature	22	5	400					400	460	Good	Good	High	1. Long	A1	4.8	2.4	Located within corridor. DBH estimated.
723	Lemon Scented Gum	<i>Corymbia citriodora</i>	Mature	24	5	300					300	360	Good	Good	High	1. Long	A1	3.6	2.2	Located within corridor. DBH estimated.
724	Queensland Brushbox	<i>Lophostemon confertus</i>	Mature	7	4	410					410	460	Good	Good	Medium	1. Long	A1	4.9	2.4	Located within corridor. DBH estimated.
725	Lemon Scented Gum	<i>Corymbia citriodora</i>	Mature	21	5	340					340	410	Good	Good	High	1. Long	A1	4.1	2.3	Located within corridor. DBH estimated.
726	Queensland Brushbox	<i>Lophostemon confertus</i>	Mature	7	4	450					450	490	Good	Good	Medium	1. Long	A1	5.4	2.5	Located within corridor. DBH estimated.
727	Lemon Scented Gum	<i>Corymbia citriodora</i>	Semi-mature	9	5	190	260				322	450	Good	Fair	Medium	3. Short	Z10	3.9	2.4	Co-dominant stems with lopped East stem.
728	Lemon Scented Gum	<i>Corymbia citriodora</i>	Mature	18	5	330					330	390	Good	Good	High	1. Long	A1	4.0	2.2	Located within corridor. DBH estimated.
729	Weeping Bottlebrush	<i>Callistemon viminalis</i>	Semi-mature	3	1	100					100	110	Good	Good	Low	5. Small/Young	Z1	2.0	1.5	Located within corridor. DBH estimated.
730	Weeping Bottlebrush	<i>Callistemon viminalis</i>	Semi-mature	3	1	100					100	110	Good	Good	Low	5. Small/Young	Z1	2.0	1.5	Located within corridor. DBH estimated.
731	Queensland Brushbox	<i>Lophostemon confertus</i>	Mature	9	4	240	450				510	580	Good	Good	High	1. Long	A1	6.1	2.6	Asymmetric crown shape.
G15	Blueberry Ash	<i>Elaeocarpus reticulatus</i>	Semi-mature	3	1	100					100	120	Good	Good	Low	5. Small/Young	Z1	2.0	1.5	Group of trees.
732	Lemon Scented Gum	<i>Corymbia citriodora</i>	Mature	20	8	440					440	510	Good	Good	High	1. Long	A1	5.3	2.5	None.
733	Grey Box	<i>Eucalyptus moluccana</i>	Semi-mature	10	5	410					410	420	Good	Good	High	1. Long	A1	4.9	2.3	Asymmetric crown shape.
734	Eucalypt	<i>Eucalyptus spp</i>	Mature	7	4	240	180				300	400	Good	Good	Medium	1. Long	A1	3.6	2.3	Long narrow leaf, urn shaped fruit.
735	Grevillea	<i>Grevillea spp</i>	Young	2	1	100					100	120	Good	Good	Low	5. Small/Young	Z1	2.0	1.5	None.
736	Grevillea	<i>Grevillea spp</i>	Young	2	1	100					100	120	Good	Good	Low	5. Small/Young	Z1	2.0	1.5	None.
737	Weeping Bottlebrush	<i>Callistemon viminalis</i>	Mature	8	3	300					300	350	Good	Good	Medium	1. Long	A1	3.6	2.1	Located within corridor. DBH estimated.
738	Weeping Bottlebrush	<i>Callistemon viminalis</i>	Mature	8	3	300					300	350	Good	Good	Medium	1. Long	A1	3.6	2.1	Located within corridor. DBH estimated.
739	Weeping Bottlebrush	<i>Callistemon viminalis</i>	Mature	8	4	350					350	400	Good	Good	Medium	1. Long	A1	4.2	2.3	Located within corridor. DBH estimated.
3346	Wallangarra White Gum	<i>Eucalyptus scoparia</i>	Mature	9	4	220	270				348	450	Good	Good	Medium	2. Medium	Z3	4.2	2.4	Located within nature strip. Exempt species.
3347	Camphor Laurel	<i>Cinnamomum camphora</i>	Mature	6	4	700					700	700	Good	Fair	Low	1. Long	Z3	8.4	2.8	Multi stem tree. Exempt species.
3348	Blackbutt	<i>Eucalyptus pilularis</i>	Semi-mature	12	3	270					270	330	Good	Good	Medium	1. Long	A1	3.2	2.1	Located within nature strip.
3349	Camphor Laurel	<i>Cinnamomum camphora</i>	Mature	12	6	700					700	780	Fair	Fair	Medium	3. Short	Z4	8.4	3.0	Significant apical dieback. Tree is in decline.
3350	African Olive	<i>Olea europaea subsp. cuspidata</i>	Mature	6	4	400					400	400	Good	Fair	Very Low	2. Medium	Z3	4.8	2.3	Exempt species. Suppressed.
3351	Bangalay	<i>Eucalyptus botryoides</i>	Mature	13	9	490					490	560	Fair	Fair	High	2. Medium	A2	5.9	2.6	Asymmetric crown shape. Low foliage density for species.
3352	Camphor Laurel	<i>Cinnamomum camphora</i>	Mature	9	5	350	150	150	130	130	449	600	Good	Fair	Low	2. Medium	Z3	5.4	2.7	Under 10m - exempt species.
3353	Wallangarra White Gum	<i>Eucalyptus scoparia</i>	Mature	15	8	580					580	650	Good	Good	Medium	2. Medium	Z3	7.0	2.8	Located within nature strip. Exempt species.
3354	Camphor Laurel	<i>Cinnamomum camphora</i>	Semi-mature	7	3	120	120	140	110	110	269	480	Good	Fair	Low	2. Medium	Z3	3.2	2.4	Under 10m - exempt species.
3355	Sweet Pittosporum	<i>Pittosporum undulatum</i>	Young	4	2	90	80	70			139	160	Good	Fair	Low	5. Small/Young	Z1	2.0	1.5	None.
3356	Camphor Laurel	<i>Cinnamomum camphora</i>	Mature	11	6	600					600	680	Good	Good	Medium	2. Medium	A1	7.2	2.8	None.
3357	Camphor Laurel	<i>Cinnamomum camphora</i>	Semi-mature	7	3	100	110	140			204	350	Good	Fair	Low	2. Medium	Z3	2.5	2.1	Under 10m - exempt species.
3358	Blackbutt	<i>Eucalyptus pilularis</i>	Semi-mature	9	3	230					230	280	Good	Fair	Medium	2. Medium	A1	2.8	1.9	Located within nature strip. Asymmetric crown shape.
3359	Wattle	<i>Acacia spp</i>	Young	5	1	90					90	100	Good	Good	Low	5. Small/Young	Z1	2.0	1.5	None.
3360	Camphor Laurel	<i>Cinnamomum camphora</i>	Mature	13	9	450	450	700			946	1100	Good	Good	Medium	1. Long	A1	11.4	3.4	None.
3361	Canary Palm	<i>Phoenix canariensis</i>	Semi-mature	6	3	400					400	NA	Good	Fair	Low	5. Small/Young	Z3	4.0	NA	Exempt species.
3362	Camphor Laurel	<i>Cinnamomum camphora</i>	Semi-mature	7	3	130	210				247	400	Good	Fair	Low	5. Small/Young	Z3	3.0	2.3	Half of tree is located within nature strip. Under 10m - exempt species. Growing through fence.
3363	Canary Palm	<i>Phoenix canariensis</i>	Semi-mature	7	3	400					400	NA	Good	Fair	Low	5. Small/Young	Z3	4.0	NA	Exempt species.
3364	Blackbutt	<i>Eucalyptus pilularis</i>	Mature	16	5	330					330	420	Good	Good	High	1. Long	A1	4.0	2.3	Located within nature strip.
3365	Camphor Laurel	<i>Cinnamomum camphora</i>	Mature	14	9	1000					1000	1200	Good	Good	Medium	1. Long	A1	12.0	3.6	None.
3366	Bangalay	<i>Eucalyptus botryoides</i>	Mature	16	10	330	600	400	260		835	990	Good	Good	Very High	1. Long	A1	10.0	3.3	Located within nature strip.
3367	Camphor Laurel	<i>Cinnamomum camphora</i>	Semi-mature	7	2	120	110	100			191	450	Good	Fair	Low	5. Small/Young	Z3	2.3	2.4	Under 10m - exempt species.
3368	Camphor Laurel	<i>Cinnamomum camphora</i>	Semi-mature	7	2	140	110	100	70	80	230	360	Good	Fair	Low	5. Small/Young	Z3	2.8	2.2	Under 10m - exempt species. Growing through fence.
3369	Camphor Laurel	<i>Cinnamomum camphora</i>	Semi-mature	9	3	250					250	290	Good	Fair	Low	2. Medium	Z3	3.0	2.0	Under 10m - exempt species.
3370	Camphor Laurel	<i>Cinnamomum camphora</i>	Semi-mature	6	2	140					140	180	Good	Fair	Low	5. Small/Young	Z3	2.0	1.6	Under 10m - exempt species. Growing through fence.
3371	Bangalay	<i>Eucalyptus botryoides</i>	Mature	14	6	440					440	490	Good	Good	High	1. Long	A1	5.3	2.5	Located within nature strip.
3372	Camphor Laurel	<i>Cinnamomum camphora</i>	Semi-mature	6	2	400					400	400	Good	Fair	Low	5. Small/Young	Z3	4.8	2.3	Under 10m - exempt species. DBH measured at base.

Appendix 2 - Tree Inspection Schedule

Tree ID	Common Name	Botanical Name	Age Class	Height (m)	Canopy Spread Radius (m)					DBH (mm)	DAB (mm)	Health	Structure	Amenity Value	SULE	Retention Value	TPZ Radius (m)	SRZ Radius (m)	Notes
					Stem 1	Stem 2	Stem 3	Stem 4	Stem 5										
3373	Lombardy Poplar	<i>Populus nigra 'Italica'</i>	Mature	16	2	490				490	580	Fair	Fair	Low	3. Short	Z3	5.9	2.6	Located within nature strip. Exempt species. In decline.
3374	Lombardy Poplar	<i>Populus nigra 'Italica'</i>	Mature	15	1	330				330	400	Fair	Fair	Low	3. Short	Z3	4.0	2.3	Located within nature strip. Exempt species. In decline.

Explanatory Notes

Tree Species - Common name followed by botanical name. Where species is unknown it is indicated with an 'spp'.

Age Class - Over mature (OM), Mature (M), Early mature (EM), Semi mature (SM), Young (Y).

Diameter at Breast Height (DBH) - Measured with a DBH tape or estimated at approximately 1.4m above ground level.

Diameter Above root Buttresses (DAB): Measured with a DBH tape or estimated above root buttresses (DAB) for calculating the SRZ.

Height - Height from ground level to top of crown. All heights are estimated unless otherwise indicated.

Spread - Radius of crown at widest section. All tree spreads are estimated unless otherwise indicated.

Tree Protection Zone (TPZ) - DBH x 12. Measured in radius from the centre of the trunk. Rounded to nearest 0.1m. For monocots, the TPZ is set at 1 metre outside the crown projection.

Structural Root Zone (SRZ) - $(DAB \times 50)^{0.42} \times 0.64$. Measured in radius from the centre of the trunk. Rounded up to nearest 0.1m.

Health - Good/Fair/Poor/Dead

Structure - Good/Fair/Poor

Safe Useful Life Expectancy (SULE) - 1. Long (40+years), 2. Medium (15 - 40 years), 3. Short (5 - 15 years), 4. Remove (under 5 years), 5. Small/young.

Amenity Value - Very High/High/Medium/Low/Very Low.

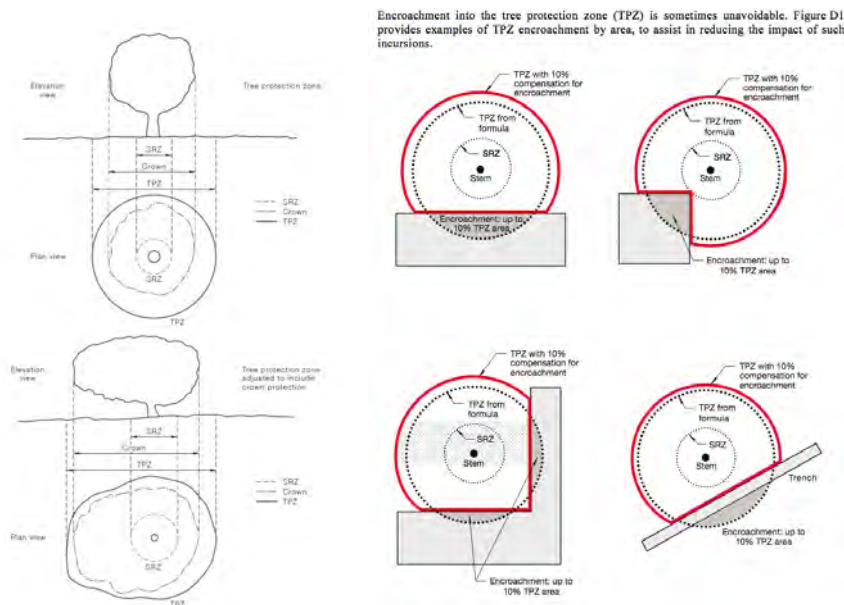
Retention Value: Tree AZ, see appendix 3 for categories.

Appendix 3 - Further Information of Methodology

1. **Tree Protection Zone:** The tree protection zone (TPZ) is the principle means of protecting trees on development sites. The TPZ is 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 radius of the TPZ is calculated for each tree by multiplying its DBH x 12. The derived value is measured in radius from the centre of the stem/trunk at ground level. A TPZ should not be less than 2.0 metres nor greater than 15 metres (except where crown protection is required). It is commonly observed that tree roots will extend significant further than the indicative TPZ, however the TPZ is an area identified AS4970-2009 to be extent where root loss or disturbance will generally not impact the viability of the tree. The TPZ is identified as a restricted area to prevent damage to trees either above or below ground during a development. Where trees are intended to be retained proposed developments must provide an adequate TPZ around trees. The TPZ is set aside for the tree's root zone, trunk and crown and it is essential for the stability and longevity of the tree. The tree protection also incorporates the SRZ (see below for more information about the SRZ). I have calculated the TPZ of palms, other monocots, cycads and tree ferns at one metre outside the crown projection. See appendices for additional information about the TPZ including information about calculating the TPZ and examples of TPZ encroachment.

Minor encroachment into TPZ: Sometimes encroachment into the TPZ is unavoidable. Encroachment includes but is not limited to activities such as excavation, compacted fill and machine trenching. Minor encroachment of up to 10% of the overall TPZ area is normally considered acceptable, providing there is space adjacent to the TPZ for the tree to compensate and the tree is displaying adequate vigour/health to tolerate changes to its growing environment.

Major encroachment into TPZ: Where encroachment of more than 10% of the overall TPZ area is proposed the project Arborist must investigate and demonstrate that the tree will remain in a viable condition. In some cases, tree sensitive construction methods such as pier and beam footings, suspended slabs, or cantilevered sections, can be utilised to allow additional encroachment into the TPZ by bridging over roots and minimising root disturbance. Major encroachment is only possible if it can be undertaken without severing significant size roots, or if it can be demonstrated that significant roots will not be impacted.



2. **Structural Root Zone:** This is the area around the base of a tree required for the trees stability in the ground. An area larger than the SRZ always need to be maintained to preserve a viable tree as it will only have a minor effect on the trees vigour and health. There are several factors that determine the SRZ which include height, crown area, soil type and soil moisture. It can also be influenced by other factors such as natural or built structures. Generally work within the SRZ should be avoided.

An indicative SRZ radius can be determined from the diameter of the trunk measured immediately above the root buttresses. Root investigation could provide more information about the extent of the SRZ. The following formula should be used to calculate the SRZ.

$$\text{SRZ radius} = (D \times 50)^{0.42} \times 0.64 \quad (D = \text{Diameter above root buttress}).$$

3. **Tree Age Class:** If can be difficult to determine the age of a tree without carrying out invasive tests that may damage the tree, so we have categorised there likely age class which is defined below;

- Young/Newly planted: Young or recently planted tree.
- Semi Mature: Up to 20% of the usual life expectancy for the species.
- Early mature/Mature: Between 20%-80% of the usual life expectancy for the species.
- Over mature: Over 80% of the usual life expectancy for the species.
- Dead: Tree is dead or almost dead.

4. **Health/Physiological Condition:** Below are examples conditions used when assigning a category for tree health.

<u>Category</u>	<u>Example condition</u>	<u>Summary</u>
Good	<ul style="list-style-type: none"> • Crown has good foliage density for species. • Tree shows no or minimal signs of pathogens that are unlikely to have an effect on the health of the tree. • Tree is displaying good vigour and reactive growth development. 	<ul style="list-style-type: none"> • The tree is in above average health and condition and no remedial works are required.
Fair	<ul style="list-style-type: none"> • The tree may be starting to dieback or have over 25% deadwood. • Tree may have slightly reduced crown density or thinning. • There may be some discolouration of foliage. • Average reactive growth development. • There may be early signs of pathogens which may further deteriorate the health of the tree. • There may be epicormic growth indicating increased levels of stress within the tree. 	<ul style="list-style-type: none"> • The tree is in below average health and condition and may require remedial works to improve the trees health.
Poor	<ul style="list-style-type: none"> • The tree may be in decline, have extensive dieback or have over 30% deadwood. • The canopy may be sparse or the leaves may be unusually small for species. • Pathogens or pests are having a significant detrimental effect on the tree health. 	<ul style="list-style-type: none"> • The tree is displaying low levels of health and removal or remedial works may be required.
Dead	<ul style="list-style-type: none"> • The tree is dead or almost dead. 	<ul style="list-style-type: none"> • The tree should generally be removed.

5. **Structural Condition:** Below are examples conditions used when assigning a category for structural condition.

<u>Category</u>	<u>Example condition</u>	<u>Summary</u>
Good	<ul style="list-style-type: none"> • Branch unions appear to be strong with no sign of defects. • There are no significant cavities. • The tree is unlikely to fail in usual conditions. • The tree has a balanced crown shape and form. 	<ul style="list-style-type: none"> • The tree is considered structurally good with well developed form.
Fair	<ul style="list-style-type: none"> • The tree may have minor structural defects within the structure of the crown that could potentially develop into more significant defects. • The tree may have a cavity that is currently unlikely to fail but may deteriorate in the future. • The tree is an unbalanced shape or leans significantly. • The tree may have minor damage to its roots. • The root plate may have moved in the past but the tree has now compensated for this. • Branches may be rubbing or crossing. 	<ul style="list-style-type: none"> • The identified defects are unlikely cause major failure. • Some branch failure may occur in usual conditions. • Remedial works can be undertaken to alleviate potential defects.
Poor	<ul style="list-style-type: none"> • The tree has significant structural defects. • Branch unions may be poor or weak. • The tree may have a cavity or cavities with excessive levels of decay that could cause catastrophic failure. • The tree may have root damage or is displaying signs of recent movement. • The tree crown may have poor weight distribution which could cause failure. 	<ul style="list-style-type: none"> • The identified defects are likely to cause either partial or whole failure of the tree.

6. **Amenity Value:** To determine the amenity value of a tree we assess a number of different factors, which include but are not limited to the information below.

- The visibility of the tree to adjacent sites.
- The relationship between the tree and the site.
- Whether the tree is protected by any statutory conditions.
- The habitat value of the tree.
- Whether the tree is considered a noxious weed species.

The amenity value is rated using one of the following values.

- Very High
- High
- Moderate
- Low
- Very Low

7. **Safe Useful Life Expectancy (SULE), (Barrel, 2001):** A trees safe useful life expectancy is determined by assessing a number of different factors including the health and vitality, estimated age in relation to expected life expectancy for the species, structural defects, and remedial works that could allow retention in the existing situation.

Category	Description
1. Long - Over 40 years	(a) Structurally sound trees located in positions that can accommodate future growth. (b) Trees that could be made suitable for retention in the long term by remedial tree care. (c) Trees of special significance for historical, commemorative or rarity reasons that would warrant extraordinary efforts to secure their long term retention.
2. Medium - 15 to 40 years	(a) Trees that may only live between 15 and 40 more years. (b) Trees that could live for more than 40 years but may be removed for safety or nuisance reasons. (c) Trees that could live for more than 40 years but may be removed to prevent interference with more suitable individuals or to provide space for new planting. (d) Trees that could be made suitable for retention in the medium term by remedial tree care.
3. Short - 5 to 15 years	(a) Trees that may only live between 5 and 15 more years. (b) Trees that could live for more than 15 years but may be removed for safety or nuisance reasons. (c) Trees that could live for more than 15 years but may be removed to prevent interference with more suitable individuals or to provide space for new planting. (d) Trees that require substantial remedial tree care and are only suitable for retention in the short term.
4. Remove - Under 5 years	(a) Dead, dying, suppressed or declining trees because of disease or inhospitable conditions. (b) Dangerous trees because of instability or recent loss of adjacent trees. (c) Dangerous trees because of structural defects including cavities, decay, included bark, wounds or poor form. (d) Damaged trees that are clearly not safe to retain. (e) Trees that could live for more than 5 years but may be removed to prevent interference with more suitable individuals or to provide space for new planting. (f) Trees that are damaging or may cause damage to existing structures within 5 years. (g) Trees that will become dangerous after removal of other trees for the reasons given in (a) to (f). (h) Trees in categories (a) to (g) that have a high wildlife habitat value and, with appropriate treatment, could be retained subject to regular review.
5. Small/Young	(a) Small trees less than 5m in height. (b) Young trees less than 15 years old but over 5m in height. (c) Formal hedges and trees intended for regular pruning to artificially control growth.

8. **Root investigations:** The root investigations should identify roots greater than 30mm in diameter that are located along the edge of the structures footprint or in the location of footings. Root investigations must be carried out using non-invasive methods (manual excavations). Any excavations for the root investigations must carried out manually to avoid damaging the roots during excavations. Manual excavation may include the use of a high-pressure air/air knife, or a combination of high-pressure water and a vacuum device. When hand excavating carefully work around roots retaining as many as possible. Take care to not fray, wound, or cause damage to any roots during excavations as this may cause decay or infection from pathogens. It is essential that exposed roots are kept moist and the excavation back filled as soon as possible. The root investigations should be carried out by a qualified Arborist minimum AQF3. Once roots are exposed, a visual assessment can be carried out by a consulting Arborist to evaluate the potential impact of the proposed root loss on the health and stability of the tree. A root map/report should be prepared identifying the findings of investigations, including photographs as supporting evidence in the report.

9. **Retention Value:** The system I have used to award the retention value is Tree AZ. Tree AZ is used to identify higher value trees worthy of being a constraint to development and lower value trees that should generally not be a constraint to the development. The table below provides a brief description of each category.

TreeAZ Categories (Version 10.04-ANZ)

CAUTION: TreeAZ assessments must be carried out by a competent person qualified and experienced in arboriculture. The following category descriptions are designed to be a brief field reference and are not intended to be self-explanatory. They must be read in conjunction with the most current explanations published at www.TreeAZ.com.

Category Z: Unimportant trees not worthy of being a material constraint

Local policy exemptions: Trees that are unsuitable for legal protection for local policy reasons including size, proximity and species

- Z1 Young or insignificant small trees, i.e. below the local size threshold for legal protection, etc
- Z2 Too close to a building, i.e. exempt from legal protection because of proximity, etc
- Z3 Species that cannot be protected for other reasons, i.e. scheduled noxious weeds, out of character in a setting of acknowledged importance, etc

High risk of death or failure: Trees that are likely to be removed within 10 years because of acute health issues or severe structural failure

- Z4 Dead, dying, diseased or declining
Severe damage and/or structural defects where a high risk of failure cannot be satisfactorily reduced by reasonable remedial care, i.e. cavities, decay, included bark, wounds, excessive imbalance, overgrown and vulnerable to adverse weather conditions, etc
- Z5 Severe damage and/or structural defects where a high risk of failure cannot be satisfactorily reduced by reasonable remedial care, i.e. cavities, decay, included bark, wounds, excessive imbalance, overgrown and vulnerable to adverse weather conditions, etc
- Z6 Instability, i.e. poor anchorage, increased exposure, etc
Excessive nuisance: Trees that are likely to be removed within 10 years because of unacceptable impact on people
- Z7 Excessive, severe and intolerable inconvenience to the extent that a locally recognized court or tribunal would be likely to authorize removal, i.e. dominance, debris, interference, etc
Excessive, severe and intolerable damage to property to the extent that a locally recognized court or tribunal would be likely to authorize removal, i.e. severe structural damage to surfacing and buildings, etc
- Z8 Excessive, severe and intolerable damage to property to the extent that a locally recognized court or tribunal would be likely to authorize removal, i.e. severe structural damage to surfacing and buildings, etc

Good management: Trees that are likely to be removed within 10 years through responsible management of the tree population

- Z9 Severe damage and/or structural defects where a high risk of failure can be temporarily reduced by reasonable remedial care, i.e. cavities, decay, included bark, wounds, excessive imbalance, vulnerable to adverse weather conditions, etc
- Z10 Poor condition or location with a low potential for recovery or improvement, i.e. dominated by adjacent trees or buildings, poor architectural framework, etc
- Z11 Removal would benefit better adjacent trees, i.e. relieve physical interference, suppression, etc
- Z12 Unacceptably expensive to retain, i.e. severe defects requiring excessive levels of maintenance, etc

NOTE: Z trees with a high risk of death/failure (Z4, Z5 & Z6) or causing severe inconvenience (Z7 & Z8) at the time of assessment and need an urgent risk assessment can be designated as ZZ. ZZ trees are likely to be unsuitable for retention and at the bottom of the categorization hierarchy. In contrast, although Z trees are not worthy of influencing new designs, urgent removal is not essential and they could be retained in the short term, if appropriate.

Category A: Important trees suitable for retention for more than 10 years and worthy of being a material constraint

- A1 No significant defects and could be retained with minimal remedial care
- A2 Minor defects that could be addressed by remedial care and/or work to adjacent trees
- A3 Special significance for historical, cultural, commemorative or rarity reasons that would warrant extraordinary efforts to retain for more than 10 years
- A4 Trees that may be worthy of legal protection for ecological reasons (Advisory requiring specialist assessment)

NOTE: Category A1 trees that are already large and exceptional, or have the potential to become so with minimal maintenance, can be designated as AA at the discretion of the assessor. Although all A and AA trees are sufficiently important to be material constraints, AA trees are at the top of the categorization hierarchy and should be given the most weight in any selection process.

TreeAZ is designed by Barrell Tree Consultancy (www.barrelltreecare.co.uk) and is reproduced with their permission

Glossary of Terms

Abiotic - Pertaining to non-living agents; e.g. environmental factors

Adventitious shoots - Shoots that develop other than from apical, axillary or dormant buds; see also 'epicormic'

Anchorage - The system whereby a tree is fixed within the soil, involving cohesion between roots and soil and the development of a branched system of roots which withstands wind and gravitational forces transmitted from the aerial parts of the tree

Bark - A term usually applied to all the tissues of a woody plant lying outside the vascular cambium, thus including the phloem, cortex and periderm; occasionally applied only to the periderm or the phellem

Branch:

- **Primary**. A first order branch arising from a stem
- **Lateral**. A second order branch, subordinate to a primary branch or stem and bearing sub-lateral branches
- **Sub-lateral**. A third order branch, subordinate to a lateral or primary branch, or stem and usually bearing only twigs

Branch collar - A visible swelling formed at the base of a branch whose diameter growth has been disproportionately slow compared to that of the parent stem; a term sometimes applied also to the pattern of growth of the cells of the parent stem around the branch base

Brown-rot - A type of wood decay in which cellulose is degraded, while lignin is only modified

Buckling - An irreversible deformation of a structure subjected to a bending load

Buttress zone - The region at the base of a tree where the major lateral roots join the stem, with buttress-like formations on the upper side of the junctions

Cambium - Layer of dividing cells producing xylem (woody) tissue internally and phloem (bark) tissue externally

Canker - A persistent lesion formed by the death of bark and cambium due to colonisation by fungi or bacteria

Compartmentalisation - The confinement of disease, decay or other dysfunction within an anatomically discrete region of plant tissue, due to passive and/or active defences operating at the boundaries of the affected region

Compressive loading - Mechanical loading which exerts a positive pressure; the opposite to tensile loading

Condition - An indication of the physiological condition of the tree. Where the term 'condition' is used in a report, it should not be taken as an indication of the stability of the tree

Crown/Canopy - The main foliage bearing section of the tree

Crown lifting - The removal of limbs and small branches to a specified height above ground level

Crown thinning - The removal of a proportion of secondary branch growth throughout the crown to produce an even density of foliage around a well-balanced branch structure

Crown reduction/shaping - A specified reduction in crown size whilst preserving, as far as possible, the natural tree shape

DAB (Diameter Above Buttress) - Trunk diameter measured above the root buttress

Defect - In relation to tree hazards, any feature of a tree which detracts from the uniform distribution of mechanical stress, or which makes the tree mechanically unsuited to its environment

Dieback - The death of parts of a woody plant, starting at shoot-tips or root-tips

Disease - A malfunction in or destruction of tissues within a living organism, usually excluding mechanical damage; in trees, usually caused by pathogenic micro-organisms

Dominance - In trees, the tendency for a leading shoot to grow faster or more vigorously than the lateral shoots; also the tendency of a tree to maintain a taller crown than its neighbours

Dormant bud - An axial bud which does not develop into a shoot until after the formation of two or more annual wood increments; many such buds persist through the life of a tree and develop only if stimulated to do so

Dysfunction - In woody tissues, the loss of physiological function, especially water conduction, in sapwood

DBH (Diameter at Breast Height) - Stem diameter measured at a height of 1.4 metres or the nearest measurable point. Where measurement at a height of 1.4 metres is not possible, another height may be specified

Deadwood - Branch or stem wood bearing no live tissues. Retention of deadwood provides valuable habitat for a wide range of species and seldom represents a threat to the health of the tree. Removal of deadwood can result in the ingress of decay to otherwise sound tissues and climbing operations to access deadwood can cause significant damage to a tree. Removal of deadwood is generally recommended only where it represents an unacceptable level of hazard

Epicormic shoot - A shoot having developed from a dormant or adventitious bud and not having developed from a first year shoot

Flush-cut - A pruning cut which removes part of the branch bark ridge and or branch-collar

Girdling root - A root which circles and constricts the stem or roots possibly causing death of phloem and/or cambial tissue

Habit - The overall growth characteristics, shape of the tree and branch structure

Hazard beam - An upwardly curved part of a tree in which strong internal stresses may occur without being reduced by adaptive growth; prone to longitudinal splitting

Heartwood/false-heartwood - The dead central wood that has become dysfunctional as part of the aging processes and being distinct from the sapwood

Heave - A term mainly applicable to a shrinkable clay soil which expands due to re-wetting after the felling of a tree which was previously extracting moisture from the deeper layers; also the lifting of pavements and other structures by root diameter expansion; also the lifting of one side of a wind-rocked root-plate

Included bark (ingrown bark) - Bark of adjacent parts of a tree (usually forks, acutely joined branches or basal flutes) which is in face-to-face contact

Lever arm - A mechanical term denoting the length of the lever represented by a structure that is free to move at one end, such as a tree or an individual branch

Lignin - The hard, cement-like constituent of wood cells; deposition of lignin within the matrix of cellulose microfibrils in the cell wall is termed Lignification

Lions tailing - A term applied to a branch of a tree that has few if any side-branches except at its end, and is thus liable to snap due to end-loading

Loading - A mechanical term describing the force acting on a structure from a particular source; e.g. the weight of the structure itself or wind pressure

Mycelium - The body of a fungus, consisting of branched filaments (hyphae)

Occlusion - The process whereby a wound is progressively closed by the formation of new wood and bark around it

Pathogen - A micro-organism which causes disease in another organism

Photosynthesis - The process whereby plants use light energy to split hydrogen from water molecules, and combine it with carbon dioxide to form the molecular building blocks for synthesizing carbohydrates and other biochemical products

Probability - A statistical measure of the likelihood that a particular event might occur

Pruning - The removal or cutting back of twigs or branches, sometimes applied to twigs or small branches only, but often used to describe most activities involving the cutting of trees or shrubs

Radial - In the plane or direction of the radius of a circular object such as a tree stem

Reactive Growth/Reaction Wood - Production of woody tissue in response to altered mechanical loading; often in response to internal defect or decay and associated strength loss (cf. adaptive growth)

Ring-barking - The removal of a ring of bark and phloem around the circumference of a stem or branch, normally resulting in an inability to transport photosynthetic assimilates below the area of damage. Almost inevitably results in the eventual death of the affected stem or branch above the damage

Root-collar - The transitional area between the stem/s and roots

Sapwood - Living xylem tissues

Soft-rot - A kind of wood decay in which a fungus degrades cellulose within the cell walls, without any general degradation of the wall as a whole

Stem/s - Principle above-ground structural component(s) of a tree that supports its branches

Stress - In plant physiology, a condition under which one or more physiological functions are not operating within their optimum range, for example due to lack of water, inadequate nutrition or extremes of temperature

SRZ (Structural Root Zone) - The area around the base of the tree required for the trees stability in the ground

Subsidence - In relation to soil or structures resting in or on soil, a sinking due to shrinkage when certain types of clay soil dry out, sometimes due to extraction of moisture by tree roots

Taper - In stems and branches, the degree of change in girth along a given length

Targets - In tree risk assessment (with slight misuse of normal meaning) persons or property or other things of value which might be harmed by mechanical failure of the tree or by objects falling from it

Topping - In arboriculture, the removal of the crown of a tree, or of a major proportion of it

Transpiration - The evaporation of moisture from the surface of a plant, especially via the stomata of leaves; it exerts a suction which draws water up from the roots and through the intervening xylem cells

TPZ (Tree Protection Zone) - A specified area above and below ground and at a given distance from the trunk set aside for the protection of a tree's roots and crown to provide for the viability and stability of a tree to be retained where it is potentially subject to damage by development

Understory - This layer consists of younger individuals of the dominant trees, together with smaller trees and shrubs which are adapted to grow under lower light conditions

Veteran tree - Tree that, by recognised criteria, shows features of biological, cultural or aesthetic value that are characteristic of, but not exclusive to, individuals surviving beyond the typical age range for the species concerned. These characteristics might typically include a large girth, signs of crown retrenchment and hollowing of the stem

Vigour - The expression of carbohydrate expenditure to growth (in trees)

White-rot - A range of kinds of wood decay in which lignin, usually together with cellulose and other wood constituents, is degraded

Wind exposure - The degree to which a tree or other object is exposed to wind, both in terms of duration and velocity

Wind pressure - The force exerted by a wind on a particular object

Windthrow - The blowing over of a tree at its roots

APPENDIX 12 PUNCHBOWL AIA (PLATEAU TREES)

Date: 13 March 2021

Re: Additional tree removals at Punchbowl Station as part of the Southwest Metro Package.

At the request of Downer Group an onsite inspection was undertaken at Punchbowl Station. It has been asked to identify and record additional tree removals beyond those recommended within the Arboricultural Impact Assessment (AIA) prepared by Urban Arbor, dated 15 January 2020, Ref 20/01/15/SWMPB. On the 5 March a site walkthrough was undertaken by myself and a representative from Downer Group. Additional tree removals were identified with respects to the proposed Southwest Metro Package works.

Based upon the information, rationale and justification provided within the AIA Report I can confirm that trees 733, 734, 735 and 736 shall require removal to accommodate the proposed works.

Additional tree removals where there is direct design clash and 100% impact to the TPZ and SRZ have been identified as trees 729 and 730 *Callistemon viminalis* (BottleBrush). These trees were initially identified for retention within the AIA report. However, it has since been confirmed that they shall require removal to accommodate the construction of a lift to the railway line overpass. Reference should be made to the AIA report for their respective tree data. Image 1 shows the location of the two trees. Image 2 shows the two trees. Drawing 1 shows their design clash.

The trees are considered to be in good health and condition and provide minor screening of the rail corridor from the area adjacent the station entry. They are

not representative of an endangered or threatened species or ecological community.



Image 1: Aerial image of Punchbowl Station showing the location of trees 729 and 730.



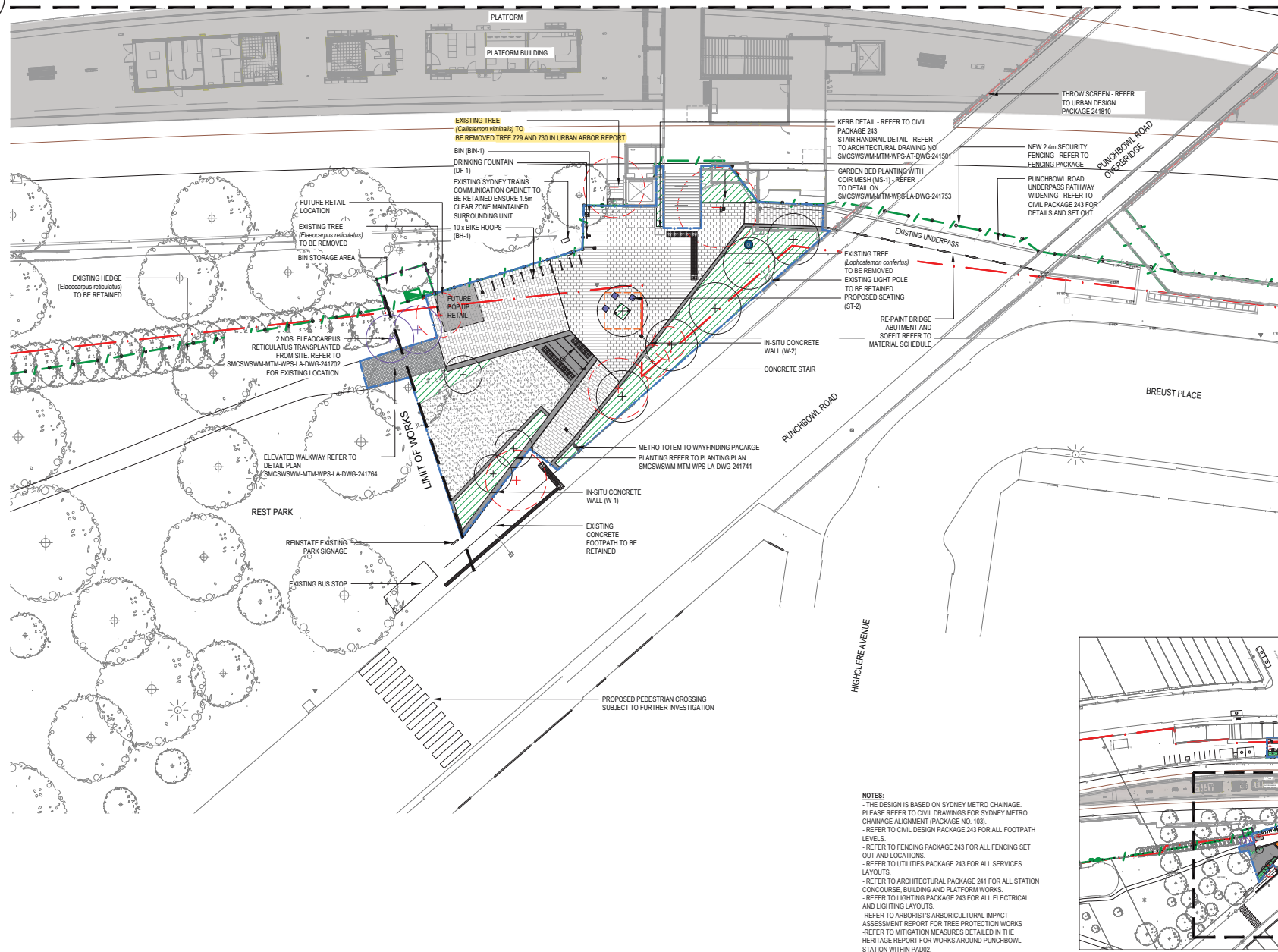
Image 2: Trees 729 and 730 are to be removed to accommodate the lift shaft works.



TO SYDNEY ←

ADJOINS DRAWINGS SMCSWSWM-MTM-WPS-LA-DG-241720

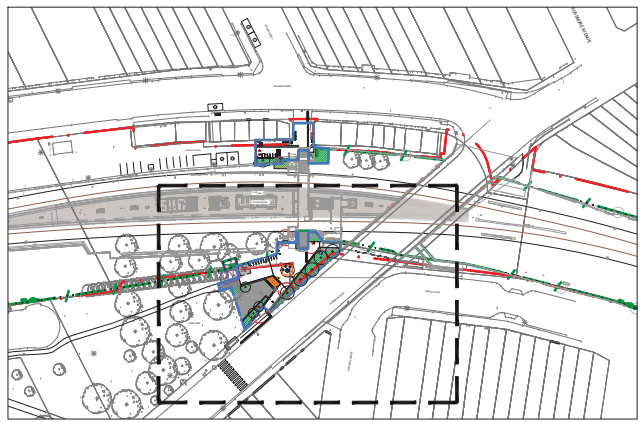
→ TO BANKSTOWN



- LEGEND**
- EXISTING**
- EXISTING TREES TO BE RETAINED
 - EXISTING TREES TO BE REMOVED
 - EXISTING ELECTRICAL POLE
 - EXISTING LIGHT
- GENERAL**
- RAILCORP PROPERTY BOUNDARY
 - EXTENT OF LANDSCAPE WORKS
- FENCES/WALLS**
- 2.4m HIGH CLOSE SPACED WELDED MESH FENCE AND GATE REFER TO FENCING PACKAGE
 - CHAIN MESH FENCE TO BIN STORAGE
 - THROW SCREEN REFER TO URBAN DESIGN PACKAGE 241810
- LANDSCAPE**
- NEW PLANTING
 - PROPOSED TREE
 - RELOCATED TREE
 - SV-1 STRATAVAULT CELL
- LAWN**
- LAWN
- HARDSCAPE**
- PAV-1 PLAZA PAVING
 - TGS-1 WARNING TACTILE INDICATORS
 - TGS-1A DIRECTIONAL TACTILE INDICATORS
 - W-1 IN-SITU CONCRETE WALL (500mm WIDE)
 - W-2 IN-SITU CONCRETE WALL (300mm WIDE)
 - EP-1 ELEVATED WALKWAY
- STREET FURNITURE**
- ST-2 PROPOSED SEATING
 - BH-1 BIKE PARKING (HOOPS)
 - DF-1 NEW DRINKING FOUNTAIN
 - NEW METRO TOTEM
- LIGHTING**
- LP-1 LIGHTING POLE
 - L-2 PEDESTRIAN LIGHTING FOR UNDERPASS
 - L-4 IN-GROUND LIGHTING

NOTES:

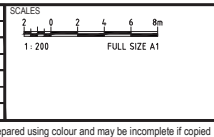
- THE DESIGN IS BASED ON SYDNEY METRO CHAINAGE. PLEASE REFER TO CIVIL DRAWINGS FOR SYDNEY METRO CHAINAGE ALIGNMENT (PACKAGE NO. 103).
- REFER TO CIVIL DESIGN PACKAGE 243 FOR ALL FOOTPATH LEVELS.
- REFER TO FENCING PACKAGE 243 FOR ALL FENCING SET OUT AND LOCATIONS.
- REFER TO UTILITIES PACKAGE 243 FOR ALL SERVICES LAYOUTS.
- REFER TO ARCHITECTURAL PACKAGE 241 FOR ALL STATION CONCOURSE, BUILDING AND PLATFORM WORKS.
- REFER TO LIGHTING PACKAGE 243 FOR ALL ELECTRICAL AND LIGHTING LAYOUTS.
- REFER TO ARBORIST'S ARBORICULTURAL IMPACT ASSESSMENT REPORT FOR TREE PROTECTION WORKS REFER TO MITIGATION MEASURES DETAILED IN THE HERITAGE REPORT FOR WORKS AROUND PUNCHBOWL STATION WITHIN PAD02.



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REV	BY	DATE	DESCRIPTION	APPRO.
E	ME	06/11/2020	UPDATED STAGE 3 ISSUE	LP
D	ME	17/06/2020	ISSUED FOR STAGE 3	LP
C	ME	09/05/2020	ISSUED FOR STAGE 3	LP
B	ME	25/10/2019	ISSUED FOR STAGE 2	LP
A	ME	25/07/2019	ISSUED FOR STAGE 1	LP



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 DESIGN CHECK: G DAVIES 06/11/2020
 APPROVAL: L PALMER 06/11/2020

STATUS: STAGE 3 | **SHEET 6 of 37** | **REV. E**

DRG No. SMCSWSWM-MTM-WPS-LA-DWG-241721

PROJECT SYDNEY METRO PUNCHBOWL (16.896km to 17.217km) LANDSCAPE DESIGN DETAIL PLAN PUNCHBOWL ROAD	STATUS: STAGE 3	SHEET 6 of 37	REV. E
DRG No. SMCSWSWM-MTM-WPS-LA-DWG-241721			

Plot Date: 12/11/20 - 17:25
 Cof File: X:\2_Planet\301819151_67_Summit\Main_Design_Services\2020_CAD\90_NPS_Punchbowl\453\SMCSWSWM-MTM-WPS-LA-DWG-241721.dwg
 100mm AT FULL SIZE

All appropriate approvals and consents are to be obtained prior to tree and vegetation removal works commencing. All tree removal works are to be undertaken by suitably qualified tree workers and in accordance with Safe Work Australia's Guide to Managing Risks of Tree Trimming and Removal Works.

Please feel free to contact me should you require any further assistance regarding this matter.

Regards.

Owen Tebbutt



Consulting Arborist
Plateau Tree Service

APPENDIX 12.1 PUNCHBOWL AIA (PLATEAU TREES)

Date: 31st May 2021

Re: Tree inspection at Punchbowl Station as part of the Southwest Metro Package.

At the request of Downer Group an onsite arboricultural inspection at Punchbowl Station was conducted on the 18th May 2021. Weather conditions were fine.

The reason for this inspection was to assess and identify trees within the area proposed for the construction of mechanical services building.

A walkthrough the site was conducted in the presence of Downer Group representatives.

Upon inspection it was concluded that the that all trees shown within the attached aerial image (and Appendix 1) will require removal to facilitate the proposed construction to take place.

All trees have been assessed as being insignificant.

It can be confirmed from the on-site inspection conducted by Plateau Trees on May 18th 2021, that all the defined trees for clearing (Appendix 1) have both the Structural Root Zone (STZ) and Tree Protection Zone (TPZ) within the area of the Project permanent design.

Best Regards

Colin Curtis



Level 5 Consulting Arborist

Tree Risk Assessment Qualification (TRAQ)

Member of Arboriculture Australia #2332

Member of the International Society of Arboriculture (ISA) # 228182

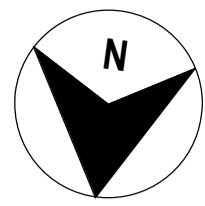


Image 1: Subject trees displayed and numbered.

Appendix 1: Tree Assessment Schedule

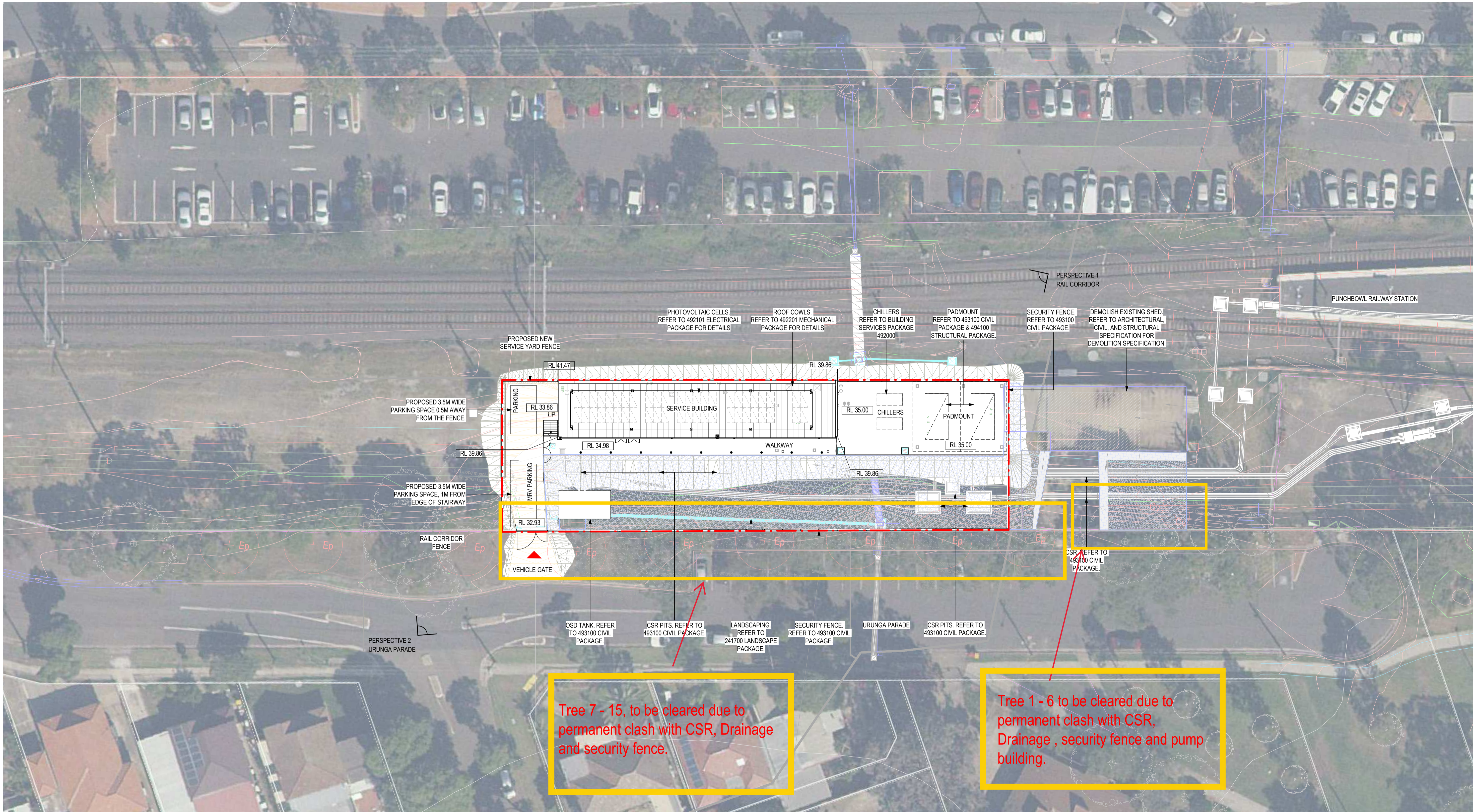
Tree number	Tree name	Tree dimensions				Vigour	Condition	Age class	ULE	Amenity and Visual Value	Native or Exotic	TPZ (m)	SRZ (m)	Comments	Remove or Retain
	Botanical name Common name	Height (m)	Spread (m)	D.B.H. (mm)	D.A.B. (mm)										
1	<i>Cinnamomum camphora</i> (Camphor Laurel)	5	4	12	N/A	N	F	M	M	L	E	2	N/A	Clash with permanent CSR, drainage, security fence and pump building	Remove
2	<i>Cinnamomum camphora</i> (Camphor Laurel)	6	4	12	N/A	N	F	M	M	L	E	2	N/A	Clash with permanent CSR, drainage, security fence and pump building	Remove
3	<i>Cinnamomum camphora</i> (Camphor Laurel)	5	3	15	N/A	N	F	M	M	L	E	2	N/A	Clash with permanent CSR, drainage, security fence and pump building	Remove
4	<i>Cinnamomum camphora</i> (Camphor Laurel)	5	4	12	N/A	N	F	M	M	L	E	2	N/A	Clash with permanent CSR, drainage, security fence and pump building	Remove
5	<i>Cinnamomum camphora</i> (Camphor Laurel)	8	4	100	N/A	N	F	M	M	L	E	12	N/A	Clash with permanent CSR, drainage, security fence and pump building	Remove
6	<i>Phoenix canariensis</i> (Date Palm)	4	3	N/A	N/A	N	F	M	M	L	E	2.5	N/A	Clash with permanent CSR, drainage, security fence and pump building	Remove
7	<i>Phoenix canariensis</i> (Date Palm)	4	3	N/A	N/A	N	F	M	M	L	E	2.5	N/A	Clash with permanent CSR, drainage and security fence.	Remove
8	<i>Cinnamomum camphora</i> (Camphor Laurel)	6	3	70	N/A	N	F	M	M	L	E	8.4	N/A	Clash with permanent CSR, drainage and security fence.	Remove
9	<i>Pittosporum undulatum</i> (Native daphne)	4	2	10	N/A	N	F	M	M	L	N	2	N/A	Clash with permanent CSR, drainage and security fence.	Remove
10	<i>Cinnamomum camphora</i> (Camphor Laurel)	4	3	12	N/A	N	F	M	M	L	E	2	N/A	Clash with permanent CSR, drainage and security fence.	Remove
11	<i>Cinnamomum camphora</i> (Camphor Laurel)	5	4	55	N/A	N	F	M	M	L	E	6.6	N/A	Clash with permanent CSR, drainage and security fence.	Remove
12	<i>Cinnamomum camphora</i> (Camphor Laurel)	4	3	35	N/A	N	F	M	M	L	E	4.2	N/A	Clash with permanent CSR, drainage and security fence.	Remove
13	<i>Olea europaea</i> (African Olive)	4	2	10	N/A	N	F	M	M	L	E	2	N/A	Clash with permanent CSR, drainage and security fence.	Remove
14	<i>Cinnamomum camphora</i> (Camphor Laurel)	10	8	65	N/A	N	F	M	M	L	E	7.8	N/A	Clash with permanent CSR, drainage and security fence.	Remove

15	<i>Cinnamomum camphora</i> (Camphor Laurel)	4	3	30	N/A	N	F	M	M	L	E	3. 6	N/A	Clash with permanent CSR, drainage and security fence.	Remove
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CENTRAL / CITY

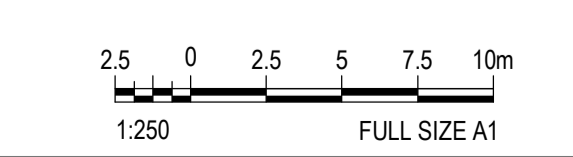
BANKSTOWN



FOR CONSTRUCTION

100mm AT FULL SIZE Plot Date & Time 19/04/2021 1:24:42 AM

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REV	BY	DATE	DESCRIPTION	APPD.
A1	Original		Co-ordinate System: MGA Zone 56 Height Datum: A.H.D. This sheet may be prepared using colour and may be incomplete if copied	



NOTE: Do not scale from this drawing. ALT. DRG No. SMCSWSWM-MTM-WPS-AT-DWG-491120

CLIENT




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 APPROVED: L. PALMER

14/04/2021

SYDNEY METRO

PUNCHBOWL ARCHITECTURAL OVERALL ARRANGEMENT SITE PLAN - SERVICE BUILDING

STATUS: FOR CONSTRUCTION SHEET 1 OF 1

DRG No. SMCSWSWM-MTM-WPS-AT-DWG-491120 REV. 00

Appendix 2: Tree Assessment Criteria

Tree number: Identifying number given to individual (or group) trees.

Botanical Name: Latin name for tree showing genus and species.

Common Name: The common name given to the tree.

Tree Dimensions: The physical dimensions of the tree.

- **Height:** Estimated or measured height of tree in meters.
- **Spread:** Estimated or measured radial canopy spread of tree in meters.
- **Diameter at Breast Height (DBH):** The estimated or measured diameter of trunk given in mm measured at 1.4m from ground.
- **Diameter Above Base (DAB):** The estimated or measured diameter of trunk given in mm measured above the root flare. Used to calculate the structural root zone of the tree.

Age Class: An estimation of how old the tree is in relation to its life expectancy.

- **Young** – Age less than 20% of life expectancy of tree in situ
- **Mature** – Age 20% - 80% of life expectancy of tree in situ
- **Old** – Age greater than 80% of life expectancy of tree in situ
- **Dead** – Tree is dead

Vigour: Ability of a tree to sustain its life processes. This is independent of the condition of a tree but may impact upon it. Vigour can appear to alter rapidly with change of seasons (seasonality) e.g., dormant, deciduous or semi-deciduous trees. Vigour can be categorised as Dormant, Low, Normal and High.

- **Dormant Vigour** – Determined by the existing turgidity in the lower order branches in the outer extremity of the crown, with good bud set and formation, and where the last extension growth is distinct from those most recently preceding it, evident by bud scale scars. Normal vigour during dormancy is achieved when such growth is evident on a majority of branches throughout the crown.
- **Low Vigour** – Reduced ability of a tree to sustain its life processes. This may be evident by the atypical growth of leaves, reduced crown cover and reduced crown density, branches, roots and trunk, and a deterioration of their functions with reduced resistance to predation. This is independent of the condition of a tree but may impact upon it, and especially the ability of a tree to sustain itself against predation.
- **Normal Vigour** – Ability of a tree to maintain and sustain its life processes. This may be evident by the typical growth of leaves, crown cover and crown density, branches, roots and trunk and resistance to predation. This is independent of the condition of a tree but may impact upon it, and especially the ability of a tree to sustain itself against predation.
- **High Vigour** – Accelerated growth of a tree due to incidental or deliberate artificial changes to its growing environment that are seemingly beneficial, but may result in premature aging or failure if the favourable conditions cease, or promote prolonged senescence if the favourable conditions remain, e.g. water from a leaking pipe, water and nutrients from a leaking or disrupted sewer pipe, nutrients from animal waste, a tree growing next to a chicken coop, or a stock feed lot, or a regularly used stockyard, a tree subject to stringent watering and fertilisation program, or some trees may achieve an extended lifespan from continuous pollarding practices over the life of the tree.

Condition: A tree's crown form and growth habit, as modified by its environment (aspect, suppression by other trees, soils) the stability and viability of the root plate, trunk and structural branches (first (1st) and possibly (2nd) order branches), including structural defects such as wounds, cavities or hollows, crooked trunk or weak trunk/branch junctions and the effects of predation by pests and diseases. These may not be directly connected with vigour and it is possible for a tree to be of normal vigour but in poor condition. Condition can be categorised as Dead, Poor, Fair and Good.

- **Dead Condition** – Tree is no longer capable of performing any of the following processes or is exhibiting any of the following symptoms; Photosynthesis via its foliage crown (as indicated by the presence of moist, green or other coloured leaves), Osmosis (the ability of the roots system to take up water), Turgidity (the ability of the plant to sustain moisture pressure in its cells), Epicormic shoots or epicormic strands in Eucalypts (the production of new shoots as a response to stress, generated from latent or adventitious buds or from a lignotuber), Permanent leaf loss, Permanent leaf wilting (the loss of turgidity which is marked by desiccation of stems leaves and roots), Abscission of the epidermis (bark desiccates and peels off to the beginning of the sap wood).
- **Poor Condition** – Tree is of good habit or misshapen, a form that may be severely restricted for space and light, exhibits symptoms of advanced and irreversible decline such as fungal, or bacterial infestation, major die-back in the branch and foliage crown, structural deterioration from insect damage e.g. termite infestation, or storm damage or lightning strike, ring barking from borer activity in the trunk, root damage or instability of the tree, or damage from physical wounding impacts or abrasion, or from altered local environmental conditions and has been unable to adapt to such changes and may decline further to death regardless of remedial works or other modifications to the local environment that would normally be sufficient to provide for its basic survival if in good to fair condition. Deterioration physically, often characterised by a gradual and continuous reduction in vigour but may be independent of a change in vigour, but characterised by a proportionate increase in susceptibility to, and predation by pests and diseases against which the tree cannot be sustained. Such conditions may also be evident in trees of advanced senescence due to normal phenological processes, without modifications to the growing environment or physical damage having been inflicted upon the tree. This may be independent from, or contributed to by vigour.
- **Fair Condition** – Tree is of good habit or misshapen, a form not severely restricted for space and light, has some physical indication of decline due to the early effects of predation by pests and diseases, fungal, bacterial, or insect infestation, or has suffered physical injury to itself that may be contributing to instability or structural weaknesses, or is faltering due to the modification of the environment essential for its basic survival. Such a tree may recover with remedial works where appropriate, or without intervention may stabilise or improve over time, or in response to the implementation of beneficial changes to its local environment. This may be independent from, or contributed to by vigour.

- **Good Condition** - Tree is of good habit, with crown form not severely restricted for space and light, physically free from the adverse effects of predation by pests and diseases, obvious instability or structural weaknesses, fungal, bacterial or insect infestation and is expected to continue to live in much the same condition as at the time of inspection provided conditions around it for its basic survival do not alter greatly. This may be independent from, or contributed to by vigour.

Useful Life Expectancy (ULE) ULE is the length of time that the arborist assesses an individual tree can be retained with an acceptable level of risk based on the information available at the time of inspection. It is a snapshot in time of the potential an individual tree has for survival in the eyes of the assessor. ULE is not static – it is closely related to tree health and the surrounding conditions. Alterations in these variables may result in changes to the ULE assessment. Consequently, the reliability all ULE assessments have will decrease as time passes from the initial assessment and the potential for changes in variables increases.

- **Remove** – Trees that should be removed within the next 5 years
- **Short** – Trees that appear to be retainable at the time of the assessment for 5-15 years with an acceptable level of risk.
- **Medium** – Trees that appear to be retainable at the time of the assessment for 15-40 years with an acceptable level of risk.
- **Long** – Trees that appear to be retainable at the time of the assessment for 40+ years with an acceptable level of risk.

Amenity and Visual Value – For the purposes of assessing the visual and landscape value of each tree the IACA Significance of a Tree, Assessment Rating System (STARS) © (IACA 2010) © has been adopted. - The landscape significance of a tree is an essential criterion to establish the importance that a particular tree may have on a site. The system uses a scale of High, Medium and Low significance in the landscape.

High significance in landscape

- The tree is in good condition and good vigour
- The tree has a form typical for the species
- The tree is a remnant or is a planted locally indigenous specimen and/or is rare or uncommon in the local area or of botanical interest or of substantial age
- The tree is listed as a heritage item, threatened species or part of an endangered ecological community or listed on council's significant tree register
- The tree is visually prominent and visible from a considerable distance when viewed from most directions within the landscape due to its size and scale and makes a positive contribution to the local amenity
- The tree supports social and cultural sentiments or spiritual associations, reflected by the broader population or community group or has commemorative values
- The tree's growth is unrestricted by above and below ground influences, supporting its ability to reach dimensions typical for the taxa in situ – tree is appropriate to the site conditions

Medium significance in landscape

- The tree is in fair-good condition and good or low vigour
- The tree has form typical or atypical of the species
- The tree is a planted locally indigenous or a common species with its taxa commonly planted in the local area
- The tree is visible from surrounding properties, although not visually prominent as partially obstructed by other vegetation or buildings when viewed from the street
- The tree provides a fair contribution to the visual character and amenity of the local area
- The tree's growth is moderately restricted by above or below ground influences, reducing its ability to reach dimensions typical for the taxa in situ

Low significance in landscape

- The tree is in fair-poor condition and good or low vigour
- The tree has form atypical of the species
- The tree is not visible or is partly visible from the surrounding properties as obstructed by other vegetation or buildings
- The tree provides a minor contribution or has a negative impact on the visual character and amenity of the local area
- The tree is a young specimen which may or may not have reached dimensions to be protected by local Tree Preservation Orders or similar protection mechanisms and can easily be replaced with a suitable specimen
- The tree's growth is severely restricted by above or below ground influences, unlikely to reach dimensions typical for the taxa in situ – tree is inappropriate to the site conditions
- The tree is listed as exempt under the provisions of the local Council Tree Preservation Order or similar protection mechanisms
- The tree has a wound or defect that has the potential to become structurally unsound
- **Environmental Pest / Noxious Weed Species**
- The tree is an environmental pest species due to its invasiveness or poisonous/allergenic properties.
- The tree is a declared noxious weed by legislation
- **Hazardous / Irreversible Decline**
- The tree is structurally unsound and/or unstable and is considered potentially dangerous
- The tree is dead, or is in irreversible decline, or has the potential to fail or collapse in full or in part in the immediate to short term

The tree is to have a minimum of three (3) criteria in a category to be classified in that group.

In the development of this document IACA acknowledges the contribution and original concept of the Footprint Green Tree Significance & Retention Value Matrix, developed by Footprint Green Pty Ltd in June 2010.

The Australian Standard 4970-2009 Protection of Trees on Development Sites defines the requirements for assessing trees with respect to development. It provides the guidance on how to decide which trees are appropriate for retention and on the means of protecting them during construction works. It describes the areas and offsets, referred to as the Tree Protection Zone (TPZ) and Structural Root Zone (SRZ) required to be free from development works to maintain tree vitality and stability. This report has been prepared in accordance with the conditions set out within the standard.

- **Tree Protection Zone** – The tree protection zone is defined as a specified area above and below ground set aside for the protection of the tree's roots and crown. It is expressed as a radial measurement taken from the centre of the trunk at ground level.
- **Structural Root Zone** – The structural root zone is defined as a specified area around the base of a tree required to maintain its stability within the ground. It is expressed as a radial measurement taken from the center of the trunk at ground level. Excavation and development works are not recommended within the structural root zone unless additional investigation as to root size and location is undertaken

APPENDIX 12.2 PUNCHBOWL AIA (PLATEAU TREES)



ARBORICULTURAL IMPACT ASSESSMENT

PUNCHBOWL TRAIN STATION UPGRADE

Prepared by Colin Curtis

AQF 5 Arboriculture Diploma

Tree Risk Assessment Qualified (TRAQ)

Member of Arboriculture Australia #2332

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0413 801 557

Prepared for: Downer Group P/L

15/06/021

EXECUTIVE SUMMARY

Plateau Trees has been commissioned by Downer Group P/L to produce an Arboricultural Impact Assessment (AIA) regarding the development of Punchbowl Train Station Upgrade

Eight (8) x trees located upon Canterbury Bankstown Council land (adjacent to the subject site) were assessed to produce this report.

Following an assessment of construction impacts (detailed in section 5 of this report) the following recommendations (detailed in section 7 of this report) have been developed.

- 7.1 Due to the major TPZ/SRZ encroachments required to undertake the proposed works, all the subject trees have been recommended to be removed (subject to council approval).
- 7.2 To ensure that the biodiversity of the area is maintained, tree/s recommended to be removed, must be replaced. Tree/s selected for replacement plantings should be endemic species that will attain a similar height & canopy spread of those removed. These trees are to be chosen in accordance with AS 2303-2015 (Tree Stock for Landscape Use) & planting is to be undertaken by a suitably qualified AQF¹ person/s.
- 7.3 Approved tree removal works must be undertaken by an AQF level 3 arborist in accordance with the Work Cover Amenity Code of Practice (1998) and the Work Safe Guide to tree Trimming and Removal (2006).
- 7.4 It is recommended that an AQF Level 5 Arborist is engaged to oversee/meet any arboricultural matters that may arise if the proposed works are approved.

¹ Australian Qualification Framework

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1. INTRODUCTION

- 1.1 Plateau Trees has been commissioned by Downer Group P/L to produce an Arboricultural Impact Assessment (AIA) regarding the development of Punchbowl Train Station (Upgrade).
- 1.2 This AIA has been prepared following the guidelines provided in Australian Standard (AS) 4970-2009, Protection of Trees on Development Sites.

2. THE SITE



Figure 1: Street view of the subject trees taken from Urunga Parade, Punchbowl (*nearmap 2021*).



Figure 2: Location of the subject trees shown in red (*nearmap 2021*).

3. METHOD

- 3.1 The subject site and trees were visually assessed from ground level on the 27th May 2021. The *Genus/species* of the subject trees were recorded as well as dimensions of Diameter at Breast Height (DBH) and Diameter at Base (DAB). Height, age and canopy spread of the trees were estimated. The subject trees were given a health / condition rating. Structural defects were looked for and comments recorded.
- 3.2 Calculations have been made using guidelines supplied in AS 4970-2009, specifically in relation to:
- Tree Protection Zone (TPZ)
 - Structural Root Zone (SRZ)
- 3.3 The trees have been allocated a landscape significance rating of Low, Medium or High using the *IACA Significance of a Tree, Assessment Rating System (STARS)*© (IACA, 2010). Stars assessment criteria includes:
- Condition and Vigour
 - Form, species specific
 - Provenance, age and botanical significance
 - Heritage and Ecological significance
 - Size, shape, and local amenity value
 - Restrictions to tree growth

Appendix B contains the assessment criteria in full.

- 3.4 The trees have been given a Useful Life Expectancy (ULE) rating, categorised as either:
- Long – 40+ years
 - Medium – 15-40 years
 - Short – 5-15 years
 - Consider for removal - <5 years

4. OBSERVATIONS/DATA

Tree No.	Common Name <i>Genus Species</i>	Age	Height	Spread	DBH	DAB	SRZ	TPZ	Vigour / Condition	Native or Exotic	ULE	Amenity & Visual Value	Comments
1	Blackbutt <i>Eucalyptus pilularis</i>	M	12	8	36	44	2.34	4.32	F/F	N	S	M	Clash with permanent CSR, drainage and security fence.
2	Blackbutt <i>Eucalyptus pilularis</i>	M	9	6	23	32	2.05	2.76	F/F	N	S	M	Clash with permanent CSR, drainage and security fence.
3	Camphor Laurel <i>Cinnamomum camphora</i>	M	6	6	24	35	2.13	2.88	P/F	E	R	L	Clash with permanent CSR, drainage and security fence.
4	Camphor Laurel <i>Cinnamomum camphora</i>	M	7	7	23	40	2.25	2.76	F/F	E	R	L	Clash with permanent CSR, drainage and security fence.
5	Scribbly Gum <i>Eucalyptus haemastoma</i>	M	12	10	57	64	2.74	6.84	F/F	N	S	M	Clash with permanent CSR, drainage and security fence.
6	Tallowood <i>Eucalyptus microcorys</i>	M	10	10	50	56	2.59	6	F/F	N	S	M	Clash with permanent CSR, drainage and security fence.
7	Blackbutt <i>Eucalyptus pilularis</i>	M	10	6	27	36	2.15	3.42	F/F	N	S	M	Clash with permanent CSR, drainage and security fence.
8	Willow Gum <i>Eucalyptus scoporia</i>	M	10	8	37	40	2.39	4.42	F/F	N	S	L	Clash with permanent CSR, drainage and security fence.

5. CONSTRUCTION IMPACTS

Tree No.	Proposed encroachments into TPZ and/or canopy	Likely Impacts from the proposed construction (Discussion)
1-8	Major 40-50% encroachments into the TPZ/SRZ for the installation of fencing and drainage.	Loss of structural woody and non woody roots resulting in reduced water uptake, along with a high likelihood of tree decline/failure.

6. DOCUMENTS USED IN THE PREPARATION OF THIS REPORT

Document type	Source/ Author	Title	Date	Summary
Plan	None	Punch Bowl Station – Location of Trees on Street	No Date	Locations of trees as discussed in this report.
Plan	Plateau Trees	TPZ/SRZ Plans	2/06/2021	TPZ/SRZ plans shown over the development.
Plan	Metro T2M	For Construction	21/04/2021	DWG.SMCSWSWM-MTM-WPS-CE-DWG-493156 shown over the development.

7. RECOMMENDATIONS/CONCLUSIONS

- 7.1 Due to the major TPZ/SRZ encroachments required to undertake the proposed works, all the subject trees have been recommended to be removed (subject to council approval).
- 7.2 To ensure that the biodiversity of the area is maintained, tree/s recommended to be removed, must be replaced. Tree/s selected for replacement plantings should be endemic species that will attain a similar height & canopy spread of those removed. These trees are to be chosen in accordance with AS 2303-2015 (Tree Stock for Landscape Use) & planting is to be undertaken by a suitably qualified AQF person/s.
- 7.3 Approved tree removal works must be undertaken by an AQF level 3 arborist in accordance with the Work Cover Amenity Code of Practice (1998) and the Work Safe Guide to tree Trimming and Removal (2006).
- 7.4 It is recommended that an AQF Level 5 Arborist is engaged to oversee/meet any arboricultural matters that may arise if the proposed works are approved.

8. LIMITATIONS ON THE USE OF THIS REPORT

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

9. ASSUMPTIONS

Care has been taken to obtain information from reliable resources. All data has been verified insofar as possible; however, the author of this report can neither guarantee nor be responsible for the accuracy of information provided by others.

Unless stated otherwise:

Information contained in this report covers only the trees that were examined & reflects the condition of the trees at the time of inspection.

The inspection was limited to visual examination of the subject trees without dissection, excavation, probing or coring. There is no warranty or guarantee, expressed or implied, that problems or deficiencies of the subject trees may not arise in the future.

This report does not represent or contain a tree risk assessment.

10. REFERENCES

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RELEVANT APPENDICES - APPENDIX A: GLOSSARY OF TERMS

Photographs – all images have been taken from near maps.

Common Name/Genus species - the common name and genus/ species of the tree.

Age Class- assessment of the trees current age.

Immature (IM) - refers to a tree at growth stages between immaturity and full size.

Semi-mature (SM) - refers to a full-sized tree with some capacity for further growth.

Mature (M)-refers to a full-sized tree with some capacity for further growth.

Over-mature (OM) - a mature tree has reached a near stable size (biomass) above and below the ground. Trees can have a Mature Age Class for > 90% of their life span. Over-mature (**OM**) trees show symptoms of irreversible decline and decreasing biomass.

Live Stag (LS) - refers to a tree in a significant state of decline. This is the last stage of a tree prior to death.

Height -estimated overall height of the tree.

Diameter at Breast Height (DBH) - the trunk diameter at breast height (in metres) of the tree, 1.4 meters above ground level.

Diameter above the Buttress (DAB) - refers to the tree trunk diameter measured above the root buttress and is used to calculate the radius of the SRZ.

Tree Protection Zone (TPZ) - is a “No Go Zone” surrounding a tree to aid in its ability to cope with disturbances associated with construction works. Tree protection involves minimising root damage that is caused by activities such as construction. Tree protection also reduces the chance of a tree’s decline in health or death & the possibly damage to structural stability of the tree from root damage.

Structural Root Zone (SRZ) – the structural root zone is the area required for the tree’s stability. A larger area is required to maintain a viable tree. The SRZ is only needed to be calculated when a major encroachment into the TPZ is proposed. There are many factors that affect the size of the SRZ (e.g. tree height, crown area, soil type, soil moisture). The SRZ may also be influenced by natural or built structures, such as rock and footings.

Vigour - Good (G), Fair (F) or Poor (P) – this refers to the trees vigour as exhibited by the crown density, leaf colour, presence of epicormic shoots, ability to withstand disease invasion and the degree of dieback.

Condition – Excellent (E), Very Good (VG), Good (G), Fair (F), Declining (D), Poor (P),Very Poor (VP).this refers to the tree’s form & growth habit, as modified by its environment (aspect suppression by other tree/s, soils,) & the state of the scaffold (i.e. trunk & major branches),including structural defects such as cavities, crooked trunks or weak trunk/branch junctions. These are not directly connected with health & it is possible for a tree to be healthy but in poor condition/vigour.

Useful Life Expectancy (ULE) ULE is the length of time that the arborist assesses an individual tree can be retained with an acceptable level of risk based on the information available at the time of inspection. It is a snapshot in time of the potential an individual tree has for survival in the eyes of the assessor. ULE is not static – it is closely related to tree health and the surrounding conditions. Alterations in these variables may result in changes to the ULE assessment. Consequently, the reliability all ULE assessments have will decrease as time passes from the initial assessment and the potential for changes in variables increases.

- **Remove** – Trees that should be removed within the next 5 years.
- **Short** – Trees that appear to be retainable at the time of the assessment for 5-15 years with an acceptable level of risk.
- **Medium** – Trees that appear to be retainable at the time of the assessment for 15-40 years with an acceptable level of risk.
- **Long** – Trees that appear to be retainable at the time of the assessment for 40+ years with an acceptable level of risk.

Crown Spread - the greatest width from drip line to drip line of a branch across the trees crown.

Significance of a Tree, Assessment Rating System* (IACA 2010) – S.T.A.R.S. ©

The landscape significance of a tree is an essential criterion to establish the importance that a particular tree may have on a site. However, rating the significance of a tree becomes subjective and difficult to ascertain in a consistent and repetitive fashion due to assessor bias. It is therefore necessary to have a rating system utilising structured qualitative criteria to assist in determining the retention value for a tree. To assist this process all definitions for terms used in the *Tree Significance - Assessment Criteria* and *Tree Retention Value - Priority Matrix*, are taken from the IACA Dictionary for Managing Trees in Urban Environments 2009.

This rating system will assist in the planning processes for proposed works, above and below ground where trees are to be retained on or adjacent a development site. The system uses a scale of *High*, *Medium* and *Low* significance in the landscape. Once the landscape significance of an individual tree has been defined, the retention value can be determined. An example of its use in an Arboricultural report is shown as Appendix A.



Tree Significance - Assessment Criteria

High Significance in landscape

- The tree is in Good condition and Good vigour.
- The tree has a form typical for the species;
- The tree is a remnant or is a planted locally indigenous specimen and/or is rare or uncommon in the local area or of botanical interest or of substantial age;
- The tree is listed as a Heritage Item, Threatened Species or part of an endangered ecological community or listed on Councils Significant Tree Register;
- The tree is visually prominent and visible from a considerable distance when viewed from most directions within the landscape due to its size and scale and makes a positive contribution to the local amenity;
- The tree supports social and cultural sentiments or spiritual associations, reflected by the broader population or community group or has commemorative values;
- The tree's growth is unrestricted by above and below ground influences, supporting its ability to reach dimensions typical for the taxa *in situ* - tree is appropriate to the site conditions.

Medium Significance in landscape

- The tree is in Fair-Good condition and Good or Low vigour;
- The tree has form typical or atypical of the species;
- The tree is a planted locally indigenous or a common species with its taxa commonly planted in the local area
- The tree is visible from surrounding properties, although not visually prominent as partially obstructed by other vegetation or buildings when viewed from the street,
- The tree provides a fair contribution to the visual character and amenity of the local area,
- The tree's growth is moderately restricted by above or below ground influences, reducing its ability to reach dimensions typical for the taxa *in situ*.

Low Significance in landscape

- The tree is in fair-poor condition and good or low vigour;
- The tree has form atypical of the species;
- The tree is not visible or is partly visible from surrounding properties as obstructed by other vegetation or buildings,
- The tree provides a minor contribution or has a negative impact on the visual character and amenity of the local area,
- The tree is a young specimen which may or may not have reached dimension to be protected by local Tree Preservation orders or similar protection mechanisms and can easily be replaced with a suitable specimen,
- The tree's growth is severely restricted by above or below ground influences, unlikely to reach dimensions typical for the taxa *in situ* - tree is inappropriate to the site conditions,
- The tree is listed as exempt under the provisions of the local Council Tree Preservation Order or similar protection mechanisms,
- The tree has a wound or defect that has potential to become structurally unsound.

Environmental Pest / Noxious Weed Species

- The tree is an Environmental Pest Species due to its invasiveness or poisonous/ allergenic properties,
- The tree is a declared noxious weed by legislation.

Hazardous/Irreversible Decline

- The tree is structurally unsound and/or unstable and is considered potentially dangerous,
- The tree is dead, or is in irreversible decline, or has the potential to fail or collapse in full or part in the immediate to short term.

The tree is to have a minimum of three (3) criteria in a category to be classified in that group.

Note: The assessment criteria are for individual trees only, however, can be applied to a monoculture stand in its entirety e.g. hedge.

Institute of Australian Consulting Arboriculturists (IACA 2010), *IACA Significance of a Tree, Assessment Rating System (STARS)*, www.iaca.org.au

Table 1.0 Tree Retention Value - Priority Matrix.

		Significance				
		1. High Significance in Landscape	2. Medium Significance in Landscape	3. Low Significance in Landscape	Environmental Pest / Noxious Weed Species	Hazardous / Irreversible Decline
Estimated Life Expectancy	1. Long >40 years					
	2. Medium 15-40 Years					
	3. Short <1-15 Years					
	Dead					

Legend for Matrix Assessment	
	Priority for Retention (High) - These trees are considered important for retention and should be retained and protected. Design modification or re-location of building/s should be considered to accommodate the setbacks as prescribed by the Australian Standard AS4970 <i>Protection of trees on development sites</i> . Tree sensitive construction measures must be implemented e.g. pier and beam etc if works are to proceed within the Tree Protection Zone.
	Consider for Retention (Medium) - These trees may be retained and protected. These are considered less critical; however their retention should remain priority with removal considered only if adversely affecting the proposed building/works and all other alternatives have been considered and exhausted.
	Consider for Removal (Low) - These trees are not considered important for retention, nor require special works or design modification to be implemented for their retention.
	Priority for Removal - These trees are considered hazardous, or in irreversible decline, or weeds and should be removed irrespective of development.

USE OF THIS DOCUMENT AND REFERENCING The IACA Significance of a Tree, Assessment Rating System (STARS) is free to use, but only in its entirety and must be cited as follows', 2010, *IACA Significance of a Tree, Assessment Rating System (STARS)*, Institute of Australian Consulting Arboriculturists, Australia, www.iaca.org.au

REFERENCES Australia ICOMOS Inc. 1999, *The Burra Charter –The Australian ICOMOS Charter for Places of Cultural Significance*, International Council of Monuments and Sites, www.icomos.org/australia Draper BD and Richards PA 2009, *Dictionary for Managing Trees in Urban Environments*, Institute of Australian Consulting Arboriculturists(IACA), CSIRO Publishing, Collingwood, Victoria, Australia. Footprint Green Pty Ltd 2001, *Footprint Green Tree Significance & Retention Value Matrix*, Avalon, NSW Australia, www.footprintgreen.com.au IACA 2010, *IACA Significance of a Tree, Assessment Rating System (STARS)*, Institute of Australian Consulting Arboriculturists, www.iaca.org.au

APPENDIX 12.3 PUNCHBOWL AIA (PLATEAU TREES)

Date: 2nd July 2021

Arborist Assessment Punchbowl Station

At the request of Downer Group an onsite arboricultural inspection at Punchbowl Station was conducted on the 29th June 2021. Weather conditions were overcast.

The reason for this inspection was to assess and identify one (1) x tree required to be removal as to allow for the construction of a new extended stairway.

A walkthrough of the site was conducted in the presence of a Downer Group representative.

Upon inspection it was concluded that the subject tree (shown within the attached images below), will require removal to facilitate the proposed construction to take place.

Best Regards

Colin Curtis



Level 5 Consulting Arborist

Tree Risk Assessment Qualification (TRAQ)

Member of Arboriculture Australia #2332

Member of the International Society of Arboriculture (ISA) # 228182



Image of the subject tree taken on the 29th June 2021.



Location of the subject tree circled in red (*Metromap 2021*)

Appendix 1: Tree Assessment Schedule

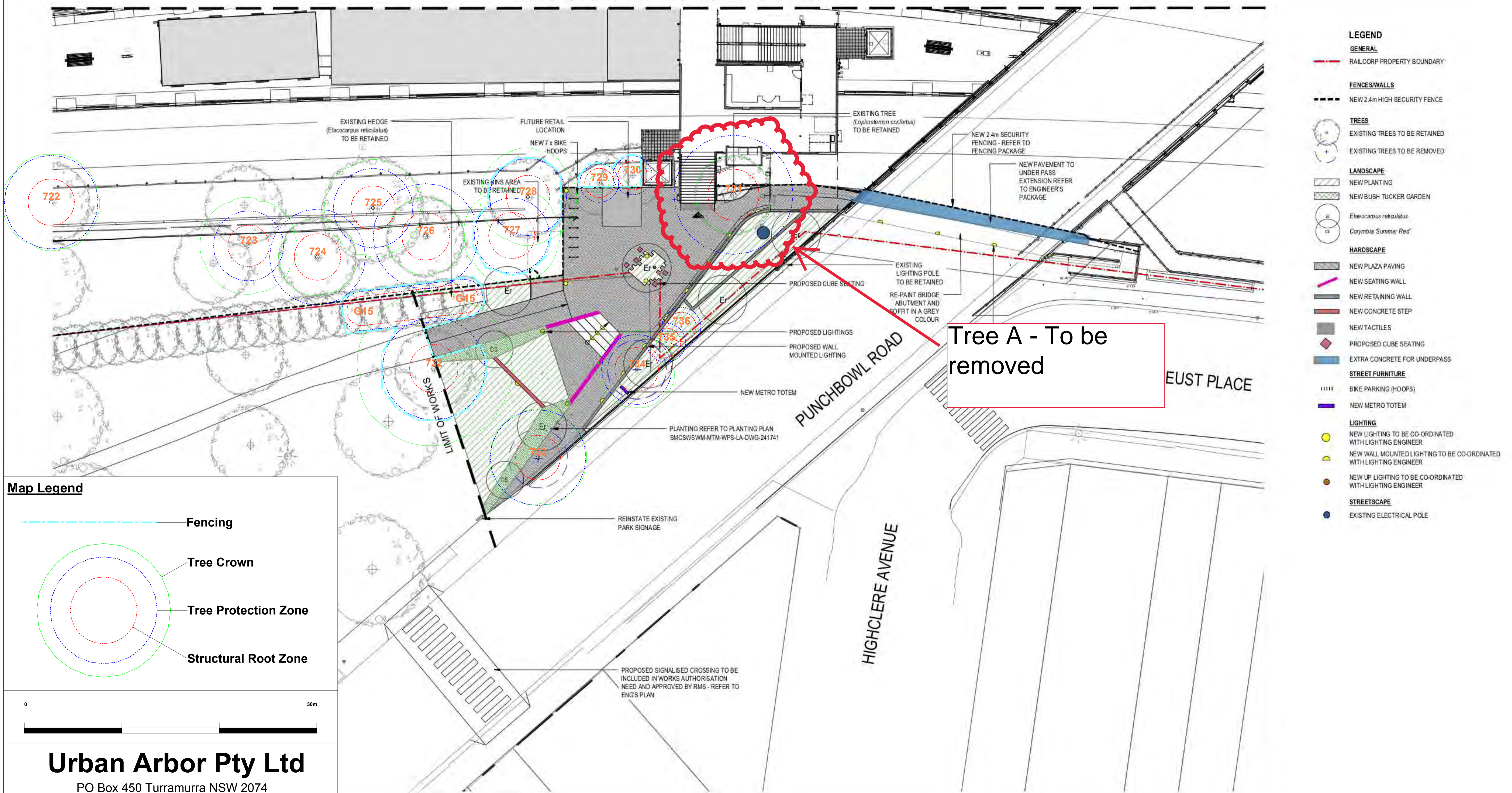
Tree number	Tree name	Tree dimensions				Vigour	Condition	Age class	ULE	Amenity and Visual Value	Native or Exotic	TPZ (m)	SRZ (m)	Comments	Remove or Retain
	<i>Botanical name</i> Common name	Height (m)	Spread (m)	DBH (mm)	DAB (mm)										
A	<i>Lophostemon confertus</i> Brush Box	9	7	35	50	NV	F	M	M	L	N	4.2	2.47	Clash with permanent stairs design.	Remove



← TO SYDNEY

→ TO BANKSTOWN

ADJOINS DRAWINGS SMCSWSWM-MTM-WPS-LA-DWG-241720

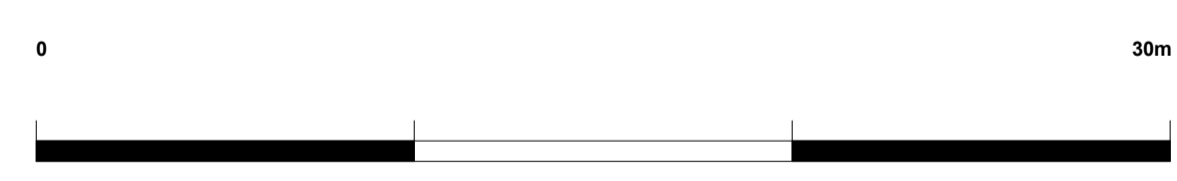


LEGEND

- GENERAL**
 - RAILCORP PROPERTY BOUNDARY
- FENCES/WALLS**
 - NEW 2.4m HIGH SECURITY FENCE
- TREES**
 - EXISTING TREES TO BE RETAINED
 - EXISTING TREES TO BE REMOVED
- LANDSCAPE**
 - NEW PLANTING
 - NEW BUSH TUCKER GARDEN
 - Elaeocarpus reticulatus
 - Corymbia 'Summer Red'
- HARDSCAPE**
 - NEW PLAZA PAVING
 - NEW SEATING WALL
 - NEW RETAINING WALL
 - NEW CONCRETE STEP
 - NEW TACTILES
 - PROPOSED CUBE SEATING
 - EXTRA CONCRETE FOR UNDERPASS
- STREET FURNITURE**
 - BIKE PARKING (HOOPS)
 - NEW METRO TOTEM
- LIGHTING**
 - NEW LIGHTING TO BE CO-ORDINATED WITH LIGHTING ENGINEER
 - NEW WALL MOUNTED LIGHTING TO BE CO-ORDINATED WITH LIGHTING ENGINEER
 - NEW UP LIGHTING TO BE CO-ORDINATED WITH LIGHTING ENGINEER
- STREETSCAPE**
 - EXISTING ELECTRICAL POLE

Map Legend

- Fencing
- Tree Crown
- Tree Protection Zone
- Structural Root Zone



Urban Arbor Pty Ltd

PO Box 450 Turrumurra NSW 2074
sales@urbanarbor.com.au

Site Location: Punchbowl Station
Punchbowl NSW

SCALE : 1 : 200 @ A1 DATE : 1/14/2020



Appendix 1A - Proposed Site Plan North

Prepared by: Jack Williams, Urban Arbor Pty Ltd

Appendix 2: Tree Assessment Criteria

Tree number: Identifying number given to individual (or group) trees.

Botanical Name: Latin name for tree showing genus and species.

Common Name: The common name given to the tree.

Tree Dimensions: The physical dimensions of the tree.

- **Height:** Estimated or measured height of tree in meters.
- **Spread:** Estimated or measured radial canopy spread of tree in meters.
- **Diameter at Breast Height (DBH):** The estimated or measured diameter of trunk given in mm measured at 1.4m from ground.
- **Diameter Above Base (DAB):** The estimated or measured diameter of trunk given in mm measured above the root flare. Used to calculate the structural root zone of the tree.

Age Class: An estimation of how old the tree is in relation to its life expectancy.

- **Young** – Age less than 20% of life expectancy of tree in situ
- **Mature** – Age 20% - 80% of life expectancy of tree in situ
- **Old** – Age greater than 80% of life expectancy of tree in situ
- **Dead** – Tree is dead

Vigour: Ability of a tree to sustain its life processes. This is independent of the condition of a tree but may impact upon it. Vigour can appear to alter rapidly with change of seasons (seasonality) e.g., dormant, deciduous or semi-deciduous trees. Vigour can be categorized as Dormant, Low, Normal and High.

- **Dormant Vigour** – Determined by the existing turgidity in the lower order branches in the outer extremity of the crown, with good bud set and formation, and where the last extension growth is distinct from those most recently preceding it, evident by bud scale scars. Normal vigour during dormancy is achieved when such growth is evident on a majority of branches throughout the crown.
- **Low Vigour** – Reduced ability of a tree to sustain its life processes. This may be evident by the atypical growth of leaves, reduced crown cover and reduced crown density, branches, roots and trunk, and a deterioration of their functions with reduced resistance to predation. This is independent of the condition of a tree but may impact upon it, and especially the ability of a tree to sustain itself against predation.
- **Normal Vigour** – Ability of a tree to maintain and sustain its life processes. This may be evident by the typical growth of leaves, crown cover and crown density, branches, roots and trunk and resistance to predation. This is independent of the condition of a tree but may impact upon it, and especially the ability of a tree to sustain itself against predation.
- **High Vigour** – Accelerated growth of a tree due to incidental or deliberate artificial changes to its growing environment that are seemingly beneficial, but may result in premature aging or failure if the favourable conditions cease, or promote prolonged senescence if the favourable conditions remain, e.g. water from a leaking pipe, water and nutrients from a leaking or disrupted sewer pipe, nutrients from animal waste, a tree growing next to a chicken coop, or a stock feed lot, or a regularly used stockyard, a tree subject to stringent watering and fertilisation program, or some trees may achieve an extended lifespan from continuous pollarding practices over the life of the tree.

Condition: A tree's crown form and growth habit, as modified by its environment (aspect, suppression by other trees, soils) the stability and viability of the root plate, trunk and structural branches (first (1st) and possibly (2nd) order branches), including structural defects such as wounds, cavities or hollows, crooked trunk or weak trunk/branch junctions and the effects of predation by pests and diseases. These may not be directly connected with vigour, and it is possible for a tree to be of normal vigour but in poor condition. Condition can be categorized as Dead, Poor, Fair and Good.

- **Dead Condition** – Tree is no longer capable of performing any of the following processes or is exhibiting any of the following symptoms; Photosynthesis via its foliage crown (as indicated by the presence of moist, green or other coloured leaves), Osmosis (the ability of the roots system to take up water), Turgidity (the ability of the plant to sustain moisture pressure in its cells), Epicormic shoots or epicormic strands in Eucalypts (the production of new shoots as a response to stress, generated from latent or adventitious buds or from a lignotuber), Permanent leaf loss, Permanent leaf wilting (the loss of turgidity which is marked by desiccation of stems leaves and roots), Abscission of the epidermis (bark desiccates and peels off to the beginning of the sap wood).
- **Poor Condition** - Tree is of good habit or misshapen, a form that may be severely restricted for space and light, exhibits symptoms of advanced and irreversible decline such as fungal, or bacterial infestation, major die-back in the branch and foliage crown, structural deterioration from insect damage e.g. termite infestation, or storm damage or lightning strike, ring barking from borer activity in the trunk, root damage or instability of the tree, or damage from physical wounding impacts or abrasion, or from altered local environmental conditions and has been unable to adapt to such changes and may decline further to death regardless of remedial works or other modifications to the local environment that would normally be sufficient to provide for its basic survival if in good to fair condition. Deterioration physically, often characterised by a gradual and continuous reduction in vigour but may be independent of a change in vigour, but characterised by a proportionate increase in susceptibility to, and predation by pests and diseases against which the tree cannot be sustained. Such conditions may also be evident in trees of advanced senescence due to normal phenological processes, without modifications to the growing environment or physical damage having been inflicted upon the tree. This may be independent from or contributed to by vigour.

- **Fair Condition** - Tree is of good habit or misshapen, a form not severely restricted for space and light, has some physical indication of decline due to the early effects of predation by pests and diseases, fungal, bacterial, or insect infestation, or has suffered physical injury to itself that may be contributing to instability or structural weaknesses, or is faltering due to the modification of the environment essential for its basic survival. Such a tree may recover with remedial works where appropriate, or without intervention may stabilise or improve over time, or in response to the implementation of beneficial changes to its local environment. This may be independent from or contributed to by vigour.
- **Good Condition** - Tree is of good habit, with crown form not severely restricted for space and light, physically free from the adverse effects of predation by pests and diseases, obvious instability or structural weaknesses, fungal, bacterial or insect infestation and is expected to continue to live in much the same condition as at the time of inspection provided conditions around it for its basic survival do not alter greatly. This may be independent from or contributed to by vigour.

Useful Life Expectancy (ULE) ULE is the length of time that the arborist assesses an individual tree can be retained with an acceptable level of risk based on the information available at the time of inspection. It is a snapshot in time of the potential an individual tree has for survival in the eyes of the assessor. ULE is not static – it is closely related to tree health and the surrounding conditions. Alterations in these variables may result in changes to the ULE assessment. Consequently, the reliability all ULE assessments have will decrease as time passes from the initial assessment and the potential for changes in variables increases.

- **Remove** – Trees that should be removed within the next 5 years
- **Short** – Trees that appear to be retainable at the time of the assessment for 5-15 years with an acceptable level of risk.
- **Medium** – Trees that appear to be retainable at the time of the assessment for 15-40 years with an acceptable level of risk.
- **Long** – Trees that appear to be retainable at the time of the assessment for 40+ years with an acceptable level of risk.

Amenity and Visual Value – For the purposes of assessing the visual and landscape value of each tree the IACA Significance of a Tree, Assessment Rating System (STARS) © (IACA 2010) © has been adopted. - The landscape significance of a tree is an essential criterion to establish the importance that a particular tree may have on a site. The system uses a scale of High, Medium and Low significance in the landscape.

High significance in landscape

- The tree is in good condition and good vigour
- The tree has a form typical for the species
- The tree is a remnant or is a planted locally indigenous specimen and/or is rare or uncommon in the local area or of botanical interest or of substantial age
- The tree is listed as a heritage item, threatened species or part of an endangered ecological community or listed on council's significant tree register
- The tree is visually prominent and visible from a considerable distance when viewed from most directions within the landscape due to its size and scale and makes a positive contribution to the local amenity
- The tree supports social and cultural sentiments or spiritual associations, reflected by the broader population or community group or has commemorative values
- The tree's growth is unrestricted by above and below ground influences, supporting its ability to reach dimensions typical for the taxa in situ – tree is appropriate to the site conditions

Medium significance in landscape

- The tree is in fair-good condition and good or low vigour
- The tree has form typical or atypical of the species
- The tree is a planted locally indigenous or a common species with its taxa commonly planted in the local area
- The tree is visible from surrounding properties, although not visually prominent as partially obstructed by other vegetation or buildings when viewed from the street
- The tree provides a fair contribution to the visual character and amenity of the local area
- The tree's growth is moderately restricted by above or below ground influences, reducing its ability to reach dimensions typical for the taxa in situ

Low significance in landscape

- The tree is in fair-poor condition and good or low vigour
- The tree has form atypical of the species
- The tree is not visible or is partly visible from the surrounding properties as obstructed by other vegetation or buildings
- The tree provides a minor contribution or has a negative impact on the visual character and amenity of the local area
- The tree is a young specimen which may or may not have reached dimensions to be protected by local Tree Preservation Orders or similar protection mechanisms and can easily be replaced with a suitable specimen
- The tree's growth is severely restricted by above or below ground influences, unlikely to reach dimensions typical for the taxa in situ – tree is inappropriate to the site conditions
- The tree is listed as exempt under the provisions of the local Council Tree Preservation Order or similar protection mechanisms
- The tree has a wound or defect that has the potential to become structurally unsound
- **Environmental Pest / Noxious Weed Species**
- The tree is an environmental pest species due to its invasiveness or poisonous/allergenic properties.
- The tree is a declared noxious weed by legislation
- **Hazardous / Irreversible Decline**

- The tree is structurally unsound and/or unstable and is considered potentially dangerous
- The tree is dead, or is in irreversible decline, or has the potential to fail or collapse in full or in part in the immediate to short term

The tree is to have a minimum of three (3) criteria in a category to be classified in that group.

In the development of this document IACA acknowledges the contribution and original concept of the Footprint Green Tree Significance & Retention Value Matrix, developed by Footprint Green Pty Ltd in June 2010.

The Australian Standard 4970-2009 Protection of Trees on Development Sites defines the requirements for assessing trees with respect to development. It provides the guidance on how to decide which trees are appropriate for retention and on the means of protecting them during construction works. It describes the areas and offsets, referred to as the Tree Protection Zone (TPZ) and Structural Root Zone (SRZ) required to be free from development works to maintain tree vitality and stability. This report has been prepared in accordance with the conditions set out within the standard.

- **Tree Protection Zone** – The tree protection zone is defined as a specified area above and below ground set aside for the protection of the tree's roots and crown. It is expressed as a radial measurement taken from the centre of the trunk at ground level.
- **Structural Root Zone** – The structural root zone is defined as a specified area around the base of a tree required to maintain its stability within the ground. It is expressed as a radial measurement taken from the centre of the trunk at ground level. Excavation and development works are not recommended within the structural root zone unless additional investigation as to root size and location is undertaken

APPENDIX 12.4 PUNCHBOWL AIA (PLATEAU TREES)

Date: 28 September 2021

Re: Additional tree removals at Punchbowl Station as part of the Southwest Metro Package.

At the request of Downer Group an onsite inspection was undertaken at Punchbowl Station. It has been asked to identify and record additional tree removals beyond those recommended within the Arboricultural Impact Assessment (AIA) prepared by Urban Arbor, dated 15 January 2020, Ref 20/01/15/SWMPB. On the 17 September a site walkthrough was undertaken by myself. Additional tree removals were identified under guidance of a Downer Group representative.

The subject trees consist of a line planting of five *Elaeocarpus reticulatus* (Blueberry Ash) located adjacent the rail corridor, refer to Appendix 1 Site photographs. They are identified as tree G15 within the AIA report prepared by Urban Arbor. Appendix 2 Tree Assessment Schedule details the data relating to the trees.

At the time of the inspection the trees were found to be in good health and condition, consistent with their species type, age class and growing environment.

It was advised that the trees are located within the footprint of a concrete slab to be installed as part of the station entry precinct. As such, they cannot be retained under the current design. Their removal is not through to pose a significant impact upon local amenity when taking into consideration the wider station upgrade works. Replacement planting with advanced tree stock is to be undertaken to offset the tree removals.

All appropriate approvals and consents are to be obtained prior to tree and vegetation removal works commencing. All tree pruning and removal works are to be undertaken by suitably qualified tree workers and in accordance with *AS4373-2007 Pruning of Amenity Trees* and the Safe Work Australia's Guide to Managing Risks of Tree Trimming and Removal Works.

Please feel free to contact me should you require any further assistance regarding this matter.

Regards.

Owen Tebbutt



Consulting Arborist
Plateau Tree Service

Appendix 1: Site Photographs



Photograph 1: Showing the five *Elaeocarpus reticulatus* (Blueberry Ash) to be removed.

Appendix 2: Tree Assessment Schedule

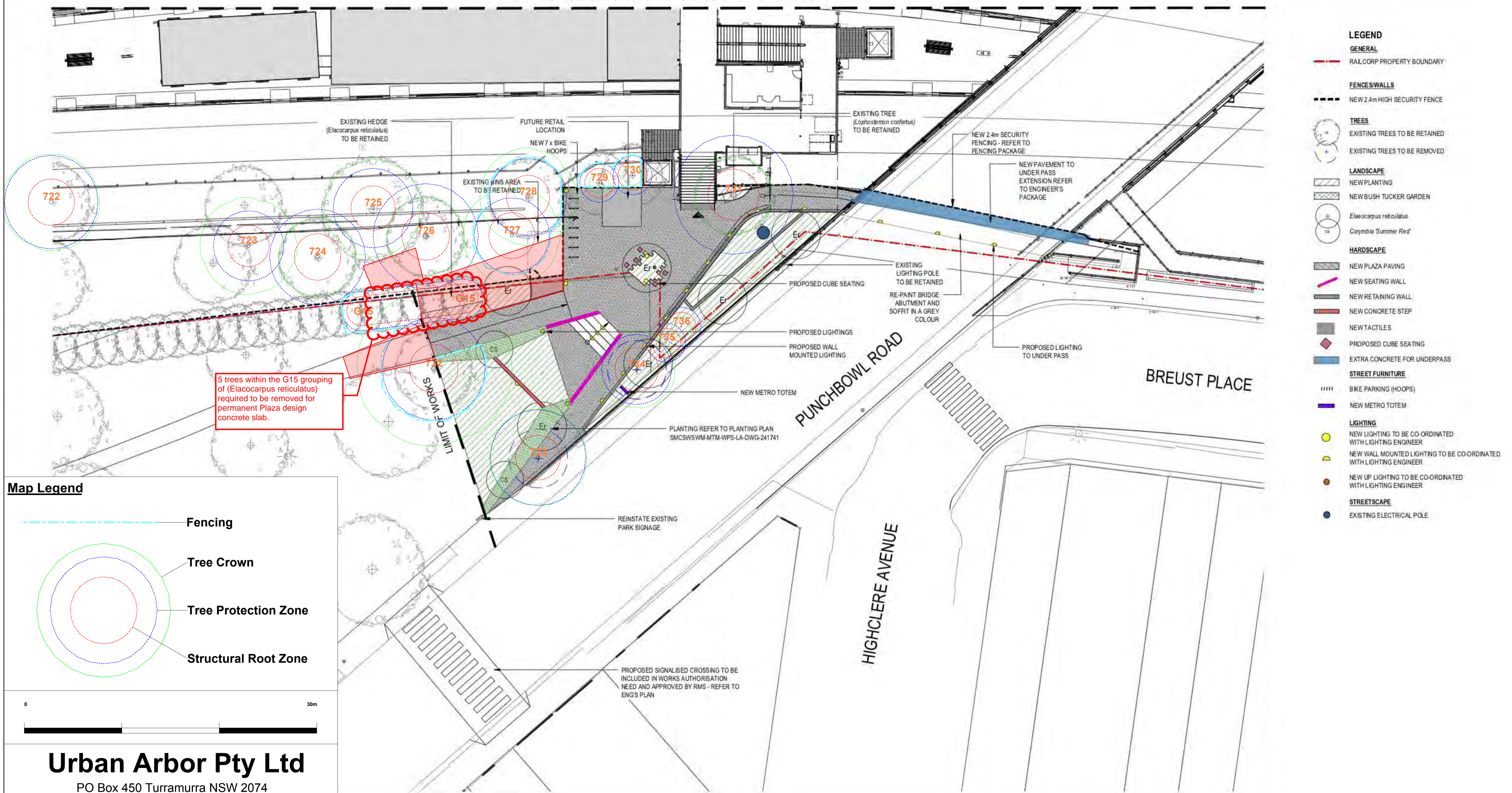
Tree number	Tree name	Tree dimensions				Vigour	Condition	Age class	ULE	Amenity and Visual Value	Native or Exotic	TPZ (m)	SRZ (m)	Comments	Remove or Retain
	Botanical name Common name	Height (m)	Spread (m)	D.B.H. (mm)	D.A.B. (mm)										
G15	<i>Elaeocarpus reticulatus</i> (Blueberry Ash)	1-5	1x1	≈70	≈100	N	G	Y	M	L	N	2	1.5	Grouping of five individual specimens at the western end of the line planting. Trees located within footprint of proposed Plaza concrete slab. DBH and DAB are average estimated measurements. Minimum TPZ and SRZ apply. Canopy density of eastern most tree considered to be low.	Remove



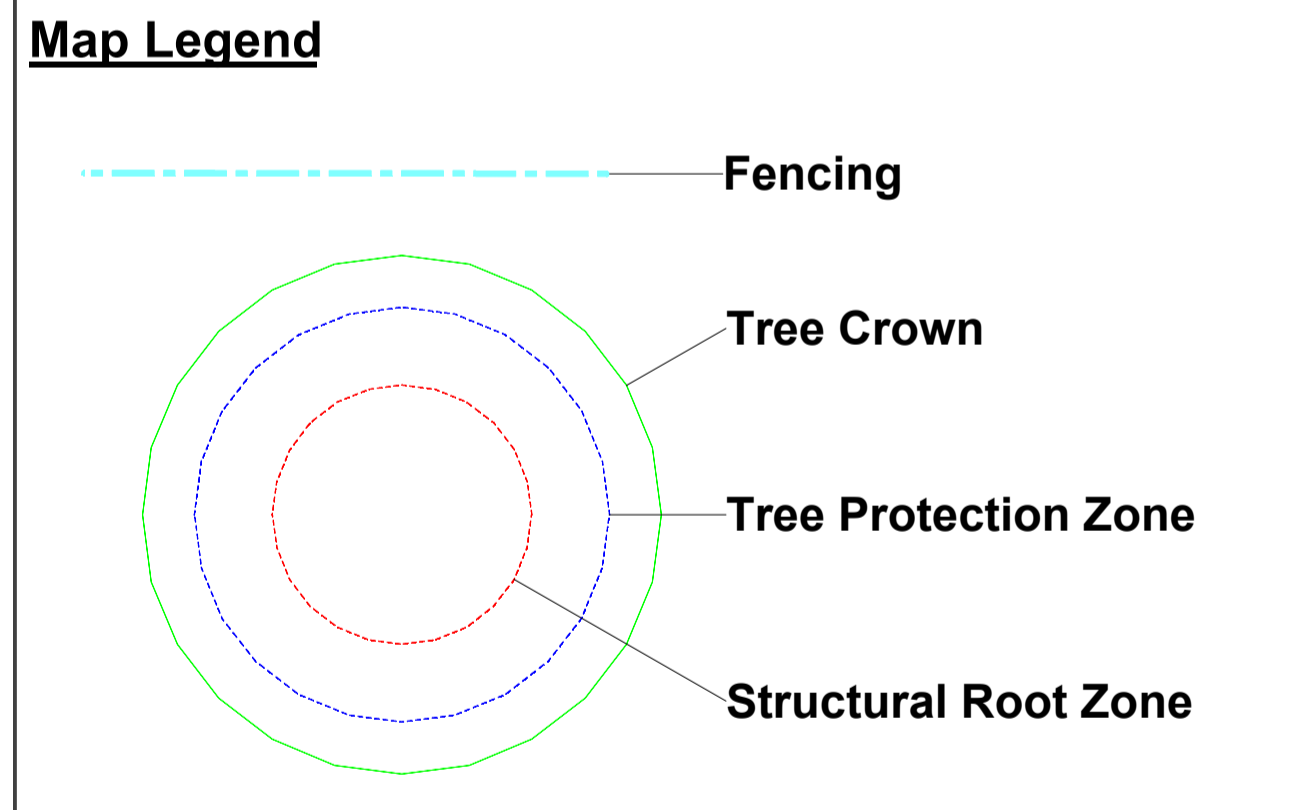
← TO SYDNEY

→ TO BANKSTOWN

ADJOINS DRAWINGS SMCSWSWM-MTM-WPS-LA-DWG-241720



- LEGEND**
- GENERAL**
- RAILCORP PROPERTY BOUNDARY
- FENCES/WALLS**
- NEW 2.4m HIGH SECURITY FENCE
- TREES**
- EXISTING TREES TO BE RETAINED
 - EXISTING TREES TO BE REMOVED
- LANDSCAPE**
- NEW PLANTING
 - NEW BUSH TUCKER GARDEN
 - Elacocarpus reticulatus*
 - Corymbia 'Summer Red'*
- HARDSCAPE**
- NEW PLAZA PAVING
 - NEW SEATING WALL
 - NEW RETAINING WALL
 - NEW CONCRETE STEP
 - NEW TACTILES
 - PROPOSED CUBE SEATING
 - EXTRA CONCRETE FOR UNDERPASS
- STREET FURNITURE**
- BIKE PARKING (HOOPS)
 - NEW METRO TOTEM
- LIGHTING**
- NEW LIGHTING TO BE CO-ORDINATED WITH LIGHTING ENGINEER
 - NEW WALL MOUNTED LIGHTING TO BE CO-ORDINATED WITH LIGHTING ENGINEER
 - NEW UP LIGHTING TO BE CO-ORDINATED WITH LIGHTING ENGINEER
- STREETSCAPE**
- EXISTING ELECTRICAL POLE



Urban Arbor Pty Ltd
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Site Location: Punchbowl Station
 Punchbowl NSW

SCALE : 1 : 200 @ A1 DATE : 1/14/2020



Appendix 1A - Proposed Site Plan North

Prepared by: Jack Williams, Urban Arbor Pty Ltd

APPENDIX 12.5 PUNCHBOWL AIA (PLATEAU TREES)

Date: 21 December 2021

Re: Additional tree removals at Punchbowl Station as part of the Southwest Metro Package.

At the request of Downer Group an onsite inspection was undertaken at Punchbowl Station. It has been asked to identify and record additional tree removals beyond those recommended within the Arboricultural Impact Assessment (AIA) prepared by Urban Arbor, dated 15 January 2020, Ref 20/01/15/SWMPB. On the 20 December a site walkthrough was undertaken by myself. Additional tree removals were identified under guidance of a Downer Group representative.

Two trees, being *Sapium sebiferum* (Chinese Tallowwood) tree 1 and *Cinnamomum camphora* (Camphor Laurel) tree 2 have been identified for removal. The trees are located within the alignment of excavations required to install the new high voltage and combined services route (CSR) conduits. As such, under the current design the trees cannot be retained.

At the time of the inspection the trees were found to be in good health and fair condition, consistent with their species type, age class and growing environment. Photographs of the trees can be found as **Appendix 1** Site Photographs. Tree data can be found as **Appendix 2** Tree assessment Schedule. **Appendix 3** details the tree assessment criteria.

Removal of the trees is not thought to pose a significant impact upon local amenity when taking into consideration the wider station upgrade works. Replacement planting with advanced tree stock is to be undertaken to offset the tree removals.

The trees are not representative of an endangered or threatened species or ecological community.

All appropriate approvals and consents are to be obtained prior to tree and vegetation removal works commencing. All tree removal works are to be undertaken by suitably qualified tree workers in accordance with Safe Work Australia's Guide to Managing Risks of Tree Trimming and Removal Works.

Please feel free to contact me should you require any further assistance regarding this matter.

Regards.

Owen Tebbutt



Plateau Trees

Appendix 1: Site Photographs



Photograph 1: The subject trees as seen from within the rail corridor. Tree 1 *Sapium sebiferum* (Chinese Tallowwood), tree 2 *Cinnamomum camphora* (Camphor Laurel).



Photograph 1: Showing the individual trunks of the subject trees.

Appendix 2: Tree Assessment Schedule

Tree number	Tree name	Tree dimensions				Vigour	Condition	Age class	ULE	Amenity and Visual Value	Native or Exotic	TPZ (m)	SRZ (m)	Comments	Remove or Retain
	Botanical name Common name	Height (m)	Spread (m)	D.B.H. (mm)	D.A.B. (mm)										
1	<i>Sapium sebiferum</i> (Chinese Tallowwood)	10-15	4x4	300 200	450	N	G	M	S	M	E	4.32	2.37	Tree has been pruned around overhead wires. Canopy offset from position of trunk. Tree trunk and root base is within the footprint of the permanent in-ground combined service route.	Remove
2	<i>Cinnamomum camphora</i> (Camphor Laurel)	5-10	0.5x0.5	100	200	N	G	Y	S	L	E	2	1.68	Tree likely to be self-seeded or sucker growth off root stock of adjacent tree. Suppressed by adjacent Chinese Tallowwood (Tree 1). Listed weed species under the Biosecurity Act 2015. Tree trunk and root base is within the footprint of the permanent in-ground combined service route.	Remove

Appendix 3: Tree Assessment Criteria

Tree number: Identifying number given to individual (or group) trees.

Botanical Name: Latin name for tree showing genus and species.

Common Name: The common name given to the tree.

Tree Dimensions: The physical dimensions of the tree.

- **Height:** Estimated or measured height of tree in meters.
- **Spread:** Estimated or measured radial canopy spread of tree in meters.
- **Diameter at Breast Height (DBH):** The estimated or measured diameter of trunk given in mm measured at 1.4m from ground.
- **Diameter Above Base (DAB):** The estimated or measured diameter of trunk given in mm measured above the root flare. Used to calculate the structural root zone of the tree.

Age Class: An estimation of how old the tree is in relation to its life expectancy.

- **Young** – Age less than 20% of life expectancy of tree in situ
- **Mature** – Age 20% - 80% of life expectancy of tree in situ
- **Old** – Age greater than 80% of life expectancy of tree in situ
- **Dead** – Tree is dead

Vigour: Ability of a tree to sustain its life processes. This is independent of the condition of a tree but may impact upon it. Vigour can appear to alter rapidly with change of seasons (seasonality) e.g., dormant, deciduous or semi-deciduous trees. Vigour can be categorised as Dormant, Low, Normal and High.

- **Dormant Vigour** – Determined by the existing turgidity in the lower order branches in the outer extremity of the crown, with good bud set and formation, and where the last extension growth is distinct from those most recently preceding it, evident by bud scale scars. Normal vigour during dormancy is achieved when such growth is evident on a majority of branches throughout the crown.
- **Low Vigour** – Reduced ability of a tree to sustain its life processes. This may be evident by the atypical growth of leaves, reduced crown cover and reduced crown density, branches, roots and trunk, and a deterioration of their functions with reduced resistance to predation. This is independent of the condition of a tree but may impact upon it, and especially the ability of a tree to sustain itself against predation.
- **Normal Vigour** – Ability of a tree to maintain and sustain its life processes. This may be evident by the typical growth of leaves, crown cover and crown density, branches, roots and trunk and resistance to predation. This is independent of the condition of a tree but may impact upon it, and especially the ability of a tree to sustain itself against predation.
- **High Vigour** – Accelerated growth of a tree due to incidental or deliberate artificial changes to its growing environment that are seemingly beneficial, but may result in premature aging or failure if the favourable conditions cease, or promote prolonged senescence if the favourable conditions remain, e.g. water from a leaking pipe, water and nutrients from a leaking or disrupted sewer pipe, nutrients from animal waste, a tree growing next to a chicken coop, or a stock feed lot, or a regularly used stockyard, a tree subject to stringent watering and fertilisation program, or some trees may achieve an extended lifespan from continuous pollarding practices over the life of the tree.

Condition: A tree's crown form and growth habit, as modified by its environment (aspect, suppression by other trees, soils) the stability and viability of the root plate, trunk and structural branches (first (1st) and possibly (2nd) order branches), including structural defects such as wounds, cavities or hollows, crooked trunk or weak trunk/branch junctions and the effects of predation by pests and diseases. These may not be directly connected with vigour and it is possible for a tree to be of normal vigour but in poor condition. Condition can be categorised as Dead, Poor, Fair and Good.

- **Dead Condition** – Tree is no longer capable of performing any of the following processes or is exhibiting any of the following symptoms; Photosynthesis via its foliage crown (as indicated by the presence of moist, green or other coloured leaves), Osmosis (the ability of the roots system to take up water), Turgidity (the ability of the plant to sustain moisture pressure in its cells), Epicormic shoots or epicormic strands in Eucalypts (the production of new shoots as a response to stress, generated from latent or adventitious buds or from a lignotuber), Permanent leaf loss, Permanent leaf wilting (the loss of turgidity which is marked by desiccation of stems leaves and roots), Abscission of the epidermis (bark desiccates and peels off to the beginning of the sap wood).
- **Poor Condition** - Tree is of good habit or misshapen, a form that may be severely restricted for space and light, exhibits symptoms of advanced and irreversible decline such as fungal, or bacterial infestation, major die-back in the branch and foliage crown, structural deterioration from insect damage e.g. termite infestation, or storm damage or lightning strike, ring barking from borer activity in the trunk, root damage or instability of the tree, or damage from physical wounding impacts or abrasion, or from altered local environmental conditions and has been unable to adapt to such changes and may decline further to death regardless of remedial works or other modifications to the local environment that would normally be sufficient to provide for its basic survival if in good to fair condition. Deterioration physically, often characterised by a gradual and continuous reduction in vigour but may be independent of a change in vigour, but characterised by a proportionate increase in susceptibility to, and predation by pests and diseases against which the tree cannot be sustained. Such conditions may also be evident in trees of advanced senescence due to normal phenological processes, without modifications to the growing environment or physical damage having been inflicted upon the tree. This may be independent from, or contributed to by vigour.
- **Fair Condition** - Tree is of good habit or misshapen, a form not severely restricted for space and light, has some physical indication of decline due to the early effects of predation by pests and diseases, fungal, bacterial, or insect infestation, or has suffered physical injury to itself that may be contributing to instability or structural weaknesses, or is faltering due to the modification of the environment essential for its basic survival. Such a tree may recover with remedial works where appropriate, or without intervention may stabilise or improve over time, or in response to the implementation of beneficial changes to its local environment. This may be independent from, or contributed to by vigour.
- **Good Condition** - Tree is of good habit, with crown form not severely restricted for space and light, physically free from the adverse effects of predation by pests and diseases, obvious instability or structural weaknesses, fungal, bacterial or insect infestation and is expected to continue to live in much the same condition as at the time of inspection provided conditions around it for its basic survival do not alter greatly. This may be independent from, or contributed to by vigour.

Useful Life Expectancy (ULE) ULE is the length of time that the arborist assesses an individual tree can be retained with an acceptable level of risk based on the information available at the time of inspection. It is a snapshot in time of the potential an individual tree has for survival in the eyes of the assessor. ULE is not static – it is closely related to tree health and the surrounding conditions. Alterations in these variables may result in changes to the ULE assessment. Consequently, the reliability all ULE assessments have will decrease as time passes from the initial assessment and the potential for changes in variables increases.

- **Remove** – Trees that should be removed within the next 5 years
- **Short** – Trees that appear to be retainable at the time of the assessment for 5-15 years with an acceptable level of risk.
- **Medium** – Trees that appear to be retainable at the time of the assessment for 15-40 years with an acceptable level of risk.
- **Long** – Trees that appear to be retainable at the time of the assessment for 40+ years with an acceptable level of risk.

Amenity and Visual Value – For the purposes of assessing the visual and landscape value of each tree the IACA Significance of a Tree, Assessment Rating System (STARS) © (IACA 2010) © has been adopted. - The landscape significance of a tree is an essential criterion to establish the importance that a particular tree may have on a site. The system uses a scale of High, Medium and Low significance in the landscape.

High significance in landscape

- The tree is in good condition and good vigour
- The tree has a form typical for the species
- The tree is a remnant or is a planted locally indigenous specimen and/or is rare or uncommon in the local area or of botanical interest or of substantial age
- The tree is listed as a heritage item, threatened species or part of an endangered ecological community or listed on council's significant tree register
- The tree is visually prominent and visible from a considerable distance when viewed from most directions within the landscape due to its size and scale and makes a positive contribution to the local amenity
- The tree supports social and cultural sentiments or spiritual associations, reflected by the broader population or community group or has commemorative values
- The tree's growth is unrestricted by above and below ground influences, supporting its ability to reach dimensions typical for the taxa in situ – tree is appropriate to the site conditions

Medium significance in landscape

- The tree is in fair-good condition and good or low vigour
- The tree has form typical or atypical of the species
- The tree is a planted locally indigenous or a common species with its taxa commonly planted in the local area
- The tree is visible from surrounding properties, although not visually prominent as partially obstructed by other vegetation or buildings when viewed from the street
- The tree provides a fair contribution to the visual character and amenity of the local area
- The tree's growth is moderately restricted by above or below ground influences, reducing its ability to reach dimensions typical for the taxa in situ

Low significance in landscape

- The tree is in fair-poor condition and good or low vigour
- The tree has form atypical of the species
- The tree is not visible or is partly visible from the surrounding properties as obstructed by other vegetation or buildings
- The tree provides a minor contribution or has a negative impact on the visual character and amenity of the local area
- The tree is a young specimen which may or may not have reached dimensions to be protected by local Tree Preservation Orders or similar protection mechanisms and can easily be replaced with a suitable specimen
- The tree's growth is severely restricted by above or below ground influences, unlikely to reach dimensions typical for the taxa in situ – tree is inappropriate to the site conditions
- The tree is listed as exempt under the provisions of the local Council Tree Preservation Order or similar protection mechanisms
- The tree has a wound or defect that has the potential to become structurally unsound
- **Environmental Pest / Noxious Weed Species**
- The tree is an environmental pest species due to its invasiveness or poisonous/allergenic properties.
- The tree is a declared noxious weed by legislation
- **Hazardous / Irreversible Decline**
- The tree is structurally unsound and/or unstable and is considered potentially dangerous
- The tree is dead, or is in irreversible decline, or has the potential to fail or collapse in full or in part in the immediate to short term

The tree is to have a minimum of three (3) criteria in a category to be classified in that group.

In the development of this document IACA acknowledges the contribution and original concept of the Footprint Green Tree Significance & Retention Value Matrix, developed by Footprint Green Pty Ltd in June 2010.

The Australian Standard 4970-2009 Protection of Trees on Development Sites defines the requirements for assessing trees with respect to development. It provides the guidance on how to decide which trees are appropriate for retention and on the means of protecting them during construction works. It describes the areas and offsets, referred to as the Tree Protection Zone (TPZ) and Structural Root Zone (SRZ) required to be free from development works to maintain tree vitality and stability. This report has been prepared in accordance with the conditions set out within the standard.

- **Tree Protection Zone** – The tree protection zone is defined as a specified area above and below ground set aside for the protection of the tree's roots and crown. It is expressed as a radial measurement taken from the centre of the trunk at ground level.
- **Structural Root Zone** – The structural root zone is defined as a specified area around the base of a tree required to maintain its stability within the ground. It is expressed as a radial measurement taken from the center of the trunk at ground level. Excavation and development works are not recommended within the structural root zone unless additional investigation as to root size and location is undertaken

APPENDIX 12.6 PUNCHBOWL AIA (PLATEAU TREES)

Tree Pruning Report

Prepared for: Downer Group

Site Address: Punchbowl Station
Punchbowl Road
Punchbowl
NSW
2196

Date: 22 January 2022

Prepared by: Owen Tebbutt
Consulting Arborist
Plateau Tree Service
Diploma in Horticulture (Arboriculture) Ryde TAFE 2006

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1.0 Introduction

1.1 Background

1.1.1 This tree pruning report has been prepared for Downer Group. It has been asked to identify and assess the pruning requirements needed to provide vegetation clearances to allow for crane lifting operations at Punchbowl Station as part of the Southwest Metro Project.

1.1.2 The station upgrade works involve the installation of prefabricated lift shafts. It has been advised that the prefabricated lift shafts arrive onsite on the semi-trailers and are to be lifted into place using a mobile slew crane. One tree being *Populus nigra 'Italica'* (Lombardy Poplar) located within the car park area adjacent The Boulevard has been identified for selective pruning to allow for clearances to undertake these operations.

1.1.3 The following documentation was reviewed and assists in the preparation of this report:

- Bankstown Development Control Plan (DCP) 2015 Part B11, Tree Management Order
- Bankstown Tree Management Manual, June 2015, V. 1 Ref.602

1.1.4 This report is to be used in its entirety only. Any written or verbal submission, report or presentation that includes statements taken from the findings, discussions, conclusions or recommendations made in this report may only be used where the whole original report (or a copy) is referenced to and directly attached to that submission, report or presentation. Information contained in the report covers only the trees that were inspected and reflects the trees condition at the time of the inspection. There is no guarantee, expressed or implied, that problems or deficiencies of the subject trees may not arise in the future.

2.0 Inspection Methodology

- 2.1 On the 20 January 2022 an inspection of the tree was undertaken.
- 2.2 A 5m high clearance envelop has been identified in order to undertake the lifting operations. Branches thought to conflict with the lifting operations were identified for pruning through selective removal or reduction. The diameter of the branch, at the branch collar or growth point, has been recorded along with the approximate percentage of the total canopy volume they represent.
- 2.3 Data collected during the on-site inspection of the tree can be found as **Appendix 1** Tree Assessment and Pruning Schedule. The tree(s) were assessed using the principles of a ground based Visual Tree Assessment (VTA)¹ and methods consistent with modern arboriculture. No aerial (climbing) inspection, tissue sampling or diagnostic testing was undertaken as part of the inspection process unless otherwise stated.
- 2.4 Photographs of the tree can be found as **Appendix 2**. Where possible individual branches required for removal have been identified and are highlighted within the photographs.
- 2.5 Tree assessment criteria can be found as **Appendix 3**.
- 2.6 Pruning recommendations take into consideration the requirements of AS4373-2007 Pruning of Amenity Trees.

3.0 The Tree

3.1 General

- 3.1.1 The assessed tree has been identified as *Populus nigra 'Italica'* (Lombardy Poplar) At the time of the inspection, they were found to be in generally good health and condition, consistent with its species type, age class and growing

¹ Mattheck, C. and Breloer, H (2006), *The Body Language of Trees – A Handbook for Failure Analysis*, The Stationary Office. Pages 118-122.

environment. **Appendix 2** photograph 1 shows the tree and illustrates the required clearance requirements.

- 3.1.2 Poplar species are identified as exempt from tree management controls under point 2.4(b) of Part B11 of the Bankstown DCP 22015. The station is not located within a Bankstown Conservation Corridor.

3.2 Wildlife and Habitat

- 3.2.1 No hollows or cavities that may contain, or are considered suitable for, wildlife nesting or habitation were observed within the tree. No arboreal mammals or birds were observed within the tree during the inspection.

3.3 Threatened Species and/or Ecological Communities

- 3.3.1 The tree is not listed as a threatened species or form part of an endangered ecological community under the Threatened Species Conservation Act 1995 or the Environment Protection and Biodiversity Conservation Act 1999.

3.4 Trees Located on Private Property

- 3.4.1 The trees are not located within private property.

3.5 Heritage

- 3.5.1 The subject tree and the site are not identified under Schedule 5 Environmental Heritage of the Bankstown Environment Plan 2015 nor are they located within a heritage conservation area.

4.0 Assessed Pruning Works

- 4.1 All branches identified for removal were assessed with respect to AS4373-2007 pruning of Amenity Trees. Under the provisions of AS4373 the assessed pruning works fall within the selective pruning class. This class of pruning is applicable to all tree species. Pruning method has been provided as part 5 of this report.
- 4.2 Tree 1 has been assessed as requiring the removal and reduction of three first order branches identified as A, B and C. Branch A is a dead branch 100mm in diameter located at 4m height. This branch is to be removed at the collar. Branch B is 120mm diameter located at 4m height. This branch is to be removed at the

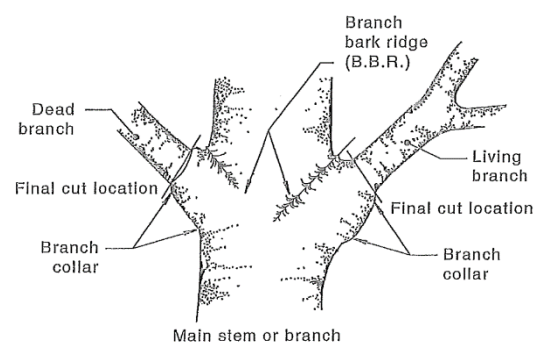
collar. Branch C is 150mm diameter located at 4m height. The branch is to be reduced to suitable growth point. Various epicormic shoots originating from the base of the trunk shall require removal. Additional second order branches less than 60mm in diameter may require removal to achieve clearances. These are to be removed as required to obtain the required clearances. The total pruning works constitute less than 10% of the total canopy volume of the tree and are considered to be minor pruning works. A short-term reduction in growth and physiological function can be expected as a result of the pruning works. Pruning wounds for branches A, B and C shall expose internal woody tissues which may become points of infection for decay causing fungi. **Appendix 2** photographs 2 and 3 shows branches identified for pruning.

4.5 The visual amenity of the tree is not expected to be significantly altered as a result of the prescribed pruning. Sightlines to the trees are thought to be limited to vehicles and pedestrians using the carpark and the junction of The Boulevard and Mathews Street.

5.0 Pruning Method

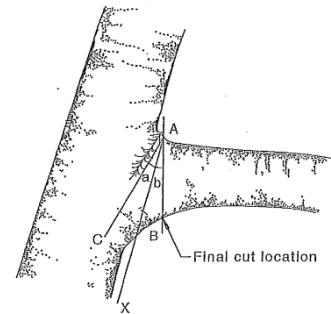
5.1 All tree pruning works are to be undertaken by suitably qualified tree workers (minimum AQF level 3 or equivalent) and in accordance with AS4373-2007 Pruning of Amenity Trees and Safe Work Australia's Guide to Managing Risks of Tree Trimming and Removal Works. All appropriate approvals and consents are to be obtained prior to tree removal works commencing.

5.2 Natural target pruning is the removal of branches, stems, and stubs such that final cuts are achieved as close as possible to the branch collar without cutting into it, or leaving a protruding stub. The branch collar is an area of overlapping trunk and branch tissue forming a swelling around the base of many branches. It contains defensive chemicals that prevent infection from bacterial



and/or fungal pathogens. The associated diagram shows final cut locations when undertaking pruning works.

5.3 On branches where the branch bark collar cannot be found, the branch bark ridge is to be used as a pruning guide. Line A to X is a line parallel to the trunk occurring just outside the branch bark ridge. Line A to C indicates the angle of the branch bark ridge and line A to B represents the angle and location of the final cut. Angle 'a' should equal angle 'b'.



5.4 The cutting of branches which results in a stub, referred to as lopping, is regarded as an unacceptable practice, except in certain circumstances. Lopping may result in:

- An increased rate of shoot production and elongation, which is weakly attached to the parent tree
- Decay of the stubs
- Poor form and visual amenity
- Reduced life expectancy of the tree
- Pre-disposing the tree to pathogenic infection and insect attack

6.0 Conclusions

- 6.1 At the time of the inspection the subject tree was found to be in generally good health and condition.
- 6.2 The prescribed pruning works are considered to be minor and are unlikely to significantly impact upon the health, condition and vitality of the tree in the short-term. The visual impacts of the pruning works are not considered to be significant given their extent.
- 6.3 Pruning works are to be undertaken as prescribed within this report.
- 6.4 In the interests of maintaining tree health and to minimise its visual impact all pruning works are to be kept to the minimal amount required to achieve the required 5m clearances. Where possible the final cuts are to be made so that the smallest wound area is left on the tree.
- 6.5 The trees are to be inspected by a suitably qualified arborist (minimum AQF 5 or equivalent) 12 months after completion of pruning works. At a minimum the inspection is to include:
- An assessment of the vigour, vitality and condition of the tree
 - An assessment for the presence of decay at the pruning sites
 - An assessment of the development of wound wood around the pruning site
 - An assessment of the development of epicormic shoots at or near to the pruning site

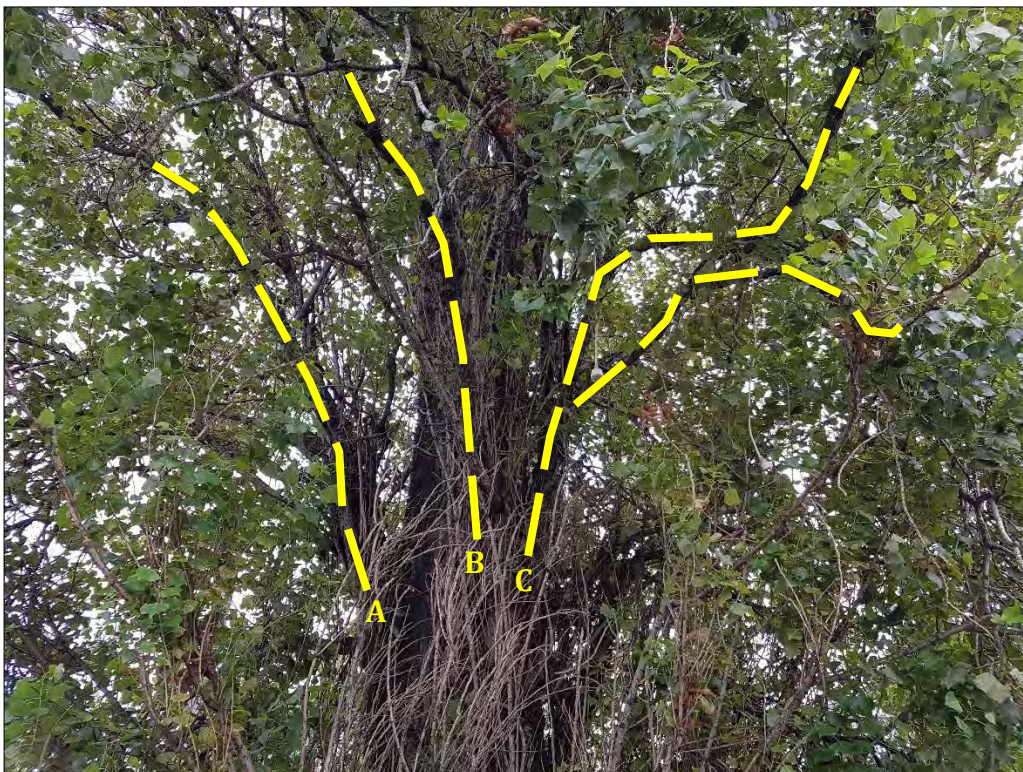
Appendix 1: Tree Assessment and Pruning Schedule

Tree number	Tree name	Tree dimensions			Vigour	Condition	Age class	ULE	Landscape Significance	Pruning Requirements	Estimated % of Live Canopy Loss	Impacts/Comments
	Botanical name Common name	Height (m)	Spread (m)	D.B.H. (mm)								
1	<i>Populus nigra 'Italica'</i> (Lombardy Poplar)	20-25	4x4	900	N	G	M	S	M	Branch A- 100mm diameter first order dead branch at 4m height, remove branch to collar Branch B- 120mm diameter first order branch at 4m height, remove branch to collar Branch C- 150mm diameter first order branch at 4m height, remove branch to collar Various epicormic shoots <30mm in diameter originating from the base of the trunk Various secondary branches <60mm diameter as and where needed to obtain clearances.	<10%	Short-term reduction in tree growth and physiological function. Pruning wounds large enough to expose internal woody tissues. Potential exists for wound area to be infected with decay causing fungi. Possible epicormic response throughout canopy.

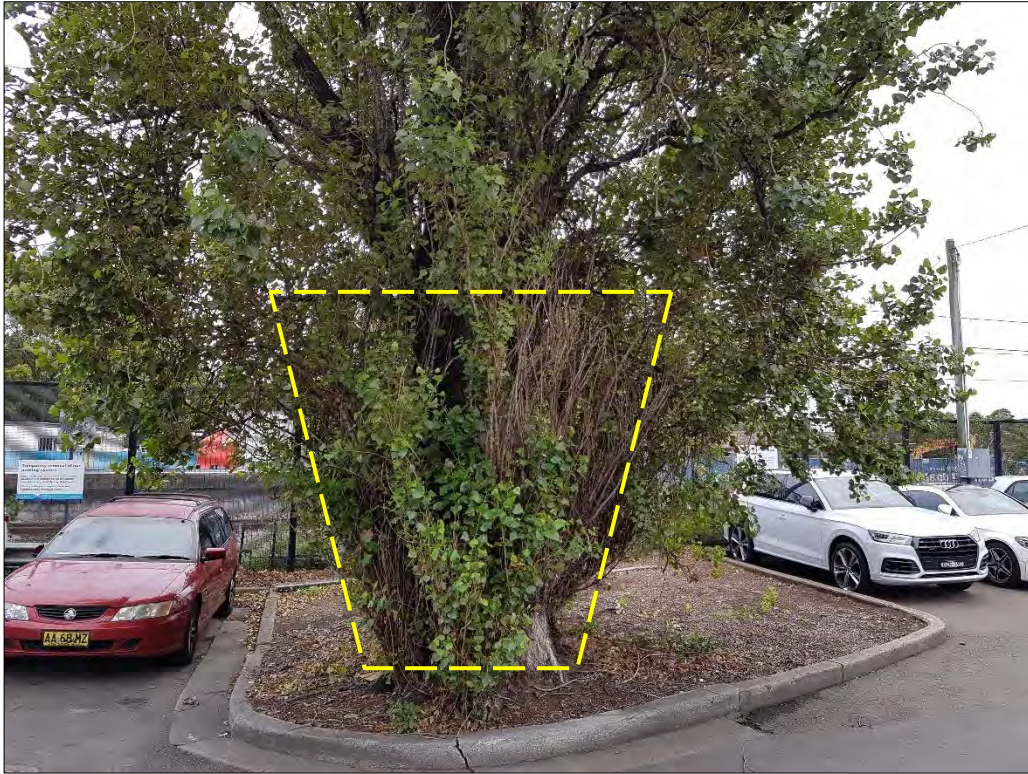
Appendix 2: Photographs



Photograph 1: Tree 1 *Populus nigra* 'Italica' (Lombardy Poplar as seen from the carpark area adjacent The Boulevard. 5m of vertical clearance is required from the outside edge of kerb adjacent the base of the tree.



Photograph 2: Branches A, B and C identified for removal.



Photograph 3: Multiple epicormic shoots originating from the base of the trunk are to be removed.

Appendix 3: Tree Assessment Criteria

Tree number: Identifying number given to individual (or group) trees.

Botanical Name: Latin name for tree showing genus and species.

Common Name: The common name given to the tree.

Tree Dimensions: The physical dimensions of the tree.

- **Height:** Estimated or measured height of tree in meters.
- **Spread:** Estimated or measured radial canopy spread of tree in meters.
- **Diameter at Breast Height (DBH):** The estimated or measured diameter of trunk given in mm measured at 1.4m from ground.

Age Class: An estimation of how old the tree is in relation to its life expectancy.

- **Young** – Age less than 20% of life expectancy of tree in situ
- **Mature** – Age 20% - 80% of life expectancy of tree in situ
- **Old** – Age greater than 80% of life expectancy of tree in situ
- **Dead** – Tree is dead

Vigour: Ability of a tree to sustain its life processes. This is independent of the condition of a tree but may impact upon it. Vigour can appear to alter rapidly with change of seasons (seasonality) e.g., dormant, deciduous or semi-deciduous trees. Vigour can be categorised as Dormant, Low, Normal and High.

- **Dormant Vigour** – Determined by the existing turgidity in the lower order branches in the outer extremity of the crown, with good bud set and formation, and where the last extension growth is distinct from those most recently preceding it, evident by bud scale scars. Normal vigour during dormancy is achieved when such growth is evident on a majority of branches throughout the crown.
- **Low Vigour** – Reduced ability of a tree to sustain its life processes. This may be evident by the atypical growth of leaves, reduced crown cover and reduced crown density, branches, roots and trunk, and a deterioration of their functions with reduced resistance to predation. This is independent of the condition of a tree but may impact upon it, and especially the ability of a tree to sustain itself against predation.
- **Normal Vigour** – Ability of a tree to maintain and sustain its life processes. This may be evident by the typical growth of leaves, crown cover and crown density, branches, roots and trunk and resistance to predation. This is independent of the condition of a tree but may impact upon it, and especially the ability of a tree to sustain itself against predation.
- **High Vigour** – Accelerated growth of a tree due to incidental or deliberate artificial changes to its growing environment that are seemingly beneficial, but may result in premature aging or failure if the favourable conditions cease, or promote prolonged senescence if the favourable conditions remain, e.g. water from a leaking pipe, water and nutrients from a leaking or disrupted sewer pipe, nutrients from animal waste, a tree growing next to a chicken coop, or a stock feed lot, or a regularly used stockyard, a tree subject to stringent watering and fertilisation program, or some trees may achieve an extended lifespan from continuous pollarding practices over the life of the tree.

Condition: A tree's crown form and growth habit, as modified by its environment (aspect, suppression by other trees, soils) the stability and viability of the root plate, trunk and structural branches (first (1st) and possibly (2nd) order branches), including structural defects such as wounds, cavities or hollows, crooked trunk or weak trunk/branch junctions and the effects of predation by pests and diseases. These may not be directly connected with vigour and it is possible for a tree to be of normal vigour but in poor condition. Condition can be categorised as Dead, Poor, Fair and Good.

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- **Poor Condition** - Tree is of good habit or misshapen, a form that may be severely restricted for space and light, exhibits symptoms of advanced and irreversible decline such as fungal, or bacterial infestation, major die-back in the branch and foliage crown, structural deterioration from insect damage e.g. termite infestation, or storm damage or lightning strike, ring barking from borer activity in the trunk, root damage or instability of the tree, or damage from physical wounding impacts or abrasion, or from altered local environmental conditions and has been unable to adapt to such changes and may decline further to death regardless of remedial works or other modifications to the local environment that would normally be sufficient to provide for its basic survival if in good to fair condition. Deterioration physically, often characterised by a gradual and continuous reduction in vigour but may be independent of a change in vigour, but characterised by a proportionate increase in susceptibility to, and predation by pests and diseases against which the tree cannot be sustained. Such conditions may also be evident in trees of advanced senescence due to normal phenological processes, without modifications to the growing environment or physical damage having been inflicted upon the tree. This may be independent from, or contributed to by vigour.
- **Fair Condition** - Tree is of good habit or misshapen, a form not severely restricted for space and light, has some physical indication of decline due to the early effects of predation by pests and diseases, fungal, bacterial, or insect infestation, or has suffered physical injury to itself that may be contributing to instability or structural weaknesses, or is faltering due to the modification of the environment essential for its basic survival. Such a tree may recover with remedial works where appropriate, or without intervention may stabilise or improve over time, or in response to the implementation of beneficial changes to its local environment. This may be independent from, or contributed to by vigour.
- **Good Condition** - Tree is of good habit, with crown form not severely restricted for space and light, physically free from the adverse effects of predation by pests and diseases, obvious instability or structural weaknesses, fungal, bacterial or insect infestation and is expected to continue to live in much the same condition as at the time of inspection provided conditions around it for its basic survival do not alter greatly. This may be independent from, or contributed to by vigour.

Useful Life Expectancy (ULE) ULE is the length of time that the arborist assesses an individual tree can be retained with an acceptable level of risk based on the information available at the time of inspection. It is a snapshot in time of the potential an individual tree has for survival in the eyes of the assessor. ULE is not static – it is closely related to tree health and the surrounding conditions. Alterations in these variables may result in changes to the ULE assessment. Consequently, the reliability all ULE assessments have will decrease as time passes from the initial assessment and the potential for changes in variables increases.

- **Remove** – Trees that should be removed within the next 5 years
- **Short** – Trees that appear to be retainable at the time of the assessment for 5-15 years with an acceptable level of risk.
- **Medium** – Trees that appear to be retainable at the time of the assessment for 15-40 years with an acceptable level of risk.
- **Long** – Trees that appear to be retainable at the time of the assessment for 40+ years with an acceptable level of risk.

Landscape significance – For the purposes of assessing the visual and landscape value of each tree the IACA Significance of a Tree, Assessment Rating System (STARS) © (IACA 2010) © has been adopted. - The landscape significance of a tree is an essential criterion to establish the importance that a particular tree may have on a site. The system uses a scale of High, Medium and Low significance in the landscape.

High significance in landscape

- The tree is in good condition and good vigour
- The tree has a form typical for the species
- The tree is a remnant or is a planted locally indigenous specimen and/or is rare or uncommon in the local area or of botanical interest or of substantial age
- The tree is listed as a heritage item, threatened species or part of an endangered ecological community or listed on council's significant tree register
- The tree is visually prominent and visible from a considerable distance when viewed from most directions within the landscape due to its size and scale and makes a positive contribution to the local amenity
- The tree supports social and cultural sentiments or spiritual associations, reflected by the broader population or community group or has commemorative values
- The tree's growth is unrestricted by above and below ground influences, supporting its ability to reach dimensions typical for the taxa in situ – tree is appropriate to the site conditions

Medium significance in landscape

- The tree is in fair-good condition and good or low vigour
- The tree has form typical or atypical of the species
- The tree is a planted locally indigenous or a common species with its taxa commonly planted in the local area
- The tree is visible from surrounding properties, although not visually prominent as partially obstructed by other vegetation or buildings when viewed from the street
- The tree provides a fair contribution to the visual character and amenity of the local area
- The tree's growth is moderately restricted by above or below ground influences, reducing its ability to reach dimensions typical for the taxa in situ

Low significance in landscape

- The tree is in fair-poor condition and good or low vigour
- The tree has form atypical of the species
- The tree is not visible or is partly visible from the surrounding properties as obstructed by other vegetation or buildings
- The tree provides a minor contribution or has a negative impact on the visual character and amenity of the local area
- The tree is a young specimen which may or may not have reached dimensions to be protected by local Tree Preservation Orders or similar protection mechanisms and can easily be replaced with a suitable specimen
- The tree's growth is severely restricted by above or below ground influences, unlikely to reach dimensions typical for the taxa in situ – tree is inappropriate to the site conditions
- The tree is listed as exempt under the provisions of the local Council Tree Preservation Order or similar protection mechanisms
- The tree has a wound or defect that has the potential to become structurally unsound
- **Environmental Pest / Noxious Weed Species**
- The tree is an environmental pest species due to its invasiveness or poisonous/allergenic properties.
- The tree is a declared noxious weed by legislation
- **Hazardous / Irreversible Decline**
- The tree is structurally unsound and/or unstable and is considered potentially dangerous
- The tree is dead, or is in irreversible decline, or has the potential to fail or collapse in full or in part in the immediate to short term

The tree is to have a minimum of three (3) criteria in a category to be classified in that group.

In the development of this document IACA acknowledges the contribution and original concept of the Footprint Green Tree Significance & Retention Value Matrix, developed by Footprint Green Pty Ltd in June 2010.

APPENDIX 12.7 CCBC APPROVAL FOR TREE REMOVAL AT PUNCHBOWL STATION

ACKNOWLEDGEMENT OF TREE REMOVAL AND TREE PRUNING

Date: 29 June 2021

Location: Punchbowl Station, Urunga Parade

Contractor: Downer

This Notice serves as Council's acknowledgement of Package 5 Sydney Metro - Tree Removal on Council Land - Punchbowl Station, Urunga Parade, proposal to prune/remove 8 Council street trees, as identified in the Aboricultural Impact Assessment (AIA), to facilitate the works subject to approved State Significant Infrastructure 8256 (SSI).

At the conclusion of removal and/or pruning works, you are requested to confirm the extent of trees removed and/or pruned for the purpose of Council updating its asset register.

I note that, pursuant to Condition E4, replacement plantings shall be:

1. At a ratio of 2:1
2. Replacement trees must be planted within the project boundary or on public land up to 500 metres of the project boundary.

Accordingly, please liaise with the undersigned for the purposes of consulting on the replacement planting, where relevant.

Wayne Bromfield
Team Leader Open Space Services

Mark Trethewy

From: James Magsipoc <James.Magsipoc@cbc.city.nsw.gov.au>
Sent: Tuesday, 29 June 2021 3:16 PM
To: Luke Fraser
Cc: Mark Trethewy; Ash Jarvis; Ben Webb; Peter Anderson
Subject: FW: Package 5 Sydney Metro - Approval sought for Tree Removal on Council Land - Punchbowl Station, Urunga Parade
Attachments: Tree Removal and Pruning-Punchbowl Station. (002).doc

[External Email] This email was sent from outside the organisation – be cautious, particularly with links and attachments.

Hi Luke,

Herewith attach copy of Council approval to remove **8 trees** in Punchbowl Station. Please return email if you did receive the attachment.

Best regards,



James Magsipoc - Project Officer
T 02 9707 9771
E James.Magsipoc@cbc.city.nsw.gov.au
www.cbc.city.nsw.gov.au

@ourcbc.city
Link & Follow us



From: Luke Fraser <Luke.Fraser@Downergroup.com>
Sent: Friday, 18 June 2021 4:02 PM
To: James Magsipoc <James.Magsipoc@cbc.city.nsw.gov.au>
Cc: Ash Jarvis <Ash.Jarvis2@transport.nsw.gov.au>; Mark Trethewy <Mark.Trethewy@downergroup.com>
Subject: RE: Package 5 Sydney Metro - Approval sought for Tree Removal on Council Land - Punchbowl Station, Urunga Parade

James,

Do we have any update on the below vegetation clearance request.

Regards,

Luke Fraser
Interface Manager

Infrastructure Projects



M | 0437495678
E | Luke.Fraser@Downergroup.com
Unit 2, 6-16 Gallegan Street
Hexham NSW 2322

From: Mark Trethewy <Mark.Trethewy@downergroup.com>
Sent: Wednesday, 9 June 2021 1:37 PM
To: James Magsipoc <James.Magsipoc@cbcity.nsw.gov.au>
Cc: Ash Jarvis <Ash.Jarvis2@transport.nsw.gov.au>; Luke Fraser <Luke.Fraser@Downergroup.com>
Subject: RE: Package 5 Sydney Metro - Approval sought for Tree Removal on Council Land - Punchbowl Station, Urunga Parade

Hi James,

Thank you very much, please let me know when you would like to inspect.

Regards,

Mark Trethewy
Environment and Sustainability Advisor
Infrastructure Projects



T | +61 427 299 517
E | Mark.Trethewy@downergroup.com
T3, Trinit Business Campus, 39 Delhi Road
North Ryde NSW 2113

From: James Magsipoc <James.Magsipoc@cbcity.nsw.gov.au>
Sent: Wednesday, 9 June 2021 12:59 PM
To: Mark Trethewy <Mark.Trethewy@downergroup.com>
Cc: Ash Jarvis <Ash.Jarvis2@transport.nsw.gov.au>
Subject: RE: Package 5 Sydney Metro - Approval sought for Tree Removal on Council Land - Punchbowl Station, Urunga Parade

[External Email] This email was sent from outside the organisation – be cautious, particularly with links and attachments.

Hi Mark,

We will update you and will organise site inspection of 8 trees as soon I have a schedule from Council Tree Management team.

Best regards,



James Magsipoc - Project Officer
T 02 9707 9771
E James.Magsipoc@cbcity.nsw.gov.au
www.cbcity.nsw.gov.au



From: Mark Trethewy <Mark.Trethewy@downergroup.com>
Sent: Wednesday, 9 June 2021 12:38 PM
To: James Magsipoc <James.Magsipoc@cbcity.nsw.gov.au>
Cc: Luke Fraser <Luke.Fraser@Downergroup.com>; Ash.Jarvis2@transport.nsw.gov.au;
Kevin.Cao@transport.nsw.gov.au; Paul Cejka <Paul.Cejka2@Downergroup.com>; Ryan O'Leary <Ryan.OLeary@Downergroup.com>; Gareth O'Brien <Gareth.OBrien@Downergroup.com>
Subject: Package 5 Sydney Metro - Approval sought for Tree Removal on Council Land - Punchbowl Station, Urunga Parade

Hi James,

I'm the Environment & Sustainability Advisor for Package 5 Sydney Metro – Punchbowl Station.

Could you please review the attached arborist report and confirm the following depicted trees at Urunga Parade can be removed?

The trees in question (identified below), are currently within the final Project design and as such require removal to facilitate the construction of the Project.

In total 8 trees are required to be removed that reside on council land.

Feel free to contact me should you require any further detail or clarification.

2. THE SITE



Figure 1: Street view of the subject trees taken from Urunga Parade, Punchbowl (neommap 2021).



Figure 2: Location of the subject trees shown in red (neommap 2021).

3 Re: Punchbowl Train Station Upgrade

Regards,

Mark Trethewy
Environment and Sustainability Advisor
Infrastructure Projects



T | +61 427 299 517
E | Mark.Trethewy@downergroup.com
T3, Triniti Business Campus, 39 Delhi Road
North Ryde NSW 2113

Downer

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MEMO FROM CITY DESIGN

From: Nina Kierath, Senior Landscape Architect

Date: 11 November 2021

Subject: South West Metro, Punchbowl Station, Punchbowl

I refer to the application for tree removal at South West Metro, Punchbowl Station, Punchbowl.

I have reviewed the Arboricultural Impact Assessment Report (Ref; 211027-SWMPs-AIA, rev; C) prepared by Jack Williams and Bryce Claassens of Urban Arbor PL on the 27th of October 2021 and Sydney Metro Southwest Punchbowl Station Landscape design package No. 241 both submitted to Council on the 4th of November 2021 and recommend the following:

- The following trees are to be retained and protected during demolition and construction (the tree numbers relate to the numbering used to identify each tree in the Arboricultural Impact Assessment Report (Ref; 211027-SWMPs-AIA, rev; C);

Tree No.	Botanical Name	Common Name	TPZ/SRZ m radius
722	<i>Corymbia maculata</i>	Spotted gum	4.8m/2.4m
723	<i>Corymbia citriodora</i>	Lemon Scented Gum	3.6m/2.2m
724	<i>Lophostemon confertus</i>	Brushbox	4.9m /2.4m
725	<i>Corymbia citriodora</i>	Lemon Scented Gum	4.1m /2.3m
726	<i>Lophostemon confertus</i>	Brushbox	5.4m /2.5m
727	<i>Corymbia citriodora</i>	Lemon Scented Gum	3.9m /2.4m
728	<i>Corymbia citriodora</i>	Lemon Scented Gum	4.0m/2.2m
729	<i>Callstemon viminalis</i>	Weeping Bottlebrush	2.0m/1.5m
732	<i>Corymbia citriodora</i>	Lemon Scented Gum	5.3m/2.5m
733	<i>Eucalyptus moluccana</i>	Grey box	4.9m/2.3m
737	<i>Callstemon viminalis</i>	Weeping Bottlebrush	3.6m/2.1m
738	<i>Callstemon viminalis</i>	Weeping Bottlebrush	3.6m/2.1m
739	<i>Callstemon viminalis</i>	Weeping Bottlebrush	4.2m/2.3m
3348	<i>Eucalyptus pilularis</i>	Blackbutt	3.2m/2.1m
3351	<i>Eucalyptus botryoides</i>	Woolybutt	5.9m/2.6m
3353	<i>Eucalyptus scoparia</i>	Wallangarra White gum	7.0m/2.8m

3354	<i>Cinnamomum camphora</i>	Camphor laurel	3.2m/2.4m
3357	<i>Cinnamomum camphora</i>	Camphor laurel	2.5m/2.1m
3358	<i>Eucalyptus pilularis</i>	Blackbutt	2.8m/1.9m
3362	<i>Cinnamomum camphora</i>	Camphor laurel	3.0m/2.3m
3364	<i>Eucalyptus pilularis</i>	Blackbutt	4.0m/2.3m
3366	<i>Eucalyptus botryoides</i>	Woollybutt	10.0m/3.3m
3367	<i>Cinnamomum camphora</i>	Camphor laurel	2.3m/2.4m
3368	<i>Cinnamomum camphora</i>	Camphor laurel	2.8m/2.2m
3369	<i>Cinnamomum camphora</i>	Camphor laurel	3.0m/2.0m
3370	<i>Cinnamomum camphora</i>	Camphor laurel	2.0m/1.6m
3371	<i>Eucalyptus botryoides</i>	Woollybutt	5.3m/2.5m
3372	<i>Cinnamomum camphora</i>	Camphor laurel	4.8m/2.3m
3373	<i>Populus nigra 'Italica'</i>	Lombardy Poplar	5.9m/2.6m
3374	<i>Populus nigra 'Italica'</i>	Lombardy Poplar	4.0m/2.3m

These trees are to be retained and protected during demolition and construction in accordance with all recommendations, advise and guidelines provided in a Tree Management Plan, to be prepared by an AQF Level 5 Registered Consulting Arborist with a minimum 5 years industry experience and submitted to Council. The Tree Management Plan is to include but is not limited to;

1. All recommendations, advise and guidelines provided in the Arboricultural Impact Assessment report (prepared by Jack Williams and Bryce Claassens of Urban Arbor PL on the 27th of October 2021 and submitted to council the 4th of November 2021) and the Australian Standard AS 4970-2009 Protection of trees on development sites.
2. The engagement of an AQF Level 5 Registered Arborist as a project arborist to supervise the building works and certify compliance with all Tree protection measures as specified above. Contact details of this project arborist are to be forwarded to council.
3. The project arborist shall be employed by the applicant to carry out the following:

- Carry out the protection of the trees to be retained during demolition and construction in accordance with all recommendations, advice and guidelines provided in the Tree Management Plan.
 - Establishment of the tree protection zone and erection of fencing and signage as per the above mentioned requirements.
 - Attendance on site regularly in accordance with section 5.4.1 of AS 4970 - 2009. Particularly, during any demolition and construction within the tree protection zones.
 - Any roots greater than 25mm in diameter that is exposed within 1m of the TPZ must be cleanly cut and kept moist.
 - Any remedial works that might be required for the tree, should these conditions and the tree protection plan have not been complied with.
 - Provide a final assessment of the tree condition, details of any works conducted to the tree and provision of certification that the tree protection works have been carried out in accordance with the requirements listed above at minimum as set out in Section 5.5.2 of AS 4970-2009. This certification is to be provided to the principle certifying authority and council at practical completion. The report must also include the following items at min:
 1. Full name, business address, telephone numbers, evidence of qualifications and experience of consulting arborist.
 2. Full address of the site
 3. Full name and details of the person/company the report is being prepared for.
 4. Details of their attendance on site
 5. Details of any work they had to complete on site
- The following trees may be removed to accommodate construction (the tree numbers relate to the numbering used to identify each tree in the Arboricultural Impact Assessment Report (Ref; 211027-SWMPS-AIA, rev; C);
 - 731, 734, 730, G15, 735, 736, 3346, 3347, 3349, 3350, 3352, 3355, 3356, 3359, 3360, 3361, 3363, 3365.

All tree removal is conditional on the replacement planting ratio of 3:1 as agreed with Council.

Yours sincerely,



Nina Kierath
SENIOR LANDSCAPE ARCHITECT