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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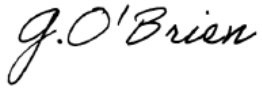
Gareth O'Brien – Environment and Sustainability Manager	

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Rev 9	22/12/2021	Endorsed	Incorporate additional stations scopes
Rev 10	27/01/2022	Endorsed	Incorporate additional stations scopes

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1 PURPOSE

This report has been produced to assess impacts to vegetation and detail the species and number of trees that will be removed as part of the Southwest Metro Package 5 and Package 6 works.
The report has been written in accordance with the requirements of the *Sydney Metro City & Southwest - Sydenham to Bankstown Tree Management Strategy* and *Sydney Metro City & Southwest - Sydenham to Bankstown - Instrument of Approval*, Condition of Approval E5.

2 PROJECT OVERVIEW AND LOCATION

The Sydney Metro City & Southwest project includes a new 30km metro line extending metro rail from the end of the Metro North West Line at Chatswood, under Sydney Harbour, through new Central Business District stations and southwest to Bankstown. It is due to open in 2024 with the ultimate capacity to run a metro train every two minutes each way through the centre of Sydney. Sydney Metro City & Southwest comprises two core components – the Chatswood to Sydenham project, and the Sydenham to Bankstown upgrade. This document refers to the Sydenham to Bankstown upgrade (herein referred to as the Southwest Metro (SWM) Project).

The SWM Project was declared to be State Significant Infrastructure (SSI) and Critical State Significant Infrastructure (CSSI) by a Ministerial order on 10 December 2015 under Section 5.12 (4) and 5.13 of the *Environmental Planning and Assessment Act 1979* (EP&A Act) (previously referred to as sections 115U(4) and 115V prior to amendment of the EP&A Act). An Environmental Impact Statement (EIS) (GHD/AECOM September 2017) was prepared and placed on public exhibition from 13 September 2017 to 8 November 2017. A Submissions and Preferred Infrastructure Report (SPIR) (GHD/AECOM June 2018) was prepared in response to the submissions received during the EIS exhibition period. The SPIR was placed on public exhibition from 20 June 2018 to 18 July 2018. A Submissions Report was then prepared by Sydney Metro (September 2018) in response to submissions received during the SPIR exhibition period. The project was approved by the Minister for Planning on 12 December 2018 (Planning Approval number SSI-8256).

A modification report for the SWM Project was prepared by Sydney Metro (May 2020) and placed on public exhibition from 21 May 2020 to 4 June 2020. A Submissions Report was prepared by Sydney Metro (September 2020) in response to the submissions received during the modification report exhibition period. The SWM Project Modification was determined by the Minister for Planning on 22 October 2020.

This document refers to the Southwest Metro Package 5 and Package 6 station upgrade works comprising of – Dulwich Hill, Campsie and Punchbowl Station (package 5) and Belmore, Hurlstone Park and Wiley Park (package 6) (the Project). Below is a description of the Construction scope for the Project:

Dulwich Hill Station

- Construction of new covered station concourse bridge from Bedford Crescent and Light Rail entry to Ewart Lane with connection to platforms;
- Refurbishment and reuse of overhead booking office;
- Refurbishment and reuse existing platform building;

- Provision of new safety rail to Wardell Road bridge adjacent to booking office;
- Construction of new landscaped public plaza incorporating lighting, seating and access to station entries;
- Construction of new platform building;
- Construction of new shared path linking Wardell Road and Ewart Lane;
- Construction of new stairs to Ewart Lane car park;
- Provision of accessible access to the pedestrian crossing at Wardell Road;
- Provision of new bicycle parking hoops;
- Construction of new service building and associated infrastructure;
- Platform works, including raising platform and provision of platform drainage. Installation of 1500mm deep tile zone, temporary tactiles and yellow safety line;
- Platform works also includes provision for platform edge screens (PES), platform screen doors (PSD) and mechanical gap fillers (MGF) (to be installed by others);
- Provision of new pedestrian lighting between Bedford Crescent and Keith Lane;
- Provision of new shelter and seat for kiss and ride on Bedford Crescent;
- Landscaping to the south of the station;
- Dudley Street bus interchange area works;
- Provision of new vertical protection screens to both sides of existing Wardell Road bridge;
- Provision of 2 new lifts and associated infrastructure, landings and canopies to lift entries;
- Installation of new security and segregation fencing;
- Construction of new Combined Services Route (CSR); and
- Services relocations / enabling works.

Campsie Station

- Refurbishment and reuse of heritage platform buildings;
- Construction of secured bike locker;
- Construction of new canopy over the concourse;
- Platform works, including raising platform and provision of platform drainage. Installation of 1500mm deep tile zone, temporary tactiles and yellow safety line;
- Platform works also includes provision for PES, PSD and MGF (to be installed by others);
- Replace open fencing on Beamish Street and renew existing planters;
- Installation of 16 x bike racks off North Parade in existing car park;
- Construction of new services building and associated infrastructure;
- Replacement of planter beds to corners of Beamish Street;
- Construction of new kiss and ride on South Parade;
- Installation of new security and segregation fencing;
- Construction of new CSR; and
- Services relocations / enabling works.

Punchbowl Station

- Repurpose and refurbishment of station rooms in Platform buildings 1 and 2;
- Provision of three new lifts and associated infrastructure, landings and canopies to lift entries and platform;
- Installation of new canopy over existing stair at Northern entry;
- Installation of new roof above the concourse bridge, Southern entry and platform stairs.

- Removal of hooped top fencing to station concourse overbridge and platform stairs and replaced with compliant glass screens and stair balustrades;
- Installation of new handrails;
- Removal of existing southern stairs, installation of new concrete slab at concourse level and new stairs further south;
- Platform works, including raising platform and provide platform drainage. Installation of 1500mm deep tile zone, temporary tactiles and yellow safety line. Provision of egress ramps off platform as required by fire life safety strategy;
- Platform works also includes provision for PES, PSD and MGF to be installed by others;
- Installation of new bike parking hoops off The Boulevarde and adjacent to the Northern entry;
- Installation of bollards to the edge of the carpark and extension to new paving to lift landing and edge of carpark;
- Landscaping to western end of Southern entry behind the retail properties;
- Mass planting to existing garden beds adjacent to Northern entry and replace timber logs;
- Upgrade to existing pedestrian pathway under Punchbowl Road, including handrail and fencing;
- Upgrade to existing lighting;
- Paint finish to wall and soffit and provision for CCTV;
- Landscaping and new lighting to Northern entry;
- Provision for pop-up retail in the park adjacent the Northern entry.
- Provision of kiss and ride on The Boulevarde;
- Construction of new service building, associated infrastructure and landscaping;
- Installation of new security fencing;
- Construction of retaining walls;
- Construction of new CSR; and
- Services relocations / enabling works.

Hurlstone Park Station

- Refurbishment and re-use of existing overhead booking office with new cladding and new canopy roof;
- Installation of bike parking hoops;
- Provision of new kiss and ride and taxi parking on Floss Street;
- New accessible carpark space at Duntroon Street;
- Construction of new service building
- Landscaped embankment treatment with new planting;
- Regrade platforms as per Metro requirements, including drainage and provision for platform screen doors, platform edge screens and mechanical gap fillers to Platform 1 and 2
- Refurbishment and re-use existing platform buildings;
- Extension of existing concourse and provision of new lifts and stairs, including canopies;
- Repair and repainting of existing fencing on corner of Duntroon Street and Crinan Street;
- Installation of new paving and provision of an extended kerb ramp on Duntroon Street;
- Installation of new vertical protection (anti-throw) screens to both sides of Duntroon Street overbridge; and

- Installation of new security and segregation fencing; and
- Construction of a new Combined Services Route.

Belmore Station

- Raise platform edges, regrade platform as required, provide platform drainage and emergency egress ramps from platforms to rail corridors as required;
- Provision for platform edge screens, platform screen doors and mechanical gap fillers
- Construction of new services building with associated landscaping;
- Replace existing seats and bins;
- Refurbish and reuse platform building;
- Provide associated passenger information displays;
- New vertical protection (anti-throw) screens to Burwood road bridge;
- New landscape works to the north and south of the station entrance, including landscaping, paving and relocation of existing bike parking and new bike parking;
- New shelter and seat to kiss and ride. New kiss and ride and taxi parking on Tobruk Avenue;
- New line marking to accessible parking within the station carpark off Tobruk Avenue;
- Installation of new security fencing;
- Construction of new Combined Services Route.

Wiley Park Station

- Provision of new accessible parking, kiss and ride and taxi spaces on The Boulevarde;
- Refurbishment and reuse of heritage overhead booking office;
- The existing station platforms would be removed, excavated and replaced within a like-for like concrete slab platform;
- Installation of new lifts and retaining walls;
- Refurbishment and reuse of heritage platform buildings;
- Construction of new services building including retaining wall construction;
- Construction of new concrete swale;
- Construction of new platform building and canopy;
- Installation of new public plaza, including paving, planters and bicycle parking;
- Installation of lighting to shared path between King Georges Road and Urunga Parade;
- Installation of errant vehicle bollards at King Georges Road and The Boulevarde intersection;
- Reinstatement of original station kiosk;
- New vertical protection screens to existing King Georges Road bridge;
- Installation of new security fencing; and
- Construction of new Combined Services Route.

An illustrative and aerial overview of each station scope is depicted below:

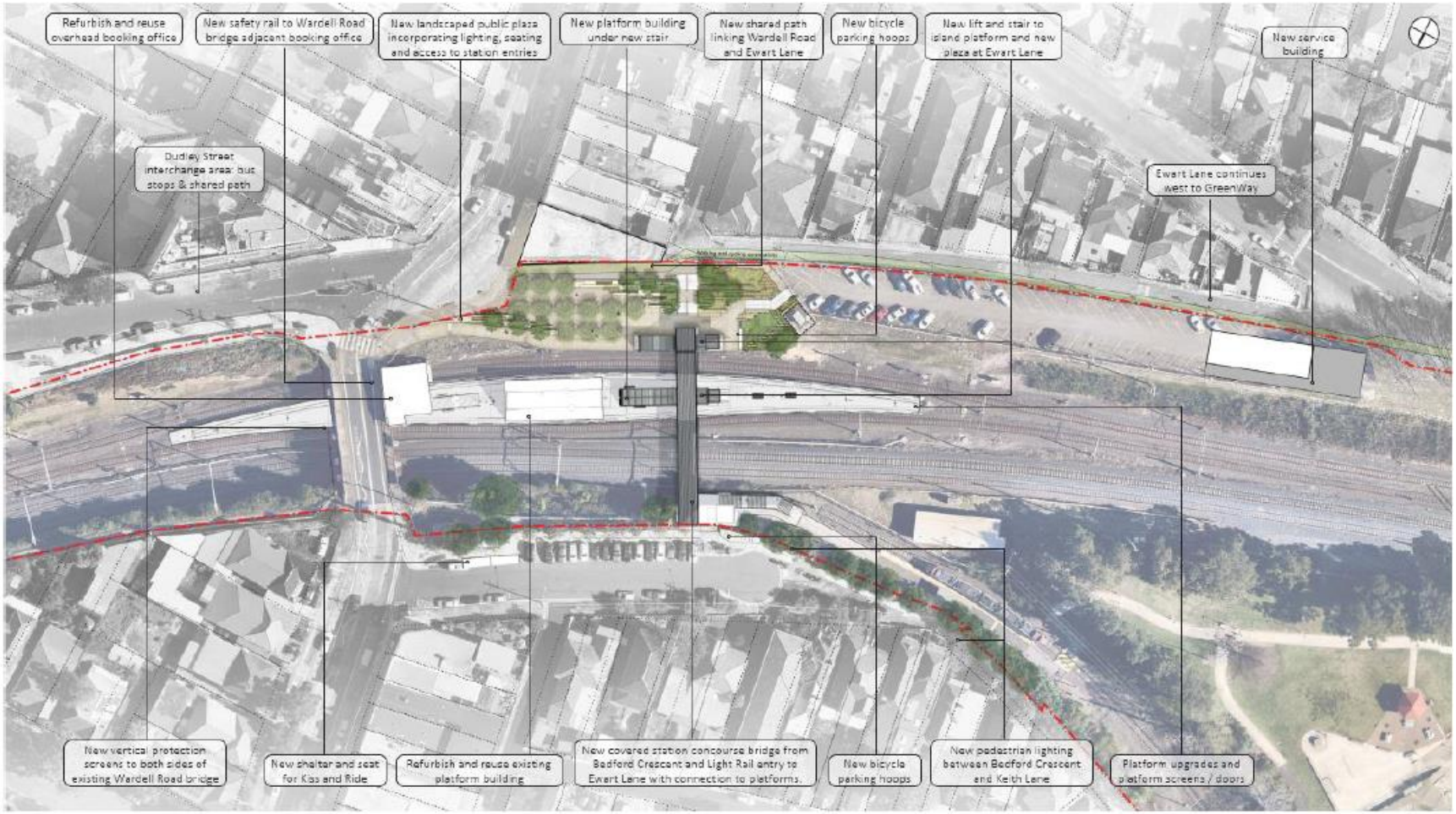

Figure 1 Sydney Metro Dulwich Hill Station upgrades

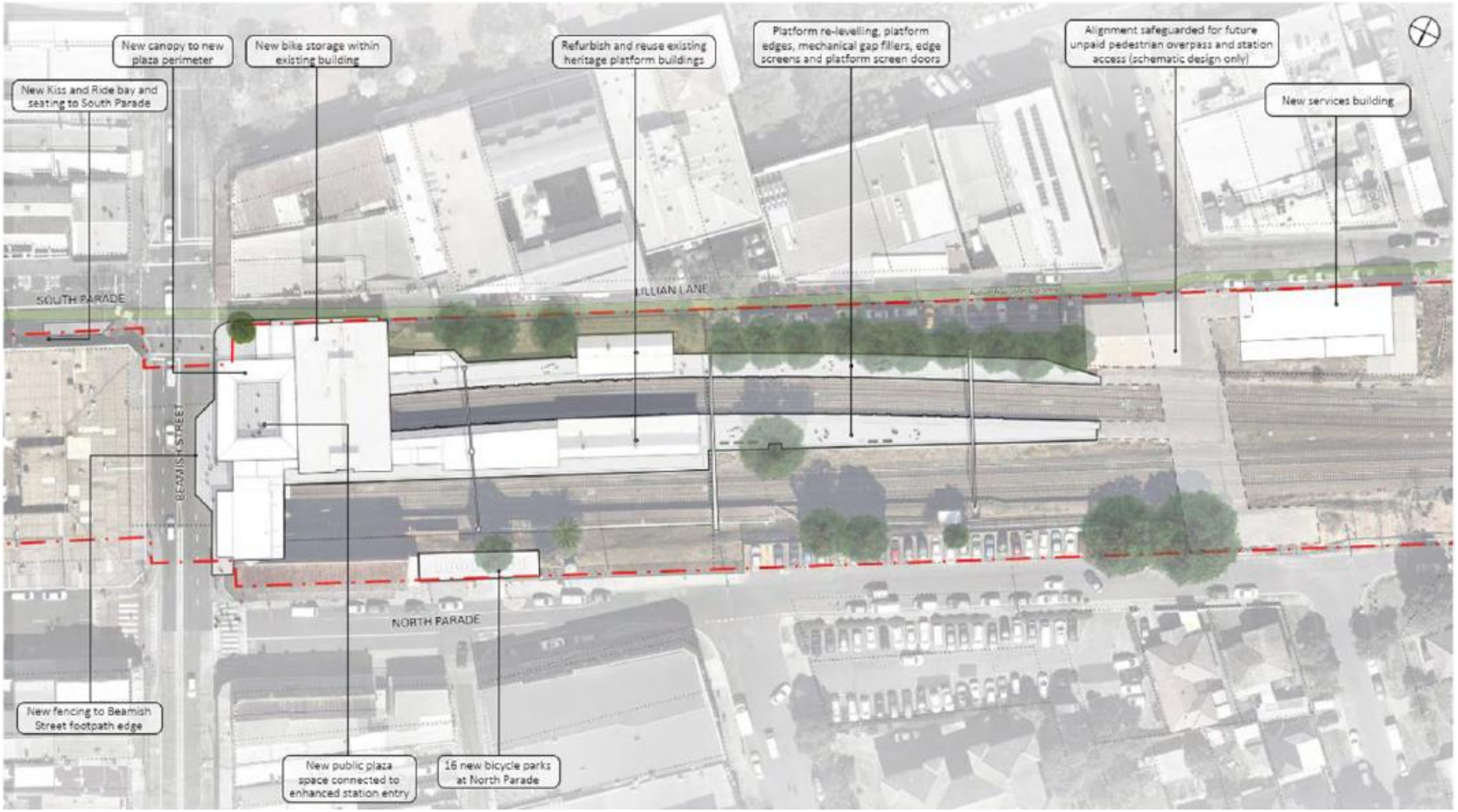

Figure 2 Sydney Metro Campsie Station upgrades

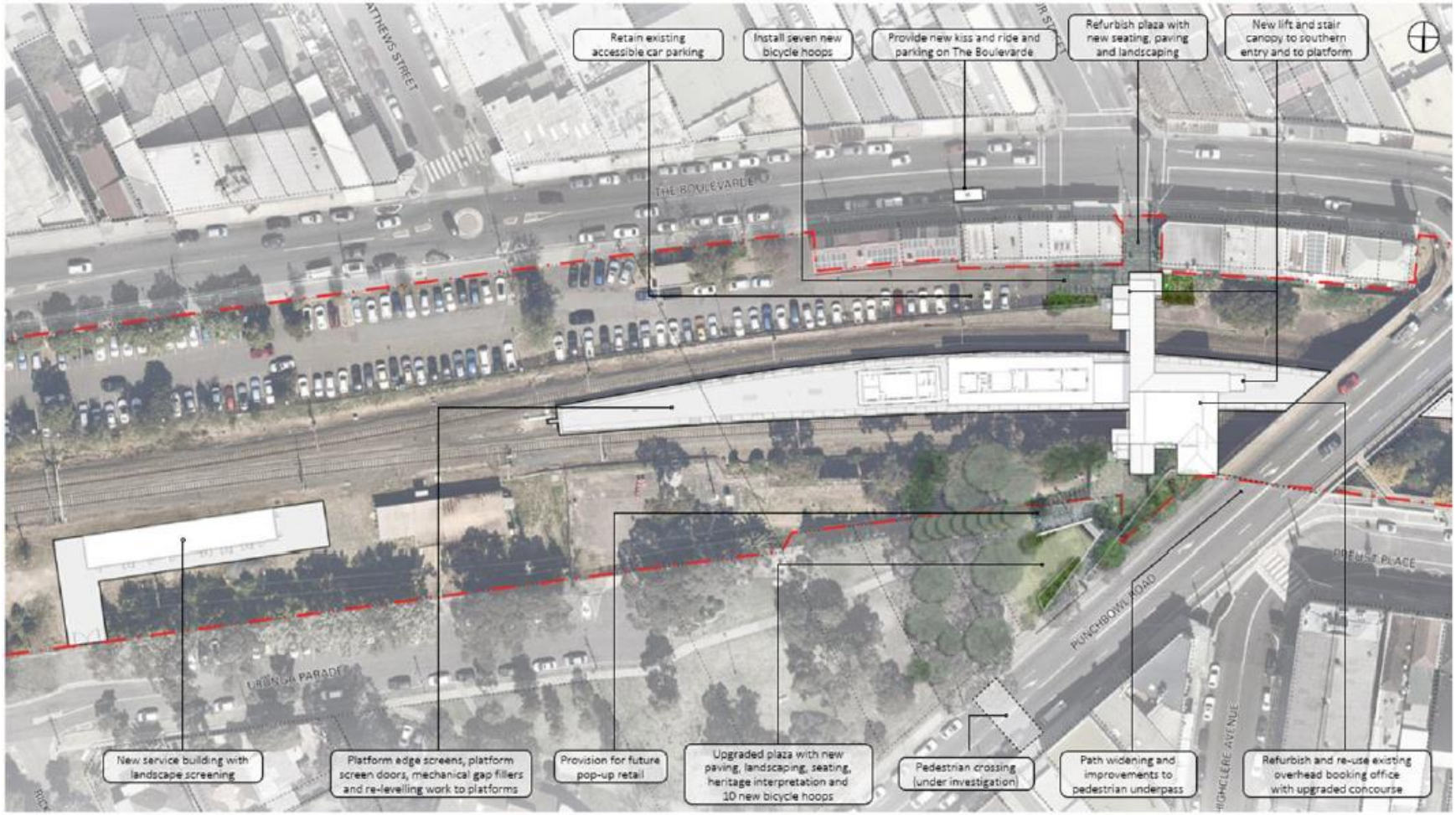

Figure 3 Sydney Metro Punchbowl Station upgrades

Figure 4 Sydney Metro Hurlstone Park Station upgrades

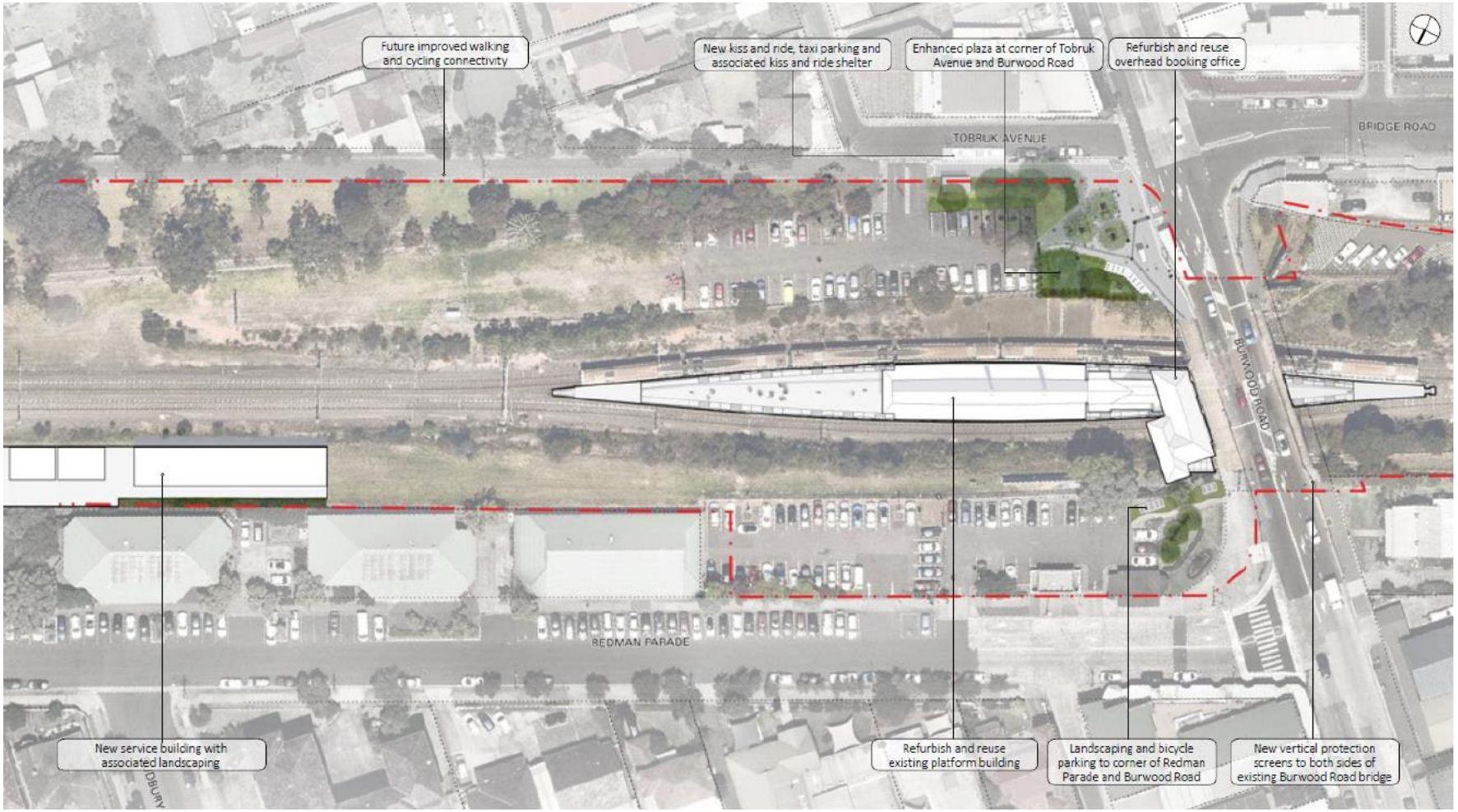

Figure 5 Sydney Metro Belmore Station upgrades

Figure 6 Sydney Metro Wiley Park Station upgrades

3 BACKGROUND

In accordance with the *Sydney Metro City & Southwest Sydenham to Bankstown Instrument of Approval* a tree is defined as "*Long lived woody perennial plant greater than (or usually greater than) 3 m in height with one or relatively few main stems or trunks*".

Condition of Approval E5 states "*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) a description of the conditions of the tree(s) and its amenity and visual value;
b) 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
c) 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 canopy or root pruning, root protection zone, excavation, site controls on waste disposal, vehicular access, storage of materials and protection of public utilities.

A copy of the report(s) must be submitted to the Planning Secretary before the removal or pruning of any trees, including those affected by site establishment Work. All recommendations of the report must be implemented by the Proponent, unless otherwise agreed by the Planning Secretary."

The ecological potential of the project site has been assessed under the Sydney Metro City & Southwest Chatswood to Sydenham Environmental Impact Statement (EIS). Section 22.2 of the EIS states "*The majority of the study area has been heavily modified by past and ongoing disturbances associated with urban development and the active rail corridor. Urban development, clearance, and ongoing maintenance of the rail corridor has resulted in fragmentation, a high level of disturbance, and degradation of vegetation communities".*

The majority of vegetation in the project area and surrounding study area comprises exotic or planted native species on highly modified landforms. There are small isolated patches of remnant or regrowth native vegetation in small portions of the study area associated with rail cuttings with less disturbed soil profiles.

Native vegetation and habitat within the project area is in medium to poor condition, and features impacts from existing maintenance activities, edge effects, weed infestation, and exotic pests."

The EIS also states "*There is relatively low native species richness within the study area, which confirms that the native vegetation has been extensively modified and is in moderate to poor condition.*

A total of 129 flora species from 40 families were recorded within the study area, comprising 63 native and 66 exotic species. Poaceae (grasses, 22 species, 11 native), Myrtaceae (flowering shrubs and trees, 20 species, 13 native), Fabaceae (23 species, 17 native), and Asteraceae (flowering herbs, 11 species, 2 native) were the most diverse families recorded. One threatened flora species (Downy Wattle) was recorded in the study area, outside the project area."

In regard to plant communities Section 22.2 of the EIS states "*two of the native plant communities identified conform to the following threatened ecological communities listed under the TSC Act:*

- *Sydney Turpentine Ironbark Forest in the Sydney Basin Bioregion (Sydney Turpentine Ironbark Forest)*
- *Shale Gravel Transition Forest in the Sydney Basin Bioregion (Shale Gravel Transition Forest).*

No threatened ecological communities listed under the EPBC Act are located in the study area."

It is noted that one threatened plant species was recorded in the vicinity of the EIS study area, however the species does not reside within the Project impact area. Downy Wattle (Acacia pubescens) was recorded near Punchbowl Station (not within 20m of the work zone). The Downy Wattle will not be impacted or removed as part of these works and will be protected. The EIS states "*No listed threatened flora species were recorded in the project area. One threatened plant species Downy Wattle (Acacia pubescens) listed as vulnerable under the EPBC Act and TSC Act, was recorded in the study area. Around 650 stems are located near the project area as shown in Figure 22.1.*

The patches of stems recorded are located mainly in the vicinity of Punchbowl Station, with around two stems recorded in the rail corridor, and one stem in a Council reserve around 100 metres east of the Yagoona substation. The project has been designed to avoid impacting on the recorded locations of this species."

As part of the EIS, GHD produced a report to support the EIS Biodiversity Impact assessments, GHD's report: *Sydney Metro: Sydenham to Bankstown tree count dated 21 August 2017* considered the numbers of trees within each station precinct and in the rail corridor between each station. The below summarises the tree count within the station precincts:

Figure 7: tree count within the stations:
Note: only Dulwich Hill, Wiley Park, Hurlstone Park, Campsie, Punchbowl and Belmore are applicable.

Station	Native			Exotic			Total
	Small	Medium	Large	Small	Medium	Large	
Marrickville	9	46	9	8	13	3	**88**
Dulwich Hill	10	3	-	1	4	1	**19**
Hurlstone Park	8	10	-	9	14	2	**43**
Canterbury	30	13	-	2	4	7	**56**
Campsie	17	16	2	2	10	1	**48**
Belmore	44	45	16	12	8	5	**130**
Lakemba	35	26	6	3	16	2	**88**
Wiley Park	26	14	7	24	33	4	**108**
Punchbowl	17	51	14	15	35	5	**137**
Bankstown	1	77	19	44	33	2	**176**
Total	**197**	**301**	**73**	**120**	**170**	**32**	**893**

GHD further identified the tree count between the stations as per the below:

Figure 8: tree count between stations:
Note: only Dulwich Hill, Wiley Park, Hurlstone Park, Campsie, Punchbowl and Belmore are applicable.

Station	Native			Exotic			Total
	Small	Medium	Large	Small	Medium	Large	
East of Marrickville	41	60	5	1	2	2	**111**
Marrickville – Dulwich Hill	20	45	5	2	12	10	**94**
Dulwich Hill – Hurlstone Park	21	9	1	1	3	9	**44**
Hurlstone Park – Canterbury	30	41	24	68	45	11	**219**
Canterbury – Campsie	188	171	5	7	14	1	**386**
Campsie – Belmore	36	58	10	10	31	14	**159**
Belmore – Lakemba	20	67	10		7	1	**105**
Lakemba – Wiley Park	58	38	16		4	5	**121**
Wiley Park – Punchbowl	29	25	9	9	18	10	**100**
Punchbowl – Bankstown	134	94	18	9	3	1	**259**
West of Bankstown	47	40	18	9	10	4	**128**
Total	**624**	**648**	**121**	**116**	**149**	**68**	**1726**

The total numbers were assessed and during the SPIR consultation process, which further elaborated upon: The *Sydney Metro City & Southwest Sydenham to Bankstown Upgrade – Submissions and Preferred Project Report* (SPIR) states "*It is expected that*

large areas of the planted native vegetation and exotic scrub and forest would not require removal for the corridor works, however this is subject to the detailed design of the proposed works, including fencing and the communications services route. This vegetation would potentially include trees that provide screening along the corridor for surrounding properties. The need to clear vegetation would be reviewed by the construction contractor/s and minimised wherever practicable." The SPIR also states "*about 16.3 hectares of vegetation (not including vegetation classed as exotic grassland) may need to be removed, including*:

- *up to 7.3 hectares of planted native vegetation*
- *up to nine hectares of exotic scrub and forest*."

The SPIR does not specify where these areas of clearing are located as this was to be developed as part of detailed design. Furthermore, these areas represent the clearing to occur for corridor works from Sydenham to Bankstown under all work packages (refer to the *Sydney Metro City & Southwest Sydenham to Bankstown Upgrade Staging Report* for more information of the different packages under which the project has been staged).
However, the SPIR does provide a summarised overview of the anticipated number of trees to be removed within each station precinct, as per Table 2.1 of Appendix B of the SPIR. This is extracted as below:

Figure 9: estimated number of trees to be removed per station:

Note: only Dulwich Hill, Wiley Park, Hurlstone Park, Campsie, Punchbowl and Belmore are applicable.

Station	Native trees	Exotic trees	Total trees
Marrickville	50	15	65
Dulwich Hill	11	2	13
Hurlstone Park	8	9	17
Canterbury	38	7	45
Campsie	28	6	34
Belmore	61	11	72
Lakemba	67	0	67
Wiley Park	22	41	63
Punchbowl	25	22	47
Bankstown	79	1	80

Note: The table presents the maximum number of trees around stations with the potential to be impacted during construction. The final numbers would be confirmed during detailed design. It does not include other trees along the corridor that may also need to be removed as part of general vegetation removal in the rail corridor (refer to Section 2.4.3).

Whilst the above nominates an anticipated number of trees per station, Appendix B of the SPIR Section 2.4.4 identifies *"The biodiversity assessment for the preferred project was undertaken based on the assumption that all vegetation within the rail corridor would need to be removed to construct the preferred project"* Based on this

assessment whilst the above table is anticipated numbers within each station precinct, the SPIR acknowledges that the final number is not finite.

Further to this it should be acknowledged that the boundaries for each station precinct as assessed by GHD which created the follow on to the SPIR, does not align to the station project boundaries with respect the Stage 3 design package and the Metro Service Building footprints. As a result, the number of trees identified in the SPIR for the reduced volumes per station in **Figure 9** above does not consider a number of Metro Service Building Locations which sit within the “corridor” and not the precinct boundary as assessed by GHD.

On this understanding it is considered that for Package 5 and Package 6 the anticipated number of trees to be impacted as noted in **Figure 9** of this document (within the station precinct) shall be combined with the total anticipated within the corridor as per **Figure 8** of this document.

In accordance with the Project approvals CSSI 8256 the combination of the above shall demonstrate the total tree count for impact for the Project. Following confirmation of the total tree count for all stations and prior to operational handover Downer shall implement replacement planting for all trees not able to be replaced within the project boundary in consultation with council’s in a ratio of 2:1, as per CoA E4.

Essentially this report shall present the number of trees impacted by the Project within the GHD assigned precinct boundary and those which sit within the “corridor”. The total numbers for each area are less than those noted above in **Figure 8** and **Figure 9** of this document, demonstrating consistency to the CSSI 8256.

4 SITE INSPECTIONS

As part of the design development (by others) the Sydney Metro design contract (METRON T2N) commissioned Arboricultural Impact Assessment (AIA) for each station (Package 5 and Package 6) by Urban Arbor. Revision B & Revision C available to Downer are as follows:

Belmore: Belmore Station Arborist Report Revision B - SMCSWSWM-MTM-WBS-LA-REP-211000

Wiley Park: Wiley Park Station Arborist Report Revision B - SMCSWSWM-MTM-WWP-LA-REP-231000

Hurlstone Park: Hurlstone Park Station Arborist Report Revision C - SMCSWSWM-MTM-WHP-LA-REP-131000-C

Dulwich Hill: Dulwich Hill Station Arborist Report Revision B - SMCSWSWM-MTM-WDH-LA-REP-121000

Campsie: Campsie Station Arborist Report Revision C - SMCSWSWM-MTM-WCS-LA-REP-151000

Punchbowl: Punchbowl Station Arborist Report Revision C - SMCSWSWM-MTM-WPS-LA-REP-241000

The above AIA were based on site inspections conducted by Urban Arbor between 2019 and 2021 to identify the total number of trees to be impacted for the entire design scope of each station.

Downer has identified a number of omissions in the reports produced by Urban Arbor, notably the departure from the definition of a tree as per the planning approval: *Sydney Metro City & Southwest Sydenham to Bankstown Instrument of Approval, a tree is defined as "Long lived woody perennial plant greater than (or usually greater than) 3 m in height with one or relatively few main stems or trunks".* The reports produced by Urban Arbor to facilitate the detailed design development have been based on "significant trees" as defined by Urban Arbor as trees greater than 5m in height" (refer to Section 2.1.1 of each report).

To satisfy the Planning Approval E5 Downer has subsequently engaged Consulting Arborist Owen Tebbutt of Plateau Trees to conduct a gap analysis for the total number of trees greater than 3m for the total design inclusive of those originally identified by Urban Arbor. The intent of this exercise is to conclusively satisfy the requirements of E5 for the latest iteration of Detailed Design and ensure all trees which meet the *Sydney Metro City & Southwest Sydenham to Bankstown* definition of a tree have been accounted within this report.

A copy of the latest available Urban Arbor AIA's is detailed within the appendices (Appendix 1,3,5,7, 9 and 11) of this document. To support the Urban Arbor reports, the updated reports by Consulting Arborist Owen Tebbutt & Colin Curtis of Plateau Trees can also be found in the appendices of this report (Appendix 2, 2.1, 4, 4.1, 4.2, 6, 6.1, 6.2, 8, 8.1, 8.2, 10, 10.1, 10.2, 12, 12.1, 12.2, 12.3,12.4 & 12.5)

A combination of both reports per station demonstrates the total number of trees to be removed and trimmed for each station precinct and adjacent MSB.

5 INSPECTION RESULTS

As stated in the Urban Arbor reports and Plateau Trees reports vegetation has been inspected within a number of zones across the Projects. The below provides a summary of the trees and vegetation to be impacted as a result of each Project, within Package 5 and Packages 6 as a result of design alignment or construction areas. All trees and vegetation are consistent with the assessed mix of planted native and exotic species as detailed in the EIS and SPIR. No trees or species are considered as endangered or threatened ecological communities.

Detailed results can be found in the arborist reports per station within the appendices of this document.

Table 1: Vegetation impact per Project

Key:

- ***Trees to be cleared contributing to Total Impact (Column 5)***
- ***Trees to be pruned contributing to Total Impact (Column 5)***

Project	Number to be removed / trimmed assessed in Urban Arbor Revision A design package reports: refer to Section 9 of each report	Number to be removed / trimmed assessed in Urban Arbor Revision B & C of design package reports: refer to Section 9 of each report	Additional gap analysis assessed in Plateau Trees reports to be trimmed / removed: refer to Appendix 1 of each report.	Total impact (at date of this report) Total = all trees and vegetation, native and exotic.
Belmore	Document location in this report: **Superseded** 5 trees	Document location in this report: **Appendix 1** Revision B of the Urban Arbor arborist report identifies 8 trees for removal (5 additional trees not assessed for removal in revision A; tree 663, 667, 2267, 2268, 2268).	Document location in this report: **Appendix 2 & Appendix 2.1** **12** additional trees **4** trees to be pruned {Appendix 2} **2** trees (additional trees not assessed in the Urban Arbor report are required for removal	**20** trees **10** trees to be pruned (excluded from total tree count) Total vegetation to be impacted: 703 m2 (vegetation includes all trees and shrubs)

		1 Tree (657) identified within revision A of Urban Arbor report for removal is assessed within revision B for retention. 3 trees (663, 667 & 2267) have not been assessed for removal within the gap analysis completed by Plateau Trees. In total, **6** trees are required to be removed detailed within Revision B of the Urban Arbor Report and not accounted for within the Plateau tree report (658, 659, 660, 663, 667 & 2267).	and assessed in the Plateau Report for removal). **6** trees to be pruned {Appendix 2.1}	
Wiley Park	Document location in this report: **Superseded** 9 trees	Document location in this report: **Appendix 3** Revision B of the Urban Arbor arborist report identifies 44 trees for removal (35 additional trees not assessed for removal in revision A; tree 691, 693, 694, 707, 708, 3325, 3330, 3337, 3339, 3345, 689, 690, 3286, 3287, 3288, 3289, 3321, 3322, 3323, 3324, 3326,	Document location in this report: **Appendix 4, Appendix 4.1 & Appendix 4.2** **80** trees plus **1** tree to be pruned {Appendix 4.0} **7** additional trees not assessed for removal 689, 690, 691, 693,	**100** trees **1** tree to be pruned (excluded from total tree count) Total vegetation to be impacted: 1127m2 (vegetation includes all trees and shrubs)

		3327, 3328, 3329, 3331, 3332, 3333, 3334, 3335, 3336, 3338, 3340, 3341, 3342, 3343, 3344). 1 Tree (669) identified within revision A for removal is assessed within revision B for retention. In total, **8** trees are required to be removed detailed within Revision B of the Urban Arbor Report and not accounted for within the Plateau tree report.	694, 707 & 708 in the Urban Arbor report are required for removal along with **4** additional trees (Tree 1-4) detailed in Plateau Report {Appendix 4.1} **1** tree, tree 711 assessed in the Urban Arbor report is required for removal and detailed in Plateau Report – hasn't been reassessed, simply identified for removal). {Appendix 4.2}	

Hurlstone Park	Document location in this report: **Superseded** 14 trees and one group, G3 comprising of 6 trees.	Document location in this report: **Appendix 5** Revision C of the Urban Arbor arborist report identifies 29 trees and one group, G3 comprising of 6 trees for removal (15 additional trees not assessed for removal in revision A; tree 194, 196, 198, 199, 183, 184, 185, 186, 189,190, 191, 192, 193, 195, 197, 200, 201, 202, 203, 204, 205). Revision C of the Urban Arbor arborist report identifies 3 trees not assessed for removal in revision A; tree 203, 204 & 205. In total **17** trees and one group, G3 comprising of **6** trees assessed within the Urban Arbor reports are not assessed for clearing by the Plateau Arborist reports and are required for removal.	Document location in this report: **Appendix 6 & Appendix 6.1** **56** trees plus (**3** additional trees not assessed for removal 194,198 & 199 in the Urban Arbor report are required for removal and detailed in Plateau Report). **6** trees to be pruned. {Appendix 6} **2** Additional trees not assessed for removal (Tree 1 & 2) in the Urban Arbor report are required for removal and detailed within the Plateau Report. **1** tree to be pruned. {Appendix 6.1} **1** tree to be pruned. {Appendix 6.2}	**84** trees **8** trees to be pruned (excluded from total tree count) Total vegetation to be impacted: 496m2 (vegetation includes all trees and shrubs)
Campsie	Document location in this	Document location in this	Document location in this report:	**34** trees

	report: **Superseded** 0 trees identified for clearing in Appendix 7.	report: **Appendix 7** Revision C of the Urban Arbor arborist report identifies 6 trees not assessed for removal in revision A; tree 523, 524, 637, 638, 639 & 640. Trees 637, 638, 639 & 640 have not been assessed for removal within the gap analysis completed by Plateau Trees. In total, **4** trees are required to be removed detailed within Revision C of the Urban Arbor Report and not accounted for within the Plateau tree report (637, 638, 639 & 640).	**Appendix 8, Appendix 8.1 & Appendix 8.2** **3** additional trees, trees not assessed for removal 523, 524 & 525 in the Urban Arbor report are required for removal and detailed within the Plateau report. {Appendix 8} **21** additional trees, trees not assessed for removal 515, 516, 517, 519, 615, 616, 620, 621, 622, 623, 624, 625, 626, 628, 629, 630, 631, 633, 634, 635 & 636 in the Urban Arbor report are required for removal and detailed within the Plateau Report. {Appendix 8.1} **6** additional trees, trees not assessed for removal 614, 627 & 632 in the Urban Arbor report are required for removal along with **3** additional trees (Tree 1-3) detailed in the Plateau Report. {Appendix 8.2}	Total vegetation to be impacted: 1008 m2 (vegetation includes all trees and shrubs)

Dulwich Hill	Document location in this report: **Superseded** 9 trees	Document location in this report: **Appendix 9** Revision C of the Urban Arbor arborist report identifies 12 trees for removal (3 additional trees not assessed for removal in revision A; tree 93, 564, 565). 1 tree, tree 565 hasn't been assessed for removal within the gap analysis completed by Plateau Trees. In total, **10** trees are required to be removed detailed within Revision C of the Urban Arbor Report and not accounted for within the Plateau Arborist tree reports.	Document location in this report: **Appendix 10, Appendix 10.1 & Appendix 10.2** **5** trees **1** tree to be relocated under IW endorsement was unable to be relocated and will be removed. {Appendix 10} **1** additional tree not assessed for removal 573 (Tree A Plateau Report) in the Urban Arbor report are required for removal along with **1** additional tree (Tree B) detailed in Plateau Report. {Appendix 10.1} **1** tree (additional tree assessed in the Urban Arbor report are required for removal and detailed in Plateau Report – these have not been reassessed, simply identified for removal). {Appendix 10.2}	**19** trees Total vegetation to be impacted: 326m2 (vegetation includes all trees and shrubs)

Punchbowl	Document location in this report: **Superseded** 4 trees	Document location in this report: **Appendix 11** Revision B of the Urban Arbor arborist report identifies 18 trees and one group, G15 comprising of 5 trees for removal (14 additional trees and one group not assessed for removal in revision A; tree 730, 731, G15, 3346, 3347, 3349, 3350, 3352, 3355, 3359, 3361, 3363, 3356, 3360, 3365). All trees identified within revision B of the Urban Arbor arborist report have been identified for removal within the existing Plateau reports. 1 Tree (733) identified within revision B for removal is assessed within revision C for retention. In total, **3** trees are required to be removed detailed within Revision C of the Urban Arbor	Document location in this report: **Appendix 12, Appendix 12.1, Appendix 12.2, Appendix 12.3 & Appendix 12.4** **2** trees (additional trees not assessed for removal 729 and 730 in Urban Arbor report are required for removal and detailed in Plateau Report – these have not been reassessed, simply identified for removal with data reflected in Urban Arbor reports) {Appendix 12} **15** trees (additional trees not assessed in the Urban Arbor report are required for removal and assessed in the Plateau Report for removal). {Appendix 12.1} **8** trees (additional trees assessed in the Urban Arbor report are required for removal and detailed in Plateau Report – these have not been reassessed, simply identified for removal).	**36** trees 1 trees to be pruned (excluded from total tree count) Total vegetation to be impacted: 1388 m2 (vegetation includes all trees and shrubs)

		Report and not accounted for within the Plateau Arborist tree reports.	{Appendix 12.2} **1** tree (additional tree assessed in the Urban Arbor report are required for removal and detailed in Plateau Report – these have not been reassessed, simply identified for removal). {Appendix 12.3} **5** trees as part of group G15 (additional trees assessed in the Urban Arbor report are required for removal and detailed in Plateau Report – these have not been reassessed, simply identified for removal). {Appendix 12.4} **2** trees (additional trees not assessed in the Urban Arbor report are required for removal and assessed in the Plateau Report for removal). {Appendix 12.5} **1** tree to be pruned.	

			{Appendix 12.6}	
	Aggregated total trees and vegetation across all stations and MSB locations.			**293 trees** **Total vegetation removal: ~5048 m2** (vegetation includes all trees and shrubs)

6 ALTERNATIVES TO DESIGN

Section 8 and Section 9 of each Station specific Urban Arbor Arboricultural Impact Assessment as detailed within Appendix 1,3,5,7,9 and 11 of this Report identifies why these trees and vegetation must be removed. This is further supported by the main body of text for each Plateau Trees report.
The majority of tree removal for the Project sites predominately relates to the designed locations for the Metro Service Buildings with minor amounts relating to general station wide service relocations and or installations. These design components are integral to the functionality of the new Sydney Metro line and have been subject to evaluation and assessment by others (Sydney Metro design contract).
Due to limited space within the project boundary, existing services and the access track, it is not feasible or reasonable to move these design components to accommodate the existing trees and vegetation.

In accordance with the Sydney Metro Sydenham to Bankstown Tree Management Strategy tree and vegetation removal has been limited through detailed design and construction planning.

Avoidance of impacts to trees and vegetation on the project during the detailed design phase has been undertaken based on the following hierarchy;
1. Avoid impacts to tree, ensuring design and construction falls outside the tree protection zone
2. Impacts within the tree protection zone, but no trimming or removal
3. Trimming of trees with visual or amenity value (including privacy screening)
4. Removal of trees with visual or amenity value (including privacy screening)
5. Trimming of trees with ecological value (habitat, threatened vegetation communities, threatened flora species)
6. Removal of trees with ecological value (habitat, threatened vegetation communities, threatened flora species)

It is noted that a number of trees within the corridor and at access gates will be trimmed to accommodate the design components and construction requirements. Where trenching may impact trees, tree sensitive service installation methods will be reviewed to determine if alternative methods of service installation (such as non-destructive digging trench excavation of underbores) are practicable and feasible to undertake. Further investigation of these methods will be undertaken for trees located adjacent to proposed services buildings locations. Some tree roots may be removed in consultation with an Arborist as required.

6.1 Considerations and restrictions

It is noted that the considerations, restrictions and design optioneering for the total impact of trees per station Project site has been reviewed and implemented by others. Trees are all generally within the existing stations precinct as assessed in the EIS and SPIR and detailed in **Figure 7** and **Figure 9** of this report and or within the adjacent corridor networks as assessed in the EIS and detailed in **Figure 8** of this report. There is no departure from the total trees assessed (by tree count) and cumulative impacts as presented in this report in comparison to the EIS; GHD report: *Sydney Metro: Sydenham to Bankstown tree count dated 21 August 2017* and the total impact assessed in SPIR Appendix B, demonstrating compliance to the CSSI 8256.

6.1.1 Hurlstone Park Station

Two trees as assessed in the Urban Arbor report and Plateau reports at Hurlstone Park is not within the Project boundary or the rail corridor. The trees are identified as tree 198 & 199 and must be removed to accommodate the new MSB permanent access road. The design optioneering to realign this access road to retain the trees is understood to have been

considered and deemed unachievable during the detailed design stage, hence the unavoidable need for removal. The trees have been identified for removal in accordance with the Stage 3 Demolition Plans for Hurlstone Park: SMCSWSWM-MTM-WHP-LA-PKG-131000. As the trees sit within CCBC owned land, approval was sought and obtained from the CCBC on the 20th May 2021 for the removal of the two trees, see Appendix 6.1 of this document.

6.1.2 Wiley Park Station

Additionally, three trees have been identified in the Wiley Park Plateau reports (Tree 2-4) for removal outside of the Project boundary and rail corridor. These trees were not assessed in the Urban Arbor reports provided by Sydney Metro design contract, however, have been identified for removal in the Stage 3 Demolition Plans for Wiley Park: SMCSWSWM-MTM-WWP-LA-DWG-231703 & SMCSWSWM-MTM-WWP-LA-DWG-231704. As the trees sit within CCBC owned land, approval was sought and obtained from the CCBC on the 15th May 2021 for the removal of the three trees, see Appendix 4.2 of this document.

6.1.3 Dulwich Hill Station

Seven trees at Dulwich Hill are additionally located outside of the rail corridor, five of which are also outside the Project boundary. These trees were not assessed in the Urban Arbor reports provided by Sydney Metro design contract, however, have been identified for removal in the landscape design package Stage 3 Dulwich Hill Station Landscape Drawing Package SMCSWSWM-MTM-WDH-LA-PKG-121000. The design optioneering to retain these trees is understood to of been considered and deemed unachievable during the detailed design stage, hence the unavoidable need for removal. To capture this omission the two Plateau reports for Dulwich Hill: *Downer Group - Southwest Metro Package - additional tree removals Dulwich Hill Station* has identified these six trees (Appendix 10 & 10.1). As the trees sit within Inner West owned land, approval was sought and obtained from the Inner West Council on the 28th May 2021 & 15th of June 2021 for the removal of all trees except tree 2 (Appendix 10), see Appendix 10.3 of this document. Further council approval will be required prior to any impact to Tree 2. As the trees were assessed as part of the "stations precinct" in GHD's report: Sydney Metro: Sydenham to Bankstown tree count dated 21 August 2017 and noted in **Figure 7** of this document, they are consistent with the EIS in terms of assessed impacts. The impact to these trees would also maintain consistency with the total number as assessed in the subsequent SPIR "estimated number of trees to be removed per station" as detailed in **Figure 9.**

6.1.4 Belmore Station

Moreover, Belmore has identified a number of trees which are required for removal which all sit within CCBC owned and managed land. This consists of seven trees, five of which are the five trees identified in the Urban Arbor in Appendix 1. Two additional trees are identified in the Plateau arborist report in Appendix 2.1. Whist they are in the Project boundary and consistent with the CSSI8256, approval from CCBC would be required prior to any impact. Approval from CCBC was obtained on the 23rd April 2021 for the removal of the five trees identified in the Urban Arbor report, see Appendix 2.1 of this document. In regard to the remaining trees residing within CCBC owned land, further council approvals and all other authority approvals shall be sought prior to any impact to the trees.

In addition, one tree is required to be pruned at Belmore. The tree requiring pruning is identified in the Plateau Report in Appendix 2 of this document and identified as Tree 14 (T14).

T14 is situated directly outside the existing Project boundary (three meters from the Project boundary). Whilst it is outside of the Project boundary it is within the "station precinct" consistent with the tree count and those assessed as part of the station precinct in the GHD report Sydney

Metro: Sydenham to Bankstown tree count dated 21 August 2017 and noted in Figure 7 of this document.

The pruning of the limb of T14 would not impact or contribute to the total tree loss count for Belmore as identified in the EIS. T14 is consistent with the EIS in terms of assessed impacts against CSSI8256. As T14 sits within CCBC owned and managed land, approval from CCBC would be required prior to any pruning. Approval was obtained from CCBC on the 23rd April 2021, see Appendix 2.1 of this document.

The requirement of the pruning is to provide sufficient clearance for heavy goods vehicles to safely access the site through the pre-existing Sydney Trains rail corridor access gate on Redman Parade at the entrance of Metro Service Building. Currently the limb identified for pruning sits at two meters in height from ground level and crosses the access gate. The required clearance to facilitate the safe access and egress into the MSB for oversized machinery (cranes, frannas etc) is 3.2 meters. An alternative option has been explored to gain access to the site for oversized vehicles however this option is only via a small access gate in the corner of the Redman Parade commuter car park. This option would require the ongoing closure of the car park and the access gate is directly adjacent to a sensitive receiver by way of the Australian Foundation for Disability.

This potential alternative option is not considered reasonable or feasible based on the significant disturbance through lack of amenity of the car park and increased noise impacts to the Australian Foundation for Disability. The option to maintain access through the already established Sydney trains rail corridor is considered the least impactful method of safe access and egress into the site for oversized vehicles.

Tree 14 is a Eucalyptus Robusta (Swamp Mahogany) the identified pruning involves the removal of one first order branch at 2m height. The branch is approximately 300mm in diameter and constitutes 30% of the total canopy volume of the tree. The removal of the branch is not considered to significantly affect local amenity or have any increase impact to visual impact to the rail corridor. The pruning of the limb identified as T14 would not have any impact on any fauna as it does not provide any existing habitat or foraging opportunities.

T14 is situated outside of the Belmore SHR curtilage posing no impacts from a heritage perspective and further impacts such as waste, water, noise, air quality, land contamination, socio-economic impacts are considered inconsequential.

Further to the original scope of pruning required at Belmore Station, an additional five trees requiring pruning have been identified in the Plateau Report in Appendix 21 of this document and identified as Tree 4, 5, 6, 7 & 8.

All branches assessed for pruning in Appendix 2.1 will be pruned in accordance with Australian Standard AS 4373-2007, the branches are 150 mm or less in diameter. As such, pruning works to be conducted by Downer EDI & its associated sub-contractors are exempt from the Bankstown & Canterbury Council Tree Management Orders, under exemption 2.4 (g), (Bankstown Development Control Plan 2015–Part B11 5 March 2015 (Amended December 2019)) and B3.4 (g), (Tree Management Order – Canterbury Development Control Plan 2012).

6.1.5 Campsie Station

To date no clearing of trees is required outside of the City and Southwest Metro Station Upgrade Works Package 5 and 6 Project Boundary. As such, no additional consideration or restrictions apply for clearing activities at Campsie Station, as all trees identified for clearing are within the Project boundary and accounted for in the original SSI & EIS.

6.1.6 Punchbowl Station

Thirteen additional trees have been identified in the Punchbowl Plateau report (Appendix 12.2 & 12.4) that require removal outside of the Project boundary and rail corridor. These trees were not assessed in the Urban Arbor reports provided by the Sydney Metro design contract,

however, have been identified for removal in the Approved for Construction (AFC) Civil Engineering Plans for Punchbowl: SMCSWSWM-MTM-WPS-CE-DWG-4931560. As the trees reside within CCBC owned land, further council approvals and all other authority approvals shall be sought prior to any impact to the trees.

7 MITIGATION MEASURES

Downer and Sydney Metro design contract will implement a number of measures to ensure the design development and construction processes ensure the correct vegetation and trees are removed and to mitigate the risk of damage to trees and vegetation that will remain. These mitigation measures include;

- Undertake all Protection Measures as identified within the appendices of this report (protection measures as stated in Urban Arbor reports and Plateau reports specific to each Project site and detailed in the appendices of this report)
- The project has / will be designed to minimise impacts to trees where possible. This will include a review of design impacts and construction impacts on trees.
- Relevant Councils and the DPIE will be consulted in regard to replacement tree planting locations. Relevant Councils will be consulted in regard to appropriate sizes for replacement trees.
- Downer's Vegetation Disturbance Permit will be implemented in accordance with the Downer EMS and CEMP.
- All existing trees to be retained within the site area must be protected in accordance with Australian Standard AS 4970 'Tree protection in development sites' to avoid and minimise impacts
- All trees to be removed or trimmed will be appropriately demarcated
- Qualified and experienced tree loppers will be engaged to removed and trim trees
- Where works will occur in the vicinity of trees that are to remain intact, demarcation or barriers will be put in place around the tree at the extent of the structural root zone
- Access tracks will be clearly delineated and defined within the Environmental Control Maps
- Staff and workers to be educated on vegetation trimming and removal requirements
- A copy of the Tree Report must be submitted to the Secretary for information before the removal, damage and/or pruning of any trees, including those affected by the site establishment works.
- All recommendations of the Tree Report must be implemented by the Proponent, unless otherwise agreed by the Secretary.
- Downer will consult with the relevant Council in regard to the timing of removal of trees on council land, as required. Downer shall implement any conditions of approval as set out by the council as part of any removal or pruning of trees on council land.
- Downer will consult with the relevant landowner's in regard to the trimming of branches that overhang into the rail corridor.
- Detailed design and construction planning would avoid direct impacts to vegetation mapped as threatened ecological communities or native plant community types, specifically Downy Wattle Turpentine - Grey Ironbark open forest on shale, Degraded Turpentine - Grey Ironbark open forest on shale and Broad-leaved Ironbark – Grey Box in accordance with **REMM B1.** There is no impact anticipated for the duration of the Project**.**
- Pre-clearing surveys and inspections for endangered and threatened flora and fauna species would be undertaken by qualified ecologists prior to any clearing occurring in accordance with **REMM B2.**
- Impacts to Downy Wattle Turpentine - Grey Ironbark open forest on shale, Degraded Turpentine - Grey Ironbark open forest on shale and Broad-leaved Ironbark – Grey Box would be avoided. The locations of these species and communities would be marked on plans, fenced on site, and avoided in accordance with **REMM B4.**

- Equipment storage and stockpiling would be restricted to identified compound sites and already cleared land in accordance with **REMM B5.**
- A trained ecologist would be present during the clearing of native vegetation or removal of potential fauna habitat to avoid impacts on resident fauna and to salvage habitat resources as far as is practicable in accordance with **REMM B6.**

In addition, Downer will maintain a Tree and Vegetation Removal Register. The register will track which tree have been removed or trimmed (based on the number within the tree report) and the area of vegetation cleared as part of the works. The Downer Vegetation Disturbance Permit will prompt the Environmental Manager (or delegate) to record these factors during the permit authorisation site inspection.

This report will be submitted to the Secretary for information prior to the removal, damage and/or pruning of any trees.

APPENDIX 1 – BELMORE AIA (URBAN ARBOR)

URBAN ARBOR
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URBAN ARBOR
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Arboricultural Impact Assessment Report

Site location:
South West Metro
Belmore Station
Belmore NSW

Prepared for:
Metron T2M

Prepared by: Jack Williams and Bryce Claassens
Urban Arbor Pty Ltd
Date: 17 December 2019
Ref: 19/12/17/SWMMS

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URBAN ARBOR
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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) Landscape Design Package No. 211, Metron T2M, SMCSWSWM-MTM-WBS-LA-PKG-211000, 11 October 2019, Including:

Belmore Station		
SMCSWSWM-MTM-WBS-LA-DWG-211700	B	LANDSCAPE DESIGN - COVER SHEET AND DRAWING LIST - SHEET 1 of 13
SMCSWSWM-MTM-WBS-LA-DWG-211701	B	LANDSCAPE DESIGN - NOTES PAGE & LEGEND - SHEET 2 of 13
SMCSWSWM-MTM-WBS-LA-DWG-211702	B	LANDSCAPE DESIGN - DEMOLITION PLAN - SHEET 3 of 13
SMCSWSWM-MTM-WBS-LA-DWG-211710	B	LANDSCAPE DESIGN - GENERAL - PRECINCT PLAN - SHEET 4 of 13
SMCSWSWM-MTM-WBS-LA-DWG-211720	B	LANDSCAPE DESIGN - DETAIL PLAN - TOBRUK STREET - SHEET 5 of 13
SMCSWSWM-MTM-WBS-LA-DWG-211721	B	LANDSCAPE DESIGN - DETAIL PLAN - REDMAN PARADE - SHEET 6 of 13
SMCSWSWM-MTM-WBS-LA-DWG-211730	A	LANDSCAPE DESIGN - PAVING PLAN - TOBRUK STREET - SHEET 7 of 13
SMCSWSWM-MTM-WBS-LA-DWG-211731	A	LANDSCAPE DESIGN - PAVING PLAN - REDMAN PARADE - SHEET 8 of 13
SMCSWSWM-MTM-WBS-LA-DWG-211740	A	LANDSCAPE DESIGN - PLANTING PLAN - TOBRUK STREET - SHEET 9 of 13
SMCSWSWM-MTM-WBS-LA-DWG-211741	A	LANDSCAPE DESIGN - PLANTING PLAN - REDMAN PARADE - SHEET 10 of 13
SMCSWSWM-MTM-WBS-LA-DWG-211760	B	LANDSCAPE DESIGN - TYPICAL DETAILS - SHEET 1 - SHEET 11 of 13
SMCSWSWM-MTM-WBS-LA-DWG-211770	B	LANDSCAPE DESIGN - PLANTING SCHEDULE - SHEET 12 of 13
SMCSWSWM-MTM-WBS-LA-DWG-211771	B	LANDSCAPE DESIGN - MATERIAL SCHEDULE - SHEET 13 of 13

1.3 The trees were inspected on 16 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.

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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.

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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.

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[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).

URBAN ARBOR
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5. SITE LOCATION AND BRIEF DESCRIPTION

5.1 The site is located in the suburb of Belmore, 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) 2012[5] and Development Control Plan (DCP) 2012.[6] The site is identified as a heritage item (I11 and I29) 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 x 50) $^{0.42}$ x 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.

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5 *Canterbury Local Environmental Plan 2012*, https://www.legislation.nsw.gov.au/#/view/EPI/2012/673, accessed 17 December 2019.

6 *Canterbury Development Control Plan 2012*, https://www.cbcity.nsw.gov.au/development/planning-control-policies/canterbury-development-control-plan-2012, accessed 17 December 2019.

7 *Canterbury Local Environmental Plan Heritage Map - Sheet HER_004*, https://www.legislation.nsw.gov.au/maps/f6a186a6-97fb-6dac-9d90-acfc8774137b/1550_COM_HER_004_010_20121105.pdf, 17 December 2019.

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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.

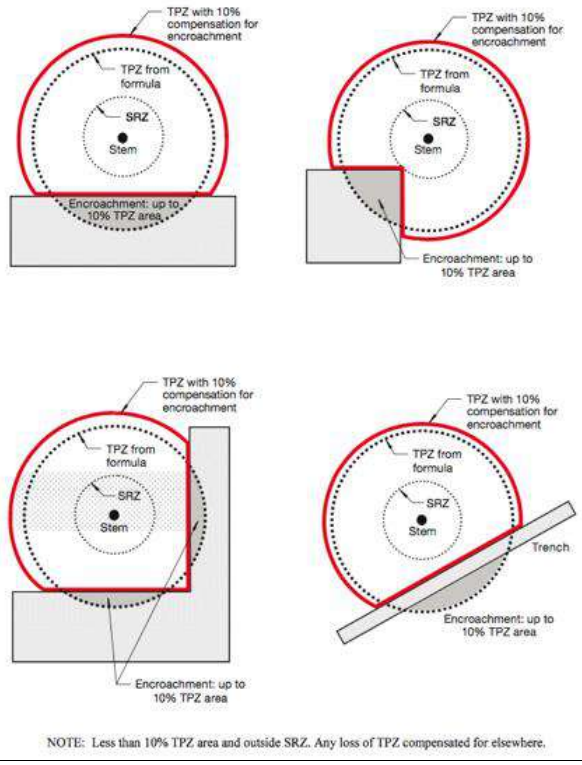

Image 1: Example minor TPZ encroachment from AS4970-2009.

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).

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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 Demolition Plan
- Appendix 1B: Proposed Plan North
- Appendix 1C: Proposed Plan South

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
646	*Tristaniopsis laurina*	A1	3.3	34.2	2.3	None	No proposed TPZ encroachment.	Retain and protect
647	*Callistemon viminalis*	Z1	2.9	26.4	1.8	None	No proposed TPZ encroachment.	Retain and protect
648	*Tristaniopsis laurina*	A1	3.8	45.4	2.2	None	No proposed TPZ encroachment.	Retain and protect
649	*Tristaniopsis laurina*	A1	3.4	36.3	2.2	None	No proposed TPZ encroachment.	Retain and protect
650	*Callistemon viminalis*	Z1	2.0	12.6	1.7	None	No proposed TPZ encroachment.	Retain and protect
651	*Tristaniopsis laurina*	Z1	2.0	12.6	1.5	None	No proposed TPZ encroachment. Proposed soft landscaping works within the TPZ must be completed in accordance with section 11.10.	Retain and protect
652	*Tristaniopsis laurina*	Z1	2.0	12.6	1.5	None	No proposed TPZ encroachment. Proposed soft landscaping works within the TPZ must be completed in accordance with section 11.10.	Retain and protect
653	*Robinia pseudoacacia*	Z3	2.8	24.6	1.9	Major	A proposed power pole will encroach into the TPZ and SRZ of the tree. This is considered to be a major TPZ encroachment and the proposed works could potentially impact the stability of the tree. To reduce the impact to the tree, the proposed power pole must be installed in accordance with section 9.2.3 of this report.	Retain and protect*
654	*Robinia pseudoacacia*	Z3	2.3	16.6	1.7	None	No proposed TPZ encroachment.	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
655	*Cinnamomum camphora*	A1	6.0	113.1	2.6	Minor	The proposed hard surfacing will encroach into the TPZ by 3% (3.2m^2) but not into the SRZ. This is considered to be a minor and acceptable TPZ encroachment and the proposed hard surfacing will not significantly impact the condition of the tree.	Retain and protect
656	*Brachychiton acerifolius*	A1	3.8	45.4	2.1	Minor	The proposed hard surfacing will encroach into the TPZ by 4% (2.0m^2) but not into the SRZ. This is considered to be a minor and acceptable TPZ encroachment and the proposed hard surfacing will not significantly impact the condition of the tree.	Retain and protect
657	*Robinia pseudoacacia*	Z3	2.9	26.4	2.1	Major	The proposed hard surfacing will encroach into the TPZ by 48% (13.1m^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 impacts from the proposed development.	Remove.
658	*Cinnamomum camphora*	Z4	10.9	373.3	3.0	Footprint	The tree has been marked for removal in the received plans. The trunk of the tree is located within the footprint of the proposed hard surface pathway.	Remove
659	*Robinia pseudoacacia 'Frisia'*	Z3	2.2	15.2	1.7	Footprint	The tree has been marked for removal in the received plans. The trunk of the tree is located within the footprint of the proposed concrete seating area.	Remove
660	*Robinia pseudoacacia 'Frisia'*	Z3	2.0	12.6	1.6	Footprint	The tree has been marked for removal in the received plans. The trunk of the tree is located within the footprint of the proposed hard surface pathway.	Remove
661	*Robinia pseudoacacia 'Frisia'*	Z3	2.0	12.6	1.7	Minor	The proposed hard surfacing will encroach into the TPZ by 4% (0.5m^2) but not into the SRZ. This is considered to be a minor and acceptable TPZ encroachment and the proposed hard surfacing will not significantly impact the condition of the tree.	Retain and protect
662	*Robinia pseudoacacia 'Frisia'*	Z3	2.4	18.1	1.8	None	No proposed TPZ encroachment.	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
663	*Robinia pseudoacacia 'Frisia'*	Z3	2.2	15.2	1.8	Major	The proposed hard surfacing will encroach into the TPZ by 18% (2.7m^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. To reduce the impact to the tree, the proposed hard surfacing must be constructed on or above existing grades and in accordance with section 9.2.1 of this report. A proposed power pole will also encroach into the TPZ and SRZ of the tree. To reduce the impact to the tree, the proposed power pole must be installed in accordance with section 9.2.3 of this report.	Retain and protect*
664	*Eucalyptus spp*	A1	10.4	339.8	3.3	Major	The proposed hard surfacing will encroach into the TPZ by 25% (85.8m^2) and slightly 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. To reduce the impact to the tree, the proposed hard surfacing must be constructed on or above existing grades and in accordance with section 9.2.1 of this report. Proposed power poles will also encroach into the TPZ of the tree. To reduce the impact to the tree, the proposed power poles must be installed in accordance with section 9.2.3 of this report.	Retain and protect*
665	*Robinia pseudoacacia 'Frisia'*	Z3	2.0	12.6	1.6	Minor	The proposed power pole will encroach into the TPZ by less than 5%. This is considered to be a minor and acceptable TPZ encroachment and the proposed works will not significantly impact the condition of the tree.	Retain and protect
666	*Robinia pseudoacacia 'Frisia'*	Z3	3.4	36.3	2.0	Minor	The proposed hard surfacing and power pole will encroach into the TPZ by 8% (2.9m^2) but not into the SRZ. This is considered to be a minor and acceptable TPZ encroachment and the proposed works will not significantly impact the condition of the tree.	Retain and protect
667	*Robinia pseudoacacia 'Frisia'*	Z4	3.9	47.8	2.3	Major	The proposed hard surfacing and power pole will encroach into the TPZ by 12% (5.8m^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 in poor health/advanced stages of decline and should not be a constraint to the development. The tree is recommended for removal due to its current condition and 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
668	*Lophostemon confertus*	A1	6.2	120.8	2.6	Major	The proposed palisade fencing will encroach into the TPZ by 42% (51.0m^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. To reduce the impact to the tree, the proposed fencing must be completed in accordance with section 9.2.3 of this report.	Retain and protect*
669	*Callistemon viminalis*	A2	9.4	277.6	3.3	None	No proposed TPZ encroachment.	Retain and protect
670	*Lophostemon confertus*	A1	3.6	40.7	2.3	Major	The proposed palisade fencing will encroach into the TPZ by 37% (15.0m^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. To reduce the impact to the tree, the proposed fencing must be completed in accordance with section 9.2.3 of this report.	Retain and protect*
671	*Callistemon viminalis*	A1	5.0	78.5	2.3	None	No proposed TPZ encroachment.	Retain and protect
672	*Callistemon viminalis*	A1	8.3	216.4	3.0	Minor	The proposed palisade fencing will encroach into the TPZ by 4% (7.9m^2) but not into the SRZ. This is considered to be a minor and acceptable TPZ encroachment and the proposed works will not significantly impact the condition of the tree.	Retain and protect
673	*Leptospermum petersonii*	A1	3.0	28.3	2.0	Major	The proposed palisade fencing will encroach into the TPZ by 47% (13.2m^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. To reduce the impact to the tree, the proposed fencing must be completed in accordance with section 9.2.3 of this report.	Retain and protect*
674	*Callistemon viminalis*	A1	9.6	289.5	3.0	Major	The proposed palisade fencing will encroach into the TPZ by 49% (142.6m^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. To reduce the impact to the tree, the proposed fencing must be completed in accordance with section 9.2.3 of this report.	Retain and protect*

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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
		A	Z
Trees to be removed	Building construction, new surfacing and/or proximity, or trees in poor condition.	None	658, 659, 660, 657, 667 (Five trees)
Retained trees subject to TPZ encroachment greater than 10%	Removal of existing surfacing/structures and/or installation of new surfacing/structures.	664, 668, 670, 673, 674 (Five trees)	653, 663 (Two trees)
Retained trees subject to TPZ encroachment of 10% or less	Removal of existing surfacing/structures and/or installation of new surfacing/structures.	646, 648, 649, 655, 656, 669, 671, 672 (Eight trees)	647, 650, 651, 652, 654, 661, 661, 665, 666 (Nine trees)

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9.2 **Construction Design/Specification Requirements:** The proposed construction will encroach into the TPZ and SRZ of seven trees, including tree 653, 663, 664, 668, 670, 673 and 674. 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 **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.

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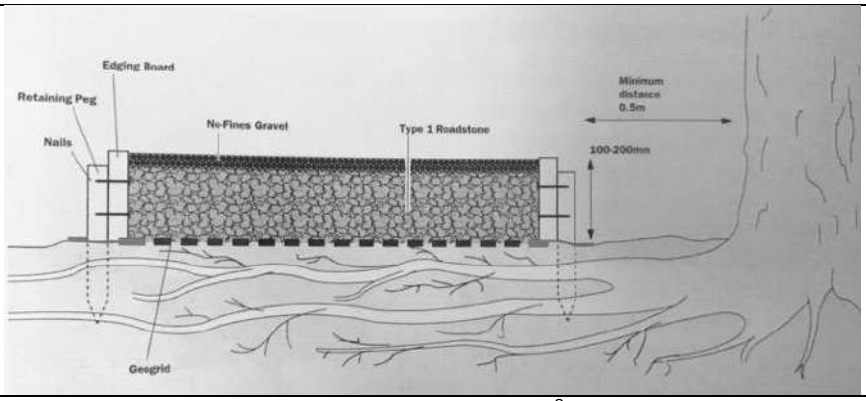

Image A: An image from 'Tree Roots in the Built Environment'[8], showing how to construct hard surfacing above a trees root system without excavation. Type 1 Roadstones are an example of blue metal or crushed sandstone.

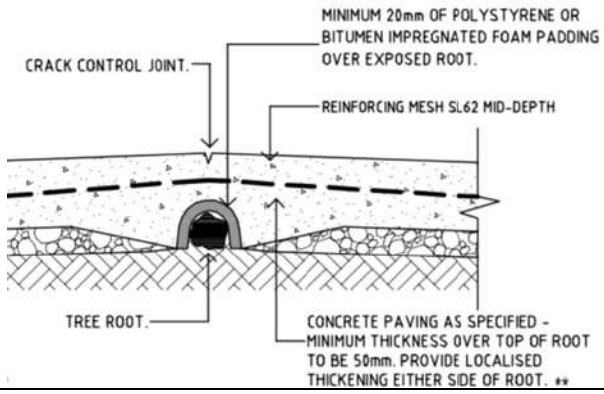

Image B: Example method for bridging concrete footpaths over tree roots provided in the Canterbury Bankstown Council standard drawings.[9]

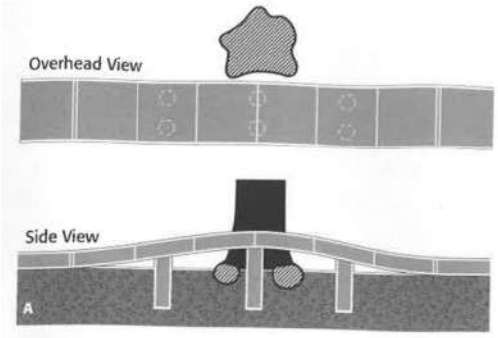

Image C: Example method from Reducing infrastructure damage by tree roots: A compendium of strategies.[10]

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.cbcity.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.

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9.2.2 **Palisade Fence:** The proposed palisade 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 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.

9.2.3 **Power Pole:** To ensure the trees are not significantly impacted by the works, all footings must be excavated manually. The footing location must be flexible to avoid the severance of significant roots 40mm and greater in diameter. No footings are to be located within the SRZ or root investigations will be required to determine the post location. If underground services are required, they must be installed in accordance with section 11.11 of this report. If any canopy pruning is required to accommodate the installation of the power poles, the pruning must be completed in accordance with AS4373-2007 Pruning of Amenity Trees.

9.3 Photographs

Image 1: Looking West towards tree 664 and 667. The proposed construction must be completed in accordance with section 9.2 to ensure tree 664 is not significantly impacted by the proposed works. Tree 667 is in poor health/advanced stages of decline and is recommended for removal due to its current condition and impacts from the proposed development.

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10. RECOMMENDATIONS

10.1 This report assesses the impact of a proposed development at the subject site to twenty-nine (29) 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 plan provided by the client. The following plans are included in appendix 1;

- Appendix 1A: Proposed Demolition Plan
- Appendix 1B: Proposed Plan North
- Appendix 1C: Proposed Plan South

10.3 Five (5) trees have been recommended for removal within this report, including tree 657, 658, 659, 660 and 667. All four trees recommended for removal are lower value category Z retention value trees that are generally should not be a constraint to development works.

10.4 Seven (7) trees will be subject to TPZ encroachments greater than 10%, including tree 653, 663, 664, 668, 670, 673 and 674. 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 seventeen (17) trees will be subject to minor and acceptable TPZ encroachments of 10% or less and can be retained in a viable condition, including tree 646, 647, 648, 649, 650, 651, 652, 654, 655, 656, 661, 662, 665, 666, 669, 671 and 672.

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 No services plan has been assessed in this report. 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.

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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
646	*Tristaniopsis laurina*	3.3	2.3	Retain and protect. Tree protection fencing is to create a combined exclusion zone for tree 646, 647, 648, 649, 650 and 651. The fencing is to run along the edge of the existing hard surfacing and is to encompass the garden bed area adjacent to the trees. TPZ signage is required on the fencing and mulch is required within the fenced area. The fencing can only be moved upon the approval of the project arborist.
647	*Callistemon viminalis*	2.9	1.8	Retain and protect. See tree protection for tree 646.
648	*Tristaniopsis laurina*	3.8	2.2	Retain and protect. See tree protection for tree 646.
649	*Tristaniopsis laurina*	3.4	2.2	Retain and protect. See tree protection for tree 646.

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650	*Callistemon viminalis*	2.0	1.7	Retain and protect. See tree protection for tree 646.
651	*Tristaniopsis laurina*	2.0	1.5	Retain and protect. Tree protection fencing is to run along the edge of the existing hard surfacing and is to encompass the garden bed area adjacent to the tree. TPZ signage is required on the fencing and mulch is required within the fenced area. The fencing can only be moved upon the approval of the project arborist.
652	*Tristaniopsis laurina*	2.0	1.5	Retain and protect. Tree protection fencing is to run along the edge of the existing hard surfacing and is to encompass the garden bed area adjacent to the tree. TPZ signage is required on the fencing and mulch is required within the fenced area. The fencing can only be moved upon the approval of the project arborist.
653	*Robinia pseudoacacia*	2.8	1.9	Retain and protect. Tree protection fencing is to create a combined exclusion zone for tree 653 and 654. The fencing is to run along the edge of the existing hard surfacing and is to encompass the garden bed area adjacent to the trees. TPZ signage is required on the fencing and mulch is required within the fenced area. The fencing can only be moved upon the approval of the project arborist.
654	*Robinia pseudoacacia*	2.3	1.7	Retain and protect. See tree protection for tree 653.
655	*Cinnamomum camphora*	6.0	2.6	Retain and protect. Tree protection fencing is to encompass the area of the TPZ between the existing fencing and the hard surfacing to the North of the tree. TPZ signage is required on the fencing. The fencing can only be moved upon the approval of the project arborist.
656	*Brachychiton acerifolius*	3.8	2.1	Retain. Set back from the proposed works. The existing fence will be sufficient for tree protection.
657	*Robinia pseudoacacia*	2.9	2.1	Remove and replace.
658	*Cinnamomum camphora*	10.9	3.0	Remove and replace.
659	*Robinia pseudoacacia 'Frisia'*	2.2	1.7	Remove and replace.
660	*Robinia pseudoacacia 'Frisia'*	2.0	1.6	Remove and replace.
661	*Robinia pseudoacacia 'Frisia'*	2.0	1.7	Retain and protect. Tree protection fencing is to create a combined exclusion zone for tree 661, 662 and 663. The fencing is to run along the edge of the proposed hard surfacing and is run along the TPZ perimeter of the trees. TPZ signage is required on the fencing and mulch is required within the fenced area. The fencing can only be moved upon the approval of the project arborist.
662	*Robinia pseudoacacia 'Frisia'*	2.4	1.8	Retain and protect. See tree protection for tree 661.

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663	*Robinia pseudoacacia 'Frisia'*	2.2	1.8	Retain and protect. See tree protection for tree 661.
664	*Eucalyptus spp*	10.4	3.3	Retain and protect. Tree protection fencing is to create a combined exclusion zone for tree 664, 665 and 666. The fencing is to run along the edge of the proposed hard surfacing and existing hard surfacing and is to encompass as much of the TPZ area as practical. TPZ signage is required on the fencing and mulch is required within the fenced area. The fencing can only be moved upon the approval of the project arborist.
665	*Robinia pseudoacacia 'Frisia'*	2.0	1.6	Retain and protect. See tree protection for tree 664.
666	*Robinia pseudoacacia 'Frisia'*	3.4	2.0	Retain and protect. See tree protection for tree 664.
667	*Robinia pseudoacacia 'Frisia'*	3.9	2.3	Remove and replace.
668	*Lophostemon confertus*	6.2	2.6	Retain and protect. Tree protection fencing is to run along the edge of the existing hard surfacing and is to encompass the garden bed area adjacent to the tree. TPZ signage is required on the fencing and mulch is required within the fenced area. The fencing can only be moved upon the approval of the project arborist.
669	*Callistemon viminalis*	9.4	3.3	Retain. Set back from works. No tree protection required.
670	*Lophostemon confertus*	3.6	2.3	Retain and protect. Tree protection fencing is to run along the edge of the existing hard surfacing and is to encompass the garden bed area adjacent to the tree. TPZ signage is required on the fencing and mulch is required within the fenced area. The fencing can only be moved upon the approval of the project arborist.
671	*Callistemon viminalis*	5.0	2.3	Retain. Set back from works. No tree protection required.
672	*Callistemon viminalis*	8.3	3.0	Retain and protect. Tree protection fencing is to encompass the drip line of the tree. TPZ signage is required on the fencing and mulch is required within the fenced area. The fencing can only be moved upon the approval of the project arborist.
673	*Leptospermum petersonii*	3.0	2.0	Retain and protect. Tree protection fencing is to create a combined exclusion zone for tree 673 and 674. The fencing is to act as trunk protection during the installation of the palisade fencing. TPZ signage is required on the fencing and mulch is required within the fenced area. The fencing can only be moved upon the approval of the project arborist.
674	*Callistemon viminalis*	9.6	3.0	Retain and protect. See tree protection for tree 673.

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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 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 in 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

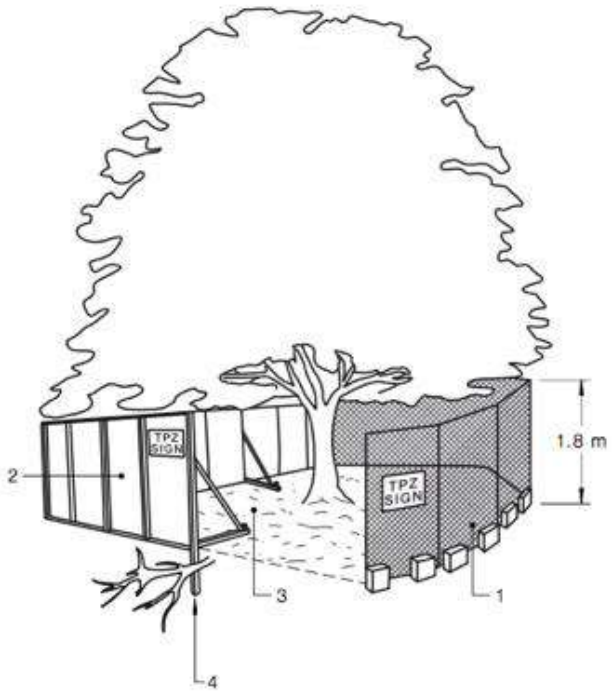
11.6.3 Trunk and Branch Protection: The trunk must be protected by wrapped hessian or similar material to limit damage. Timber planks (50mm x 100mm or similar) should then be placed around tree trunk. The timber planks should be spaced at 100mm intervals, and must be fixed against the trunk with tie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



LEGEND:
1 Chain wire mesh panels with shade cloth (if required) attached, held in place with concrete feet.
2 Alternative plywood or wooden paling fence panels. This fencing material also prevents building materials or soil entering the TPZ.
3 Mulch installation across surface of TPZ (at the discretion of the project arborist). No excavation, construction activity, grade changes, surface treatment or storage of materials of any kind is permitted within the TPZ.
4 Bracing is permissible within the TPZ. Installation of supports should avoid damaging roots.

An image from AS4970-2009,[11] with example tree protection.

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

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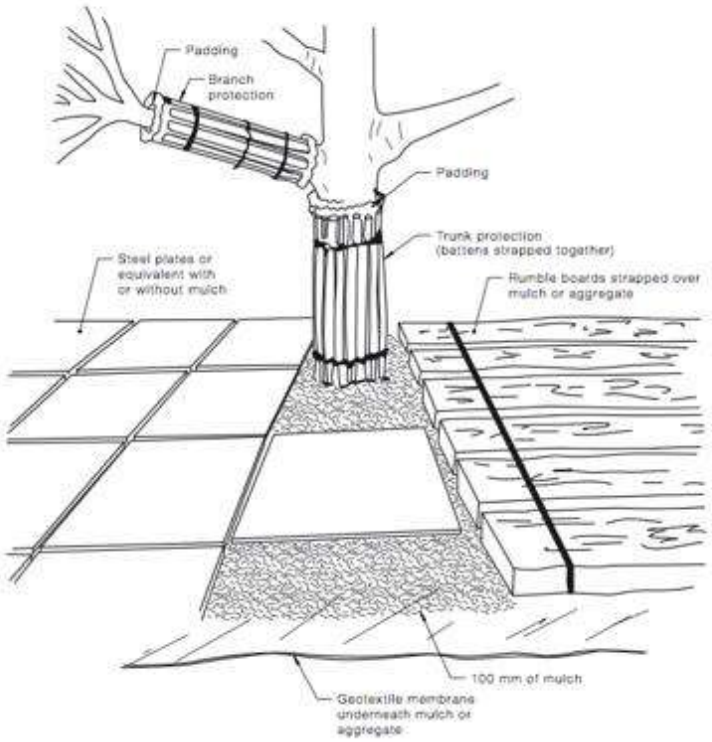

NOTES:

1 For trunk and branch protection use boards and padding that will prevent damage to bark. Boards are to be strapped to trees, not nailed or screwed.

2 Rumble boards should be of a suitable thickness to prevent soil compaction and root damage.

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.

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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 principle 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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13. BIBLIOGRAPHY/REFERENCES

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14. LIST OF APPENDICES

The following are included in the appendices:
Appendix 1A - Proposed Demolition Plan
Appendix 1B - Proposed Plan North
Appendix 1C - Proposed Plan South
Appendix 2 - Tree Inspection Schedule
Appendix 3 - Further information of methodology

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Registered Consulting Arborist No. 2556
ISA Member No. 228863
Quantified Tree Risk Assessment (QTRA)
ISA Tree Risk Assessment Qualification (TRAQ)

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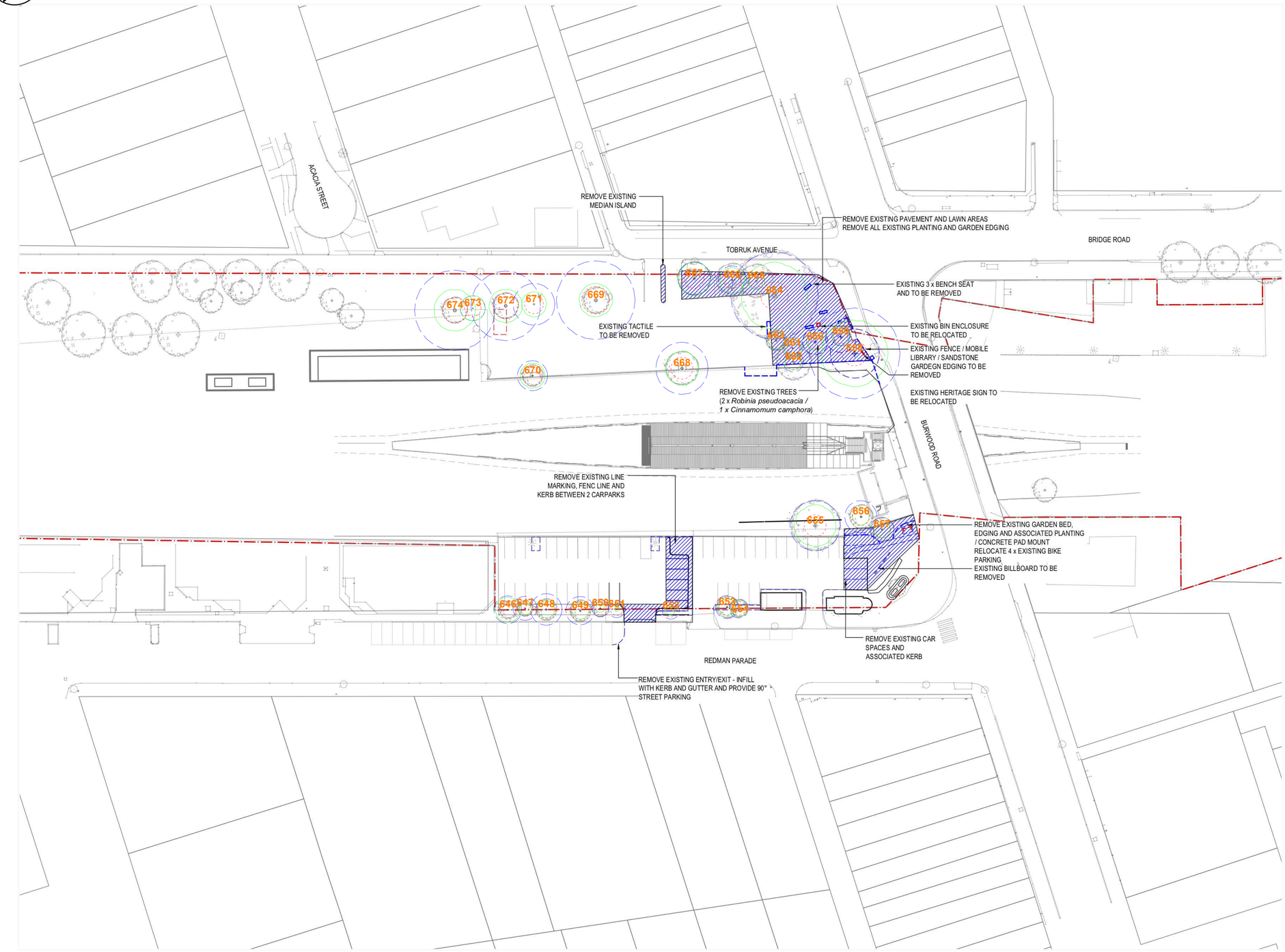
Diploma of Arboriculture (AQF5)
Cert III Landscape Construction
Member Arboriculture Australia
QTRA
TRAQ

TO SYDNEY

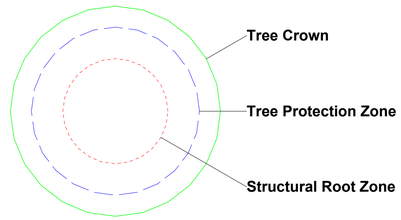
TO BANKSTOWN



LEGEND

- RAILCORP PROPERTY BOUNDARY
- WORKS TO BE REMOVED
- EXISTING STREET FURNITURE / FENCE TO BE REMOVED
- EXISTING STREET SIGN / FURNITURE TO BE RELOCATED
- EXISTING TREES TO BE RETAINED
- EXISTING TREES TO BE REMOVED

Tree Legend



0 — 80m

Urban Arbor Pty Ltd

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

Site Location: Belmore Station, Belmore, NSW

SCALE :	DATE :
1 : 500 @ A1	17/12/2019

Appendix 1A: Proposed Demolition Plan

URBAN ARBOR
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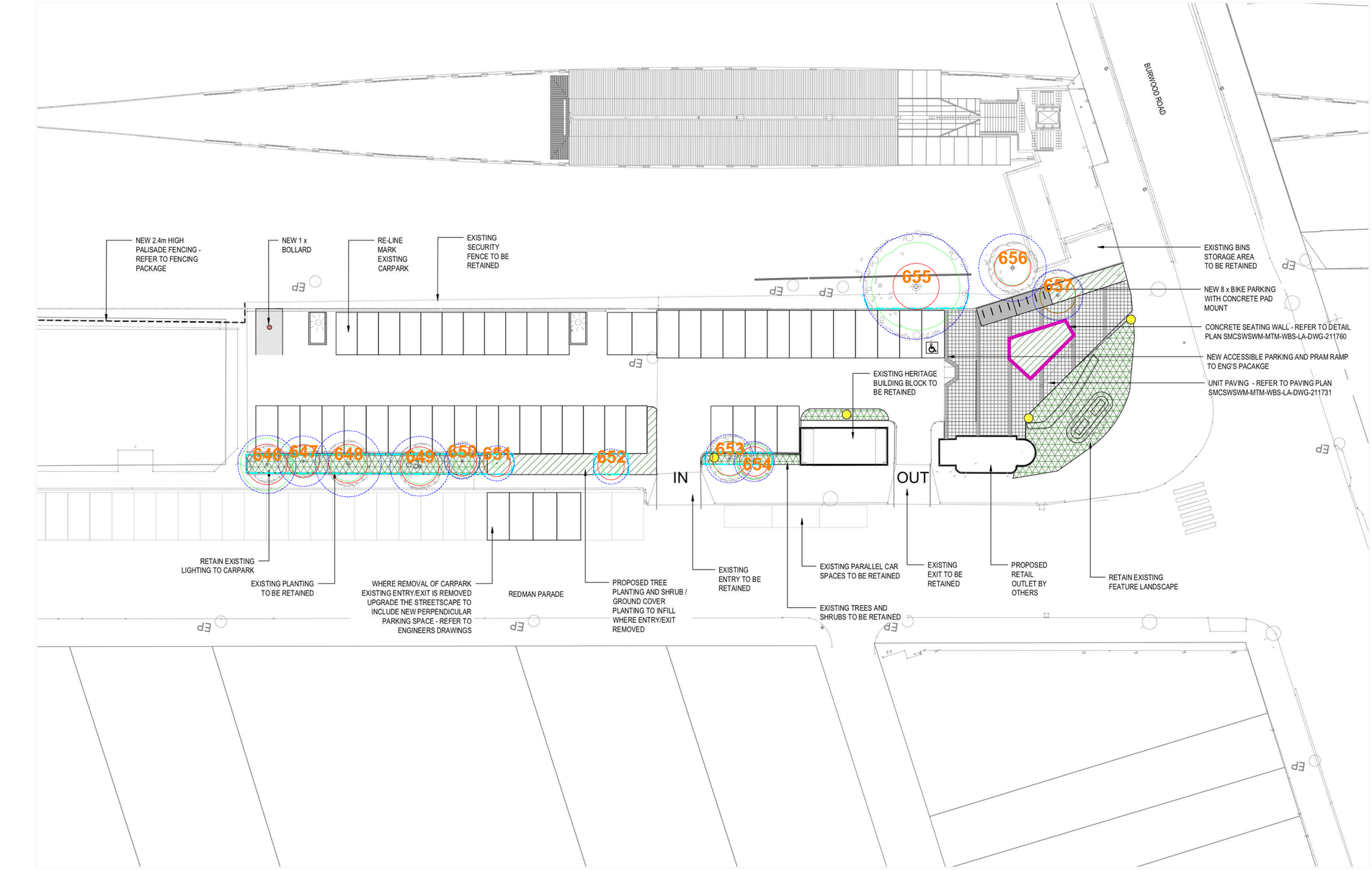
Prepared by: Bryce Claassens

TO SYDNEY

TO BANKSTOWN



LEGEND

GENERAL
- RAILCORP PROPERTY BOUNDARY

FENCES/WALLS
- NEW 2.4m HIGH PALISADE SECURITY FENCE
- NEW PERFORATED ALUMINUM SCREEN / GATE

TREES
- EXISTING TREES TO BE RETAINED
- EXISTING TREES TO BE REMOVED

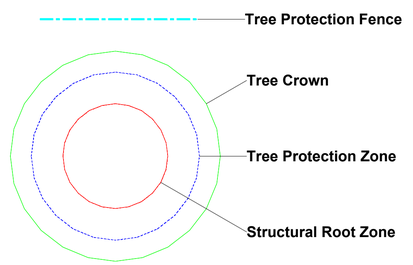
LANDSCAPE
- NEW PLANTING
- EXISTING PLANTING

HARDSCAPE
- NEW PLAZA PAVING

STREET FURNITURE
- BIKE PARKING (HOOPS)
- NEW SEAT

LIGHTING
- NEW LIGHTING TO BE CO-ORDINATED WITH LIGHTING ENGINEER

Tree Legend



0 40m

Urban Arbor Pty Ltd

PO Box 450, Turramurra, NSW, 2074

sales@urbanarbor.com.au, (02) 8004 2802

Site Location: Belmore Station, Belmore, NSW

SCALE :	DATE :
1 : 250 @ A1	18/12/2019

URBAN ARBOR
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Appendix 1B: Proposed Plan North

Prepared by: Bryce Claassens

TO SYDNEY

TO BANKSTOWN

NEW KISS AND RIDE SHELTER
NEW KNR & TAXI PARKING WITH
NEW STREET LIGHTING

TOBRUK AVENUE

1 x EXISTING *Eucalyptus spp*
TO BE RETAINED - SUBJECT
TO ARBORIST REPORT

RELOCATED EXISTING
BIKE RACK

BRIDGE ROAD

NEW DRINKING FOUNTAIN

EXISTING BUS SIGN AND
TACTILE TO BE RETAINED

CONCRETE SEATING WALL WITH SEAT
- REFER TO DETAIL PLAN
SMCSWSWM-MTM-WBS-LA-DWG-211760

EXISTING BUS SHELTER
TO BE RETAINED

UNIT PAVING - REFER TO PAVING PLAN
SMCSWSWM-MTM-WBS-LA-DWG-211730

FUTURE POP UP RETAIL

PROPOSED PLANTING REFER TO
PLANTING PLAN
SMCSWSWM-MTM-WBS-LA-DWG-211740

NEW TACTILE AND
2 x BOLLARDS

EXISTING PARKING
LINE MARKING TO BE
RETAINED

PROPOSED
SEAT

NEW 2.4m HIGH
PALISADE FENCING -
REFER TO FENCING
PACKAGE

EXISTING POWER
POLES TO BE RETAINED

BURWOOD ROAD

LEGEND

GENERAL
RAILCORP PROPERTY BOUNDARY

FENCES/WALLS
NEW 2.4m HIGH PALISADE SECURITY FENCE

TREES
EXISTING TREES TO BE RETAINED
EXISTING TREES TO BE REMOVED

LANDSCAPE
NEW PLANTING

HARDSCAPE
EXISTING URBANSTONE PAVING
NEW PLAZA PAVING
NEW SEATING WALL

STREET FURNITURE
EXISTING BIKE RACK
NEW SHELTER
NEW SEAT
NEW DRINKING FOUNTAIN
NEW BOLLARDS

LIGHTING
NEW LIGHTING TO BE CO-ORDINATED
WITH LIGHTING ENGINEER

STREETSCAPE
KISS AND RIDE PARKING
TAXI PARKING

Tree Legend

Tree Protection Fence
Tree Crown
Tree Protection Zone
Structural Root Zone

0 40m

Urban Arbor Pty Ltd

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

Site Location: Belmore Station, Belmore, NSW

SCALE : 1 : 250 @ A1

DATE : 17/12/2019

Appendix 1C: Proposed Plan South

URBAN ARBOR
The Trusted Name in Tree Management

Prepared by: Bryce Claassens

Appendix 2 - Tree Inspection Schedule

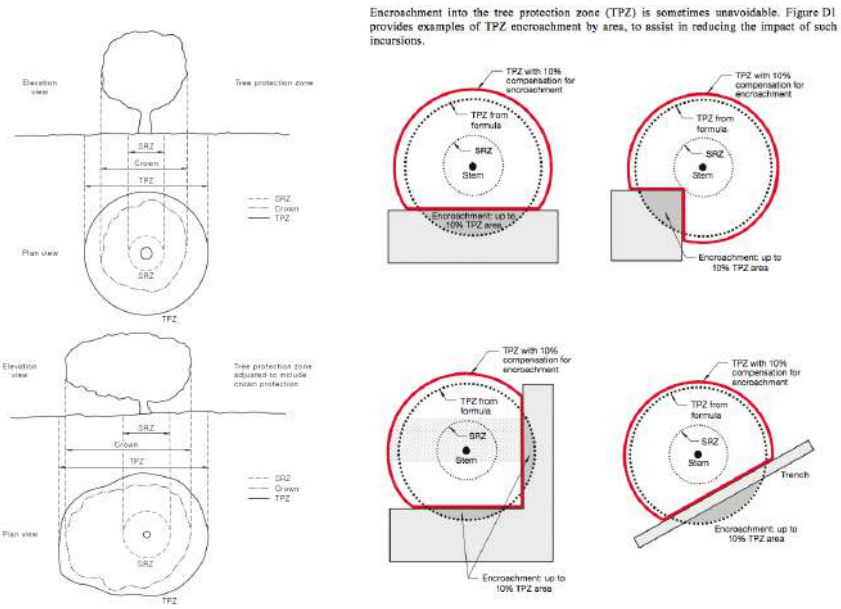
Tree ID	Common Name	Botanical Name	Age Class	Height (m)	Canopy Spread Radius (m	Stem 1	Stem 2	Stem 3	Stem 4	Stem 5	DBH (mm)	DAB (mm)	Health	Structure	Amenity Value	SULE	Retention Value	TPZ Radius (m)	SRZ Radius (m)	Notes
646	Water Gum	*Tristaniopsis laurina*	Mature	5	3	200	100	100	90	90	276	420	Good	Fair	Medium	2. Medium	A1	3.3	2.3	Multi stem tree. Deadwood in lower crown.
647	Weeping Bottlebrush	*Callistemon viminalis*	Semi-mature	2.5	1.5	150	120	100	100		239	250	Good	Good	Low	5. Small/Young	Z1	2.9	1.8	None.
648	Water Gum	*Tristaniopsis laurina*	Mature	5	2	230	160	100	100		314	380	Good	Fair	Medium	2. Medium	A1	3.8	2.2	Multi stem tree. Deadwood in lower crown.
649	Water Gum	*Tristaniopsis laurina*	Mature	5	2	200	200				283	380	Good	Good	Medium	1. Long	A1	3.4	2.2	Co-dominant stems.
650	Weeping Bottlebrush	*Callistemon viminalis*	Young	2	1	120	100				156	200	Good	Good	Low	5. Small/Young	Z1	2.0	1.7	None.
651	Water Gum	*Tristaniopsis laurina*	Young	1	0.5	80					80	90	Good	Good	Low	5. Small/Young	Z1	2.0	1.5	None.
652	Water Gum	*Tristaniopsis laurina*	Young	2	1	100					100	110	Good	Good	Low	5. Small/Young	Z1	2.0	1.5	None.
653	Robinia	*Robinia pseudoacacia*	Mature	5	2	230					230	280	Good	Good	Low	2. Medium	Z3	2.8	1.9	Exempt species.
654	Robinia	*Robinia pseudoacacia*	Semi-mature	5	2	190					190	200	Good	Good	Low	2. Medium	Z3	2.3	1.7	Exempt species.
655	Camphor Laurel	*Cinnamomum camphora*	Mature	11	5	500					500	580	Good	Fair	Medium	2. Medium	A1	6.0	2.6	Located within corridor. DBH estimated.
656	Illawara Flame	*Brachychiton acerifolius*	Mature	8	2	320					320	340	Good	Good	Medium	2. Medium	A1	3.8	2.1	Located within corridor. DBH estimated.
657	Robinia	*Robinia pseudoacacia*	Mature	5	2	200	130				239	320	Good	Good	Low	2. Medium	Z3	2.9	2.1	Exempt species.
658	Camphor Laurel	*Cinnamomum camphora*	Mature	9	8	670	610				906	780	Fair	Fair	Low	3. Short	Z4	10.9	3.0	Apical dieback. Large diameter deadwood. Tree is in decline.
659	Golden Robinia	*Robinia pseudoacacia 'Frisia'*	Semi-mature	5	2	180					180	200	Good	Fair	Low	2. Medium	Z3	2.2	1.7	Exempt species. Co-dominant stems with tight union.
660	Golden Robinia	*Robinia pseudoacacia 'Frisia'*	Semi-mature	4	2	150					150	170	Fair	Fair	Low	2. Medium	Z3	2.0	1.6	Exempt species. Apical dieback.
661	Golden Robinia	*Robinia pseudoacacia 'Frisia'*	Semi-mature	5	2	170					170	200	Good	Good	Low	2. Medium	Z3	2.0	1.7	Exempt species.
662	Golden Robinia	*Robinia pseudoacacia 'Frisia'*	Semi-mature	5	2	200					200	230	Fair	Fair	Low	3. Short	Z3	2.4	1.8	Exempt species. Dieback of S stem.
663	Golden Robinia	*Robinia pseudoacacia 'Frisia'*	Semi-mature	5	2	180					180	220	Good	Fair	Low	2. Medium	Z3	2.2	1.8	Exempt species.
664	Eucalypt	*Eucalyptus spp*	Mature	16	8	870					870	990	Good	Good	Very High	1. Long	A1	10.4	3.3	Minor deadwood.
665	Golden Robinia	*Robinia pseudoacacia 'Frisia'*	Semi-mature	5	2	160					160	180	Good	Fair	Low	2. Medium	Z3	2.0	1.6	Exempt species. Suppressed.
666	Golden Robinia	*Robinia pseudoacacia 'Frisia'*	Mature	5	3	260	110				282	310	Fair	Fair	Low	3. Short	Z3	3.4	2.0	Exempt species. In decline.
667	Golden Robinia	*Robinia pseudoacacia 'Frisia'*	Mature	5	4	240	170	140			326	440	Poor	Poor	Low	4. Remove	Z4	3.9	2.3	Exempt species. Tree is in advanced stages of decline.
668	Queensland Brushbox	*Lophostemon confertus*	Mature	6	4	520					520	580	Good	Good	Medium	1. Long	A1	6.2	2.6	None.
669	Weeping Bottlebrush	*Callistemon viminalis*	Mature	8	4	550	400	250	300		784	1000	Fair	Fair	Medium	2. Medium	A2	9.4	3.3	Minor apical dieback. Monitor tree health.
670	Queensland Brushbox	*Lophostemon confertus*	Mature	4.5	3	300					300	400	Good	Fair	Medium	2. Medium	A1	3.6	2.3	None.
671	Weeping Bottlebrush	*Callistemon viminalis*	Mature	6	3	270	260	180			416	400	Good	Good	Medium	1. Long	A1	5.0	2.3	None.
672	Weeping Bottlebrush	*Callistemon viminalis*	Mature	8	4	550	300	220	200		693	800	Good	Good	Medium	2. Medium	A1	8.3	3.0	Fire damage on trunk.
673	Lemon Scented Tea Tree	*Leptospermum petersonii*	Mature	5	3	190	160				248	300	Good	Fair	Medium	2. Medium	A1	3.0	2.0	Co-dominant stems at base with indicators of instability.
674	Weeping Bottlebrush	*Callistemon viminalis*	Mature	9	5	800					800	800	Good	Good	Medium	1. Long	A1	9.6	3.0	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.

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.
   SRZ radius = $(D \times 50)^{0.42} \times 0.64$ (D = 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.

Category	Example condition	Summary
Good	• 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.	• The tree is in above average health and condition and no remedial works are required.
Fair	• 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.	• The tree is in below average health and condition and may require remedial works to improve the trees health.
Poor	• The 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.	• The tree is displaying low levels of health and removal or remedial works may be required.
Dead	• The tree is dead or almost dead.	• The tree should generally be removed.

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

Category	Example condition	Summary
Good	• 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.	• The tree is considered structurally good with well developed form.
Fair	• The tree may have minor structural defects within the structure of the crown that could potentially develop into more significant defects. • The tree may 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.	• 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	• 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.	• 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 statuary 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
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.

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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

Incorporating extracts from Lonsdale, D. 1999. Principles of Tree Hazard Assessment. Her Majesty's Stationary Office, London

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

Incorporating extracts from Lonsdale, D. 1999. Principles of Tree Hazard Assessment. Her Majesty's Stationary Office, London

APPENDIX 2 – BELMORE AIA (PLATAEU TREES)

PLATEAUTREES
Safety. Quality. Progress.

Date: 28 September 2021

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

At the request of Downer Group an onsite inspection was undertake at Belmore Station. It has been asked to record additional tree removals and selective pruning works as part of the Southwest Metro Package. The assessed trees are not identified within the Arboricultural Impact Assessment (AIA) prepared by Urban Arbor, dated 17 December 2019, Ref 19/12/17/SWMMS. On the 7 April a site walkthrough was undertaken by myself under guidance of a Downer Group representative.

Twelve additional trees were identified for removal. These trees are in direct conflict with proposed pilling (1), excavation works (2,3,4,6,8,9,10,11,12), realignment of the GST (7) and sewer (13). Two trees have been assessed for selective pruning works to create clearances to accommodate the works (5) and allow for site access (14). An aerial image of the site showing approximate tree locations can be found as Image 1. Tree data can be found as Appendix 1 of this report.

Trees identified for removal are considered to have low amenity and visual value given their size and location within the rail corridor. They are likely to be self-seeded specimens or regrowth off old stumps where previous tree removal works have been undertaken. Selective pruning works have been detailed in Appendix 3 of this report. All pruning works are to be undertaken by suitably qualified tree workers and meet the requirements of *AS4373-2007 Pruning of Amenity Trees*.

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All appropriate approvals and consents are to be obtained prior to tree and vegetation removal works commencing. Given their size and location, it is felt that trees 2, 3, 4, 6, 7, 8, 9, 10, 11, 12 and 13 may be removed using an excavator without significant impact on tree 5.

Image 1: Aerial image of Belmore station showing approximate tree locations. Red dots indicate trees to be removed, green dots indicate trees to be pruned.

Tree 1 *Ligustrum sinensis* (Small-leafed Privet) is an identified species under the *Biosecurity Act 2015*. A general biosecurity duty exists within NSW to prevent, eliminate or minimise any biosecurity risk. The trees and not representative of a threatened or endangered species or ecological community.

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

Regards.

Owen Tebbutt

Plateau Tree Service

Appendix 1: Tree assessment Schedule

PLATEAUTREES
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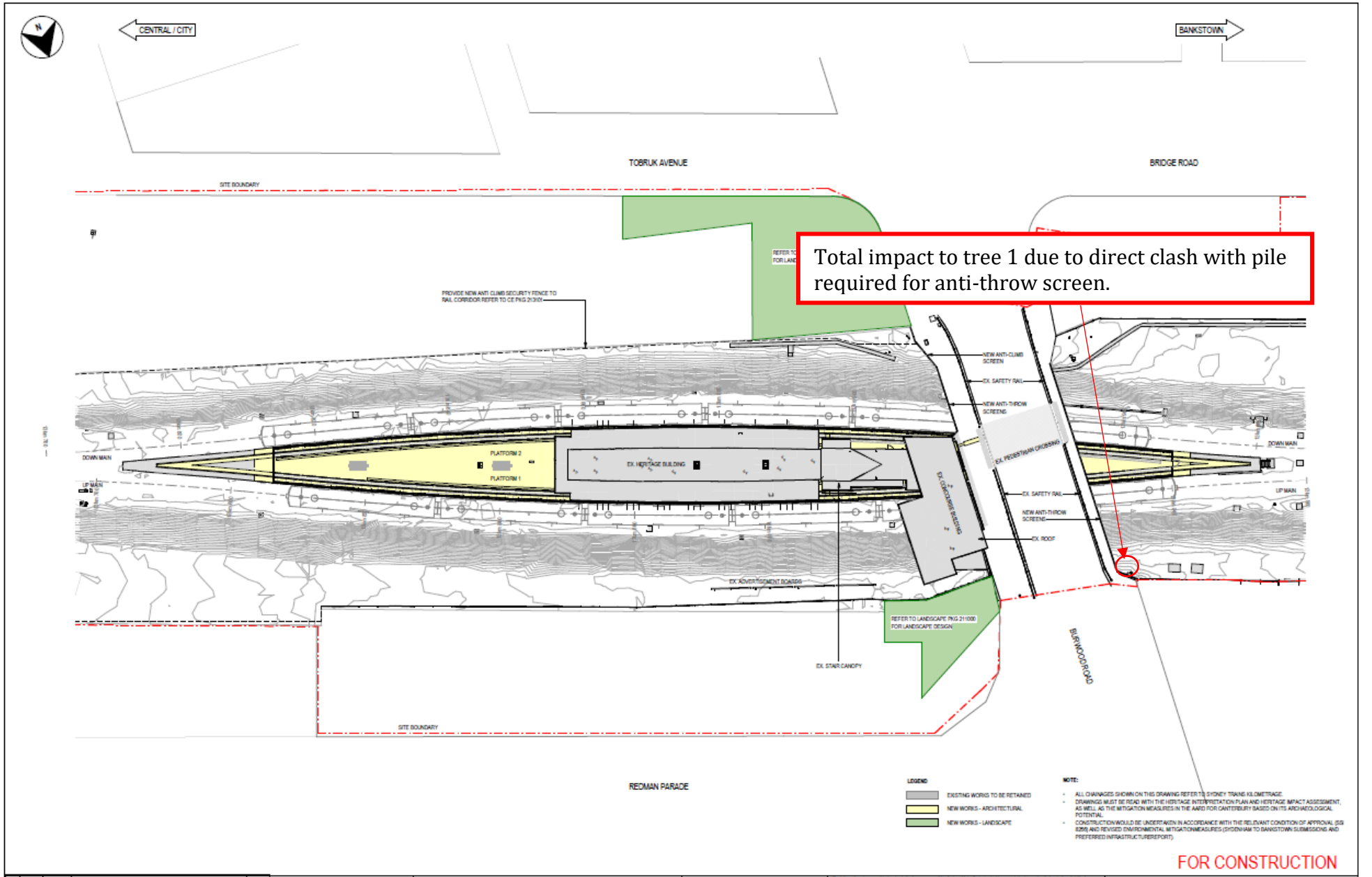
Tree number	Tree name	Tree dimensions				Vigour	Condition	Age class	ULE	Amenity and Visual Value	Native or Exotic	TPZ (m)	SRZ (m)	Comments	Remove or Retain
	Botanical name Common name	Height (m)	Spread (m)	D.B.H. (mm)	D.A.B. (mm)										
1	*Ligustrum sinensis* (Small-leafed Privet)	5-10	2x2	200	300	N	F	M	R	L	E	2	1.5	Minimum TPZ and SRZ apply. Listed weed under Biosecurity Act 2015. Clash with Piling for anti-throw screens.	Remove
2	*Acacia* sp (Wattle)	<5	1x1	30,30	-	N	G	Y	S	L	N	2	1.5	Direct clash with permanent CSR route.	Remove
3	*Leptospermum* sp (Tee Tree)	<5	1x1	multi	-	N	G	Y	S	L	N	2	1.5	Direct clash with permanent CSR route.	Remove
4	*Unknown species*	<5	1x1	multi	-	N	G	Y	S	L	-	2	1.5	Direct clash with permanent CSR route.	Remove
5	*Acacia* sp (Wattle)	5-10	2x2	40,40,40	-	N	G	Y	S	L	N	2	1.5	Minimum TPZ and SRZ apply.	Retain and prune
6	*Acacia* sp (Wattle)	<5	1x1	20	-	N	G	Y	S	L	N	2	1.5	Direct clash with permanent CSR route.	Remove
7	*Eucalyptus robusta* (Swamp Mahogany)	5-10	2x2	90,90, 60,30,30	-	N	G	Y	S	L	N	2	1.5	Direct clash with permanent GST.	Remove
8	*Acacia* sp (Wattle)	<5	1x1	30,30	-	N	G	Y	S	L	N	2	1.5	Direct clash with permanent CSR route.	Remove
9	*Pittosporum undulatum* (Sweet Pittosporum)	<5	1x1	multi	-	N	G	Y	S	L	N	2	1.5	Direct clash with permanent CSR route.	Remove
10	*Acacia* sp (Wattle)	<5	1x1	20,20,20	-	N	G	Y	S	L	N	2	1.5	Direct clash with permanent CSR route.	Remove
11	*Acacia* sp (Wattle)	<5	1x1	15	-	N	G	Y	S	L	N	2	1.5	Direct clash with permanent CSR route.	Remove
12	*Acacia* sp (Wattle)	<5	1x1	40	-	N	G	Y	S	L	N	2	1.5	Direct clash with permanent CSR route.	Remove
13	*Eucalyptus robusta* (Swamp Mahogany)	5-10	2x2	60,60,40, 40	-	N	G	Y	S	L	N	2	1.5	Direct clash with permanent sewerage service.	Remove
14	*Eucalyptus robusta* (Swamp Mahogany)	10-15	7x7	450	550	N	G	M	M	M	N	5.4	2.57	Tree located within road reserve area adjacent rail corridor access gate	Retain and prune



Total impact to tree 1 due to direct clash with pile required for anti-throw screen.

FOR CONSTRUCTION

REV	BY	DATE	DESCRIPTION	APPD
00	AW	31/03/2021	APPROVED FOR CONSTRUCTION	LP

1:250 FULL SIZE A1

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-WBS-AT-DWG-211120

CLIENT: Transport for NSW | Sydney Metro

SERVICE PROVIDERS: METRON T2M

DRAWN: I. ROMO
DESIGNED: G. DAVIES
DRG CHECK: A. MITRAKOSKI
DESIGN CHECK: G. DAVIES
APPROVED: L. DALVEY 31/03/2021

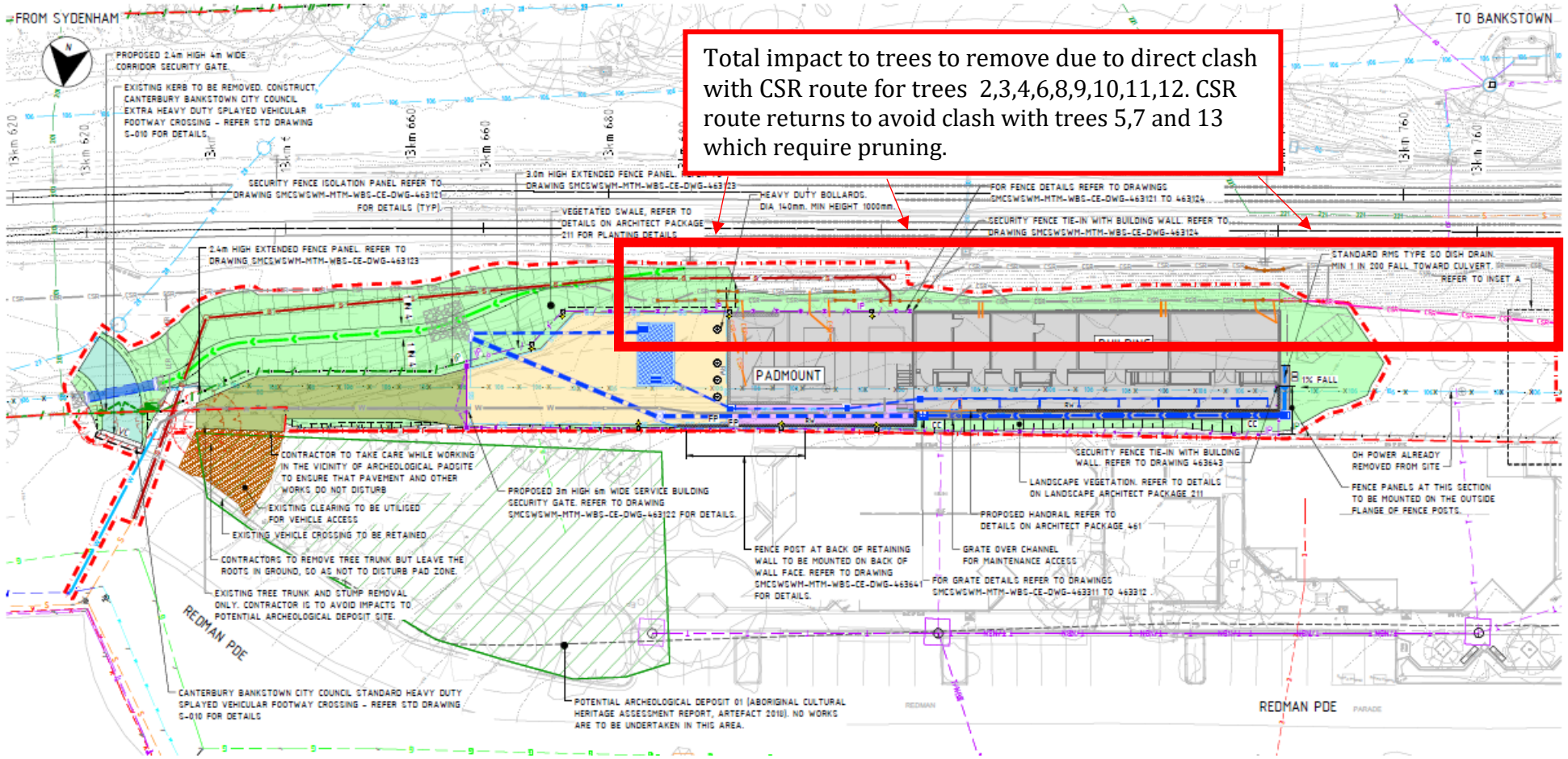
SYDNEY METRO

BELMORE STATION (13.555km to 14.029km Sydney Metro Kilometrage)
ARCHITECTURAL DESIGN
OVERALL ARRANGEMENT
SITE PLAN

STATUS: FOR CONSTRUCTION | SHEET 1 OF 1

DRG No. SMCSWSWM-MTM-WBS-AT-DWG-211120 | REV. 00

Total impact to trees to remove due to direct clash with CSR route for trees 2,3,4,6,8,9,10,11,12. CSR route returns to avoid clash with trees 5,7 and 13 which require pruning.



PLAN
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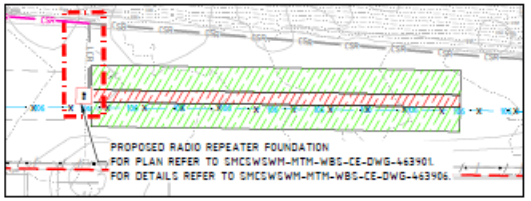

INSET A
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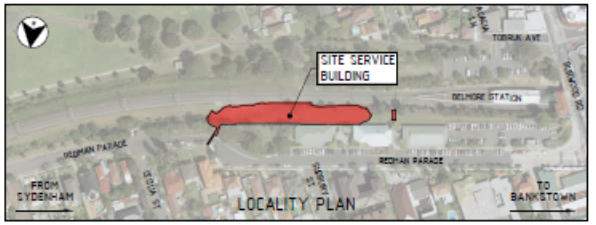

NOTES

1. FOR GENERAL NOTES REFER TO DRAWINGS SMCSWSWM-MTM-WBS-CE-DWG-463104 TO 463107.
2. FOR LEGEND REFER TO DRAWING SMCSWSWM-MTM-WBS-CE-DWG-463108 TO 463109.
3. REFER TO STATION DESIGN PACKAGES FOR PLATFORM AND BUILDING WORKS.
4. FOR PAVEMENT PLAN REFER TO DRAWING SMCSWSWM-MTM-WBS-CE-DWG-463161.
5. FOR BULK EARTHWORKS CUT AND FILL PLAN REFER DRAWING SMCSWSWM-MTM-WBS-CE-DWG-463201.
6. FOR BULK EARTHWORKS GRADING PLAN AND LONGITUDINAL SECTION REFER TO DRAWING SMCSWSWM-MTM-WBS-CE-DWG-463206.
7. FOR DRAINAGE GENERAL ARRANGEMENT PLAN REFER TO DRAWING SMCSWSWM-MTM-WBS-CE-DWG-463301.
8. FOR CSR GENERAL ARRANGEMENT PLAN REFER TO DRAWING SMCSWSWM-MTM-WBS-CE-DWG-463411. 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-WBS-CE-DWG-463501.
10. FOR RETAINING WALL PLAN AND DETAILS, INCLUDING HANDRAIL DETAILS, REFER DRAWINGS SMCSWSWM-MTM-WBS-CE-DWG-463611 TO 464643.
11. NO MACHINERY EXCAVATIONS ARE TO BE CARRIED OUT WITHIN 1M OFFSET FROM THE PAD (POTENTIAL ARCHEOLOGICAL DEPOSIT) ZONE.

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FOR CONSTRUCTION

REV	BY	DATE	DESCRIPTION	APPD
00	MC	31.03.2021	APPROVED FOR CONSTRUCTION	LP

SCALES: 1:200 FULL SIZE A1

CLIENT: NSW GOVERNMENT | sydney METRO

SERVICE PROVIDERS: METRON T2M

DRAWN: M. FORTU
DESIGNED: G. LUO / C. STANFORD
DRG CHECK: P. ALFORD
DESIGN CHECK: T. LEE
APPROVED: L. PALMER 31.03.2021

SYDNEY METRO
BELMORE STATION - SERVICE BUILDING
CIVIL ENGINEERING
SERVICE BUILDING - CIVIL
GENERAL ARRANGEMENT PLAN

STATUS: FOR CONSTRUCTION | SHEET 1 OF 1 | ©

DRG No. SMCSWSWM-MTM-WBS-CE-DWG-463111 | REV. 00

ALT. DRG No. SMCSWSWM-MTM-WBS-CE-DWG-463111 0

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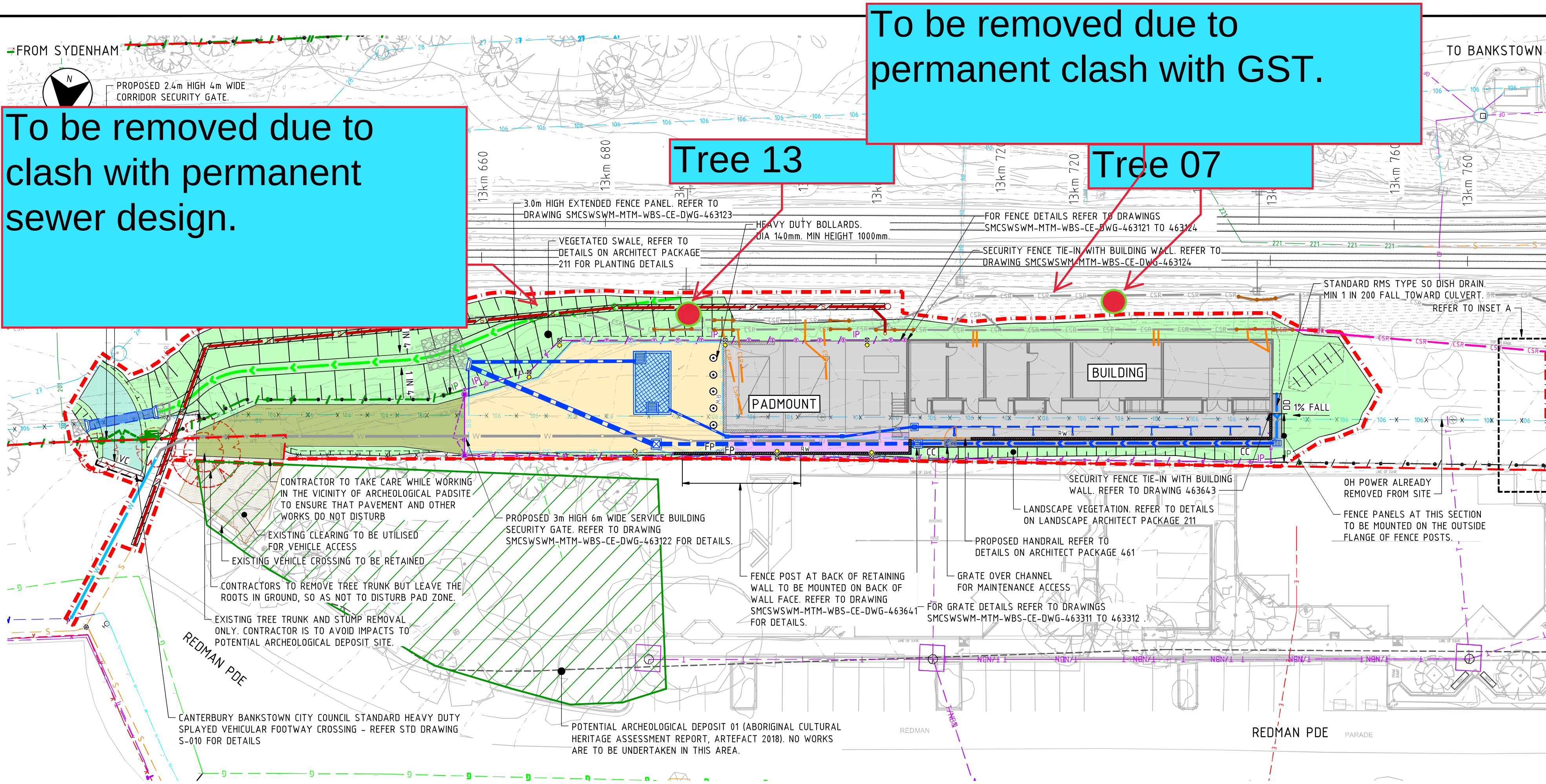
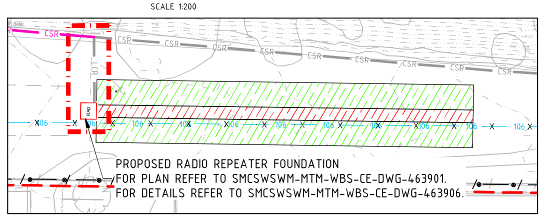


PLAN
SCALE 1:200

NOTES

1. FOR GENERAL NOTES REFER TO DRAWINGS SMCSWSWM-MTM-WBS-CE-DWG-463104 TO 463107.
2. FOR LEGEND REFER TO DRAWING SMCSWSWM-MTM-WBS-CE-DWG-463108 TO 463109.
3. REFER TO STATION DESIGN PACKAGES FOR PLATFORM AND BUILDING WORKS.
4. FOR PAVEMENT PLAN REFER TO DRAWING SMCSWSWM-MTM-WBS-CE-DWG-463161.
5. FOR BULK EARTHWORKS CUT AND FILL PLAN REFER DRAWING SMCSWSWM-MTM-WBS-CE-DWG-463201.
6. FOR BULK EARTHWORKS GRADING PLAN AND LONGITUDINAL SECTION REFER TO DRAWING SMCSWSWM-MTM-WBS-CE-DWG-463206.
7. FOR DRAINAGE GENERAL ARRANGEMENT PLAN REFER TO DRAWING SMCSWSWM-MTM-WBS-CE-DWG-463301.
8. FOR CSR GENERAL ARRANGEMENT PLAN REFER TO DRAWING SMCSWSWM-MTM-WBS-CE-DWG-463411. 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-WBS-CE-DWG-463501.
10. FOR RETAINING WALL PLAN AND DETAILS, INCLUDING HANDRAIL DETAILS, REFER DRAWINGS SMCSWSWM-MTM-WBS-CE-DWG-463611 TO 464643.
11. NO MACHINERY EXCAVATIONS ARE TO BE CARRIED OUT WITHIN 1M OFFSET FROM THE PAD (POTENTIAL ARCHEOLOGICAL DEPOSIT) ZONE.



INSET A
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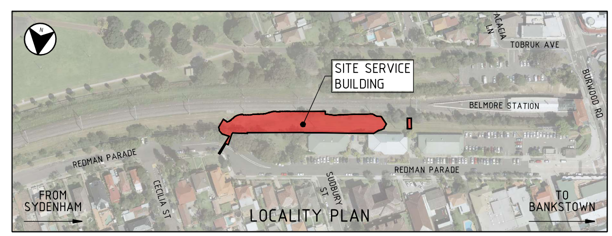

LOCALITY PLAN

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FOR CONSTRUCTION

REV.	BY	DATE	DESCRIPTION	APPD.
00	MC	31.03.2021	APPROVED FOR CONSTRUCTION	LP

SCALES 1 : 200 FULL SIZE A1

CLIENT: NSW GOVERNMENT — sydney METRO

SERVICE PROVIDERS: METRON T2M

DRAWN: M. FORTU
DESIGNED: G. LUO / C. STANFORD
DRG CHECK: P. ALFORD
DESIGN CHECK: T. LEE
APPROVED: L. PALMER 31.03.2021

SYDNEY METRO
BELMORE STATION - SERVICE BUILDING
CIVIL ENGINEERING
SERVICE BUILDING - CIVIL
GENERAL ARRANGEMENT PLAN

STATUS: FOR CONSTRUCTION | SHEET 1 OF 1

DRG No. SMCSWSWM-MTM-WBS-CE-DWG-463111 | REV. 00

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-WBS-CE-DWG-463111 0

Appendix 2: Site Photographs

Photograph 1: Tree 1 *Ligustrum sinensis* (Small-leafed Privet) to be removed for pilling works adjacent rail bridge.

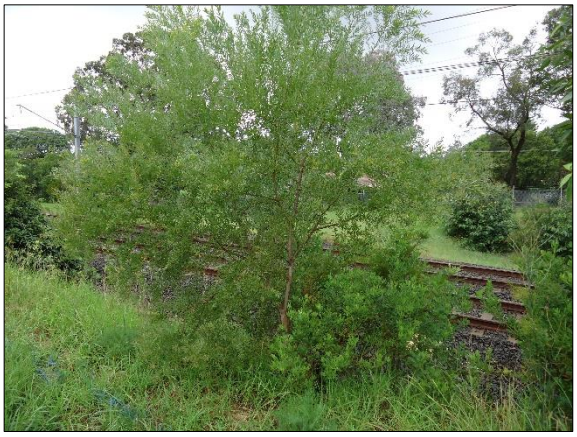
Photograph 2: Trees 2 *Acacia* sp (Wattle), 3 *Leptospurmum* sp (Tee Tree) and 4 Unknown species to be removed for MSB works.

Photograph 3: Tree 5 *Acacia* sp (Wattle) to be selectively pruned for clearance along the embankment.

Photograph 4: Tree 6 *Acacia* sp (Wattle) to be removed for MSB works.

Photograph 5: Tree 7 *Eucalyptus robusta* (Swamp Mahogany) to be removed to accommodate the new GST alignment.

Photograph 6: Tree 8 *Acacia* sp (Wattle) to be removed for MSB works.



Photograph 7: Tree 9 *Pittorporum undulatum* (Sweet Pittosporum) to be removed for MSB works.

Photograph 8: Tree 10 *Acacia* sp (Wattle) to be removed for MSB works.

Photograph 9: Trees 11 and 12 *Acacia* sp (Wattle) to be removed for MSB works.

Photograph 10: Tree 13 *Eucalyptus robusta* (Swamp Mahogany) to be removed to accommodate the new sewer alignment.

Photograph 11: Tree 14 *Eucalyptus robusta* (Swamp Mahogany) located within road reserve to be selectively pruned for site access clearances.

Appendix 3: Identified Selective Pruning Works

Tree 5 Acacia sp (Wattle) identified pruning involves the removal of approximately four branches up to 20mm in diameter and constitutes <10% of the total canopy volume. The pruning is not expected to have a significant impact upon the remaining stems.

Tree 14 *Eucalyptus robusta* (Swamp Mahogany) identified pruning involves the removal of one first order branch at 2m height. The branch is approximately 300mm in diameter and constitutes 30% of the total canopy volume of the tree. A reduction in tree growth and physiological function can be expected as a result of the pruning works. Exposure of internal woody tissues at the site of the final pruning cut shall be susceptible to infection by decay causing fungi. The removal of the branch is not considered to significantly affect vocal amenity.

Appendix 4: 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 crow, 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 2.1 – BELMORE AIA (PLATAEU TREES)

PLATEAUTREES
Safety. Quality. Progress.

Date: 20 May 2021

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

At the request of Downer Group an onsite inspection was undertake at Belmore Station. It has been asked to record additional tree removals and selective pruning works as part of the Southwest Metro Package. The assessed trees are not identified within the Arboricultural Impact Assessment (AIA) prepared by Urban Arbor, dated 17 December 2019, Ref 19/12/17/SWMMS. On the 19 May a site walkthrough was undertaken by myself under guidance of a Downer Group representative.

Eight additional trees were assessed with respects to the proposed works. Their locations are show within Figure 1. Trees 1 and 2 have been identified for removal. Trees 3, 4, 5, 6, 7 and 8 have been identified for selective pruning works. Additional controls with respects to undertaking excavation works within the TPZ of tree 3 have been provided. Tree data can be found as Appendix 1 of this report.

It was advised by Downer Group that two trees being a Swamp Mahogany, tree 1, and a Brown Pine, tree 2, are to be removed. Both trees were considered to be in good health and have medium useful life expectancies of 15 to 40 years. These trees are located within the road reserve area adjacent to the rail corridor and form part of the existing streetscape. Their removal, in particular the Swamp Mahogany is likely to be visually significant. The Swamp Mahogany and Brown Pine are not representative of an endangered or threatened species or ecological community. Photographs 1 and 2 show these trees.

Plateau Tree Service Pty Ltd
PO BOX 1522, DEE WHY NSW 2099 Australia
P: 02 9939 5350 | F: 02 9905 7569
E: info@plateautrees.com.au | W: www.plateautrees.com.au
ABN : 17 090 798 002

Image 1: Aerial image of Belmore station showing the approximate locations of assessed trees. (*Source: Six Maps accessed 20/05/2021*).

The new GST is aligned past tree 3, Camphor Laurel and shall require the removal of the suckers and epicormics from around the base of its trunk. Any excavation within 6m of the trunk (refer to **Appendix 1** Tree Assessment Schedule for TPZ offset) to install the troughing posts is to be undertaken using methods that do not damage tree roots. There is to be enough flexibility in the GST's design and alignment to reposition posts if roots greater than 30mm in diameter are exposed within the excavations. Although commonly regarded as a weed species this specimen is protected under local tree preservation controls due to its height. Photographs 3 and 4 show the tree and suckering around the base of the trunk to be removed.

The placement of site sheds and amenities, adjacent the southern side of the rail corridor, is within the protection zones of trees 5, 6, 7, 8 and 9. Whilst their placement is not thought to pose a significant risk to the ongoing health and condition of the trees selective pruning works have been identified to remove and reduce overhanging branches. These pruning works are considered to be minor, require less than 10% of the total canopy volume of each individual tree to be removed and are restricted to branches less than

50mm in diameter. The pruning works shall allow for the removal of the sheds upon completion of the project. Additional selective pruning works are expected to be required to tree 8 to accommodate the installation of overhead electrical services. These pruning works are to be undertaken upon installation of the new pole within the compound area to ensure correct clearance requirements are met. Only the minimal amount of pruning is to be undertaken to achieve the required outcome. Photographs 5 to 9 shows each tree to be pruned. Where possible branches have been identified for removal within the photographs.

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

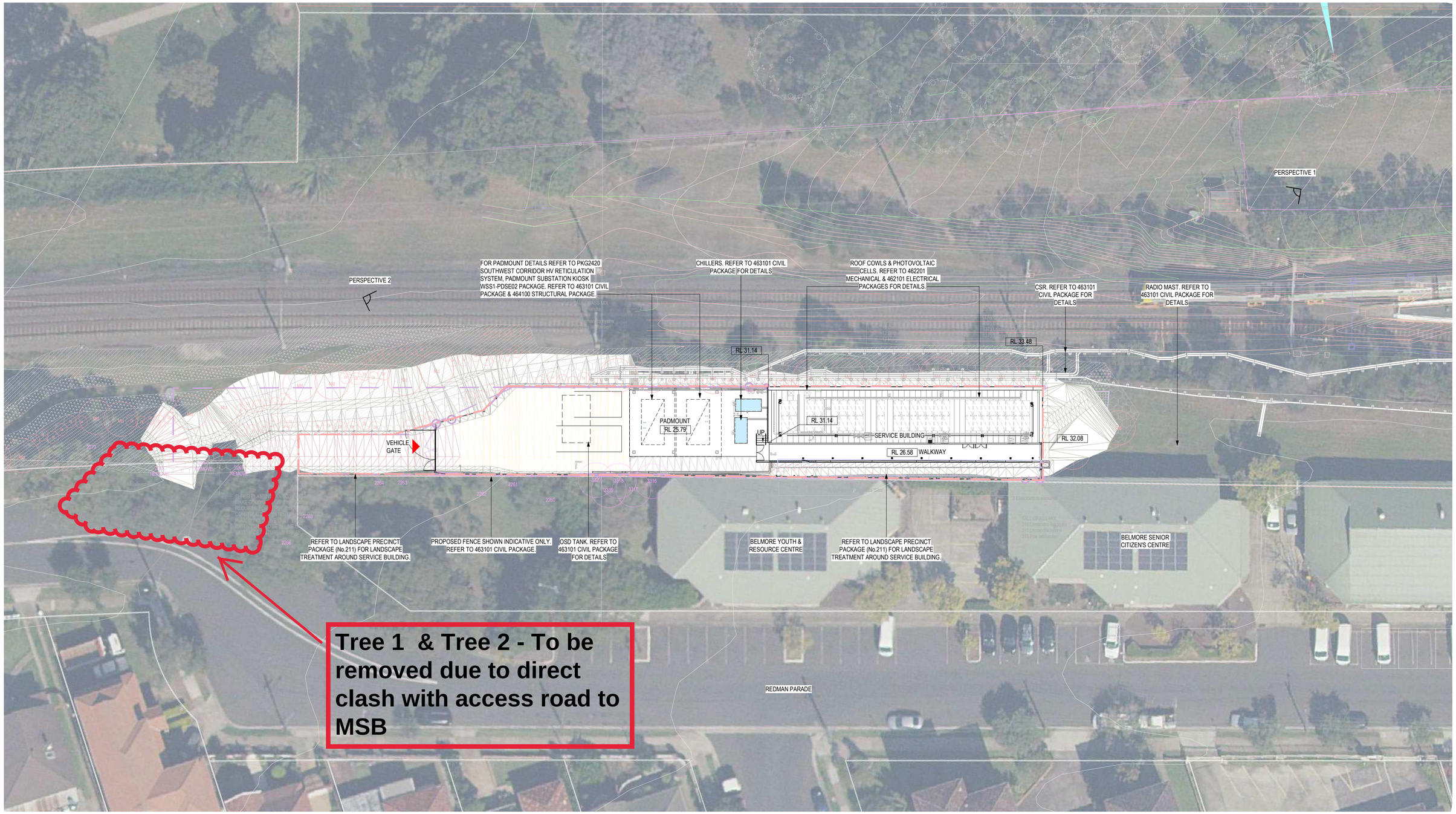
Appendix 1: Tree assessment Schedule

Tree number	Tree name Botanical name Common name	Tree dimensions Height (m)	Spread (m)	D.B.H. (mm)	D.A.B. (mm)	Vigour	Condition	Age class	ULE	Amenity and Visual Value	Native or Exotic	TPZ (m)	SRZ (m)	Comments	Remove or Retain
1	*Eucalyptus robusta* (Swamp Mahogany)	15-20	6x6	600	750	N	G	M	M	M	N	7.2	2.93	Tree located within road reserve area. Tree to be removed due to direct clash with permanent design access road to MSB.	Remove
2	*Podocarpus elatus* (Brown Pine)	10-15	3x3	200 230 250 300	500	N	G	M	M	M	N	6	2.47	Tree located within road reserve area. Tree to be removed due to direct clash with permanent design access road to MSB.	Remove
3	*Cinnamomum camphora* Camphor Laurel)	15-20	6x6	500	600	N	F	M	S	M	E	6	2.67	Negligible impacts of establishing site shed within TPZ.	Retain and prune
4	*Callistemon salignus* (Willow Bottlebrush)	5-10	4x4	300 200 400	800	N	G	M	S	M	N	6.48	3.01	Negligible impacts of establishing site shed within TPZ.	Retain and prune
5	*Leptospermum petersonii* (Lemon-scented Tee Tree)	5-10	3x3	200	300	N	G	M	S	M	N	2.4	2	Negligible impacts of establishing site shed within TPZ.	Retain and prune
6	*Leptospermum petersonii* (Lemon-scented Tee Tree)	5-10	3x3	300	400	N	G	M	S	M	N	3.6	2.25	Negligible impacts of establishing site shed within TPZ.	Retain and prune
7	*Leptospermum petersonii* (Lemon-scented Tee Tree)	5-10	3x3	150 150 150 150 200	500	N	G	M	S	M	N	4.32	2.47	Negligible impacts of establishing site shed within TPZ.	Retain and prune
8	*Leptospermum petersonii* (Lemon-scented Tee Tree)	1-5	2x2	200	250	N	G	M	S	M	N	2.4	1.85	Negligible impacts of establishing site shed within TPZ.	Retain and prune

N

CENTRAL / CITY

BANKSTOWN



FOR CONSTRUCTION

REV.	BY	DATE	DESCRIPTION	APPD.
00	BN	31/03/2021	APPROVED FOR CONSTRUCTION	LP

2.5 0 2.5 5 7.5 10m

1:250 FULL SIZE A1

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-WBS-AT-DWG-461120

CLIENT

NSW GOVERNMENT | sydney METRO

The information shown on this drawing is for the purposes of the Sydney Metro Project only. No warranty is given or implied as to its suitability for any other purpose. The Service Providers accept no liability arising from the use of this drawing and the information shown thereon for any purpose other than the Sydney Metro Project.

SERVICE PROVIDERS

METRON T2M

DRAWN E. GUYOT

DESIGNED B. NOVANTO

DRG CHECK M. LODGE

DESIGN CHECK G. DAVIES

APPROVED L. PALMER 31/03/2021

SYDNEY METRO

BELMORE
ARCHITECTURAL
OVERALL ARRANGEMENT
SITE PLAN – SERVICE BUILDING

STATUS: FOR CONSTRUCTION | SHEET 1 OF 1 | ©

DRG No. SMCSWSWM-MTM-WBS-AT-DWG-461120 | REV. 00

100mm AT FULL SIZE Plot Date & Time 29/03/2021 8:36:01 PM

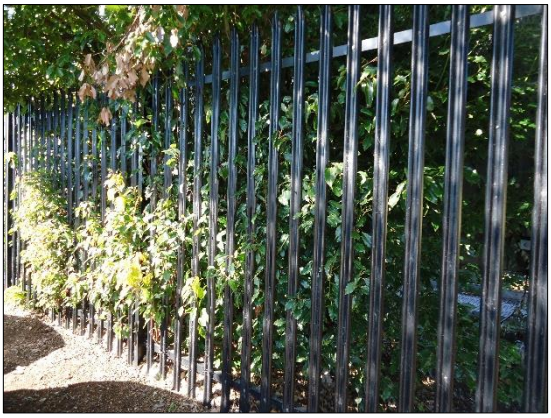
Appendix 2: Site Photographs

Photograph 1: Tree 1 *Eucalyptus robusta* (Swamp Mahogany) to be removed due to direct clash with permanent design access road to MSB.

Photograph 2: Tree 2 *Podocarpus elatus* (Brown Pine) to be removed due to direct clash with permanent design access road to MSB.

Photograph 3: Tree 3 *Cinnamomum camphora* (Camphor Laurel) within northern side of rail corridor.

Photograph 4: Suckering around the base of tree 3 is to be removed to allow for the proposed alignment of the new GST.

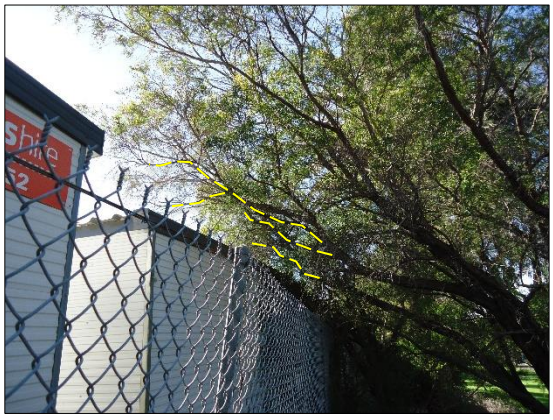


Photograph 5: Tree 4 *Callistemon slaignus* (Weeping Bottlebrush) to be selectively pruned to clear site sheds.

Photograph 6: Tree 5 *Leptospernum petersonii* (Lemon-scented Tee Tree) to be selectively pruned to clear site sheds.

Photograph 7: Tree 6 *Leptospernum petersonii* (Lemon-scented Tee Tree) to be selectively pruned to clear site sheds.

Photograph 8: Tree 7 *Leptospernum petersonii* (Lemon-scented Tee Tree) to be selectively pruned to clear site sheds. Additional pruning shall be required to provide clearances to new over head cabling.



Photograph 9: Tree 8 *Leptospernum petersonii* (Lemon-scented Tee Tree) to be selectively pruned to clear site sheds.

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 crow, 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 2.2 CCBC APPROAVL FOR TREE REMOVAL AND PRUNING AT BELMORE

Gareth O'Brien

From: Peter D'Costa
Sent: Friday, 23 April 2021 4:50 PM
To: Sarah-ann Brennan; Kevin Cao
Cc: Gareth O'Brien; Madush Priyan; William Healy; Julie Henderson; Rachel Leet
Subject: FW: Tree removal and pruning -Belmore station
Attachments: S-201.pdf

Hi All

Please see approval below from council for Tree removal and Pruning at Belmore.

Regards

Peter D'Costa
Senior Project Engineer
Infrastructure Projects

Downer
Relationships creating success

T | 0478 074 294 **M** | 0478 074 294
E | Peter.D'Costa@Downergroup.com
T3, Triniti Business Campus, 39 Delhi Road
North Ryde NSW 2113
www.downergroup.com

From: James Magsipoc <James.Magsipoc@cbcity.nsw.gov.au>
Sent: Friday, 23 April 2021 12:50 PM
To: Peter D'Costa <Peter.D'Costa@Downergroup.com>
Cc: Julie Henderson <Julie.Henderson@Downergroup.com>; Andrew Smith <Andrew.Smith2@downergroup.com>; Ash Jarvis <Ash.Jarvis2@transport.nsw.gov.au>; Ben Webb <Ben.Webb@cbcity.nsw.gov.au>; Peter Anderson <Peter.ANDERSON@cbcity.nsw.gov.au>
Subject: FW: Tree removal and pruning -Belmore station

Hi Peter,

The tree removal and pruning at Redman Parade ,Belmore had been approved subject to the conditions listed below.

Please return email if you had receive this email and its attachment with clarity.

Best regards,

James Magsipoc - Project Officer
T 02 9707 9771
E James.Magsipoc@cbcity.nsw.gov.au
www.cbcity.nsw.gov.au

@ourcbcity
Like & follow us

From: Wayne Bromfield <Wayne.Bromfield@cbcity.nsw.gov.au>
Sent: Friday, 23 April 2021 12:32 PM
To: James Magsipoc <James.Magsipoc@cbcity.nsw.gov.au>
Subject: FW: Tree removal and pruning -Belmore station

Hello James,

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.

Any tress 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.

Regards,

Wayne.

APPENDIX 3 WILEY PARK AIA (URBAN ARBOR)

URBAN ARBOR
The Trusted Name in Tree Management

Arboricultural Impact Assessment Report

Site location:
South West Metro
Wiley Park Station
Wiley Park NSW

Prepared for:
Metron T2M

Prepared by: Jack Williams and Bryce Claassens
Urban Arbor Pty Ltd
Date: 15 January 2020
Ref: 20/01/15/SWMWP

URBAN ARBOR
The Trusted Name in Tree Management

Table of Contents

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URBAN ARBOR
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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) Landscape Design Package No. 221, Metron T2M, SMCSWSWM-MTM-WLS-LA-PKG-231000, Issue B - 25 October 2019, Including:

Wiley Park Station		
SMCSWSWM-MTM-WWP-LA-DWG-231700	B	LANDSCAPE DESIGN - COVER SHEET AND DRAWING LIST - SHEET 1 of 16
SMCSWSWM-MTM-WWP-LA-DWG-231701	B	LANDSCAPE DESIGN - NOTES PAGE & LEGEND - SHEET 2 of 16
SMCSWSWM-MTM-WWP-LA-DWG-231702	B	LANDSCAPE DESIGN - DEMOLITION PLAN - KING GEORGES ROAD - SHEET 3 of 16
SMCSWSWM-MTM-WWP-LA-DWG-231703	A	LANDSCAPE DESIGN - DEMOLITION PLAN - SHARED PATH - SHEET 4 of 16
SMCSWSWM-MTM-WWP-LA-DWG-231704	A	LANDSCAPE DESIGN - DEMOLITION PLAN - STANLEA PARADE - SHEET 5 of 16
SMCSWSWM-MTM-WWP-LA-DWG-231710	B	LANDSCAPE DESIGN - GENERAL - PRECINCT PLAN - SHEET 6 of 16
SMCSWSWM-MTM-WWP-LA-DWG-231720	B	LANDSCAPE DESIGN - DETAIL PLAN - KING GEORGES ROAD - SHEET 7 of 16
SMCSWSWM-MTM-WWP-LA-DWG-231721	B	LANDSCAPE DESIGN - DETAIL PLAN - SHARED PATH - SHEET 8 of 16
SMCSWSWM-MTM-WWP-LA-DWG-231722	A	LANDSCAPE DESIGN - DETAIL PLAN - STANLEA PARADE - SHEET 9 of 16
SMCSWSWM-MTM-WWP-LA-DWG-231723	A	LANDSCAPE DESIGN - DETAIL PLAN - RENDERED PLAN - SHARED PATH - SHEET 10 of 16
SMCSWSWM-MTM-WWP-LA-DWG-231730	A	LANDSCAPE DESIGN - PAVING PLAN - KING GEORGES ROAD - SHEET 11 of 16
SMCSWSWM-MTM-WWP-LA-DWG-231740	A	LANDSCAPE DESIGN - PLANTING PLAN - KING GEORGES ROAD - SHEET 12 of 16
SMCSWSWM-MTM-WWP-LA-DWG-231741	A	LANDSCAPE DESIGN - PLANTING PLAN - SHARED PATH - SHEET 13 of 16
SMCSWSWM-MTM-WWP-LA-DWG-231760	B	LANDSCAPE DESIGN - TYPICAL DETAILS - SHEET 1 - SHEET 14 of 16
SMCSWSWM-MTM-WWP-LA-DWG-231770	B	LANDSCAPE DESIGN - PLANTING SCHEDULE - SHEET 15 of 16
SMCSWSWM-MTM-WWP-LA-DWG-231771	B	LANDSCAPE DESIGN - MATERIAL SCHEDULE - SHEET 16 of 16

1.3 The trees were inspected on 16 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.

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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.

URBAN ARBOR
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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.

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[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).

URBAN ARBOR
The Trusted Name in Tree Management

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) 2012[5] and Development Control Plan (DCP) 2012.[6] The site is identified as a heritage item (number I159) 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 x 50) $^{0.42}$ x 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.

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5 *Canterbury Local Environmental Plan 2012*, https://www.legislation.nsw.gov.au/#/view/EPI/2012/673, accessed 13 January 2020.

6 *Canterbury Development Control Plan 2012*, https://www.cbcity.nsw.gov.au/development/planning-control-policies/canterbury-development-control-plan-2012, accessed 13 January 2020.

7 *Canterbury Local Environmental Plan Heritage Map - Sheet HER_004*, https://www.legislation.nsw.gov.au/maps/f6a186a6-97fb-6dac-9d90-acfc8774137b/1550_COM_HER_004_010_20121105.pdf, 13 January 2020.

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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.

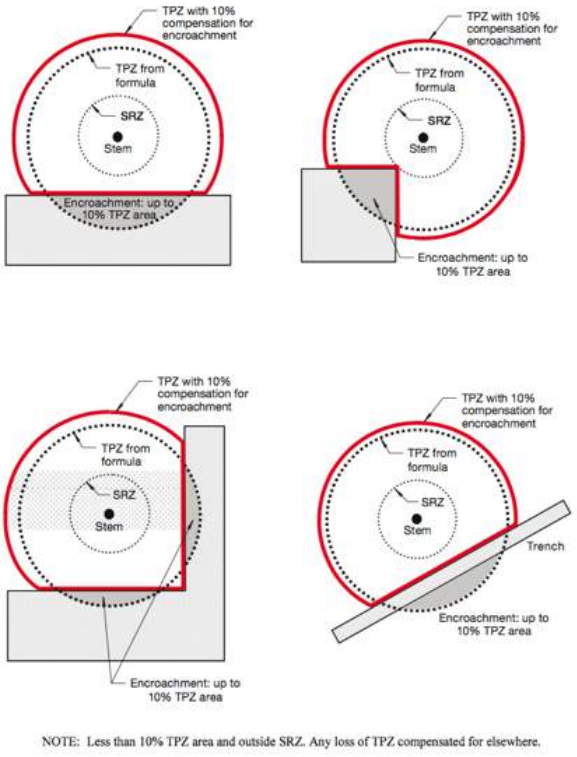

Image 1: Example minor TPZ encroachment from AS4970-2009.

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).

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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 proposed plans provided by the client. The following plans are included in appendix 1;

- Appendix 1A: Proposed Site Plan East
- Appendix 1B: Proposed Site Plan West

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
683	*Ficus spp*	Z1	2.2	14.7	1.7	Footprint	The trunk is within the footprint of new hard surfacing.	Remove
684	*Pittosporum undulatum*	Z1	2.4	18.1	1.7	Footprint	The trunk is within the footprint of new wire mesh area and the tree is proposed to be removed.	Remove
685	*Grevillea spp*	Z1	2.0	12.6	1.8	None	No encroachment into the TPZ.	Retain and protect
686	*Leptospermum petersonii*	A1	2.6	21.9	1.8	None	No encroachment into the TPZ.	Retain and protect
687	*Quercus robur*	A1	5.5	95.7	2.5	Footprint	The trunk is within the footprint of a proposed building.	Remove
688	*Unknown spp*	Z4	2.6	21.2	2.1	Major	New concrete hard surfacing encroaches into the TPZ by more than 10% and into the SRZ. The tree is dead and should be removed.	Remove
689	*Nerium oleander*	Z1	2.4	18.1	1.7	Minor	New concrete hard surfacing encroaches into the TPZ by 9% ($1.6m^2$), which is minor TPZ encroachment and will not impact tree.	Retain and protect
690	*Pittosporum undulatum*	Z1	2.0	12.6	1.6	None	No encroachment into the TPZ.	Retain and protect
691	*Quercus robur*	A1	2.3	16.3	1.8	None	No encroachment into the TPZ.	Retain and protect
692	*Schinus molle*	A1	12.6	498.8	3.6	None	No encroachment into the TPZ.	Retain and protect
693	*Sapium sebiferum*	A1	3.3	34.7	2.4	None	No encroachment into the TPZ.	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
694	*Sapium sebiferum*	A1	4.1	52.3	2.3	Minor	A proposed building encroaches into the TPZ by less than 5%, which is minor TPZ encroachment and will not impact tree.	Retain and protect
695	*Schinus molle*	A1	5.7	103.0	2.8	Footprint	The trunk is within the footprint of a proposed building.	Remove
696	*Schinus molle*	A1	7.5	175.3	3.0	Footprint	The trunk is within the footprint of a proposed padmount.	Remove
697	*Schinus molle*	A1	6.0	113.1	2.6	Footprint	The trunk is within the footprint of a proposed padmount.	Remove
698	*Callistemon viminalis*	A1	3.1	30.6	2.0	Major	A proposed welded mesh fence encroaches into the TPZ by 7% ($2m^2$) and into the SRZ. If significant roots are severed in the SRZ, the 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*
699	*Auranticarpa rhombifolia*	Z4	2.0	12.0	1.7	Footprint	The trunk of the tree is within or directly adjacent to the footprint of a proposed welded mesh fence. The tree is in poor condition and should be removed.	Remove
700	*Auranticarpa rhombifolia*	Z9	2.8	23.9	1.8	Major	A proposed welded mesh fence encroaches into the TPZ by 31% ($32.4m^2$) and into the SRZ. If significant roots are severed in the TPZ and SRZ during the construction of the fence, 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*
701	*Quercus robur*	A1	6.5	131.9	2.7	Major	A proposed welded mesh fence encroaches into the TPZ by 25% ($7.4m^2$), but not into the SRZ. If significant roots are severed in the TPZ during the construction of the fence, the condition 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*
702	*Auranticarpa rhombifolia*	A1	2.4	18.1	1.8	Major	A proposed welded mesh fence encroaches into the TPZ by 34% ($6.2m^2$) and into the SRZ. If significant roots are severed in the TPZ and SRZ during the construction of the fence, 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
703	*Arbutus unedo*	Z1	3.6	40.7	2.4	None	No encroachment into the TPZ.	Retain and protect
704	*Quercus robur*	A2	7.9	197.1	3.0	Major	A proposed welded mesh fence encroaches into the TPZ by 35% (69.8m^2) and into the SRZ. If significant roots are severed in the TPZ and SRZ during the construction of the fence, 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*
705	*Quercus robur*	A1	4.1	52.1	2.6	Major	A proposed awning encroaches into the TPZ by 11% (5.9m^2) and into the SRZ. The awning will be located on pier footings, the proposed site plan indicates that only one pier will be located in the TPZ of the tree, which will be of low impact to the trees root system. Canopy pruning will be required to accommodate the pruning, which will require the removal of approximately 10-15% of the overall live crown area, which will not adversely impact the tree.	Retain and protect
706	*Quercus robur*	A1	5.9	108.6	2.6	Major	A proposed awning encroaches into the TPZ by 38% (41.6m^2) and into the SRZ. The impact to trees root system within this area could be mitigated through trees sensitive measures. However, more than 30% of the overall crown will need to be removed to accommodate the awning, which will significantly modify the shape/form of the tree and adversely impact the tree condition. The tree is therefore recommended to be removed.	Remove
707	*Quercus robur*	A1	3.1	30.6	2.0	Major	A proposed awning encroaches into the TPZ by 6% (1.9m^2) and into the SRZ. The awning will be located on pier footings, the proposed site plan indicates that only one pier will be located in the TPZ of the tree, which will be of low impact to the trees root system. Canopy pruning will be required to accommodate the pruning, which will require the removal of approximately 10% of the overall live crown area, which will not adversely impact the tree.	Retain and protect
708	*Quercus robur*	A1	3.8	46.3	2.2	None	No encroachment into the TPZ.	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
709	*Quercus robur*	A1	2.3	16.3	1.8	Major	A proposed welded mesh fence encroaches into the TPZ by 36% (5.9m^2) and into the SRZ. If significant roots are severed in the TPZ and SRZ during the construction of the fence, 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*
710	*Quercus robur*	A1	2.6	21.9	2.0	Major	A proposed welded mesh fence encroaches into the TPZ by 32% (7m^2) and into the SRZ. If significant roots are severed in the TPZ and SRZ during the construction of the fence, 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*
711	*Quercus robur*	A1	4.9	74.0	2.5	Minor	A proposed welded mesh fence encroaches into the TPZ by 7% (4.9m^2), which is minor TPZ encroachment and will not impact the tree.	Retaina and protect
712	*Quercus robur*	A1	4.2	56.1	2.5	Major	A proposed welded mesh fence encroaches into the TPZ by 13% (7.1m^2), but not into the SRZ. If significant roots are severed in the TPZ during the construction of the fence, the condition 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*
713	*Quercus robur*	A1	3.6	40.7	2.1	None	No encroachment into the TPZ.	Retain and protect
714	*Quercus robur*	A1	2.6	21.9	1.9	Minor	A proposed welded mesh fence encroaches into the TPZ by less than 5%, which is minor TPZ encroachment and will not impact the tree.	Retain and protect
715	*Quercus robur*	A1	5.0	79.8	2.5	Major	A proposed welded mesh fence encroaches into the TPZ by 39% (31.2m^2) and into the SRZ. If significant roots are severed in the TPZ and SRZ during the construction of the fence, 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*
716	*Corymbia eximia*	A1	3.7	43.5	2.2	None	No encroachment into the TPZ.	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
717	*Quercus robur*	Z9	4.8	72.6	2.4	Major	A proposed welded mesh fence encroaches into the TPZ by 21% (15.6m^2) and into the SRZ. If significant roots are severed in the TPZ and SRZ during the construction of the fence, 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*
718	*Eucalyptus paniculata*	A1	10.2	326.9	3.4	Major	A proposed welded mesh fence encroaches into the TPZ by 23% (75.1m^2) and into the SRZ. If significant roots are severed in the TPZ and SRZ during the construction of the fence, 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*
719	*Quercus robur*	A1	5.0	78.3	2.5	Major	A proposed welded mesh fence encroaches into the TPZ by 39% (30.2m^2) and into the SRZ. If significant roots are severed in the TPZ and SRZ during the construction of the fence, 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*
720	*Eucalyptus saligna*	A1	8.3	215.4	3.1	Major	A proposed welded mesh fence encroaches into the TPZ by 51% (110.5m^2) and into the SRZ. If significant roots are severed in the TPZ and SRZ during the construction of the fence, 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*
721	*Populus nigra*	Z3	4.8	72.4	2.4	None	No encroachment into the TPZ.	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
		A	Z
Trees to be removed	Building construction, new surfacing and/or proximity, or trees in poor condition.	687, 695, 696, 697, 706 (Fivetrees)	683, 684, 688, 699 (Four trees)
Retained trees subject to TPZ encroachment greater than 10%	Removal of existing surfacing/structures and/or installation of new surfacing/structures.	698, 701, 702, 704, 705, 707, 709, 710, 712, 715, 718, 719, 720 (Thirteen trees)	700, 717 (Two trees)
Retained trees subject to TPZ encroachment of 10% or less	Removal of existing surfacing/structures and/or installation of new surfacing/structures.	686, 691, 692, 693, 694, 708, 711, 713, 714, 716 (Ten trees)	685, 689, 690, 703, 721 (Five trees)

9.2 **Construction Design/Specification Requirements:** The proposed construction will encroach into the TPZ and SRZ of fourteen trees, including tree 698, 700, 701, 702, 704, 705, 709, 710, 712, 715, 717, 718, 719 and 720. 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 **Welded mesh Fence:** The proposed welded mesh 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 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.

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10. RECOMMENDATIONS

10.1 This report assesses the impact of a proposed development at the subject site to thirty-nine (39) 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 proposed plans provided by the client. The following plans are included in appendix 1;

- Appendix 1A: Proposed Site Plan East
- Appendix 1B: Proposed Site Plan West

10.3 Nine (9) trees have been recommended for removal within this report, including tree 683, 684, 687, 688, 695, 696, 697, 699 and 706. Tree 687, 695, 696 and 706 are higher value category A retention value trees.

10.4 Fifteen (15) trees will be subject to TPZ encroachments greater than 10%, including tree 698, 700, 701, 702, 704, 705, 707, 709, 710, 712, 715, 717, 718, 719 and 720. To reduce the impact to trees 698, 700, 701, 702, 704, 705, 709, 710, 712, 715, 717, 718, 719 and 720, the proposed construction within the TPZ of the trees must be completed in accordance with section 9.2 of this report. Tree 707 will not be significantly impacted by the proposed works.

10.5 The remaining fifteen (15) trees will be subject to minor and acceptable TPZ encroachments of 10% or less and can be retained in a viable condition, including tree 685, 686, 689, 690, 691, 692, 693, 694, 703, 708, 711, 713, 714, 716 and 721.

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 No services plan has been assessed in this report. 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.

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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
683	*Ficus spp*	2.2	1.7	Remove and replace.
684	*Pittosporum undulatum*	2.4	1.7	Remove and replace.
685	*Grevillea spp*	2.0	1.8	Retain and protect. Protective fencing should be installed at the extent of the TPZ radius/adjacent the existing hard surfacing. TPZ signage on fencing. The fencing should only be relocated for landscaping in the TPZ under the approval of the project arborist.
686	*Leptospermum petersonii*	2.6	1.8	Retain and protect. No tree protection required, no development works are proposed in close proximity to the TPZ.
687	*Quercus robur*	5.5	2.5	Remove and replace.
688	*Unknown spp*	2.6	2.1	Remove and replace.

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689	*Nerium oleander*	2.4	1.7	Retain and protect. Protective fencing should be installed to create a combined TPZ exclusion zone for tree 689, 690 and 691. Protective fencing should be aligned at the extent of the TPZ radius of each tree, or as close to the proposed paving as practical. TPZ signage on fencing. The fencing should only be relocated for landscaping in the TPZ under the approval of the project arborist.
690	*Pittosporum undulatum*	2.0	1.6	Retain and protect. See tree 689 for tree protection requirements.
691	*Quercus robur*	2.3	1.8	Retain and protect. See tree 689 for tree protection requirements.
692	*Schinus molle*	12.6	3.6	Retain and protect. Protective fencing should be installed at the extent of the TPZ radius, adjacent the existing hard surfacing or existing boundary fence. TPZ signage on fencing.
693	*Sapium sebiferum*	3.3	2.4	Retain and protect. Protective fencing should be installed to create a combined TPZ exclusion zone for tree 693 and 694. Protective fencing should be aligned at the extent of the TPZ radius of each tree within the site/as close to the proposed building as practical. TPZ signage on fencing.
694	*Sapium sebiferum*	4.1	2.3	Retain and protect. See tree 693 for tree protection requirements.
695	*Schinus molle*	5.7	2.8	Remove and replace.
696	*Schinus molle*	7.5	3.0	Remove and replace.
697	*Schinus molle*	6.0	2.6	Remove and replace.
698	*Callistemon viminalis*	3.1	2.0	Retain and protect*. Protective fencing should be installed at the extent of the TPZ radius/adjacent the proposed fence. TPZ signage on fencing. The fencing should only be relocated for landscaping in the TPZ under the approval of the project arborist.
699	*Auranticarpa rhombifolia*	2.0	1.7	Remove and replace.
700	*Auranticarpa rhombifolia*	2.8	1.8	Retain and protect*. Protective fencing should be installed at the extent of the TPZ radius/as close to the proposed fence as practical. TPZ signage on fencing.
701	*Quercus robur*	6.5	2.7	Retain and protect*. Protective fencing should be installed to create a combined TPZ exclusion zone for tree 701, 702 and 703. Protective fencing should be aligned at the extent of the TPZ radius of each tree or as close to the proposed fence as practical. TPZ signage on fencing.
702	*Auranticarpa rhombifolia*	2.4	1.8	Retain and protect*. See tree 701 for protection requirements.
703	*Arbutus unedo*	3.6	2.4	Retain and protect. See tree 701 for protection requirements.
704	*Quercus robur*	7.9	3.0	Retain and protect*. Protective fencing should be installed to create a combined TPZ exclusion zone for tree 704 and 705. Protective fencing should be aligned at the extent of the TPZ radius of each tree or as close to the proposed fence/awning and existing hard surfaces as practical. TPZ signage on fencing.

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705	*Quercus robur*	4.1	2.6	Retain and protect. See tree 704 for protection requirements.
706	*Quercus robur*	5.9	2.6	Remove and replace.
707	*Quercus robur*	3.1	2.0	Retain and protect. Protective fencing should be installed to create a combined TPZ exclusion zone for tree 707 and 708. Protective fencing should be aligned at the extent of the TPZ radius of each tree or as close to the proposed fence/awning and existing hard surfaces as practical. TPZ signage on fencing.
708	*Quercus robur*	3.8	2.2	Retain and protect. See tree 707 for protection requirements.
709	*Quercus robur*	2.3	1.8	Retain and protect*. Protective fencing should be installed to create a combined TPZ exclusion zone for tree 709, 710, 711, 712, 713, 714, 715, 716, 717, 718 and 719. Protective fencing should be aligned at the extent of the TPZ radius of each tree or as close to the existing hard surfacing as practical. TPZ signage on fencing. The fencing should only be relocated for the construction of the new fence under the approval of the project Arborist.
710	*Quercus robur*	2.6	2.0	Retain and protect*. See tree 709 for protection requirements.
711	*Quercus robur*	4.9	2.5	Retaina and protect. See tree 709 for protection requirements.
712	*Quercus robur*	4.2	2.5	Retain and protect*. See tree 709 for protection requirements.
713	*Quercus robur*	3.6	2.1	Retain and protect. See tree 709 for protection requirements.
714	*Quercus robur*	2.6	1.9	Retain and protect. See tree 709 for protection requirements.
715	*Quercus robur*	5.0	2.5	Retain and protect*. See tree 709 for protection requirements.
716	*Corymbia eximia*	3.7	2.2	Retain and protect. See tree 709 for protection requirements.
717	*Quercus robur*	4.8	2.4	Retain and protect*. See tree 709 for protection requirements.
718	*Eucalyptus paniculata*	10.2	3.4	Retain and protect*. See tree 709 for protection requirements.
719	*Quercus robur*	5.0	2.5	Retain and protect*. See tree 709 for protection requirements.
720	*Eucalyptus saligna*	8.3	3.1	Retain and protect*. Protective fencing should be installed at the extent of the TPZ radius/as close to the proposed fence as practical. TPZ signage on fencing.
721	*Populus nigra*	4.8	2.4	Retain and protect. Protective fencing should be installed at the extent of the TPZ radius. TPZ signage on fencing.

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 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 in 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

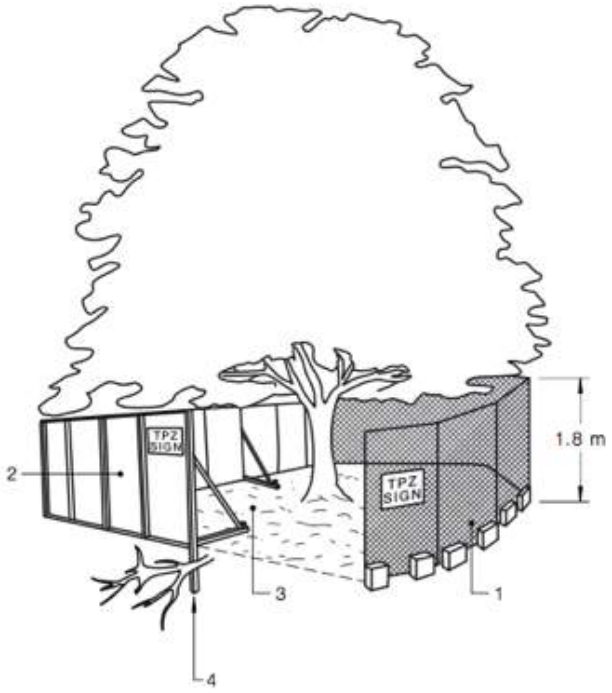
11.6.3 Trunk and Branch Protection: The trunk must be protected by wrapped hessian or similar material to limit damage. Timber planks (50mm x 100mm or similar) should then be placed around tree trunk. The timber planks should be spaced at 100mm intervals, and must be fixed against the trunk with tie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

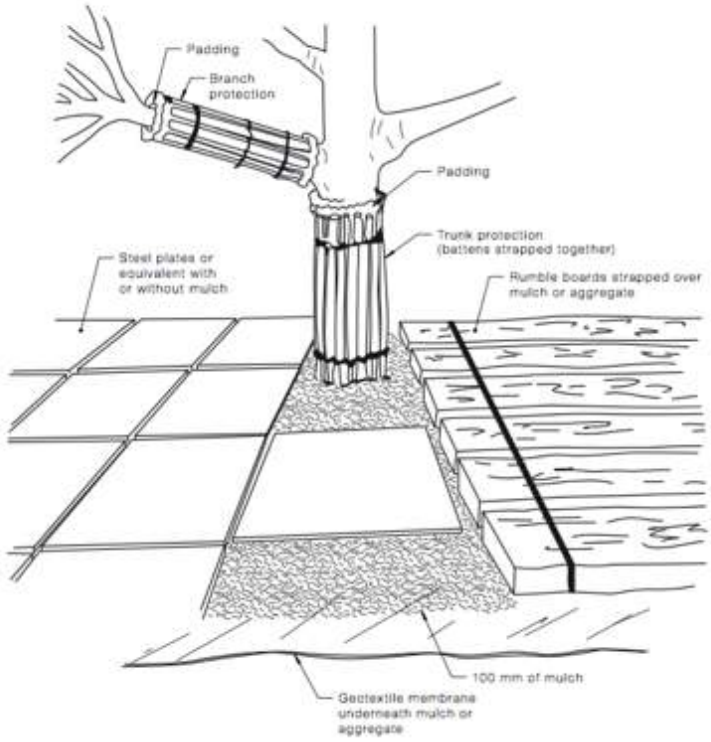
11.6.6 Temporary irrigation: Temporary irrigation should be set up in the TPZ of all trees to be retained, and should distribute water evenly throughout the area of the TPZ. The irrigation should be used for at minimum one hour daily throughout all stages of the development.



LEGEND:
1 Chain wire mesh panels with shade cloth (if required) attached, held in place with concrete feet.
2 Alternative plywood or wooden paling fence panels. This fencing material also prevents building materials or soil entering the TPZ.
3 Mulch installation across surface of TPZ (at the discretion of the project arborist). No excavation, construction activity, grade changes, surface treatment or storage of materials of any kind is permitted within the TPZ.
4 Bracing is permissible within the TPZ. Installation of supports should avoid damaging roots.

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.



NOTES:

1 For trunk and branch protection use boards and padding that will prevent damage to bark. Boards are to be strapped to trees, not nailed or screwed.

2 Rumble boards should be of a suitable thickness to prevent soil compaction and root damage.

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 **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.

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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 principle 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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13. BIBLIOGRAPHY/REFERENCES

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14. LIST OF APPENDICES

The following are included in the appendices:
Appendix 1A - Proposed Site Plan East
Appendix 1B - Proposed Site Plan West
Appendix 2 - Tree Inspection Schedule
Appendix 3 - Further information of methodology

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Member Arboriculture Australia
QTRA
TRAQ

TO SYDNEY

TO BANKSTOWN

THE BOULEVARDE

KING GEORGES ROAD

EXISTING SHOTCRETE WALL TO BE RETAINED

FURTHER DEVELOPMENT AND COORDINATION REQUIRED BETWEEN CSR AND FENCE LOCATION DURING STAGE 3 DESIGN

EXISTING CARPARK

PROPOSED NEW 2.4M WELDED MESH FENCE REFER TO FENCING PACKAGE

EXISTING PLATING TO BE RETAINED

NEW CANOPY TO ARCHITECTURAL DETAILS

ADJOINS DRAWING SMCSWSWM-MTM-WDH-LA-DWG-23172X

PLATFORM 2

PROPOSED RONSTAN WIRE MESH FIX TO EXISTING EMBANKMENT FOR CLIMBING PLANTS

RETAIN EXISTING GREVILLEA

PLATFORM 1

REFURBISHED EXISTING PLATFORM 1 BUILDING

NEW PLATFORM 1 SERVICE BUILDING

EXISTING BIN ENCLOSURE TO BE RETAINED, NEW FENCE TO FRONT

EXISTING ROCK RETAINING WALL TO BE RETAINED

PROPOSED LIGHTING REFER TO LIGHTING ENGINEER'S PACKAGE

NEW PLANTING BED WALL REFER TO DRAWING SMCSWSWM-MTM-WWP-LA-DWG-231760

NEW PLANTING REFER TO DRAWING SMCSWSWM-MTM-WWP-LA-DWG-231741

PROPOSED NEW 2.4M WELDED MESH FENCE REFER TO FENCING PACKAGE

NEW ROOF REFER TO ARCHITECT'S PACKAGE

EXISTING ELECTRICITY POLE TO BE RETAINED

NEW CONCRETE FOR FUTURE STATION ENTRY AND EMERGENCY EGRESS REFER TO CIVIL ENGINEER'S PACKAGE

NEW CONCRETE FOOTPATH TO ACCESS BIN ENCLOSURE FROM PLATFORM

WILEY LANE

SHADFORTH STREET

Map Legend

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

0 30m

Urban Arbor Pty Ltd

PO Box 450 Turramurra NSW 2074

sales@urbanarbor.com.au

Site Location: Wiley Park Station
Wiley Park NSW

SCALE :	DATE :
1 : 200 @ A1	1/15/2020

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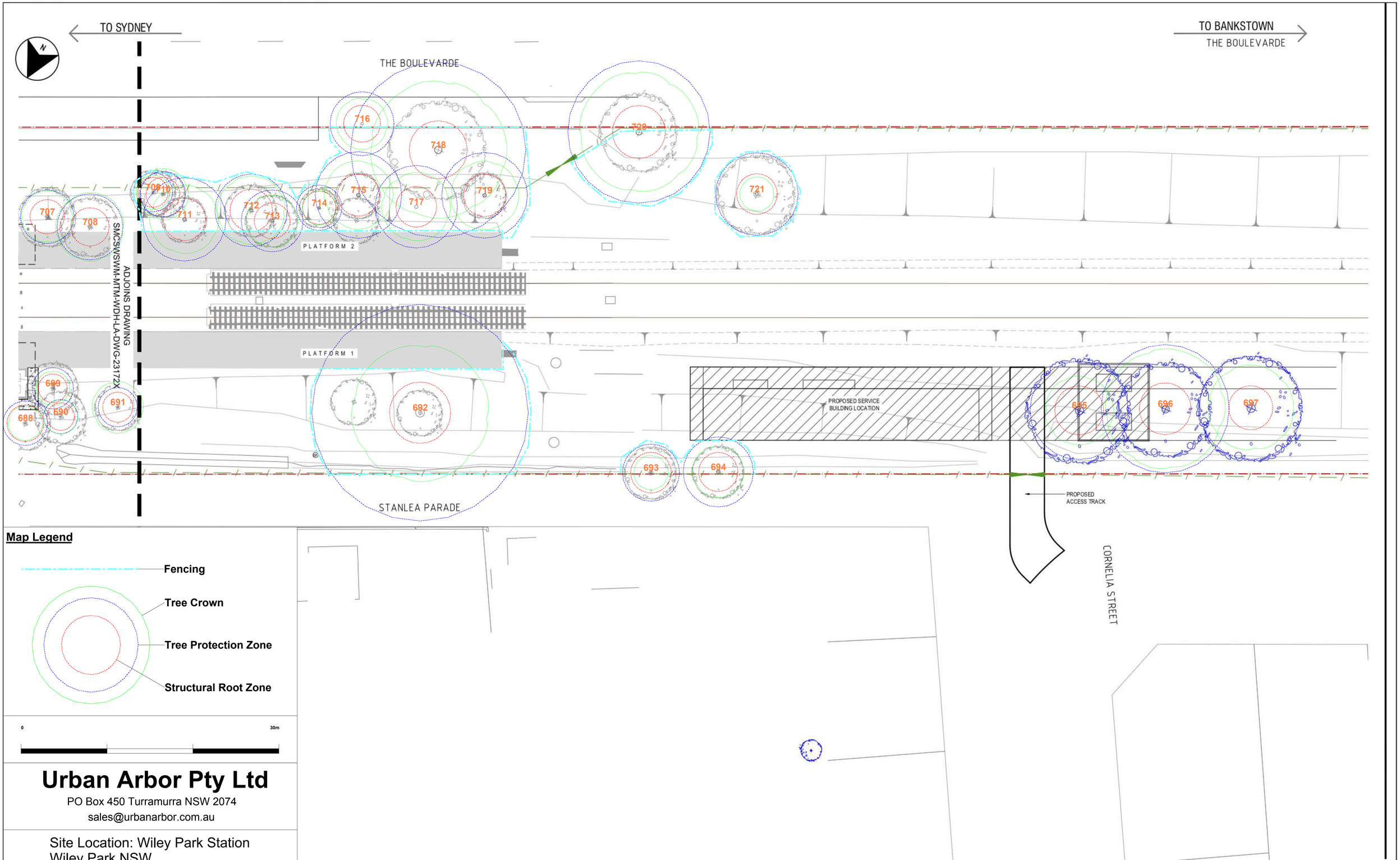
Appendix 1A - Proposed Site Plan East

Prepared by: Jack Williams, Urban Arbor Pty Ltd



Map Legend

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

0 30m

Urban Arbor Pty Ltd

PO Box 450 Turramurra NSW 2074
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Site Location: Wiley Park Station
Wiley Park NSW

SCALE :	DATE :
1 : 200 @ A1	1/15/2020

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Appendix 1B - Proposed Site Plan West

Prepared by: Jack Williams, Urban Arbor Pty Ltd

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
683	Fig	*Ficus spp*	Semi-mature	2	0.5	180					180	200	Good	Fair	Low	5. Small/Young	Z1	2.2	1.7	Leaning on tree guard.
684	Sweet Pittosporum	*Pittosporum undulatum*	Semi-mature	4	2	200					200	200	Good	Fair	Low	5. Small/Young	Z1	2.4	1.7	Located within corridor.
685	Grevillea 'Moonlight'	*Grevillea spp*	Semi-mature	3	1.5	100	50				112	220	Good	Good	Low	5. Small/Young	Z1	2.0	1.8	None.
686	Lemon Scented Tea Tree	*Leptospermum petersonii*	Mature	6	2	220					220	250	Good	Good	Medium	1. Long	A1	2.6	1.8	None.
687	Common Oak	*Quercus robur*	Mature	10	5	460					460	520	Good	Good	Medium	1. Long	A1	5.5	2.5	None.
688	Unknown	*Unknown spp*	Dead	5	2	120	180				216	350	Dead	Poor	Low	4. Remove	Z4	2.6	2.1	Dead tree.
689	Oleander	*Nerium oleander*	Semi-mature	5	2	200					200	200	Good	Fair	Low	5. Small/Young	Z1	2.4	1.7	Located within corridor.
690	Sweet Pittosporum	*Pittosporum undulatum*	Semi-mature	5	2	150					150	180	Good	Fair	Low	5. Small/Young	Z1	2.0	1.6	Located within corridor.
691	Common Oak	*Quercus robur*	Semi-mature	7	3	190					190	220	Good	Good	Medium	1. Long	A1	2.3	1.8	Located within corridor.
692	Peppercorn	*Schinus molle*	Mature	10	8	1050					1050	1200	Good	Good	Medium	1. Long	A1	12.6	3.6	Located within corridor.
693	Chinese Tallo	*Sapium sebiferum*	Mature	5	2	160	160	160			277	450	Good	Good	Medium	2. Medium	A1	3.3	2.4	Located within corridor.
694	Chinese Tallo	*Sapium sebiferum*	Mature	6	3	340					340	410	Good	Good	Medium	1. Long	A1	4.1	2.3	Located within corridor.
695	Peppercorn	*Schinus molle*	Mature	9	4	260	400				477	700	Good	Fair	Medium	2. Medium	A1	5.7	2.8	Located within corridor. DBH estimated. Surrounded by weed species.
696	Peppercorn	*Schinus molle*	Mature	9	7	450	430				622	800	Good	Fair	Medium	2. Medium	A1	7.5	3.0	Located within corridor. DBH estimated. Surrounded by weed species.
697	Peppercorn	*Schinus molle*	Mature	9	5	500					500	550	Good	Fair	Medium	2. Medium	A1	6.0	2.6	Located within corridor. DBH estimated. Surrounded by weed species.
698	Weeping Bottlebrush	*Callistemon viminalis*	Mature	7	3	260					260	290	Good	Good	Medium	1. Long	A1	3.1	2.0	None.
699	Diamond Leaf Pittosporum	*Auranticarpa rhombifolia*	Semi-mature	6	2	120	110				163	200	Fair	Fair	Low	3. Short	Z4	2.0	1.7	Low foliage density for power. Tree in decline. Rhombifolia.
700	Diamond Leaf Pittosporum	*Auranticarpa rhombifolia*	Mature	5	2	230					230	250	Good	Fair	Medium	3. Short	Z9	2.8	1.8	Large cambium wound to north.
701	Common Oak	*Quercus robur*	Mature	10	5	540					540	590	Good	Good	Medium	1. Long	A1	6.5	2.7	None.
702	Diamond Leaf Pittosporum	*Auranticarpa rhombifolia*	Mature	6	2	200					200	250	Good	Good	Medium	1. Long	A1	2.4	1.8	None.
703	Strawberry Tree	*Arbutus unedo*	Mature	4	2	240	180				300	450	Good	Fair	Medium	5. Small/Young	Z1	3.6	2.4	Wound on trunk.
704	Common Oak	*Quercus robur*	Mature	9	6	660					660	780	Good	Fair	Medium	2. Medium	A2	7.9	3.0	Loss of central leader.
705	Common Oak	*Quercus robur*	Mature	9	4	240	240				339	560	Good	Good	Medium	1. Long	A1	4.1	2.6	Co-dominant stems.
706	Common Oak	*Quercus robur*	Mature	10	5	490					490	540	Good	Good	Medium	1. Long	A1	5.9	2.6	None.
707	Common Oak	*Quercus robur*	Semi-mature	8	3	260					260	300	Good	Good	Medium	1. Long	A1	3.1	2.0	Located within corridor.
708	Common Oak	*Quercus robur*	Mature	9	4	320					320	390	Good	Good	Medium	1. Long	A1	3.8	2.2	Located within corridor. DBH estimated.
709	Common Oak	*Quercus robur*	Semi-mature	6	2	190					190	220	Good	Fair	Medium	2. Medium	A1	2.3	1.8	Located within corridor. DBH estimated. Suppressed by adjacent trees.
710	Common Oak	*Quercus robur*	Semi-mature	8	3	220					220	290	Good	Good	Medium	1. Long	A1	2.6	2.0	Located within corridor. DBH estimated.
711	Common Oak	*Quercus robur*	Mature	9	4	220	240	240			404	500	Good	Good	Medium	1. Long	A1	4.9	2.5	Located within corridor. DBH estimated.
712	Common Oak	*Quercus robur*	Mature	9	4	200	210	200			352	500	Good	Fair	Medium	2. Medium	A1	4.2	2.5	Located within corridor. DBH estimated. Co-dominant stems with bark inclusion.
713	Common Oak	*Quercus robur*	Mature	9	3	300					300	330	Good	Good	Medium	1. Long	A1	3.6	2.1	Located within corridor. DBH estimated.
714	Common Oak	*Quercus robur*	Semi-mature	7	2	220					220	280	Good	Good	Medium	1. Long	A1	2.6	1.9	Located within corridor. DBH estimated.
715	Common Oak	*Quercus robur*	Mature	9	4	420					420	490	Good	Good	Medium	1. Long	A1	5.0	2.5	Located within corridor. DBH estimated.
716	Yellow Bloodwood	*Corymbia eximia*	Mature	9	3	310					310	360	Good	Good	High	1. Long	A1	3.7	2.2	None.
717	Common Oak	*Quercus robur*	Mature	9	4	160	180	320			400	450	Fair	Fair	Medium	3. Short	Z9	4.8	2.4	Located within corridor. DBH estimated. Dieback with large deadwood.
718	Grey Ironbark	*Eucalyptus paniculata*	Mature	25	8	850					850	1050	Good	Good	Very High	1. Long	A1	10.2	3.4	Located within corridor. DBH estimated.
719	Common Oak	*Quercus robur*	Mature	8	4	230	240	250			416	500	Good	Fair	Medium	2. Medium	A1	5.0	2.5	Suppressed by adjacent tree.
720	Sydney Blue Gum	*Eucalyptus saligna*	Mature	19	7	690					690	840	Good	Good	Very High	1. Long	A1	8.3	3.1	None.
721	Lombardy Poplar	*Populus nigra*	Mature	19	2	400					400	450	Good	Fair	Low	2. Medium	Z3	4.8	2.4	Located within corridor. DBH estimated. Exempt species.

Appendix 2 - Tree Inspection Schedule

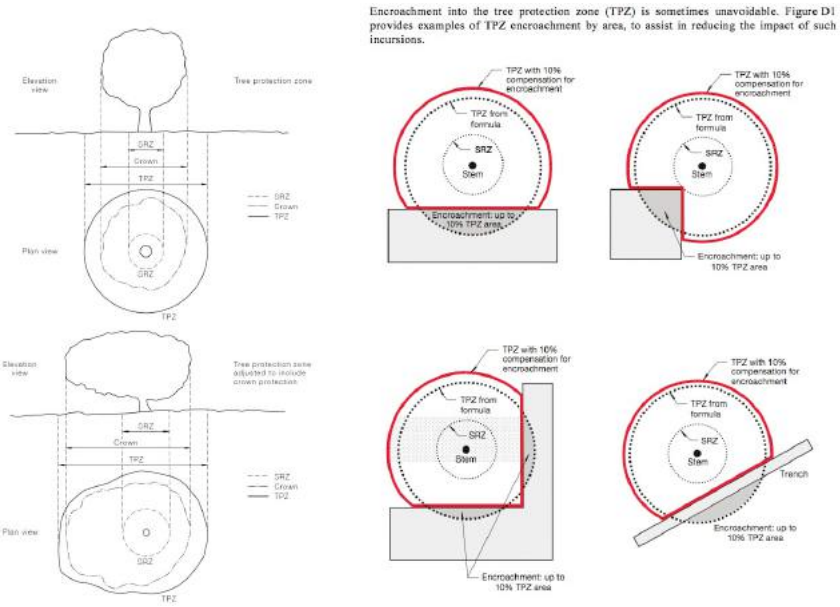
Tree ID	Common Name	Botanical Name	Age Class	Height (m)	Canopy Spread Radius (m	Stem 1	Stem 2	Stem 3	Stem 4	Stem 5	DBH (mm)	DAB (mm)	Health	Structure	Amenity Value	SULE	Retention Value	TPZ Radius (m)	SRZ Radius (m)	Notes

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.

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.
   SRZ radius = $(D \times 50)^{0.42} \times 0.64$ (D = 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.

Category	Example condition	Summary
Good	• 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.	• The tree is in above average health and condition and no remedial works are required.
Fair	• 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.	• The tree is in below average health and condition and may require remedial works to improve the trees health.
Poor	• The 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.	• The tree is displaying low levels of health and removal or remedial works may be required.
Dead	• The tree is dead or almost dead.	• The tree should generally be removed.

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

Category	Example condition	Summary
Good	• 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.	• The tree is considered structurally good with well developed form.
Fair	• The tree may have minor structural defects within the structure of the crown that could potentially develop into more significant defects. • The tree may 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.	• 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	• 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.	• 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 statuary 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, such as manual excavations or ground penetrating radar (GPR). 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
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.

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

Incorporating extracts from Lonsdale, D. 1999. Principles of Tree Hazard Assessment. Her Majesty's Stationary Office, London

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 bas 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

Incorporating extracts from Lonsdale, D. 1999. Principles of Tree Hazard Assessment. Her Majesty's Stationary Office, London

APPENDIX 4 WILEY PARK AIA (PLATAEU TREES)

PLATEAUTREES
Safety. Quality. Progress.

Date: 17 March 2021

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

At the request of Downer Group an onsite inspection was undertake at Wiley Park 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, Ref20/01/15/SWMWP. On the 1 March a site walkthrough was undertaken by myself and representatives 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.

Based upon the information, rational and justification provided within the AIA Report I can confirm that trees 683, 684, 687, 688, 695, 696, 697, 699 and 706 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 where there is a direct design clash and 100% encroachment into the TPZ and SRZ consist of seventeen *Schinus molle* (Peppercorn Tree), one *Eucalyptus scoparia* (Wallangarra White Gum) which constitute the significant trees within the site. Understory plants totaling sixty-two individual specimens were also identified. All trees are located along the rail embankment adjacent Urunga Parade. Image 1 shows the area of assessment and approximate locations of significant trees (trees 1-18). The Peppercorn trees are typically arranged in a line suggesting a landscape planting. The Wallangarra White Gum is likely to be a self- seeded specimen.

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The understory consists of forty-five *Ligustrum lucidum* (Broad-leafed Privet) trees 19 to 63, ten *Pittosporum undultaum* (Sweet Pittosporum) trees 64 to 73, four *Phoenix canariensis* (Canary Island Date Palm) trees 74 to 77 and three *Camellia* sp (Camellia) trees 78 to 80. Although meeting the requirement of a tree under the *Sydney Metro City & Southwest Sydenham to Bankstown Instrument of Approval* these species are commonly considered to be weeds or have low retention value with respects to the proposed works. Broad-leafed Privet is an identified species under the *Biosecurity Act 2015*. A general biosecurity duty exists within NSW to prevent, eliminate or minimise any biosecurity risk. The understory generally ranges in height between 3 and 10m and has been previously managed through selective pruning, lopping and removal works. Its significance has been assessed under the Pre-clearance Assessment prepared by Cumberland Ecology dated 14 March 2021.

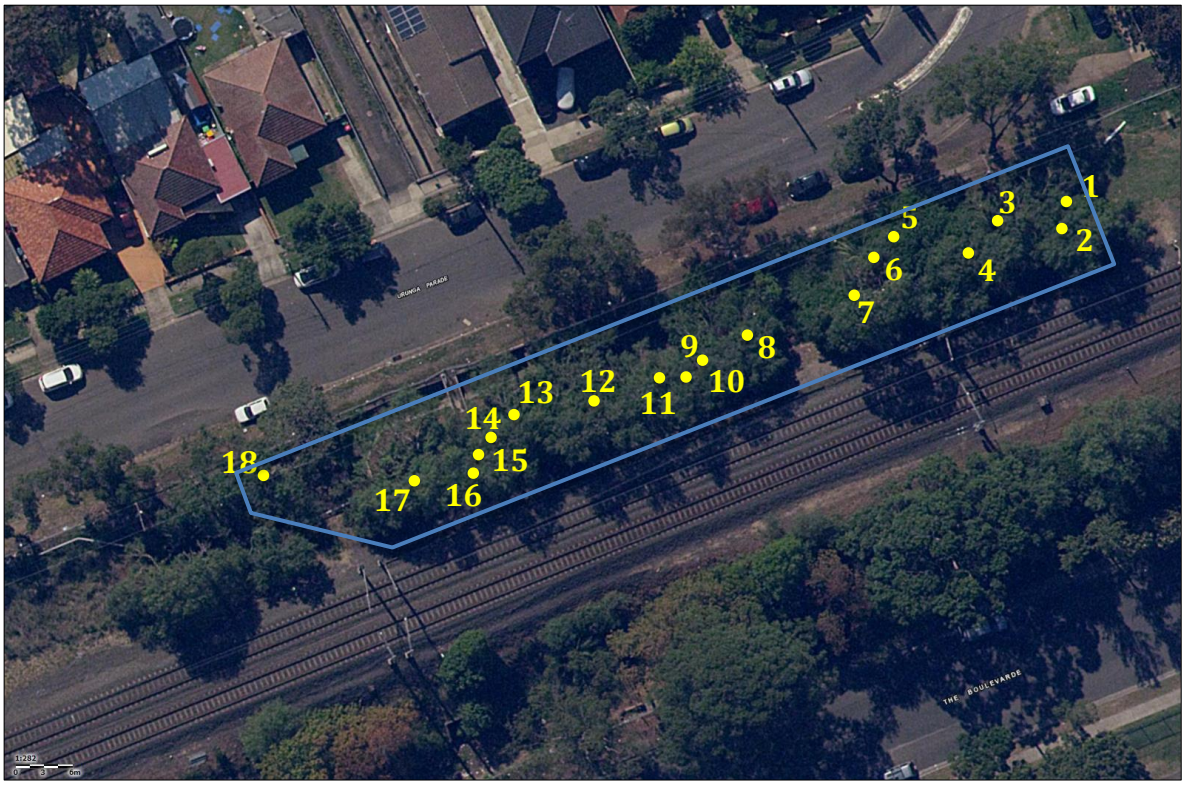


Image 1: Aerial image showing the proposed vegetation clearance area (blue outline) and approximate locations of significant trees (1 to 18).

The Peppercorn trees are considered to have a medium useful life expectancy of 15 to 40 years and medium landscape significance they are readily seen from the eastern end of Urunga Parade and the immediate surrounds. They provide screening from the rail corridor and its associated infrastructure. Each of these trees has been photographed and

can be found as Appendix 2 of this report. The understory species would generally be considered as having a short useful life expectancy and low landscape significance. It provides minor screening from the rail corridor.

Based on an assessment of the provided plans:

- Trees 1, 2 and 3 are positioned within the footprint of the pad mounted substation kiosk and cannot be retained
- Trees 4 and 5 are located within the footprint of the car park and cannot be retained
- Trees 6 and 7 are located within the area of the proposed OSD tank and access for retaining wall works and cannot be retained
- Trees 8, 9, 10, 11, 12, 13, 14, 15, 16 and 17 are located within the footprint required to undertake access, battering and pilling works associated with the retaining wall and cannot be retained
- The canopy of tree 18 potentially encroaches within the proposed works area due to the lean of the tree. The removal of a significant portion of the trees live canopy is likely to affect its health and condition reducing its useful life expectancy necessitating its removal
- Associated understory plants, trees 19 to 80, are within the footprint of works and cannot be retained

Pruning works were identified to be undertaken on tree 692 *Schinus molle* (Peppercorn Tree) to provide clearance along the rail corridor access track for plant and equipment. It is envisioned that pruning works shall involve the reduction and removal of selected branches up to 100mm in diameter and constitute approximately 25-30% of the total live canopy volume of the tree. Based upon the current health and condition of the tree these pruning works are considered to be significant and shall likely result in a reduction of tree growth and physiological function. All pruning works are to be undertaken by suitably qualified tree workers and meet the requirements of *AS4373-2007 Pruning of Amenity Trees*. Image 2 shows the tree and branches that overhang the access road.

Image 2: Yellow outline indicates branches from Tree 692, *Schinus molle* (Peppercorn Tree), that shall require selective removal to provide clearances along the rail corridor access track.

The additional Peppercorn trees are not representative of an endangered or threatened species or ecological community. The single Wallangarra White Gum is located out of its natural range and is not considered to be significant (refer to Pre-clearance Assessment prepared by Cumberland Ecology).

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

O. Tebbutt

Consulting Arborist
Plateau Tree Service

Tree number	Tree name Botanical name Common name	Tree dimensions Height (m)	Spread (m)	D.B.H. (mm)	D.A.B. (mm)	Vigour	Condition	Age class	ULE	Amenity and Visual Value	Native or Exotic	TPZ (m)	SRZ (m)	Comments	Remove or Retain
1	*Schinus molle* (Peppercorn Tree)	10-15	6x6	450 300	600	N	F	M	M	M	E	6.48	2.67	Direct clash with MSB	Remove
2	*Schinus molle* (Peppercorn Tree)	10-15	5x5	400	500	N	F	M	M	M	E	4.80	2.47	Direct clash with MSB	Remove
3	*Schinus molle* (Peppercorn Tree)	10-15	3x3	450 300	550 400	N	F	M	M	M	E	6.48	2.87	Twin-stemmed specimen. Cavity observed within trunk. Direct clash with MSB.	Remove
4	*Schinus molle* (Peppercorn Tree)	10-15	4x4	400	500	N	F	M	M	M	E	4.80	2.47	Direct clash with MSB	Remove
5	*Schinus molle* (Peppercorn Tree)	10-15	5x5	400	500	N	F	M	M	M	E	4.80	2.47	Direct clash with MSB	Remove
6	*Schinus molle* (Peppercorn Tree)	10-15	6x6	400	500	N	F	M	M	M	N	3.60	2.37	Direct clash with MSB	Remove
7	*Eucalyptus scoparia* (Wallangarra White Gum)	15-20	9x9	300	450	N	F	M	M	M	E	5.16	2.57	Pruning for overhead electrical wires has resulted in a flattened skewed canopy. Direct clash with MSB	Remove
8	*Schinus molle* (Peppercorn Tree)	10-15	5x5	350 250	550	N	F	M	M	M	E	6.24	2.71	A portion of the canopy appears dead. Direct clash with MSB.	Remove
9	*Schinus molle* (Peppercorn Tree)	10-15	5x5	200 150	-	N	F	M	M	M	E	6.00	-	Twin-stemmed specimen. Direct clash with MSB	Remove
10	*Schinus molle* (Peppercorn Tree)	10-15	5x5	350 300	-	N	F	M	M	M	E	5.52	-	Twin-stemmed specimen. Direct clash with MSB	
11	*Schinus molle* (Peppercorn Tree)	10-15	4x4	300 400	-	N	F	M	M	M	E	5.40	-	Direct clash with MSB	Remove
12	*Schinus molle* (Peppercorn Tree)	10-15	4x4	450	550	N	F	M	M	M	E	4.80	2.47	Direct clash with MSB	Remove
13	*Schinus molle* (Peppercorn Tree)	5-10	6x6	400	500	N	F	M	M	M	E	7.20	2.85	Direct clash with MSB	Remove

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)										
14	*Schinus molle* (Peppercorn Tree)	10-15	6x6	600	700	N	F	M	M	M	E	5.88	2.65	Direct clash with MSB	Remove
15	*Schinus molle* (Peppercorn Tree)	10-15	4x4	350 350	-	N	F	M	M	M	E	3.60	-	Twin-stemmed specimen. Direct clash with MSB	Remove
16	*Schinus molle* (Peppercorn Tree)	5-10	3x3	300	400	N	F	M	M	M	E	6.00	2.67	Direct clash with MSB	Remove
17	*Schinus molle* (Peppercorn Tree)	10-15	5x5	500	600	N	F	M	M	M	E	7.68	2.67	Direct clash with MSB	Remove
18	*Schinus molle* (Peppercorn Tree)	10-15	5x5	450 450	600	N	F	M	M	M	E	6.48	2.67	Direct clash with MSB	Remove
19	*Ligustrum lucidim* (Broad-leafed Privet)	5-10	1x1	100	200	N	G	M	S	L	E	2	1.5	Understorey specimen. Listed noxious weed under Biosecurity Act 2015 – Direct clash with MSB	Remove
20	*Ligustrum lucidim* (Broad-leafed Privet)	5-10	1x1	100	200	N	G	M	S	L	E	2	1.5	Understorey specimen. Listed noxious weed under Biosecurity Act 2015 – Direct clash with MSB	Remove
21	*Ligustrum lucidim* (Broad-leafed Privet)	5-10	1x1	100	200	N	G	M	S	L	E	2	1.5	Understorey specimen. Listed noxious weed under Biosecurity Act 2015 – Direct clash with MSB	Remove
22	*Ligustrum lucidim* (Broad-leafed Privet)	5-10	1x1	100	200	N	G	M	S	L	E	2	1.5	Understorey specimen. Listed noxious weed under Biosecurity Act 2015 – Direct clash with MSB	Remove
23	*Ligustrum lucidim* (Broad-leafed Privet)	5-10	1x1	100	200	N	G	M	S	L	E	2	1.5	Understorey specimen. Listed noxious weed under Biosecurity Act 2015 – Direct clash with MSB	Remove
24	*Ligustrum lucidim* (Broad-leafed Privet)	5-10	1x1	100	200	N	G	M	S	L	E	2	1.5	Understorey specimen. Listed noxious weed under Biosecurity Act 2015 – Direct clash with MSB	Remove
25	*Ligustrum lucidim* (Broad-leafed Privet)	5-10	1x1	50	80	N	G	M	S	L	E	2	1.5	Understorey specimen. Listed noxious weed under Biosecurity Act 2015 – Direct clash with MSB	Remove
26	*Ligustrum lucidim* (Broad-leafed Privet)	5-10	1x1	50	80	N	G	M	S	L	E	2	1.5	Understorey specimen. Listed noxious weed under Biosecurity Act 2015 – Direct clash with MSB	Remove

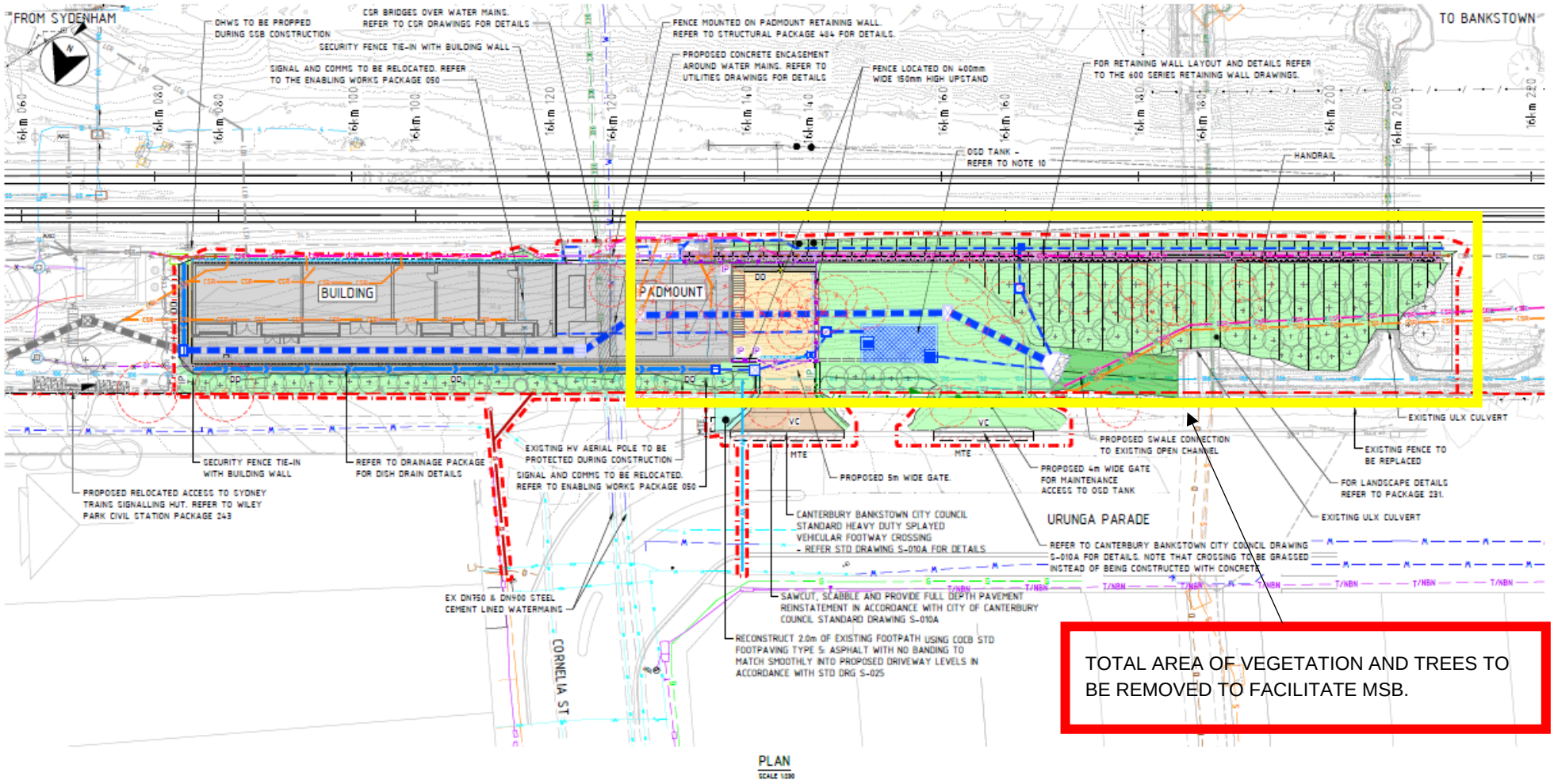
Tree number	Tree name	Tree dimensions				Vigour	Condition	Age class	ULE	Amenity and Visual Value	Native or Exotic	TPZ (m)	SRZ (m)	Comments	Remove or Retain
	Botanical name Common name	Height (m)	Spread (m)	D.B.H. (mm)	D.A.B. (mm)										
27	*Ligustrum lucidim* (Broad-leafed Privet)	5-10	1x1	50	80	N	G	M	S	L	E	2	1.5	Understorey specimen. Listed noxious weed under Biosecurity Act 2015 – Direct clash with MSB	Remove
28	*Ligustrum lucidim* (Broad-leafed Privet)	5-10	1x1	50	80	N	G	M	S	L	E	2	1.5	Understorey specimen. Listed noxious weed under Biosecurity Act 2015 – Direct clash with MSB	Remove
29	*Ligustrum lucidim* (Broad-leafed Privet)	5-10	1x1	50	80	N	G	M	S	L	E	2	1.5	Understorey specimen. Listed noxious weed under Biosecurity Act 2015 – Direct clash with MSB	Remove
30	*Ligustrum lucidim* (Broad-leafed Privet)	5-10	1x1	50	80	N	G	M	S	L	E	2	1.5	Understorey specimen. Listed noxious weed under Biosecurity Act 2015 – Direct clash with MSB	Remove
31	*Ligustrum lucidim* (Broad-leafed Privet)	5-10	1x1	50	80	N	G	M	S	L	E	2	1.5	Understorey specimen. Listed noxious weed under Biosecurity Act 2015 – Direct clash with MSB	Remove
32	*Ligustrum lucidim* (Broad-leafed Privet)	5-10	1x1	50	80	N	G	M	S	L	E	2	1.5	Understorey specimen. Listed noxious weed under Biosecurity Act 2015 – Direct clash with MSB	Remove
33	*Ligustrum lucidim* (Broad-leafed Privet)	5-10	1x1	50	80	N	G	M	S	L	E	2	1.5	Understorey specimen. Listed noxious weed under Biosecurity Act 2015 – Direct clash with MSB	Remove
34	*Ligustrum lucidim* (Broad-leafed Privet)	5-10	1x1	50	80	N	G	M	S	L	E	2	1.5	Understorey specimen. Listed noxious weed under Biosecurity Act 2015 – Direct clash with MSB	Remove
35	*Ligustrum lucidim* (Broad-leafed Privet)	5-10	1x1	50	80	N	G	M	S	L	E	2	1.5	Understorey specimen. Listed noxious weed under Biosecurity Act 2015 – Direct clash with MSB	Remove
36	*Ligustrum lucidim* (Broad-leafed Privet)	5-10	1x1	50	80	N	G	M	S	L	E	2	1.5	Understorey specimen. Listed noxious weed under Biosecurity Act 2015 – Direct clash with MSB	Remove
37	*Ligustrum lucidim* (Broad-leafed Privet)	5-10	1x1	50	80	N	G	M	S	L	E	2	1.5	Understorey specimen. Listed noxious weed under Biosecurity Act 2015 – Direct clash with MSB	Remove
38	*Ligustrum lucidim* (Broad-leafed Privet)	5-10	1x1	50	80	N	G	M	S	L	E	2	1.5	Understorey specimen. Listed noxious weed under Biosecurity Act 2015 – Direct clash with MSB	Remove
39	*Ligustrum lucidim* (Broad-leafed Privet)	5-10	1x1	50	80	N	G	M	S	L	E	2	1.5	Understorey specimen. Listed noxious weed under Biosecurity Act 2015 – Direct clash with MSB	Remove

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)										
40	*Ligustrum lucidim* (Broad-leafed Privet)	5-10	1x1	50	80	N	G	M	S	L	E	2	1.5	Understorey specimen. Listed noxious weed under Biosecurity Act 2015 – Direct clash with MSB	Remove
41	*Ligustrum lucidim* (Broad-leafed Privet)	5-10	1x1	50	80	N	G	M	S	L	E	2	1.5	Understorey specimen. Listed noxious weed under Biosecurity Act 2015 – Direct clash with MSB	Remove
42	*Ligustrum lucidim* (Broad-leafed Privet)	5-10	1x1	50	80	N	G	M	S	L	E	2	1.5	Understorey specimen. Listed noxious weed under Biosecurity Act 2015 – Direct clash with MSB	Remove
43	*Ligustrum lucidim* (Broad-leafed Privet)	5-10	1x1	50	80	N	G	M	S	L	E	2	1.5	Understorey specimen. Listed noxious weed under Biosecurity Act 2015 – Direct clash with MSB	Remove
44	*Ligustrum lucidim* (Broad-leafed Privet)	5-10	1x1	50	80	N	G	M	S	L	E	2	1.5	Understorey specimen. Listed noxious weed under Biosecurity Act 2015 – Direct clash with MSB	Remove
45	*Ligustrum lucidim* (Broad-leafed Privet)	5-10	1x1	100	200	N	G	M	S	L	E	2	1.5	Understorey specimen. Listed noxious weed under Biosecurity Act 2015 – Direct clash with MSB	Remove
46	*Ligustrum lucidim* (Broad-leafed Privet)	5-10	1x1	100	200	N	G	M	S	L	E	2	1.5	Understorey specimen. Listed noxious weed under Biosecurity Act 2015 – Direct clash with MSB	Remove
47	*Ligustrum lucidim* (Broad-leafed Privet)	5-10	1x1	100	200	N	G	M	S	L	E	2	1.5	Understorey specimen. Listed noxious weed under Biosecurity Act 2015 – Direct clash with MSB	Remove
48	*Ligustrum lucidim* (Broad-leafed Privet)	5-10	1x1	100	200	N	G	M	S	L	E	2	1.5	Understorey specimen. Listed noxious weed under Biosecurity Act 2015 – Direct clash with MSB	Remove
49	*Ligustrum lucidim* (Broad-leafed Privet)	5-10	1x1	100	200	N	G	M	S	L	E	2	1.5	Understorey specimen. Listed noxious weed under Biosecurity Act 2015 – Direct clash with MSB	Remove
50	*Ligustrum lucidim* (Broad-leafed Privet)	5-10	1x1	100	200	N	G	M	S	L	E	2	1.5	Understorey specimen. Listed noxious weed under Biosecurity Act 2015 – Direct clash with MSB	Remove
51	*Ligustrum lucidim* (Broad-leafed Privet)	5-10	1x1	100	200	N	G	M	S	L	E	2	1.5	Understorey specimen. Listed noxious weed under Biosecurity Act 2015 – Direct clash with MSB	Remove
52	*Ligustrum lucidim* (Broad-leafed Privet)	5-10	1x1	100	200	N	G	M	S	L	E	2	1.5	Understorey specimen. Listed noxious weed under Biosecurity Act 2015 – Direct clash with MSB	Remove

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)										
53	*Ligustrum lucidim* (Broad-leafed Privet)	5-10	1x1	100	200	N	G	M	S	L	E	2	1.5	Understorey specimen. Listed noxious weed under Biosecurity Act 2015 – Direct clash with MSB	Remove
54	*Ligustrum lucidim* (Broad-leafed Privet)	5-10	1x1	100	200	N	G	M	S	L	E	2	1.5	Understorey specimen. Listed noxious weed under Biosecurity Act 2015 – Direct clash with MSB	Remove
55	*Ligustrum lucidim* (Broad-leafed Privet)	5-10	1x1	100	200	N	G	M	S	L	E	2	1.5	Understorey specimen. Listed noxious weed under Biosecurity Act 2015 – Direct clash with MSB	Remove
56	*Ligustrum lucidim* (Broad-leafed Privet)	5-10	1x1	100	200	N	G	M	S	L	E	2	1.5	Understorey specimen. Listed noxious weed under Biosecurity Act 2015 – Direct clash with MSB	Remove
57	*Ligustrum lucidim* (Broad-leafed Privet)	5-10	1x1	100	200	N	G	M	S	L	E	2	1.5	Understorey specimen. Listed noxious weed under Biosecurity Act 2015 – Direct clash with MSB	Remove
58	*Ligustrum lucidim* (Broad-leafed Privet)	5-10	1x1	50	80	N	G	M	S	L	E	2	1.5	Understorey specimen. Listed noxious weed under Biosecurity Act 2015 – Direct clash with MSB	Remove
59	*Ligustrum lucidim* (Broad-leafed Privet)	5-10	1x1	50	80	N	G	M	S	L	E	2	1.5	Understorey specimen. Listed noxious weed under Biosecurity Act 2015 – Direct clash with MSB	Remove
60	*Ligustrum lucidim* (Broad-leafed Privet)	5-10	1x1	50	80	N	G	M	S	L	E	2	1.5	Understorey specimen. Listed noxious weed under Biosecurity Act 2015 – Direct clash with MSB	Remove
61	*Ligustrum lucidim* (Broad-leafed Privet)	5-10	1x1	50	80	N	G	M	S	L	E	2	1.5	Understorey specimen. Listed noxious weed under Biosecurity Act 2015 – Direct clash with MSB	Remove
62	*Ligustrum lucidim* (Broad-leafed Privet)	5-10	1x1	50	80	N	G	M	S	L	E	2	1.5	Understorey specimen. Listed noxious weed under Biosecurity Act 2015 – Direct clash with MSB	Remove
63	*Ligustrum lucidim* (Broad-leafed Privet)	5-10	1x1	50	80	N	G	M	S	L	E	2	1.5	Understorey specimen. Listed noxious weed under Biosecurity Act 2015 – Direct clash with MSB	Remove
64	*Pittosporum undulatum* (Sweet pittosporum)	1-5	2x2	50	80	N	G	M	S	L	N	2	1.5	Understorey specimen. Direct clash with MSB	Remove
65	*Pittosporum undulatum* (Sweet pittosporum)	1-5	2x2	50	80	N	G	M	S	L	N	2	1.5	Understorey specimen. Direct clash with MSB	Remove

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)										
66	*Pittosporum undulatum* (Sweet pittosporum)	1-5	2x2	50	80	N	G	M	S	L	N	2	1.5	Understorey specimen. Direct clash with MSB	Remove
67	*Pittosporum undulatum* (Sweet pittosporum)	5-10	2x2	50	80	N	G	M	S	L	N	2	1.5	Understorey specimen. Direct clash with MSB	Remove
68	*Pittosporum undulatum* (Sweet pittosporum)	5-10	2x2	50	80	N	G	M	S	L	N	2	1.5	Understorey specimen. Direct clash with MSB	Remove
69	*Pittosporum undulatum* (Sweet pittosporum)	5-10	2x2	100	200	N	G	M	S	L	N	2	1.5	Understorey specimen. Direct clash with MSB	Remove
70	*Pittosporum undulatum* (Sweet pittosporum)	5-10	2x2	100	200	N	G	M	S	L	N	2	1.5	Understorey specimen. Direct clash with MSB	Remove
71	*Pittosporum undulatum* (Sweet pittosporum)	5-10	2x2	150	250	N	G	M	S	L	N	2	1.5	Understorey specimen. Direct clash with MSB	Remove
72	*Pittosporum undulatum* (Sweet pittosporum)	5-10	2x2	50	80	N	G	M	S	L	N	2	1.5	Understorey specimen. Direct clash with MSB	Remove
73	*Pittosporum undulatum* (Sweet pittosporum)	5-10	2x2	50	80	N	G	M	S	L	N	2	1.5	Understorey specimen. Direct clash with MSB	Remove
74	*Phoenix canariensis* (Canary Island Date Palm)	1-5	3x3	400	500	N	G	M	M	L	E	4	1.5	Understorey specimen. Direct clash with MSB	Remove
75	*Phoenix canariensis* (Canary Island Date Palm)	1-5	3x3	400	500	N	G	M	M	L	E	4	1.5	Understorey specimen. Direct clash with MSB	Remove
76	*Phoenix canariensis* (Canary Island Date Palm)	1-5	3x3	150	250	N	G	M	M	L	E	4	1.5	Understorey specimen. Direct clash with MSB	Remove
77	*Phoenix canariensis* (Canary Island Date Palm)	1-5	3x3	150	250	N	G	M	M	L	E	4	1.5	Understorey specimen. Direct clash with MSB	Remove
78	*Camellia* sp (Camellia)	1-5	1x1	50	80	N	G	M	S	L	E	2	1.5	Understorey specimen. Direct clash with MSB	Remove

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)										
79	*Camellia* sp (Camellia)	1-5	1x1	50	80	N	G	M	S	L	E	2	1.5	Understorey specimen. Direct clash with MSB	Remove
80	*Camellia* sp (Camellia)	1-5	1x1	50	80	N	G	M	S	L	E	2	1.5	Understorey specimen. Direct clash with MSB	Remove



PLAN
SCALE 1:200

NOTES

1. FOR GENERAL NOTES REFER TO DRAWINGS SMCSWSWM-MTM-WWP-CE-DWG-403104 TO 403107.
2. FOR LEGEND REFER TO DRAWINGS SMCSWSWM-MTM-WWP-CE-DWG-403108 TO 403109.
3. FOR PAVEMENT PLAN REFER TO DRAWING SMCSWSWM-MTM-WWP-CE-DWG-403161.
4. FOR FINISHED SURFACE PLAN REFER TO DRAWING SMCSWSWM-MTM-WWP-CE-DWG-403137.
5. FOR BULK EARTHWORKS CUT AND FILL PLAN REFER DRAWING SMCSWSWM-MTM-WWP-CE-DWG-403201.
6. FOR BULK EARTHWORKS GRADING PLAN AND LONGITUDINAL SECTION REFER TO DRAWING SMCSWSWM-MTM-WWP-CE-DWG-403206.
7. FOR DRAINAGE GENERAL ARRANGEMENT PLAN REFER TO DRAWING SMCSWSWM-MTM-WWP-CE-DWG-403301.
8. FOR CGR GENERAL ARRANGEMENT PLAN REFER TO DRAWINGS SMCSWSWM-MTM-WWP-CE-DWG-403411 TO 403412. DO NOT REFER TO ANY OTHER GENERAL ARRANGEMENT PLANS FOR THE DESIGN AND EXTENTS OF CGR WORKS.
9. FOR UTILITIES GENERAL ARRANGEMENT PLAN REFER TO DRAWING SMCSWSWM-MTM-WWP-CE-DWG-403501.
10. FOR RETAINING WALL GENERAL ARRANGEMENT PLAN AND DETAILS, INCLUDING HANDRAIL DETAILS, REFER DRAWINGS SMCSWSWM-MTM-WWP-CE-DWG-403601 TO 404633.
11. FOR OSD DETAILS REFER TO DRAINAGE DRAWING SMCSWSWM-MTM-WWP-CE-DWG-403321.
12. FOR MEP CONDUITS REFER TO PACKAGE 402. NOTE THAT MEP CONDUITS ARE NOT SHOWN ON CIVIL GA.

DRAWING COLOUR CODED - PRINT ALL COPIES IN COLOUR

FOR CONSTRUCTION

REV.	BY	DATE	DESCRIPTION	APPD
00	MC	31.03.2021	APPROVED FOR CONSTRUCTION	LP

SCALES: 1 : 200 FULL SIZE A1

CLIENT: NSW GOVERNMENT | sydney METRO

SERVICE PROVIDERS: METRON T2M

DRAWN: M. FORTU
DESIGNED: C. STANFORD
DRG CHECK: P. ALFORD
DESIGN CHECK: T. LEE
APPROVED: L. PALMER 31.03.2021

SYDNEY METRO
WILEY PARK STATION - SERVICE BUILDING
CIVIL ENGINEERING
SERVICE BUILDING - CIVIL
GENERAL ARRANGEMENT PLAN

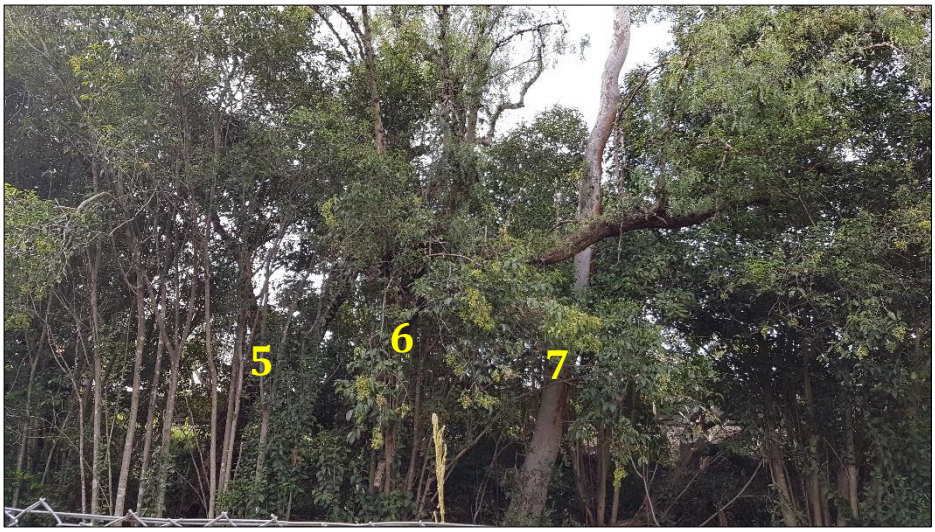
STATUS: FOR CONSTRUCTION | SHEET 1 OF 1 | (G)
DRG No: SMCSWSWM-MTM-WWP-CE-DWG-403111 | REV: 00

At 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-WWP-CE-DWG-403111 0

Appendix 2: Site Photographs

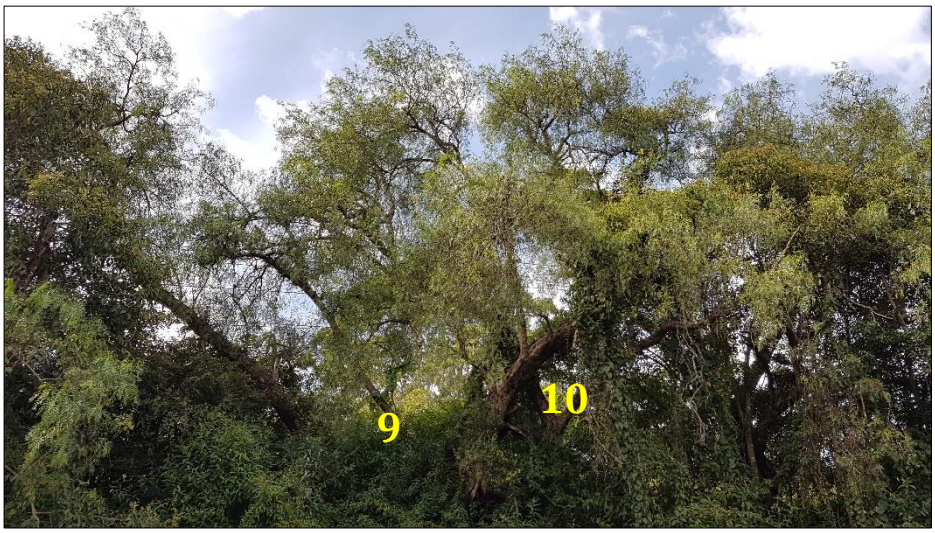
Photograph 1: Trees 1 and 2 *Schinus molle* (Peppercorn Tree) to be removed.

Photograph 2: Trees 3 and 4D *Schinus molle* (Peppercorn Tree) to be removed.

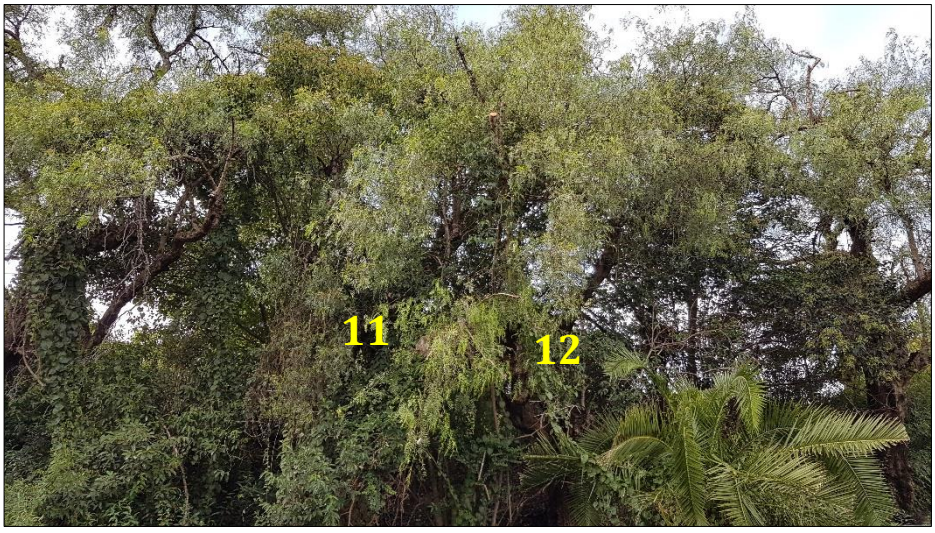


Photograph 3: Trees 5, 6 and 7 *Schinus molle* (Peppercorn Tree) to be removed.

Photograph 4: Tree 8 *Schinus molle* (Peppercorn Tree) to be removed.



Photograph 5: Trees 9 and 10 *Schinus molle* (Peppercorn Tree) to be removed.



Photograph 6: Trees 11 and 12 *Schinus molle* (Peppercorn Tree) to be removed.

Photograph 7: Trees 13, 14, 15 and 16 *Schinus molle* (Peppercorn Tree) to be removed.

Photograph 8: Tree 17 *Schinus molle* (Peppercorn Tree) to be removed.

Photograph 9: Tree 18 *Schinus molle* (Peppercorn Tree) 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.
- **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 crow, 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 4.1 WILEY PARK AIA (PLATAEU TREES)

PLATEAUTREES
Safety. Quality. Progress.

Date: 30 April 2021

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

At the request of Downer Group an onsite inspection was undertake at Wiley Park Station. It has been asked to confirm existing tree removals as recommended within the Arboricultural Impact Assessment (AIA) prepared by Urban Arbor, dated 15 January 2020, Ref 20/01/15/SWMPB and record additional trees to be removed as part of the proposed works package. On the 30 April a site walkthrough was undertaken by myself and a representative from Downer Group.

As stated within the existing AIA report trees 684, 687, 688 and 706 shall require removal to accommodate the proposed works. Trees 689, 690, 691, 693, 694, 707 and 708, previously identified for retention, are now to be removed. Trees 689, 690 and 691 are located within the footprint of works for the station services building adjacent platform 1 and cannot be retained. Trees 693 and 694 are located within the footprint of a permanent staircase to the signal hut and drainage line and cannot be retained. Trees 707 and 708 are located within the footprint of works for the station services building adjacent platform 2 and cannot be retained. Reference should be made to the AIA report for their respective tree data.

An additional four trees were identified for removal as part of the works. These consist of one *Pittosporum undulatum* (Sweet Pittosporum) tree 1 located adjacent platform 2 and one *Eucalyptus pilularis* (Blackbutt) tree 2, one *Eucalyptus robusta* (Swamp Mahogany) tree 3, one *Eucalyptus scoparia* (Wallangarra White Gum) tree 4 located adjacent the southern side of Urunga Parade. These additional trees are

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PO BOX 1522, DEE WHY NSW 2099 Australia
P: 02 9939 5350 | F: 02 9905 7569
E: info@plateautrees.com.au | W: www.plateautrees.com.au
ABN : 17 090 798 002

located within the footprint of the proposed works and cannot be retained under the current design. The Sweet Pittosporum is considered to have low landscape significance. Its removal is not expected to have a significant impact upon the local amenity. The Blackbutt, Swamp Mahogany and Wallangarra White Gum are considered to have medium landscape significance. Their removal shall expose the northern end of Urunga parade to the new Metro Services Building, rail corridor and associated infrastructure. The locations of the additional trees to be removed can be found as Image 1. Tree data collected during the site inspection can be found as Appendix 1. Each additional tree for removal has been photographed and can be found as Appendix 2.

The Wallangarra White Gum (tree 4) is listed as Endangered under the Biodiversity Conservation Act 2016 and Vulnerable under the Environmental Protection Biodiversity Conservation Act 1999. However, the subject specimen is located outside of its naturally occurring range and appears to have been planted as part of the streetscape.

Image 1: Aerial image of Wiley Park Station Station showing the location of additional trees to be removed.

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	*Pittosporum undulatum* (Sweet Pittosporum)	1-5	2x2	90	150	N	G	M	S	L	N	2	1.5	Growing at base of adjacent tree 706. Tree to be removed to accommodate the proposed station services building adjacent platform 2.	Remove
2	*Eucalyptus pilularis* (Blackbutt)	15-20	7x7	600	700	N	F	M	M	M	N	7.2	2.85	Council owned street tree located within road reserve. Tree has poor form due to regular pruning to clear overhead power lines. Epicormics and dead wood within canopy. Tree to be removed to accommodate driveway access to proposed Metro Services Building.	Remove
3	*Eucalyptus robusta* (Swamp mahogany)	15-20	6x6	550	550	N	F	M	M	M	N	6.6	2.57	Council owned street tree located within road reserve. Tree has poor form due to regular pruning to clear overhead power lines. Epicormics and dead wood within canopy. Exposed surface roots around base of trunk. Tree to be removed to accommodate ULX and permanent fencing.	Remove
4	*Eucalyptus scoparia* (Wallangarra White Gum)	15-20	7x7	400	500	N	F	M	M	M	N	4.8	2.47	Council owned street tree located within road reserve. Tree has poor form due to regular pruning to clear overhead power lines. Epicormics and dead wood within canopy. Tree to be removed to accommodate ULX and permanent fencing.	Remove

Appendix 1: Site Photographs

Photograph 1: Tree 1 *Pittosporum undulatum* (Sweet Pittosporum) identified for removal to accommodate Station Services Building adjacent platform 2.

Photograph 2: Tree 2 *Eucalyptus pilularis* (Blackbutt) identified for removal to accommodate Metro services Building driveway and access.

Photograph 3: Tree 3 *Eucalyptus robusta* (Swamp Mahogany) identified for removal to accommodate ULX and permanent fencing.

Photograph 4: Tree 4 *Eucalyptus scoparia* (Wallangarra White Gum) identified for removal to accommodate ULX and permanent fencing.

TO SYDNEY

TO BANKSTOWN

THE BOULEVARDE

TREE 1, 706, 707 & 708 TO BE REMOVED DUE TO DIRECT CLASH WITH PERMANENT PLATFORM SERVICE BUILDING

REMOVE EXISTING SECURITY FENCE

REMOVE EXISTING HOOP STYLE FENCE

EXISTING PLATFORM 2 BUILDING

REMOVE EXISTING TREE

706

Tree 1

707

708

PLATFORM 2

TREES 693 & 694, TO BE REMOVED DUE TO DIRECT CLASH WITH PERMANENT STAIRWAY TO SIGNAL HUT AND DRAINAGE LINE

LOCALISED DEMOLITION REFER TO ARCHITECTURAL PACKAGE

REMOVE EXISTING TIMBER SLEEPER EDGES

SMCSWSWM-MTM-WWP-LA-DWG-231702 ADJOINS DRAWING

SMCSWSWM-MTM-WWP-LA-DWG-231704 ADJOINS DRAWING

PLATFORM 1

EXISTING PLATFORM 1 BUILDING

TREES 693 & 694, TO BE REMOVED DUE TO DIRECT CLASH WITH PERMANENT STAIRWAY TO SIGNAL HUT AND DRAINAGE LINE

684

687

689

688

690

691

REMOVE EXISTING HOOP STYLE FENCE

REMOVE EXISTING SECURITY FENCE

REMOVE EXISTING CONCRETE FOOTPATH TO BIN PAD

REMOVE EXISTING TREES

TREE 687, 688, 689, 690 & 691 TO BE REMOVED DUE TO DIRECT CLASH WITH PERMANENT PLATFORM SERVICE BUILDING

WILEY LANE

TREET

LEGEND

- RAILCORP PROPERTY BOUNDARY
- EXISTING TREES TO BE PROTECTED AND RETAINED
- EXISTING TREES TO BE REMOVED
- EXISTING HOOP FENCE TO BE REMOVED
- EXISTING SECURITY FENCE TO BE REMOVED
- WORKS TO BE DEMOLISHED
- WATER
- TELSTRA
- LOW PRESSURE GAS MAIN
- HV CABLE
- ELECTRIC

DRAWING COLOUR CODED - PRINT ALL COPIES IN COLOUR

NOT FOR CONSTRUCTION

REV.	BY	DATE	DESCRIPTION	APPD.
C	ME	23/10/2020	UPDATED STAGE 3 ISSUE	LP
B	ME	06/05/2020	ISSUED FOR STAGE 3	LP
A	ME	25/10/2019	ISSUED FOR STAGE 2	LP

SCALES 2 0 2 4 6 8m

1 : 200 FULL SIZE A1

CLIENT

NSW GOVERNMENT | sydney METRO

SERVICE PROVIDERS

METRON T2M

DRAWN	D.LEE	23/10/2020
DESIGNED	M. ENOCH	23/10/2020
DRG CHECK	M. ENOCH	23/10/2020
DESIGN CHECK	G. DAVIES	23/10/2020
APPROVED	L. PALMER	23/10/2020

SYDNEY METRO

WILEY PARK (15.846km to 16.211km)

LANDSCAPE DESIGN

DEMOLITION PLAN

SHARED PATH

STATUS: STAGE 3 | SHEET 4 of 24 | ©

DRG No. SMCSWSWM-MTM-WWP-LA-DWG-231703 | REV. C

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-WWP-LA-DWG-231703 P01

TO SYDNEY

TO BANKSTOWN

LEGEND

- RAILCORP PROPERTY BOUNDARY
- EXISTING TREES TO BE PROTECTED AND RETAINED
- EXISTING TREES TO BE REMOVED
- EXISTING HOOP FENCE TO BE REMOVED
- EXISTING SECURITY FENCE TO BE REMOVED
- WORKS TO BE DEMOLISHED
- WATER
- TELSTRA
- 202 LOW PRESSURE GAS MAIN
- 106 HV CABLE
- ELECTRIC

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 231.
- REFER TO ARBORIST'S ARBORICULTUAL IMPACT ASSESSMENT REPORT FOR TREE PROTECTION WORKS.

THE BOULEVARDE

THE BOULEVARDE

ADJOINS DRAWING SMCSWSWM-MTM-WWP-LA-DWG-231703

PLATFORM 2

PLATFORM 1

EXISTING SIGNAL BUILDING

REMOVE EXISTING HOOP STYLE FENCE

REMOVE EXISTING TREES

REMOVE EXISTING VEGETATION AND TOPSOIL. REFER TO SOIL REPORT FOR TREATMENT OF TOPSOIL AT WILEY PARK.

ARADE

REPLACE EXISTING CONCRETE CHANNEL WITH NEW ALIGNMENT REFER TO ENGINEER PACKAGE

REMOVE EXISTING SECURITY FENCE

693

694

REMOVE EXISTING TREES

TREES 693 & 694, TO BE REMOVED DUE TO DIRECT CLASH WITH PERMANENT STAIRWAY TO SIGNAL HUT AND DRAINAGE LINE

REMOVE EXISTING TREES. REFER TO ARBORIST'S REPORT

REMOVE EXISTING VEGETATION AND TOPSOIL. REFER TO SOIL REPORT FOR TREATMENT OF TOPSOIL AT WILEY PARK.

Tree 2

Tree 3

Tree 4

CORNELIA STREET

TREES 693 & 694, TO BE REMOVED DUE TO DIRECT CLASH WITH ULX & PERMANENT FENCE

TREE 3, TO BE REMOVED DUE TO DIRECT CLASH WITH PERMANENT DRIVEWAY

DRAWING COLOUR CODED - PRINT ALL COPIES IN COLOUR

FOR CONSTRUCTION

REV.	BY	DATE	DESCRIPTION	APPD.
00	ME	31/03/2021	APPROVED FOR CONSTRUCTION	LP

SCALES

CLIENT

NSW GOVERNMENT | sydney METRO

SERVICE PROVIDERS

METRON T2M

DRAWN	D.LEE	31/03/2021
DESIGNED	M. ENOCH	31/03/2021
DRG CHECK	M. ENOCH	31/03/2021
DESIGN CHECK	G. DAVIES	31/03/2021
APPROVED	L. PALMER	31/03/2021

SYDNEY METRO

WILEY PARK (15.846km to 16.211km)
LANDSCAPE DESIGN
DEMOLITION PLAN
STANLEA PARADE

STATUS: FOR CONSTRUCTION APPROVAL | SHEET 5 of 25 | ©

DRG No. SMCSWSWM-MTM-WWP-LA-DWG-231704 | REV. 00

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-WWP-LA-DWG-231704 P01

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 crow, 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 4.2 WILEY PARK AIA (PLATAEU TREES)

PLATEAUTREES
Safety. Quality. Progress.

Date: 28 September 2021

Re: Additional tree removal at Wiley Park Station as part of the Southwest Metro Package.

At the request of Downer Group an onsite inspection was undertake at Wiley Park 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 tree consists of one *Quercus robur* (Common Oak) located adjacent the rear of Platform 2. It is identified as tree 711 within the AIA report.

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 tree is located within the direct alignment of a proposed platform footprint & fence to be installed along the rear of Platform 2. As such, the tree cannot be retained under the current design. Its removal 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.

Photographs 1 and 2 of Appendix 1 shows the tree and its position with respects to Platform 2 and the proposed alignment of the fence. Appendix 2 Tree Assessment Schedule details the data relating to the tree.

Plateau Tree Service Pty Ltd
PO BOX 1522, DEE WHY NSW 2099 Australia
P: 02 9939 5350 | F: 02 9905 7569
E: info@plateautrees.com.au | W: www.plateautrees.com.au
ABN : 17 090 798 002

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: Site Photographs

Photograph 1: Tree 711 *Quercus robur* (Common Oak).

Photograph 2: The position of tree 711 with regards to the alignment of Platform 2 and proposed fence.

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)										
711	Quercus robur (Common Oak)	15-10	4x4	220 240 240	500	N	G	M	L	M	E	4.9	2.5	Trunk of tree located within the footprint of the permanent Platform 2 and the platform security fence.	Remove

TO SYDNEY

TO BANKSTOWN

LEGEND

- RAILCORP PROPERTY BOUNDARY
- EXISTING TREES TO BE PROTECTED AND RETAINED
- EXISTING TREES TO BE REMOVED
- EXISTING HOOP FENCE TO BE REMOVED
- EXISTING SECURITY FENCE TO BE REMOVED
- WORKS TO BE DEMOLISHED
- W — WATER
- T — TELSTRA
- 202 — LOW PRESSURE GAS MAIN
- 106 — HV CABLE
- E — ELECTRIC

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 231.
- REFER TO ARBORIST'S ARBORICULTUAL IMPACT ASSESSMENT REPORT FOR TREE PROTECTION WORKS.

THE BOULEVARDE

THE BOULEVARDE

ADJOINS DRAWING SMCSWSWM-MTM-WWP-LA-DWG-231703

PLATFORM 2

Tree 1 to be removed due to direct clash with permanent platform 2 footprint and security fencing along edge of platform.

EXISTING SIGNAL BUILDING

REMOVE EXISTING HOOP STYLE FENCE

REMOVE EXISTING TREES.
REFER TO ARBORIST'S REPORT

REMOVE EXISTING TREES

REMOVE EXISTING VEGETATION AND TOPSOIL. REFER TO SOIL REPORT FOR TREATMENT OF TOPSOIL AT WILEY PARK.

ARADE

REPLACE EXISTING CONCRETE CHANNEL WITH NEW ALIGNMENT REFER TO ENGINEER PACKAGE

REMOVE EXISTING SECURITY FENCE

REMOVE EXISTING TREES

REMOVE EXISTING VEGETATION AND TOPSOIL. REFER TO SOIL REPORT FOR TREATMENT OF TOPSOIL AT WILEY PARK.

CORNELIA STREET

DRAWING COLOUR CODED - PRINT ALL COPIES IN COLOUR

FOR CONSTRUCTION

REV.	BY	DATE	DESCRIPTION	APPD.
00	ME	31/03/2021	APPROVED FOR CONSTRUCTION	LP

SCALES

CLIENT

NSW GOVERNMENT | sydney METRO

SERVICE PROVIDERS

METRON T2M

DRAWN	D.LEE	31/03/2021
DESIGNED	M. ENOCH	31/03/2021
DRG CHECK	M. ENOCH	31/03/2021
DESIGN CHECK	G. DAVIES	31/03/2021
APPROVED	L. PALMER	31/03/2021

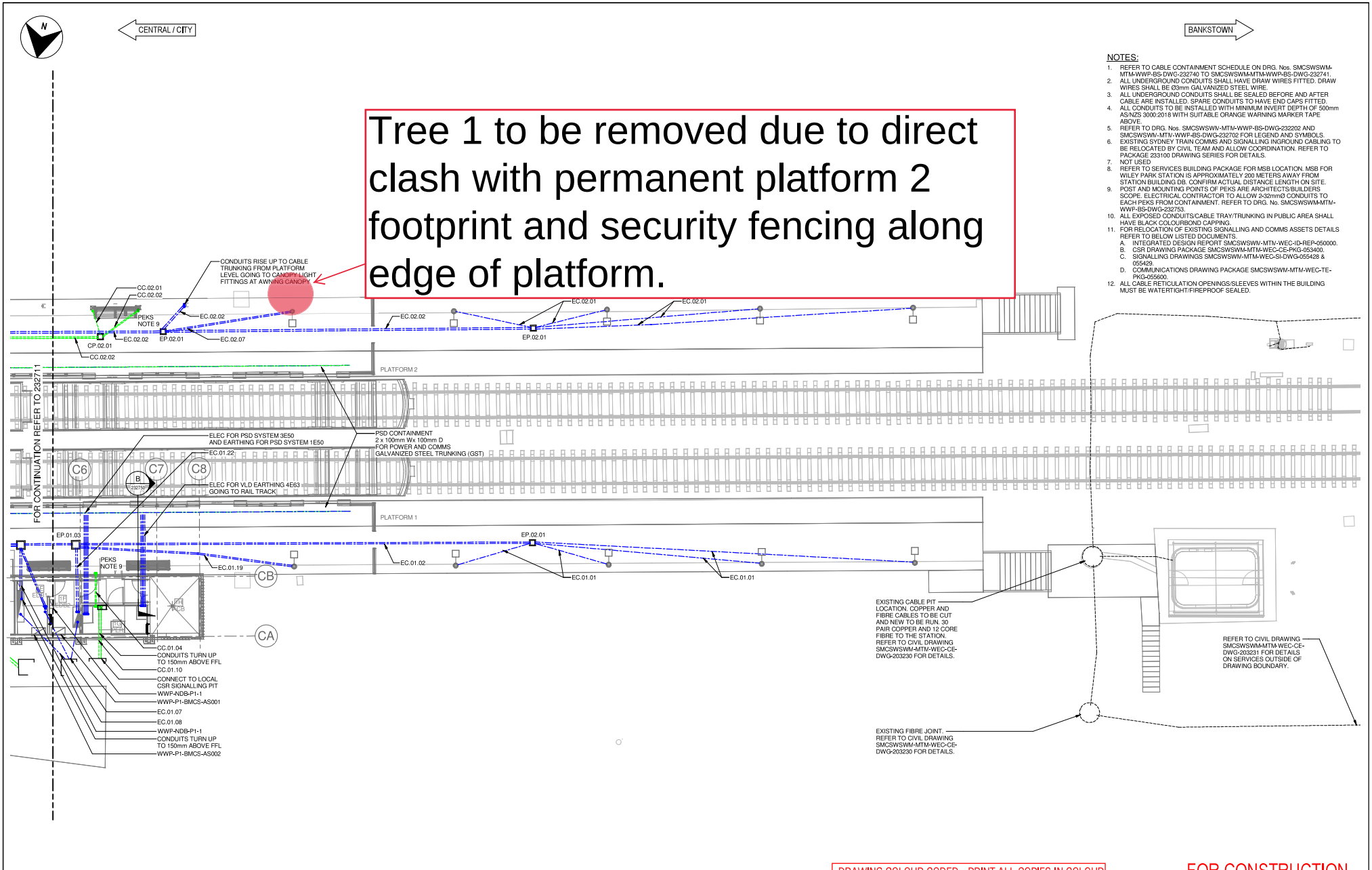
SYDNEY METRO

WILEY PARK (15.846km to 16.211km)
LANDSCAPE DESIGN
DEMOLITION PLAN
STANLEA PARADE

STATUS: FOR CONSTRUCTION APPROVAL | SHEET 5 of 25 | ©

DRG No. SMCSWSWM-MTM-WWP-LA-DWG-231704 | REV. 00

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-WWP-LA-DWG-231704 P01



NOTES:

1. REFER TO CABLE CONTAINMENT SCHEDULE ON DRG. Nos. SMCSWSWM-MTM-WWP-BS-DWG-232740 TO SMCSWSWM-MTM-WWP-BS-DWG-232741.
2. ALL UNDERGROUND CONDUITS SHALL HAVE DRAW WIRES FITTED. DRAW WIRES SHALL BE Ø3mm GALVANIZED STEEL WIRE.
3. ALL UNDERGROUND CONDUITS SHALL BE SEALED BEFORE AND AFTER CABLE ARE INSTALLED. SPARE CONDUITS TO HAVE END CAPS FITTED.
4. ALL CONDUITS TO BE INSTALLED WITH MINIMUM INVERT. DEPTH OF 500mm AS/NZS 3000:2018 WITH SUITABLE ORANGE WARNING MARKER TAPE ABOVE.
5. REFER TO DRG. Nos. SMCSWSWM-MTM-WWP-BS-DWG-232202 AND SMCSWSWM-MTM-WWP-BS-DWG-232702 FOR LEGEND AND SYMBOLS.
6. EXISTING SYDNEY TRAIN COMMS AND SIGNALLING INGROUND CABLING TO BE RELOCATED BY CIVIL TEAM AND ALLOW COORDINATION. REFER TO PACKAGE 233100 DRAWING SERIES FOR DETAILS.
7. NOT USED
8. REFER TO SERVICES BUILDING PACKAGE FOR MSB LOCATION. MSB FOR WILEY PARK STATION IS APPROXIMATELY 200 METERS AWAY FROM STATION BUILDING DB. CONFIRM ACTUAL DISTANCE LENGTH ON SITE.
9. POST AND MOUNTING POINTS OF PEKS ARE ARCHITECTS/BUILDERS SCOPE. ELECTRICAL CONTRACTOR TO ALLOW 2-32mmØ CONDUITS TO EACH PEKS FROM CONTAINMENT. REFER TO DRG. No. SMCSWSWM-MTM-WWP-BS-DWG-232753.
10. ALL EXPOSED CONDUITS/CABLE TRAY/TRUNKING IN PUBLIC AREA SHALL HAVE BLACK COLOURBOND CAPPING.
11. FOR RELOCATION OF EXISTING SIGNALLING AND COMMS ASSETS DETAILS REFER TO BELOW LISTED DOCUMENTS.
    A. INTEGRATED DESIGN REPORT SMCSWSWM-MTM-WEC-ID-REP-050000.
    B. CSR DRAWING PACKAGE SMCSWSWM-MTM-WEC-CE-PKG-053400.
    C. SIGNALLING DRAWINGS SMCSWSWM-MTM-WEC-SI-DWG-055428 & 055429.
    D. COMMUNICATIONS DRAWING PACKAGE SMCSWSWM-MTM-WEC-TE-PKG-055600.
12. ALL CABLE RETICULATION OPENINGS/SLEEVES WITHIN THE BUILDING MUST BE WATERTIGHT/FIREPROOF SEALED.

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FOR CONSTRUCTION

REV.	BY	DATE	DESCRIPTION	APPD.
00	AC / CA	31/03/2021	APPROVED FOR CONSTRUCTION	LP

1:100 FULL SIZE A1

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-WWP-BS-DWG-232712 P01

CLIENT

SERVICE PROVIDERS

METRON T2M

DRAWN R.DEBIQUITO
DESIGNED A.CHIKKA / C.ASIS
DRG CHECK C. ROSENBERG
DESIGN CHECK R.PATHAK
APPROVED L. PALMER 31/03/2021

SYDNEY METRO

WILEY PARK (15.846km to 16.21km SYDNEY METRO KILOMETRAGE)
CABLE CONTAINMENT
STATION PLATFORM LAYOUT PLAN 3 - INGROUND

STATUS: FOR CONSTRUCTION | SHEET 3 OF 3 | ©

DRG No. SMCSWSWM-MTM-WWP-BS-DWG-232712 | REV. 00

100mm AT FULL SIZE Plot Date & Time 3/29/2021 1:09:35 PM

APPENDIX 4.3 CCBC APPROAVL FOR TREE REMOVAL AT WILEY PARK

APPROVAL FOR TREE REMOVAL AND TREE PRUNING

Date: 14 May 2021
Location: Urunga Parade, Wiley Park Station
Contractor: Downer

Approval for the removal of the three (3) council street trees identified in the Aboricultural Impact Assessment to facilitate the works required for the Sydney Metro project at the above location is approved subject to the following conditions:

Any tress 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.

Wayne Broomfield
Team Leader Open Space Services

APPENDIX 5 HURLSTONE PARK AIA (URBAN ARBOR)

URBAN ARBOR
The Trusted Name in Tree Management

URBAN ARBOR
The Trusted Name in Tree Management

Arboricultural Impact Assessment Report

Site location:
South West Metro
Hurlstone Park Station
Hurlstone Park NSW

Prepared for:
Metron T2M

Prepared by: Jack Williams and Bryce Claassens
Urban Arbor Pty Ltd
Date: 11 December 2019
Ref: 19/12/11/SWMMS

URBAN ARBOR
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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) Landscape Design Package No. 131, Metron T2M, SMCSWSWM-MTM-WMS-LA-PKG-131000, 30 September 2019, Including:

SMCSWSWM-MTM-WHP-LA-DWG-131700	B	LANDSCAPE DESIGN - COVER SHEET AND DRAWING LIST - SHEET 1 of 15
SMCSWSWM-MTM-WHP-LA-DWG-131701	B	LANDSCAPE DESIGN - NOTES PAGE & LEGEND - SHEET 2 of 15
SMCSWSWM-MTM-WHP-LA-DWG-131702	A	LANDSCAPE DESIGN - DEMOLITION PLAN - SHEET 1 - SHEET 3 of 15
SMCSWSWM-MTM-WHP-LA-DWG-131703	A	LANDSCAPE DESIGN - DEMOLITION PLAN - SHEET 2 - SHEET 4 of 15
SMCSWSWM-MTM-WHP-LA-DWG-131704	A	LANDSCAPE DESIGN - DEMOLITION PLAN - SHEET 3 - SHEET 5 of 15
SMCSWSWM-MTM-WHP-LA-DWG-131710	B	LANDSCAPE DESIGN - GENERAL - PRECINCT PLAN - SHEET 6 of 15
SMCSWSWM-MTM-WHP-LA-DWG-131720	B	LANDSCAPE DESIGN - PRECINCT PLAN - SHEET 1 - SHEET 7 of 15
SMCSWSWM-MTM-WHP-LA-DWG-131721	B	LANDSCAPE DESIGN - PRECINCT PLAN - SHEET 2 - SHEET 8 of 15
SMCSWSWM-MTM-WHP-LA-DWG-131722	A	LANDSCAPE DESIGN - PRECINCT PLAN - SHEET 3 - SHEET 9 of 15
SMCSWSWM-MTM-WHP-LA-DWG-131730	A	LANDSCAPE DESIGN - PAVING PLAN - FLOSS STREET - SHEET 10 of 15
SMCSWSWM-MTM-WHP-LA-DWG-131740	A	LANDSCAPE DESIGN - PLANTING PLAN - PLATFORM 2 - SHEET 11 of 15
SMCSWSWM-MTM-WHP-LA-DWG-131760	A	LANDSCAPE DESIGN - TYPICAL DETAILS - SHEET 1 - SHEET 12 of 15
SMCSWSWM-MTM-WHP-LA-DWG-131761	A	LANDSCAPE DESIGN - TYPICAL SECTIONS - SHEET 13 of 15
SMCSWSWM-MTM-WHP-LA-DWG-131770	B	LANDSCAPE DESIGN - PLANTING SCHEDULE - SHEET 14 of 15
SMCSWSWM-MTM-WHP-LA-DWG-131771	B	LANDSCAPE DESIGN - MATERIAL SCHEDULE - SHEET 15 of 15

1.3 The trees were inspected on 5 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.

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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.

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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.

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[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).

URBAN ARBOR
The Trusted Name in Tree Management

5. SITE LOCATION AND BRIEF DESCRIPTION

5.1 The site is located in the suburb of Hurlstone Park, New South Wales, which is located in the Canterbury Bankstown Local Government Area (LGA). All trees within the Canterbury Bankstown LGA are subject to protection under the Canterbury Local Environmental Plan (LEP) 2012[5] and Development Control Plan (DCP) 2012.[6] The site is identified as a heritage item (I124) 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 x 50) $^{0.42}$ x 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 11 December 2019.

6 *Canterbury Development Control Plan 2012*, https://www.cbcity.nsw.gov.au/development/planning-control-policies/canterbury-development-control-plan-2012, accessed 11 December 2019.

7 *Canterbury Local Environmental Plan Heritage Map - Sheet HER_009*, https://www.legislation.nsw.gov.au/maps/97a9d84a-cdcf-cf29-ae35-e3dc43c6dc7f/1550_COM_HER_009_010_20121105.pdf, 11 December 2019.

URBAN ARBOR
The Trusted Name in Tree Management

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.

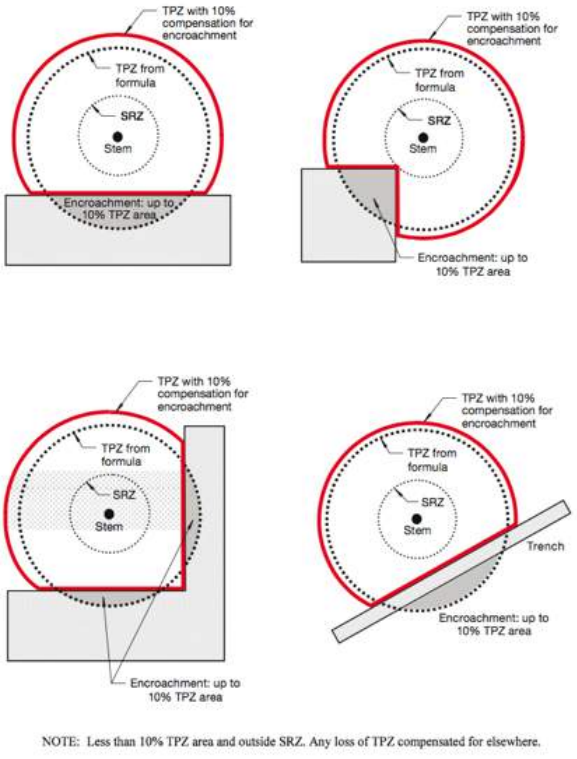

Image 1: Example minor TPZ encroachment from AS4970-2009.

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).

URBAN ARBOR
The Trusted Name in Tree Management

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 has been included in appendix 1, where the indicative TPZ and SRZ of the trees have been overlaid onto the received plan provided by the client. The following plan is included in appendix 1;

- Appendix 1A: Proposed Site Plan East
- Appendix 1B: Proposed Site Plan West

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
166	*Morus nigra*	Z3	2.0	12.6	1.5	Footprint	The trunk is within the footprint of a proposed service building area.	Remove
167	*Morus nigra*	Z3	2.0	12.6	1.7	Footprint	The trunk is within the footprint of a proposed service building area.	Remove
168	*Ligustrum lucidum*	Z3	2.4	18.1	1.8	Minor	The proposed access road encroaches into the TPZ by less than 5%, which is minor TPZ encroachment and will not impact the tree.	Retain and protect
169	*Ficus elastica*	Z1	2.0	12.6	1.6	Minor	The proposed access road encroaches into the TPZ by less than 5%, which is minor TPZ encroachment and will not impact the tree.	Retain and protect
170	*Ilex spp*	Z1	2.0	12.6	1.5	Minor	The proposed access road encroaches into the TPZ by less than 5%, which is minor TPZ encroachment and will not impact the tree.	Retain and protect
G3	*Ailanthus altissima*	Z3	2.0	12.6	1.5	Footprint	The trunk is within the footprint of a proposed service building area.	Remove
171	*Cinnamomum camphora*	A1	13.2	547.4	3.7	Footprint	The trunk is within the footprint of a proposed service building area.	Remove
G4	*Acmena smithii var. minor*	A1	2.2	14.7	1.6	Minor	The proposed access road encroaches into the TPZ of the trees within the group by less than 10%, which is minor TPZ encroachment and will not impact the tree.	Retain and protect
172	*Ligustrum lucidum*	Z3	2.0	12.6	1.5	Footprint	The trunk is within the footprint of a proposed service building area.	Remove
173	*Ligustrum lucidum*	Z3	2.0	12.6	1.5	Footprint	The trunk is within the footprint of a proposed service building area.	Remove
174	*Celtis sinensis*	Z3	2.0	12.6	1.5	Major	A proposed retaining wall encroaches into the TPZ by more than 10% and into the SRZ, indicating that the stability of the tree will be impacted.	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
175	*Ligustrum lucidum*	Z3	2.4	17.6	1.8	Footprint	The trunk is within the footprint of a proposed service building area.	Remove
176	*Ligustrum lucidum*	Z3	2.0	12.6	1.5	Footprint	The trunk is within the footprint of a proposed service building area.	Remove
177	*Ailanthus altissima*	Z3	2.0	12.6	N/A	Footprint	The trunk is within the footprint of a proposed service building area.	Remove
178	*Ailanthus altissima*	Z3	2.0	12.6	N/A	Footprint	The trunk is within the footprint of a proposed service building area.	Remove
179	*Cinnamomum camphora*	Z3	2.0	12.6	N/A	Footprint	The trunk is within the footprint of a proposed service building area.	Remove
180	*Eucalyptus saligna*	A1	2.0	12.6	N/A	Footprint	The trunk is within the footprint of a proposed service building area.	Remove
181	*Ligustrum lucidum*	Z3	2.0	12.6	1.5	Major	A proposed retaining wall encroaches into the TPZ by more than 10% and into the SRZ, indicating that the stability of the tree will be impacted.	Remove
182	*Ligustrum lucidum*	Z3	2.0	12.6	1.6	Footprint	The trunk is within the footprint of a proposed service building area.	Remove
183	*Gleditsia triacanthos*	Z3	2.0	12.6	1.5	None	No encroachment into the TPZ.	Retain and protect
184	*Robinia pseudoacacia*	Z3	2.6	20.9	1.8	None	No encroachment into the TPZ.	Retain and protect
185	*Robinia pseudoacacia*	Z3	2.0	12.6	1.5	None	No encroachment into the TPZ.	Retain and protect
186	*Robinia pseudoacacia*	Z3	2.0	12.6	2.0	None	No encroachment into the TPZ.	Retain and protect
187	*Eucalyptus botryoides*	A1	2.0	12.6	2.8	None	No encroachment into the TPZ.	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
188	*Callistemon salignus*	A1	4.8	72.4	2.3	None	No encroachment into the TPZ.	Retain and protect
189	*Ligustrum lucidum*	Z3	2.0	12.6	1.6	None	No encroachment into the TPZ.	Retain and protect
190	*Robinia pseudoacacia*	Z3	2.0	12.6	1.6	None	No encroachment into the TPZ.	Retain and protect
191	*Gleditsia triacanthos*	Z3	2.0	12.6	1.5	None	No encroachment into the TPZ.	Retain and protect
192	*Robinia pseudoacacia*	Z3	2.0	13.1	1.6	None	No encroachment into the TPZ.	Retain and protect
193	*Robinia pseudoacacia*	Z3	2.1	13.4	1.7	None	No encroachment into the TPZ.	Retain and protect
194	*Cinnamomum camphora*	A1	15.0	706.9	3.7	Major	The proposed access road encroaches into the TPZ by 11% (75.2m^2) and significantly into the SRZ. If significant roots are severed within the SRZ area, the stability of the tree will potentially be impacted. There is an existing unsurfaced but compacted road within the footprint of the proposed access road. If the new access road is constructed on or above the soil grades of the existing road, the tree will not be impacted as there will be no root disturbance in the SRZ.	Retain and protect*
195	*Robinia pseudoacacia*	Z3	2.0	12.6	1.5	None	No encroachment into the TPZ.	Retain and protect
196	*Pittosporum undulatum*	A1	2.0	12.6	1.6	None	No encroachment into the TPZ.	Retain and protect
197	*Cinnamomum camphora*	Z3	2.9	25.6	2.7	None	No encroachment into the TPZ.	Retain and protect
198	*Jacaranda mimosifolia*	A1	5.9	109.5	2.5	None	No encroachment into the TPZ.	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
199	*Lophostemon confertus*	A1	6.1	117.7	2.6	None	No encroachment into the TPZ.	Retain and protect
591	*Morus nigra*	A1	2.8	23.9	1.9	None	No encroachment into the TPZ.	Retain and protect
592	*Ligustrum lucidum*	Z1	2.0	12.6	1.5	None	No encroachment into the TPZ.	Retain and protect
593	*Ficus elastica*	A1	3.0	28.3	2.0	None	No encroachment into the TPZ.	Retain and protect
594	*Ilex spp*	A1	4.2	55.4	2.2	None	No encroachment into the TPZ.	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
		A	Z
Trees to be removed	Building construction, new surfacing and/or proximity, or trees in poor condition.	171, 180 (Two trees)	166, 167, G3, 172, 173, 174, 175, 176, 177, 178, 179, 181, 182 (Twelve trees and one group)
Retained trees subject to TPZ encroachment greater than 10%	Removal of existing surfacing/structures and/or installation of new surfacing/structures.	194 (One tree)	None
Retained trees subject to TPZ encroachment of 10% or less	Removal of existing surfacing/structures and/or installation of new surfacing/structures.	187, 188, 196, 198, 199, 591, 593, 594, G4 (Eight trees and one group)	168, 169, 170, 183, 184, 185, 186, 189, 190, 191, 192, 193, 195, 197, 592 (Fifteen trees)

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10. RECOMMENDATIONS

10.1 This report assesses the impact of a proposed development at the subject site to thirty-eight (38) trees and two groups of trees located within the site and adjoining sites, in accordance with AS4970 Protection of trees on development sites (2009).

10.2 A site plan has been included in appendix 1, where the indicative TPZ and SRZ of the trees have been overlaid onto the received plan provided by the client. The following plan is included in appendix 1;

- Appendix 1 - Proposed Site Plan

10.3 Fourteen (14) trees and one (1) group have been recommended for removal to accommodate the development works, including tree 166, 167, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182 and G3. Two trees to be removed are higher value category value trees, including tree 171 and 180. All other trees to be removed are lower value category Z retention value trees.

10.4 One (1) tree will be subject to a TPZ encroachment greater than 10% from the proposed access road, including tree to 194. The tree can be retained in a viable condition if the access road is constructed on or above the grades of the existing access road.

10.5 The remaining twenty-three (23) 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 168, 169, 170, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 195, 196, 197, 198, 199, 591, 592, 593, 594 and G4.

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 No services plan has been assessed in this report. 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.

10.9 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.

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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
168	*Ligustrum lucidum*	2.4	1.8	Retain and protect. Protective fencing should be installed to create a combined TPZ exclusion zone for tree 168, 169 and 170. The fencing should be aligned as close to the proposed access road as practical or at the extent of the TPZ of each tree within the site. TPZ signage on fencing. Mulch in TPZ area.
169	*Ficus elastica*	2.0	1.6	Retain and protect. See tree protection for tree 168.
170	*Ilex spp*	2.0	1.5	Retain and protect. See tree protection for tree 168.
G4	*Acmena smithii var. minor*	2.2	1.6	Retain and protect. Protective fencing should be aligned as close to the proposed access road as practical or at the extent of the TPZ of each tree within the site. TPZ signage on fencing. Mulch in TPZ area.

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183	*Gleditsia triacanthos*	2	1.5	Retain and protect. Protective fencing should be installed to create a combined TPZ exclusion zone for tree 183, 184, 185, 186, 189, 190, 191, 192, 193, 194, 195, 196, 197 and 198. The fencing should be aligned as close to the proposed access road as practical or at the extent of the TPZ of each tree within the site. TPZ signage on fencing. Mulch in TPZ area.
184	*Robinia pseudoacacia*	2.6	1.8	Retain and protect. See tree protection for tree 183.
185	*Robinia pseudoacacia*	2	1.5	Retain and protect. See tree protection for tree 183.
186	*Robinia pseudoacacia*	2	2	Retain and protect. See tree protection for tree 183.
187	*Eucalyptus botryoides*	2	2.8	Retain and protect. Protective fencing should be installed to create a combined TPZ exclusion zone for tree 187 and 188. The fencing should be aligned as close to the proposed access road as practical or at the extent of the TPZ of each tree within the site. TPZ signage on fencing. Mulch in TPZ area.
188	*Callistemon salignus*	4.8	2.3	Retain and protect. See tree protection for tree 187.
189	*Ligustrum lucidum*	2	1.6	Retain and protect. See tree protection for tree 183.
190	*Robinia pseudoacacia*	2	1.6	Retain and protect. See tree protection for tree 183.
191	*Gleditsia triacanthos*	2	1.5	Retain and protect. See tree protection for tree 183.
192	*Robinia pseudoacacia*	2	1.6	Retain and protect. See tree protection for tree 183.
193	*Robinia pseudoacacia*	2.1	1.7	Retain and protect. See tree protection for tree 183.
194	*Cinnamomum camphora*	15.6	3.7	Retain and protect. See tree protection for tree 183.
195	*Robinia pseudoacacia*	2	1.5	Retain and protect. See tree protection for tree 183.
196	*Pittosporum undulatum*	2	1.6	Retain and protect. See tree protection for tree 183.
197	*Cinnamomum camphora*	2.9	2.7	Retain and protect. See tree protection for tree 183.
198	*Jacaranda mimosifolia*	5.9	2.5	Retain and protect. See tree protection for tree 183.
199	*Lophostemon confertus*	6.1	2.6	Retain. No tree protection required.
591	*Morus nigra*	2.8	1.9	Retain and protect. Protective fencing should be aligned at the extent of the TPZ or as close to the existing paving as practical. TPZ signage on fencing. Mulch in TPZ area.
592	*Ligustrum lucidum*	2	1.5	Retain and protect. Protective fencing should be aligned at the extent of the TPZ or as close to the existing paving as practical. TPZ signage on fencing. Mulch in TPZ area.

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593	*Ficus elastica*	3	2	Retain and protect. Protective fencing should be installed to create a combined TPZ exclusion zone for tree 593 and 594. The fencing should be aligned as close to the existing structures as practical or at the extent of the TPZ of each tree within the site. TPZ signage on fencing. Mulch in TPZ area.
594	*Ilex spp*	4.2	2.2	Retain and protect. See tree protection for tree 593.

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 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 in 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.

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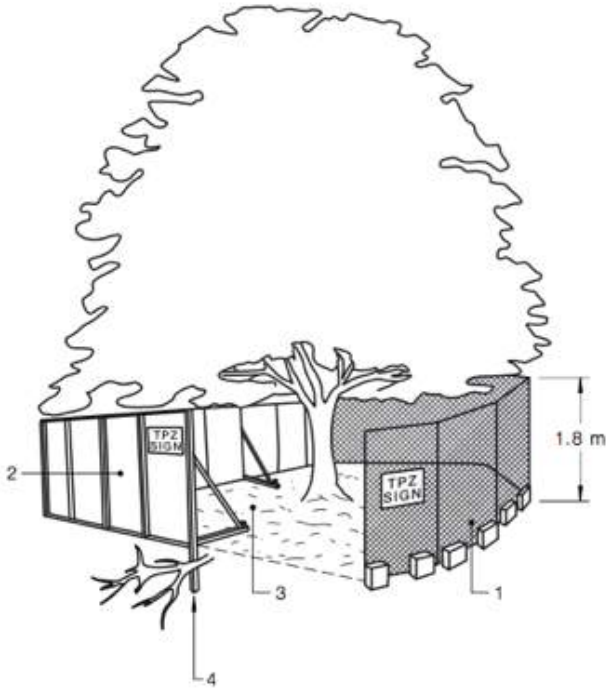
11.6.4 Mulch: Any areas of the TPZ located inside the subject site (only trees to be retained directly adjacent to site works must be mulched to a depth of 75mm with good quality composted wood chip/leaf mulch.

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.

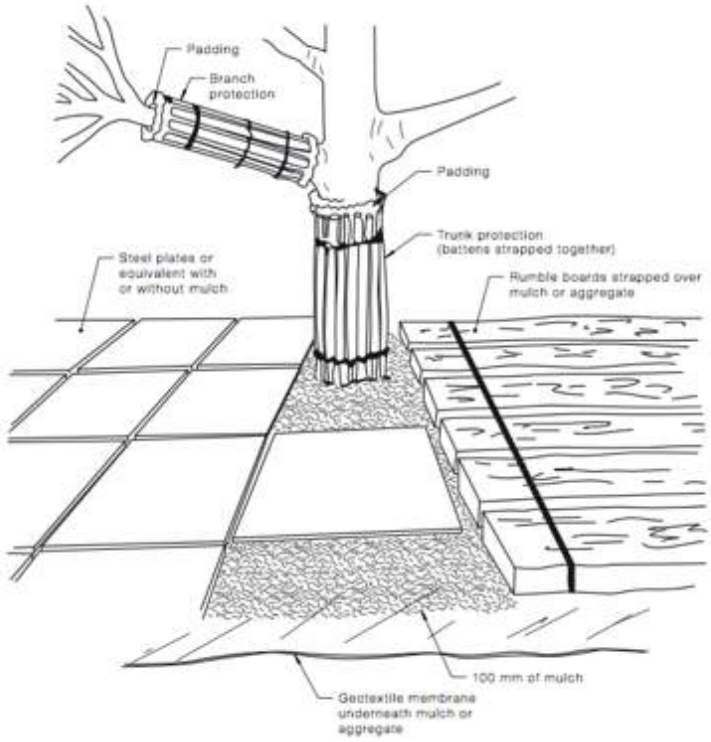
11.6.6 Temporary irrigation: Temporary irrigation should be set up in the TPZ of all trees to be retained, and should distribute water evenly throughout the area of the TPZ. The irrigation should be used for at minimum one hour daily throughout all stages of the development.



LEGEND:
1 Chain wire mesh panels with shade cloth (if required) attached, held in place with concrete feet.
2 Alternative plywood or wooden paling fence panels. This fencing material also prevents building materials or soil entering the TPZ.
3 Mulch installation across surface of TPZ (at the discretion of the project arborist). No excavation, construction activity, grade changes, surface treatment or storage of materials of any kind is permitted within the TPZ.
4 Bracing is permissible within the TPZ. Installation of supports should avoid damaging roots.

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.



NOTES:

1 For trunk and branch protection use boards and padding that will prevent damage to bark. Boards are to be strapped to trees, not nailed or screwed.

2 Rumble boards should be of a suitable thickness to prevent soil compaction and root damage.

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.

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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.

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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 principle 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 East
Appendix 1B: Proposed Site Plan West
Appendix 2 - Tree Inspection Schedule
Appendix 3 - Further information of methodology

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TO SYDNEY

TO BANKSTOWN

FLOSS STREET

DUNTROON STREET

CRINAN STREET

ST-1

900

PROPOSED PRAM RAMP REFER TO CIVIL ENGINEER'S DOCUMENTATION

PROPOSED KISS & RIDE, TAXI STAND AND ACCESSIBLE PARKING REFER TO ENGINEER'S PACKAGE FOR LINEMARKING, SETOUT AND LEVEL INFORMATION

REFUGE ISLAND REFER TO CIVIL ENGINEER'S DOCUMENTATION

EXTENDED PRAM RAMP REFER TO CIVIL ENGINEER'S DOCUMENTATION

EXISTING GARBAGE AREA TO BE RETAINED

EXISTING BUS SHELTER TO BE RETAINED

EXISTING PEDESTRIAN CROSSING TO BE RETAINED

EXISTING PEDESTRIAN FENCE TO BE REPAIRED AND PAINTED GREEN TO MATCH EXISTING COLOUR

EXISTING EUCALYPTUS TREE AND PLANTING TO BE RETAINED

METRO SIGN LOCATION TO ARCHITECTS DETAILS

BIKE RACK X 2

RELOCATED EXISTING BIN

RELOCATED INTERPRETIVE PANEL

NEW / UPGRADE PAVING REFER TO PAVING PLAN 131730

STATION BUILDING ROOF LINE

BR-1 X 5

EXISTING TGSIS AT BUS STOP TO BE RETAINED

EXISTING BUS STOP SIGN TO BE RETAINED

591

592

593

594

EXISTING TREES ON EMBANKMENT TO BE RETAINED

PLATFORM 2

PLATFORM 1

PLATFORM BUILDING 2 REFER ARCHITECT'S PACKAGE

PLATFORM BUILDING 1 REFER ARCHITECT'S PACKAGE

THROW SCREEN - REFER TO ARCHITECTURAL PACKAGE

EXISTING FLOSS ST CARPARK

ADJOINS DRAWING SMCSWSWM-MTM-WHP-LA-DWG-131721

LEGEND

EXISTING

- RAILCORP PROPERTY BOUNDARY
- EXISTING TREES TO BE RETAINED
- EXISTING PLANTING TO BE RETAINED

PROPOSED

FENCE/WALLS

- EXISTING PEDESTRIAN FENCE TO BE REPAIRED AND PAINTED
- 2.4m CLOSE SPACED WELDED MESH FENCE REFER TO FENCING PACKAGE
- 2.4m PALISADE FENCE REFER TO FENCING PACKAGE
- 1.7m HIGH STEEL FLAT BAR FENCE REFER TO ARCHITECT'S DETAILS
- SEGREGATION FENCE REFER TO FENCING PACKAGE

PLANTING

- PROPOSED TREES
- MASS PLANTING

PAVING

- NEW PAVING TO MATCH EXISTING REFER TO PAVING PLAN 131730
- TGSIS REFER TO ARCHITECTURAL PACKAGE

FURNITURE

- ST-1 - AS SPECIFIED

NOTES:

- REFER TO CIVIL DESIGN PACKAGE FOR ALL FOOTPATH LEVELS
- REFER TO FENCING PACKAGE FOR ALL FENCING SET OUT AND LOCATIONS
- REFER TO UTILITIES PACKAGE FOR ALL SERVICES LAYOUTS
- REFER TO ARCHITECTURAL PACKAGE FOR ALL STATION CONCOURSE, BUILDING, PLATFORM WORKS AND THROW SCREEN
- REFER TO LIGHTING PACKAGE FOR ALL ELECTRICAL AND LIGHTING LAYOUTS

Map Legend

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

0 30m

Urban Arbor Pty Ltd

PO Box 450 Turramurra NSW 2074

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Site Location: Hulrstone Park Station
Hurlstone Park NSW

SCALE :	DATE :
1 : 200 @ A1	12/12/2019

URBAN ARBOR
The Trusted Name in Tree Management

Appendix 1A - Proposed Site Plan East

Prepared by: Jack Williams, Urban Arbor Pty Ltd

TO SYDNEY

TO BANKSTOWN

RAILWAY STREET

PROPOSED GATE TO CORRIDOR - REFER TO ENGINEER'S PACKAGE

NEW SERVICE ACCESS REFER TO ENGINEER'S PACKAGE FOR DETAILS, SETOUTS AND LEVELS

NEW SERVICE BUILDING REFER TO ENGINEER'S DRAWING FOR SET OUT AND DETAILS

RETAINING WALL REFER TO ENGINEER'S DRAWING

WM-MTM-WHP-LA-DWG-131721

LEGEND

EXISTING

- RAILCORP PROPERTY BOUNDARY
- EXISTING TREES TO BE RETAINED
- EXISTING PLANTING TO BE RETAINED

PROPOSED

FENCE/WALLS

- EXISTING PEDESTRIAN FENCE TO BE REPAIRED AND PAINTED
- 2.4m CLOSE SPACED WELDED MESH FENCE REFER TO FENCING PACKAGE
- 2.4m PALISADE FENCE REFER TO FENCING PACKAGE
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- SEGREGATION FENCE REFER TO FENCING PACKAGE

PLANTING

- PROPOSED TREES
- MASS PLANTING

PAVING

- NEW PAVING TO MATCH EXISTING REFER TO PAVING PLAN 131730
- TGSIS REFER TO ARCHITECTURAL PACKAGE

FURNITURE

- ST-1 - AS SPECIFIED

NOTES:
- REFER TO CIVIL DESIGN PACKAGE FOR ALL FOOTPATH LEVELS
- REFER TO FENCING PACKAGE FOR ALL FENCING SET OUT AND LOCATIONS
- REFER TO UTILITIES PACKAGE FOR ALL SERVICES LAYOUTS
- REFER TO ARCHITECTURAL PACKAGE FOR ALL STATION CONCOURSE, BUILDING, PLATFORM WORKS AND THROW SCREEN
- REFER TO LIGHTING PACKAGE FOR ALL ELECTRICAL AND LIGHTING LAYOUTS

Map Legend

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

0 30m

Urban Arbor Pty Ltd

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Site Location: Hulrstone Park Station
Hurlstone Park NSW

SCALE :	DATE :
1 : 200 @ A1	12/12/2019

URBAN ARBOR
The Trusted Name in Tree Management

Appendix 1B - Proposed Site Plan West

Prepared by: Jack Williams, Urban Arbor Pty Ltd

NOT FOR CONSTRUCTION

Appendix 2 - Tree Inspection Schedule

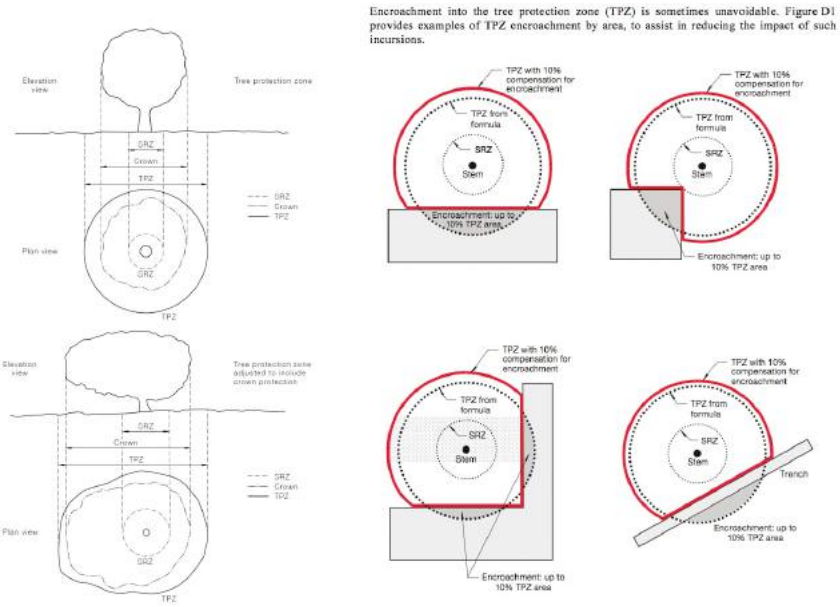
Tree ID	Common Name	Botanical Name	Age Class	Height (m)	Canopy Spread Radius (m)	Stem 1	Stem 2	Stem 3	Stem 4	Stem 5	DBH (mm)	DAB (mm)	Health	Structure	Amenity Value	SULE	Retention Value	TPZ Radius (m)	SRZ Radius (m)	Notes
166	Common or Black Mulberry	*Morus nigra*	Young	4	2	90					90	100	Good	Fair	Low	5. Small/ Young	Z3	2.0	1.5	Located within corridor. Exempt species.
167	Common or Black Mulberry	*Morus nigra*	Semi-mature	7	2	160					160	200	Good	Good	Low	5. Small/ Young	Z3	2.0	1.7	Located within corridor. Exempt species.
168	Broad Leaved Privet	*Ligustrum lucidum*	Mature	7	2	200					200	220	Good	Fair	Low	2. Medium	Z3	2.4	1.8	Canopy extends into corridor. Exempt species.
169	Rubber Tree	*Ficus elastica*	Semi-mature	6	2	150					150	180	Good	Fair	Low	5. Small/ Young	Z1	2.0	1.6	Canopy extends into corridor.
170	Holly	*Ilex spp*	Mature	5	2	150					150	160	Good	Good	Low	5. Small/ Young	Z1	2.0	1.5	Canopy extends slightly into corridor.
G3	Tree of Heaven	*Ailanthus altissima*	Mature	8	1.5	100					100	120	Fair	Fair	Low	3. Short	Z3	2.0	1.5	Located within corridor. Group of trees in decline. Exempt species. Approximately 6 trees.
171	Camphor Laurel	*Cinnamomum camphora*	Mature	17	7	1100					1100	1300	Good	Good	Medium	1. Long	A1	13.2	3.7	Located within corridor.
G4	Dwarf Lilly Pilly	*Acmena smithii var. minor*	Semi-mature	8	2	180					180	190	Good	Good	Medium	1. Long	A1	2.2	1.6	Canopy extends into corridor. Group of acmena smithii var minor. Approximately 7 trees.
172	Broad Leaved Privet	*Ligustrum lucidum*	Semi-mature	5	1	100					100	120	Good	Fair	Very Low	5. Small/ Young	Z3	2.0	1.5	Located within corridor. Exempt species.
173	Broad Leaved Privet	*Ligustrum lucidum*	Young	4	1	90					90	100	Good	Fair	Very Low	5. Small/ Young	Z3	2.0	1.5	Located within corridor. Exempt species.
174	Chinese Hackberry	*Celtis sinensis*	Semi-mature	4	1	100					100	120	Good	Good	Very Low	5. Small/ Young	Z3	2.0	1.5	Located within corridor. Exempt species.
175	Broad Leaved Privet	*Ligustrum lucidum*	Semi-mature	5	2	100	110	130			197	250	Good	Fair	Very Low	5. Small/ Young	Z3	2.4	1.8	Located within corridor. Exempt species.
176	Broad Leaved Privet	*Ligustrum lucidum*	Young	5	1	100					100	110	Good	Good	Very Low	5. Small/ Young	Z3	2.0	1.5	Located within corridor. Exempt species.
177	Tree of Heaven	*Ailanthus altissima*	Semi-mature	5	2	90	120				150	160	Fair	Fair	Very Low	3. Short	Z3	2.0	N/A	Located within corridor. Exempt species with low foliage dens for species and apical dieback.
178	Tree of Heaven	*Ailanthus altissima*	Semi-mature	6	1	100	110				149	200	Fair	Fair	Very Low	3. Short	Z3	2.0	N/A	Located within corridor. Exempt species in decline.
179	Camphor Laurel	*Cinnamomum camphora*	Semi-mature	8	2	200					200	210	Good	Fair	Low	2. Medium	Z3	2.0	N/A	Located within corridor. Exempt species.
180	Sydney Blue Gum	*Eucalyptus saligna*	Mature	22	6	550					550	600	Good	Fair	High	1. Long	A1	2.0	N/A	Located within corridor. Asymmetric crown shape due to pow line clearance.
181	Broad Leaved Privet	*Ligustrum lucidum*	Semi-mature	6	2	110					110	120	Good	Fair	Very Low	5. Small/ Young	Z3	2.0	1.5	Located within corridor. Exempt species.
182	Broad Leaved Privet	*Ligustrum lucidum*	Semi-mature	5	1	110	100				149	180	Good	Fair	Very Low	5. Small/ Young	Z3	2.0	1.6	Located within corridor. Exempt species.

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
183	Honey Locust	*Gleditsia triacanthos*	Young	5	1	100					100	110	Good	Fair	Very Low	5. Small/ Young	Z3	2.0	1.5	Located within corridor. Exempt species.
184	Robinia	*Robinia pseudoacacia*	Mature	9	2.5	190	100				215	240	Good	Fair	Very Low	2. Medium	Z3	2.6	1.8	Located within corridor. Exempt species.
185	Robinia	*Robinia pseudoacacia*	Semi-mature	8	2	140					140	160	Good	Fair	Very Low	5. Small/ Young	Z3	2.0	1.5	Located within corridor. Exempt species.
186	Robinia	*Robinia pseudoacacia*	Mature	7	2.5	210					210	290	Good	Fair	Very Low	2. Medium	Z3	2.0	2.0	Located within corridor. Weed/vine species at base of trunk. Exempt species
187	Bangalay	*Eucalyptus botryoides*	Mature	20	6	640					640	700	Good	Good	High	2. Medium	A1	2.0	2.8	Canopy extends into corridor. DBH estimated.
188	Willow Bottlebrush	*Callistemon salignus*	Mature	10	4	400					400	440	Good	Good	High	1. Long	A1	4.8	2.3	Canopy extends into corridor. DBH estimated.
189	Broad Leaved Privet	*Ligustrum lucidum*	Semi-mature	5	2	150					150	180	Good	Fair	Very Low	5. Small/ Young	Z3	2.0	1.6	Located within corridor. Exempt species.
190	Robinia	*Robinia pseudoacacia*	Semi-mature	6	2	150					150	180	Good	Good	Very Low	2. Medium	Z3	2.0	1.6	Located within corridor. Exempt species.
191	Honey Locust	*Gleditsia triacanthos*	Young	8	1.5	50	100				112	150	Good	Fair	Very Low	5. Small/ Young	Z3	2.0	1.5	Located within corridor. Exempt species.
192	Robinia	*Robinia pseudoacacia*	Semi-mature	9	1.5	170					170	190	Good	Fair	Very Low	2. Medium	Z3	2.0	1.6	Located within corridor. Exempt species.
193	Robinia	*Robinia pseudoacacia*	Semi-mature	8	2	140	100				172	200	Good	Fair	Very Low	2. Medium	Z3	2.1	1.7	Located within corridor. Exempt species.
194	Camphor Laurel	*Cinnamomum camphora*	Mature	17	4	1300					1300	1300	Good	Fair	Medium	2. Medium	A1	15.6	3.7	Located within corridor. DBH measured at base.
195	Robinia	*Robinia pseudoacacia*	Semi-mature	6	1	100					100	120	Good	Fair	Very Low	5. Small/ Young	Z3	2.0	1.5	Located within corridor. Exempt species.
196	Sweet Pittosporum	*Pittosporum undulatum*	Semi-mature	6	1	150					150	180	Good	Good	Medium	1. Long	A1	2.0	1.6	Located within corridor.
197	Camphor Laurel	*Cinnamomum camphora*	Semi-mature	8	2	100	100	100	120	110	238	600	Good	Fair	Low	5. Small/ Young	Z3	2.9	2.7	Located within corridor. Exempt species. Multi stem tree.
198	Blue Jacaranda	*Jacaranda mimosifolia*	Mature	14	5	390	300				492	500	Good	Good	Medium	1. Long	A1	5.9	2.5	Canopy extends into corridor.
199	Queensland Brushbox	*Lophostemon confertus*	Mature	18	5	510					510	580	Good	Good	High	1. Long	A1	6.1	2.6	Upper canopy extends into corridor.
591	Red Flowering Gum	*Corymbia ficifolia*	Mature	5	3	230					230	280	Good	Good	Medium	1. Long	A1	2.8	1.9	None
592	Japanese Camellia	*Camellia japonica*	Young	2	0.5	40	40				57	80	Good	Good	Low	5. Small/ Young	Z1	2.0	1.5	None.
593	Weeping Bottlebrush	*Callistemon viminalis*	Mature	5	2.5	250					250	290	Good	Good	Medium	2. Medium	A1	3.0	2.0	Located on steep embankment.
594	Weeping Bottlebrush	*Callistemon viminalis*	Veteran	5	3	350					350	390	Good	Good	Medium	2. Medium	A1	4.2	2.2	Located on steep embankment.

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.
   SRZ radius = $(D \times 50)^{0.42} \times 0.64$ (D = 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.

Category	Example condition	Summary
Good	• 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.	• The tree is in above average health and condition and no remedial works are required.
Fair	• 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.	• The tree is in below average health and condition and may require remedial works to improve the trees health.
Poor	• The 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.	• The tree is displaying low levels of health and removal or remedial works may be required.
Dead	• The tree is dead or almost dead.	• The tree should generally be removed.

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

Category	Example condition	Summary
Good	• 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.	• The tree is considered structurally good with well developed form.
Fair	• The tree may have minor structural defects within the structure of the crown that could potentially develop into more significant defects. • The tree may 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.	• 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	• 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.	• 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 statuary 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, such as manual excavations or ground penetrating radar (GPR). 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
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.

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

Incorporating extracts from Lonsdale, D. 1999. Principles of Tree Hazard Assessment. Her Majesty's Stationary Office, London

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 bas 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

Incorporating extracts from Lonsdale, D. 1999. Principles of Tree Hazard Assessment. Her Majesty's Stationary Office, London

APPENDIX 6 HURLSTONE PARK AIA (PLATAEU TREES)

PLATEAUTREES
Safety. Quality. Progress.

Date: 17 March 2021

Revision: 10 May 2021

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

At the request of Downer Group an onsite inspection was undertake at Hurlstone Park Station. It has been asked to identify and record additional tree removals beyond those recommended within the Arboricultural Impact Assessment (AIA) was prepared by Urban Arbor, dated 11 December 2019, Ref19/12/11/SWMMS. On the 5 March a site walkthrough was undertaken by myself and representatives 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.

Based upon the information, rational and justification provided within the AIA Report I can confirm that trees G3, 166, 167, 171, 172, 173, 174, 175, 177, 178, 179, 180, 181 and 182 shall require removal to accommodate the proposed works. Reference should be made to the AIA report for respective tree data.

Additional tree removals were identified where there is a direct design clash and 100% encroachment into the TPZ and SRZ at the following locations:

- adjacent the southern side of the rail corridor along Floss Street
- adjacent the southern side of the rail corridor along Railway Street

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Additional tree removal adjacent Railway Street

Additional tree and vegetation removal adjacent Floss Street involves two Wattles, trees 1 and 2, located adjacent the bridge and woody vegetation along the rail embankment. Image 1 shows their location.

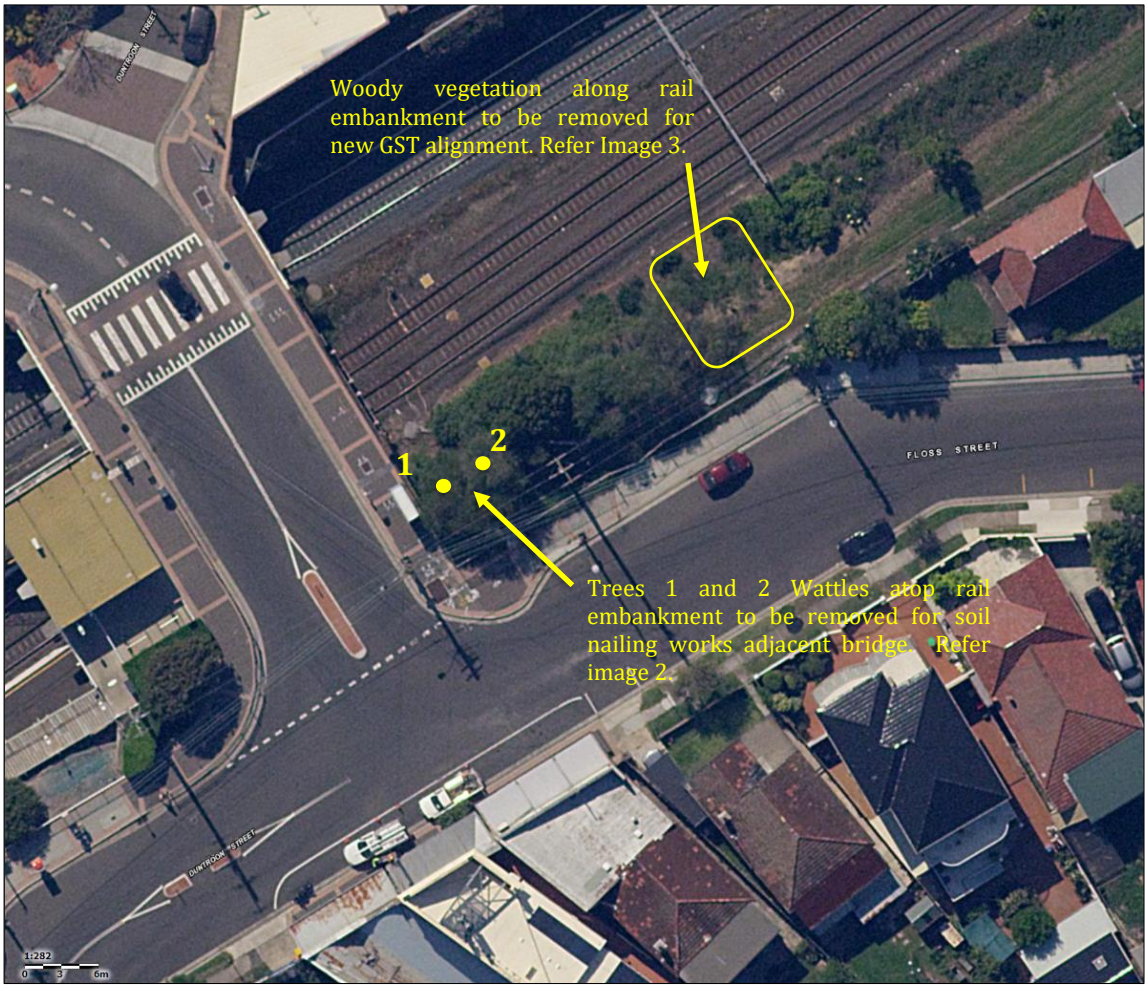


Image 1: Aerial image of Hurlstone Park Station adjacent Floss Street showing additional tree and vegetation removal. *(Source Six Maps accessed 10/03/2021)*.

The two Wattles were identified for removal to accommodate soil nailing works. Image 2 shows the subject trees. The trees were found to have a short useful life expectancy given their species type and medium landscape significance. The trees provide some screening from the rail corridor and its associated infrastructure.

Image 2: Trees 1 and 2, Wattles require removal to accommodate soil pinning works adjacent the bridge.

Woody vegetation located along the rail embankment was identified for removal to align the new GST. No access was gained to the rail corridor to assess the vegetation, but it has been confirmed in consultation with the project Ecologist to consist of; one Pittosporum undultaum (Sweet Pittosporum) tree 13, seven Acacia saligna (Golden Wreath Wattle) trees 47 to 53, one Grevillea sp (Grevillea), tree 54 and two Yucca sp (Yucca) trees 55 and 56. The vegetation is considered to have a short useful life expectancy and low landscape significance given its location within the rail corridor. Image 3 shows the approximate area to be cleared.

Image 3: Approximate area of woody vegetation along the rail embankment to be cleared to align the new GST.

Additional tree removal adjacent Railway Street

Additional tree removals were identified within the rail corridor associated with the construction of the Metro Services Building. A concrete pad is to be relocated from adjacent trees 166 and 167 to overlay the position of tree 194 *Cinnamomum camphora* (Camphor Laurel) requiring its removal. The tree has been identified for removal on demolition documentation viewed during the on-site inspection. Image 4 shows the tree.

Image 4: Tree 194 as identified within the AIA report shall require removal to accommodate the relocation of the concrete pad. Note the rail embankment to the rear of the tree has been cleared of woody vegetation.

Tree 198 *Jacaranda mimosifolia* (Jacaranda) and and 199 *Lophostemon confertus* (Brush Box) is a council owned street tree located within the road reserve area adjacent the rail corridor access gate. These trees are positioned within the footprint of the access road into the proposed Metro Services Building requiring their removal. Image 5 shows the trees. These trees have been identified for removal on demolition documentation viewed during the on-site inspection.

At the time of the inspection, it was found that a portion of the rail embankment had been cleared by others. Trees 181, 182, 183, 184, 185, 186, 189, 190, 191, 192, 193, 195, 196 and 197, as identified within the AIA report and have been removed by others as part of regular rail corridor clearing works.

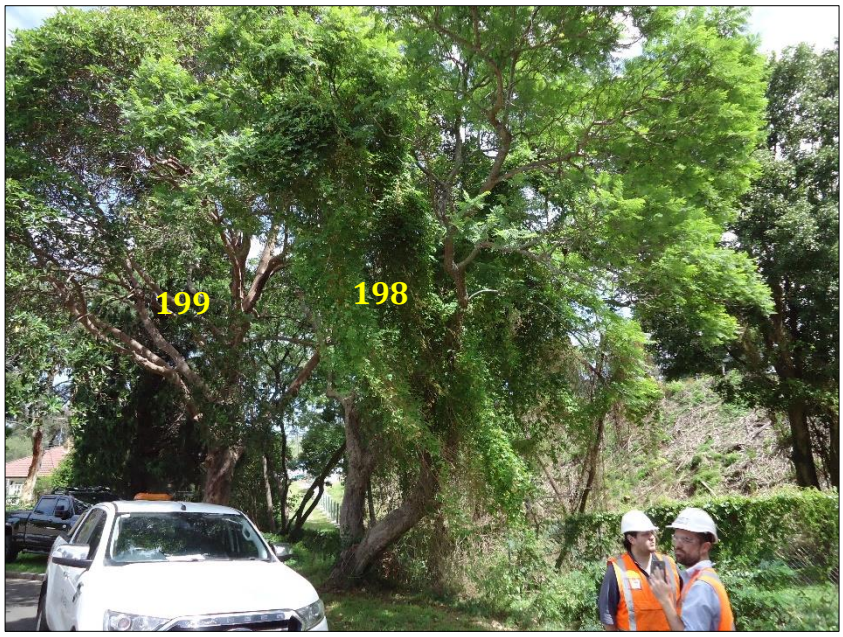


Image 5: Trees 198 and 199 as identified within the AIA report shall require removal for the Metro Services Building access road.

An understory of ten *Ligustrum lucidum* (Broad-leafed Privet) trees 3 to 12, two *Phoenix canariensis* (Canary Island Date Palm) trees 14 and 15, eight *Cinnamomum camphora* (Camphor Laurel) trees 16 to 23, nine *Alianthus altissima* (Tree of Heaven) trees 24 to 32, three *Robinia psuedoacacia* (Black Locust) trees 33 to 35, one *Gleditsia triacanthos* (Honey Locust) tree 36, two *Morus alba* (Mulberry) trees 37 and 38 and eight *Senna pendula* (Easter Cassia) trees 39 to 46 exists along the embankment beneath the canopies of trees 166 to 180. Although meeting the requirement of a tree under the *Sydney Metro City & Southwest Sydenham to Bankstown Instrument of Approval* these species are commonly considered to be weeds. Broad-leafed Privet, Camphor Laurel, Tree of Heaven, Easter Cassia, Black Locust and Honey Locust are identified species under the *Biosecurity Act 2015*. A general biosecurity duty exists within NSW to prevent, eliminate or minimise any biosecurity risk. The understory generally ranges in height between 3 and 10m and has been previously managed through selective pruning, lopping and removal works. Its significance has been assessed under the Pre-clearance Assessment prepared by Cumberland Ecology dated 14 March 2021.

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

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	*Acacia saligna* (Golden Wreath Wattle)	1-5	4x4	-	-	N	G	M	S	M	N	-	-	No access to rail corridor, DBH not obtained. Short lived tree species. Clash with soil nailing and GST.	Remove
2	*Acacia saligna* (Golden Wreath Wattle)	1-5	4x4	-	-	N	G	M	S	M	N	-	-	No access to rail corridor, DBH not obtained. Short lived tree species. Clash with soil nailing and GST.	Remove
3	*Ligustrum lucidim* (Broad-leafed Privet)	5-10	1x1	100	200	N	G	M	S	L	E	2	1.5	Understorey specimen. Listed noxious weed under Biosecurity Act 2015 – general biosecurity duty exists. Clash with MSB.	Remove
4	*Ligustrum lucidim* (Broad-leafed Privet)	5-10	1x1	100	200	N	G	M	S	L	E	2	1.5	Understorey specimen. Listed noxious weed under Biosecurity Act 2015 – general biosecurity duty exists. Clash with MSB.	Remove
5	*Ligustrum lucidim* (Broad-leafed Privet)	1-5	1x1	50	80	N	G	M	S	L	E	2	1.5	Understorey specimen. Listed noxious weed under Biosecurity Act 2015 – general biosecurity duty exists. Clash with MSB.	Remove
6	*Ligustrum lucidim* (Broad-leafed Privet)	1-5	1x1	50	80	N	G	M	S	L	E	2	1.5	Understorey specimen. Listed noxious weed under Biosecurity Act 2015 – general biosecurity duty exists. Clash with MSB.	Remove
7	*Ligustrum lucidim* (Broad-leafed Privet)	1-5	1x1	50	80	N	G	M	S	L	E	2	1.5	Understorey specimen. Listed noxious weed under Biosecurity Act 2015 – general biosecurity duty exists. Clash with MSB.	Remove
8	*Ligustrum lucidim* (Broad-leafed Privet)	5-10	1x1	50	80	N	G	M	S	L	E	2	1.5	Understorey specimen. Listed noxious weed under Biosecurity Act 2015 – general biosecurity duty exists. Clash with MSB.	Remove
9	*Ligustrum lucidim* (Broad-leafed Privet)	5-10	1x1	50	80	N	G	M	S	L	E	2	1.5	Understorey specimen. Listed noxious weed under Biosecurity Act 2015 – general biosecurity duty exists. Clash with MSB.	Remove
10	*Ligustrum lucidim* (Broad-leafed Privet)	5-10	1x1	50	80	N	G	M	S	L	E	2	1.5	Understorey specimen. Listed noxious weed under Biosecurity Act 2015 – general biosecurity duty exists. Clash with MSB.	Remove
11	*Ligustrum lucidim* (Broad-leafed Privet)	5-10	1x1	50	80	N	G	M	S	L	E	2	1.5	Understorey specimen. Listed noxious weed under Biosecurity Act 2015 – general biosecurity duty exists. Clash with MSB.	Remove
12	*Ligustrum lucidim* (Broad-leafed Privet)	5-10	1x1	50	80	N	G	M	S	L	E	2	1.5	Understorey specimen. Listed noxious weed under Biosecurity Act 2015 – general biosecurity duty exists. Clash with MSB.	Remove
13	*Pittosporum undulatum* (Sweet pittosporum)	5-10	2x2	100	200	N	G	M	S	L	N	2	1.5	Clash with soil nailing and GST.	Remove

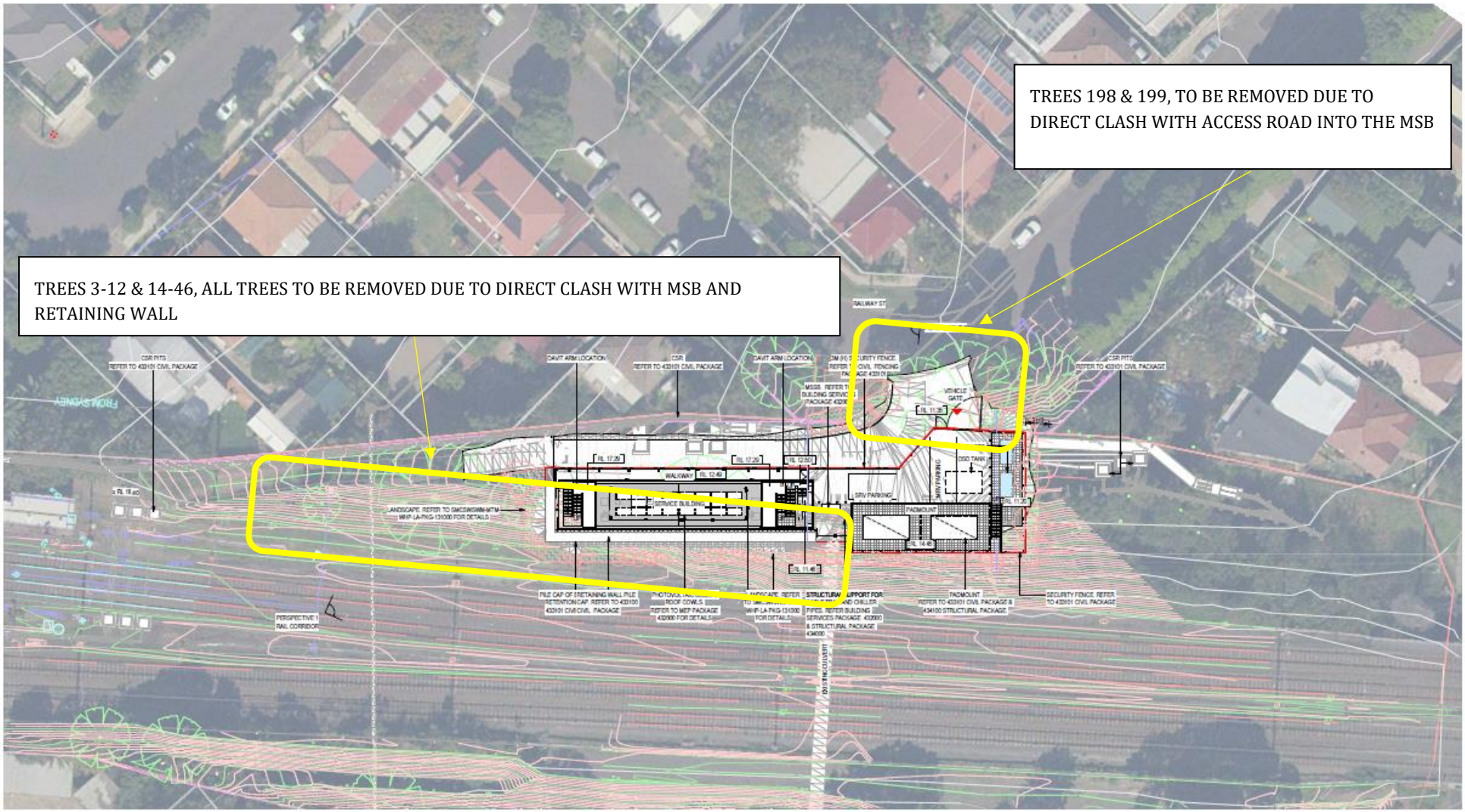
Tree number	Tree name Botanical name Common name	Tree dimensions Height (m)	Spread (m)	D.B.H. (mm)	D.A.B. (mm)	Vigour	Condition	Age class	ULE	Amenity and Visual Value	Native or Exotic	TPZ (m)	SRZ (m)	Comments	Remove or Retain
14	*Phoenix canariensis* (Canary Island Date Palm)	1-2	2x2	100	200	N	G	M	M	L	E	3	1.5	Understorey specimen. Clash with MSB. Not a tree due to height.	Remove
15	*Phoenix canariensis* (Canary Island Date Palm)	1-2	2x2	100	200	N	G	M	M	L	E	3	1.5	Understorey specimen. Clash with MSB. Not a tree due to height.	Remove
16	*Cinnamomum camphora* (Camphor laurel)	5-10	3x3	100	200	N	G	M	M	L	E	2	1.5	Understorey specimen. Listed noxious weed under Biosecurity Act 2015 – general biosecurity duty exists. Clash with MSB.	Remove
17	*Cinnamomum camphora* (Camphor laurel)	5-10	3x3	100	200	N	G	M	M	L	E	2	1.5	Understorey specimen. Listed noxious weed under Biosecurity Act 2015 – general biosecurity duty exists. Clash with MSB.	Remove
18	*Cinnamomum camphora* (Camphor laurel)	5-10	3x3	100	200	N	G	M	M	L	E	2	1.5	Understorey specimen. Listed noxious weed under Biosecurity Act 2015 – general biosecurity duty exists. Clash with MSB.	Remove
19	*Cinnamomum camphora* (Camphor laurel)	5-10	3x3	100	200	N	G	M	M	L	E	2	1.5	Understorey specimen. Listed noxious weed under Biosecurity Act 2015 – general biosecurity duty exists. Clash with MSB.	Remove
20	*Cinnamomum camphora* (Camphor laurel)	10-15	3x3	150	250	N	G	M	M	L	E	2	1.5	Understorey specimen. Listed noxious weed under Biosecurity Act 2015 – general biosecurity duty exists. Clash with MSB.	Remove
21	*Cinnamomum camphora* (Camphor laurel)	10-15	3x3	1000	1200	N	G	M	M	L	E	12	3.6	Understorey specimen. Listed noxious weed under Biosecurity Act 2015 – general biosecurity duty exists. Clash with MSB.	Remove
22	*Cinnamomum camphora* (Camphor laurel)	5-10	3x3	50	80	N	G	M	M	L	E	2	1.5	Understorey specimen. Listed noxious weed under Biosecurity Act 2015 – general biosecurity duty exists. Clash with MSB.	Remove
23	*Cinnamomum camphora* (Camphor laurel)	5-10	3x3	50	80	N	G	M	M	L	E	2	1.5	Understorey specimen. Listed noxious weed under Biosecurity Act 2015 – general biosecurity duty exists. Clash with MSB.	Remove
24	*Alianthus altissima* (Tree of Heaven)	5-10	3x3	100	200	N	G	M	S	L	E	2	1.5	Understorey specimen. Listed noxious weed under Biosecurity Act 2015 – general biosecurity duty exists. Clash with MSB.	Remove
25	*Alianthus altissima* (Tree of Heaven)	5-10	3x3	100	200	N	G	M	S	L	E	2	1.5	Understorey specimen. Listed noxious weed under Biosecurity Act 2015 – general biosecurity duty exists. Clash with MSB.	Remove
26	*Alianthus altissima* (Tree of Heaven)	5-10	3x3	100	200	N	G	M	S	L	E	2	1.5	Understorey specimen. Listed noxious weed under Biosecurity Act 2015 – general biosecurity duty exists. Clash with MSB.	Remove

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)										
27	*Alianthus altissima* (Tree of Heaven)	5-10	3x3	100	200	N	G	M	S	L	E	2	1.5	Understorey specimen. Listed noxious weed under Biosecurity Act 2015 – general biosecurity duty exists. Clash with MSB.	Remove
28	*Alianthus altissima* (Tree of Heaven)	5-10	3x3	100	200	N	G	M	S	L	E	2	1.5	Understorey specimen. Listed noxious weed under Biosecurity Act 2015 – general biosecurity duty exists. Clash with MSB.	Remove
29	*Alianthus altissima* (Tree of Heaven)	5-10	3x3	100	200	N	G	M	S	L	E	2	1.5	Understorey specimen. Listed noxious weed under Biosecurity Act 2015 – general biosecurity duty exists. Clash with MSB.	Remove
30	*Alianthus altissima* (Tree of Heaven)	5-10	3x3	100	200	N	G	M	S	L	E	2	1.5	Understorey specimen. Listed noxious weed under Biosecurity Act 2015 – general biosecurity duty exists. Clash with MSB.	Remove
31	*Alianthus altissima* (Tree of Heaven)	5-10	3x3	100	200	N	G	M	S	L	E	2	1.5	Understorey specimen. Listed noxious weed under Biosecurity Act 2015 – general biosecurity duty exists. Clash with MSB.	Remove
32	*Alianthus altissima* (Tree of Heaven)	5-10	3x3	100	200	N	G	M	S	L	E	2	1.5	Understorey specimen. Listed noxious weed under Biosecurity Act 2015 – general biosecurity duty exists. Clash with MSB.	Remove
33	*Robinia psuedoacacia* (Black Locust)	5-10	3x3	100	200	N	G	M	S	L	E	2	1.5	Understorey specimen. Listed noxious weed under Biosecurity Act 2015 – general biosecurity duty exists. Clash with MSB.	Remove
34	*Robinia psuedoacacia* (Black Locust)	5-10	3x3	100	200	N	G	M	S	L	E	2	1.5	Understorey specimen. Listed noxious weed under Biosecurity Act 2015 – general biosecurity duty exists. Clash with MSB.	Remove
35	*Robinia psuedoacacia* (Black Locust)	5-10	3x3	100	200	N	G	M	S	L	E	2	1.5	Understorey specimen. Listed noxious weed under Biosecurity Act 2015 – general biosecurity duty exists. Clash with MSB.	Remove
36	*Gleditsia triacanthos* (Honey Locust)	1-2	1x1	50	80	N	G	Y	S	L	E	2	1.5	Understorey specimen. Listed noxious weed under Biosecurity Act 2015. Not a tree due to height. Clash with MSB.	Remove
37	*Morus alba* (Mulberry)	5-10	3x3	200	300	N	G	M	S	L	E	2.4	2	Understorey specimen. Clash with MSB	Remove
38	*Morus alba* (Mulberry)	5-10	3x3	200	300	N	G	M	S	L	E	2.4	2	Understorey specimen. Clash with MSB	Remove
39	*Senna pendula* (Easter Cassia)	1-5	1x1	50	80	N	G	Y	S	L	E	2	1.5	Understorey specimen. Listed noxious weed under Biosecurity Act 2015 – general biosecurity duty exists. Clash with MSB	Remove

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)										
40	*Senna pendula* (Easter Cassia)	1-5	1x1	50	80	N	G	Y	S	L	E	2	1.5	Understorey specimen. Listed noxious weed under Biosecurity Act 2015 – general biosecurity duty exists. Clash with MSB	Remove
41	*Senna pendula* (Easter Cassia)	1-5	1x1	50	80	N	G	Y	S	L	E	2	1.5	Understorey specimen. Listed noxious weed under Biosecurity Act 2015 – general biosecurity duty exists. Clash with MSB	Remove
42	*Senna pendula* (Easter Cassia)	1-5	1x1	50	80	N	G	Y	S	L	E	2	1.5	Understorey specimen. Listed noxious weed under Biosecurity Act 2015 – general biosecurity duty exists. Clash with MSB	Remove
43	*Senna pendula* (Easter Cassia)	1-5	1x1	50	80	N	G	Y	S	L	E	2	1.5	Understorey specimen. Listed noxious weed under Biosecurity Act 2015 – general biosecurity duty exists. Clash with MSB	Remove
44	*Senna pendula* (Easter Cassia)	1-5	1x1	50	80	N	G	Y	S	L	E	2	1.5	Understorey specimen. Listed noxious weed under Biosecurity Act 2015 – general biosecurity duty exists. Clash with MSB	Remove
45	*Senna pendula* (Easter Cassia)	1-5	1x1	50	80	N	G	Y	S	L	E	2	1.5	Understorey specimen. Listed noxious weed under Biosecurity Act 2015 – general biosecurity duty exists. Clash with MSB	Remove
46	*Senna pendula* (Easter Cassia)	1-5	1x1	50	80	N	G	Y	S	L	E	2	1.5	Understorey specimen. Listed noxious weed under Biosecurity Act 2015 – general biosecurity duty exists. Clash with MSB	Remove
47	*Acacia saligna* (Golden Wreath Wattle)	5-10	3x3	150	250	N	G	M	S	L	N	2	1.5	Clash with soil nailing and GST.	Remove
48	*Acacia saligna* (Golden Wreath Wattle)	5-10	3x3	150	250	N	G	M	S	L	N	2	1.5	Clash with soil nailing and GST.	Remove
49	*Acacia saligna* (Golden Wreath Wattle)	5-10	3x3	150	250	N	G	M	S	L	N	2	1.5	Clash with soil nailing and GST.	Remove
50	*Acacia saligna* (Golden Wreath Wattle)	5-10	3x3	50	80	N	G	M	S	L	N	2	1.5	Clash with soil nailing and GST.	Remove
51	*Acacia saligna* (Golden Wreath Wattle)	5-10	3x3	50	80	N	G	M	S	L	N	2	1.5	Clash with soil nailing and GST.	Remove
52	*Acacia saligna* (Golden Wreath Wattle)	5-10	3x3	100	200	N	G	M	S	L	N	2	1.5	Clash with soil nailing and GST.	Remove

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)										
53	*Acacia saligna* (Golden Wreath Wattle)	5-10	3x3	100	200	N	G	M	S	L	N	2	1.5	Clash with soil nailing and GST.	Remove
54	*Grevillea* sp (Grevillea)	5-10	2x2	50	80	N	G	M	S	L	N	2	1.5	Clash with soil nailing and GST.	Remove
55	*Yucca* sp (Yucca)	1-5	1x1	-	-	N	G	M	S	L	E	2	1.5	Clash with soil nailing and GST.	Remove
56	*Yucca* sp (Yucca)	1-5	1x1	-	-	N	G	M	S	L	E	2	1.5	Clash with soil nailing and GST.	Remove


TREES 3-12 & 14 -46, ALL TREES TO BE REMOVED DUE TO DIRECT CLASH WITH MSB AND RETAINING WALL
3,4,5,6,7,8,9,10,11,12,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,
31,32,33,34,35,36,37,38,39,40,41,42,43,44,45 & 46
Railway St
Railway St
Railway St
Hopetoun St
1
2
3
4
5
6
7
8
10A
12



FOR CONSTRUCTION

REV	BY	DATE	DESCRIPTION	APPD
00	BN	31/03/2021	APPROVED FOR CONSTRUCTION	LP

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-WHP-AT-DWG-431120

CLIENT

SERVICE PROVIDERS

METRON T2M

DRAWN E. GUYOT
DESIGNED B. HOWARD
DRG CHECK M. LODGE
DESIGN CHECK G. DAVIES
APPROVED A. PALMER 31/03/2021

SYDNEY METRO

HURLSTONE PARK
ARCHITECTURAL
OVERALL ARRANGEMENT
SITE PLAN – SERVICE BUILDING

STATUS: FOR CONSTRUCTION | SHEET 1 OF 1

DRG No. SMCSWSWM-MTM-WHP-AT-DWG-431120 | 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** – 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 crow, 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

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Pruning Specification

7 COMMONS ST,HURLSTONE PARK 2193

Prepared By: Colin Curtis
AQF 5 Arboriculture Diploma
Arboriculture Australia Member #2332
Member of the International Society of Arboriculture #228182

Prepared For:
Downer Group

11/05/2021

1. INTRODUCTION

1.1 A request from Downer Group was made to Plateau Trees on the 11th May 2021, to produce a pruning specification as to allow for heavy vehicle access within the rail corridor of Hurlstone Park Station. The pruning of one (1) x tree is detailed within this specification.

2. THE SITE

2.1 The subject tree are located in the rear yard of 7 Commons St, Hurlstone Park 2193.The tree can be seen in figure 1 below, numbered and outlined in red.

Figure 1

1 7 Commons St, Hurlstone Park 2193.

Plateau Tree Service Pty Ltd
PO BOX 1522, DEE WHY NSW 2099 Australia
P: 02 9939 5350 | F: 02 9905 7569
E: info@plateautrees.com.au | W: www.plateautrees.com.au
ABN : 17 090 798 002

3. PRUNING SPECIFICATION

3.1 TREE 1 – MORTON BAY FIG (*FICUS MACROPHYLLA*) SEE FIGURE 2

Branch No #	Branch / Stem Height (Mts)	Branch / Stem Diameter (mm)	Branch Order	Pruning Class	Canopy Percentage
1	3	80	2nd	7.2.4, Selective	3%
2	3	250	2nd	7.2.4, Selective	13%
3	3.6	180	2nd	7.2.4, Selective	7%

Figure 2: Cut locations of limbs to be pruned marked in red.

2 7 Commons St, Hurlstone Park 2193.

This area of foliage is minor regrowth from weed species and is requested to be pruned back to the fence line.

3 7 Commons St, Hurlstone Park 2193.

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ABN : 17 090 798 002

4. CONCLUSION & RECOMMENDATIONS

4.1 All works must be undertaken in accordance with the Australian Standard (AS)4373-2007, Pruning of Amenity Trees.

4.2 Any additional limbs that may be required to be pruned that have not been mentioned in this specification, will be undertaken at the discretion of the site arborist.

4.3 Pruning must be undertaken by a qualified Arborist (AQF[1] 3) following the guidelines provided in the Amenity Tree Industry – Work Cover Code of Practice 1998 and Safe work Australia's "Guide to managing risks of tree trimming and removal work" (July 2016).

.

[1] *Australian Qualification Framework*

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ABN : 17 090 798 002

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Pruning Specification

5 RAILWAY ST,HURLSTONE PARK 2193

Prepared By: Colin Curtis
AQF 5 Arboriculture Diploma
Arboriculture Australia Member #2332
Member of the International Society of Arboriculture #228182

Prepared For:
Downer Group

11/05/2021

1. INTRODUCTION

1.1 A request from Downer Group was made to Plateau Trees on the 11th May 2021, to produce a pruning specification as to allow for heavy vehicle access within the rail corridor of Hurlstone Park Station. The pruning of two (2) x trees is detailed within this specification.

2. THE SITE

2.1 The subject trees are located in the rear yard of 5 Railway St, Hurlstone Park 2193.These trees can be seen in figure 1 below, numbered and outlined in red.

Figure 1

1 5 Railway S, Hurlstone Park 2193.

3. PRUNING SPECIFICATION

3.1 TREE 1 – WILLOW BOTTLE BRUSH (*CALLISTEMON SALIGNUS*) SEE FIGURE 2

Branch No #	Branch / Stem Height (Mts)	Branch / Stem Diameter (mm)	Branch Order	Pruning Class	Canopy Percentage
1	2	150	1st	7.2.4, Selective	4%
2	2.1	120	1st	7.2.4, Selective	4%
3	2.3	100	1st	7.2.4, Selective	4%
4	2.5	80	1st	7.2.4, Selective	3%

Figure 2: Limbs to be pruned marked in red.

2 5 Railway S, Hurlstone Park 2193.

3.2 TREE 2 – GUM TREE (*UNIDENTIFIED EUCALYPTUS SP.*) SEE FIGURE 3

Branch No #	Branch / Stem Height	Branch / Stem Diameter	Branch Order	Pruning Class	Canopy Percentage
1	4.4m	180mm	2nd	7.2.4, Selective	8%
2	4.5m	180mm	2nd	7.2.4, Selective	9%

Figure 3: Limbs to be pruned marked in red.

3 5 Railway S, Hurlstone Park 2193.

4. CONCLUSION & RECOMMENDATIONS

4.1 All works must be undertaken in accordance with the Australian Standard (AS)4373-2007, Pruning of Amenity Trees.

4.2 Any additional limbs that may be required to be pruned that have not been mentioned in this specification, will be undertaken at the discretion of the site arborist.

4.3 Pruning must be undertaken by a qualified Arborist (AQF[1] 3) following the guidelines provided in the Amenity Tree Industry – Work Cover Code of Practice 1998 and Safe work Australia's "Guide to managing risks of tree trimming and removal work" (July 2016).

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APPENDIX 6.1 HURLSTONE PARK AIA (PLATAEU TREES)

PLATEAUTREES
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Date: 23 August 2021

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

At the request of Downer Group an onsite inspection was undertake at Hurlstone Park Station. It has been asked to identify and record additional tree removals beyond those recommended within the Arboricultural Impact Assessment (AIA) was prepared by Urban Arbor, dated 11 December 2019, Ref19/12/11/SWMMS. On the 17 August a site walkthrough was undertaken by myself and representatives 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.

Additional tree removals were identified at the following locations:

- Tree 1, northern side of the rail corridor adjacent the western side of rail bridge
- Trees 2 and 3 southern side of rail corridor adjacent Floss Street

Image 1 show the approximate locations of the assessed trees.

Tree 1 consists of a self-seeded multi-stemmed *Acer negundo* (Box Elder), refer Appendix 2 photograph 1. It has been assessed as having a short useful life expectancy and low landscape value. The wider Southwest Metro Package works require three 300mm diameter piles to be excavated at the location of the tree to

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Image 1: Aerial image of Hurlstone Park Station showing the location of additional tree and vegetation removal. *(Source Six Maps accessed 23/08/2021)*.

enable the construction of a materials throw screen. As such, the tree cannot be retained.

Trees 2 and 3 consist of an *Acacia* sp (Wattle) and *Cinnamomum camphora* (Camphor Laurel) respectively. They have been assessed as having a short useful life expectancy and medium landscape significance. A scaffolding pad is to be established over the position of tree 2 to enable equipment access to the rail corridor to undertake soil nailing works. Some selected individual stems of tree 3 may also require removal to accommodate these works. Tree 2 and selected stems of tree 3 shall require removal to enable these works. The removal of selected stems from tree 3 is not expected to have a significant impact upon the clump of stems as a whole. Only those stems found to be directly impacted upon by the proposed works are to be removed from the Camphor Laurel.

The additional trees to be removed are not representative of an endangered or threatened species or ecological community. The removal of tree 1 is not expected to have a significant impact upon local amenity. The removal of tree 2 and selected stems of tree 3 are likely to result in a short-term loss of amenity and greater exposure of the rail corridor and associated infrastructure from Floss Street.

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	*Acer negundo* (Box elder)	5-10	2x2	multi	multi	-	G	Y	S	L	E	2	1.5	Multi-stemmed self-seeded specimen. Minimum TPZ and SRZ apply. Seasonal loss of leaves prevents accurate assessment of vigour.	Remove
2	*Acacia* sp (Wattle)	5-10	1x1	200	300	N	G	M	S	M	N	2.4	2	Likely a self-seeded specimen growing atop rail embankment. Kinked trunk with cavity. Tree has poor form. Tree is required to be removed to provide construction access to Duntroon St Bridge.	Remove
3	*Cinnamomum camphora* (Camphor Laurel)	10-15	4x4	100	-	N	G	M	S	M	E	4	-	Clump of multiple stems. Possibly regrowth off of old stump.	Remove stems as required

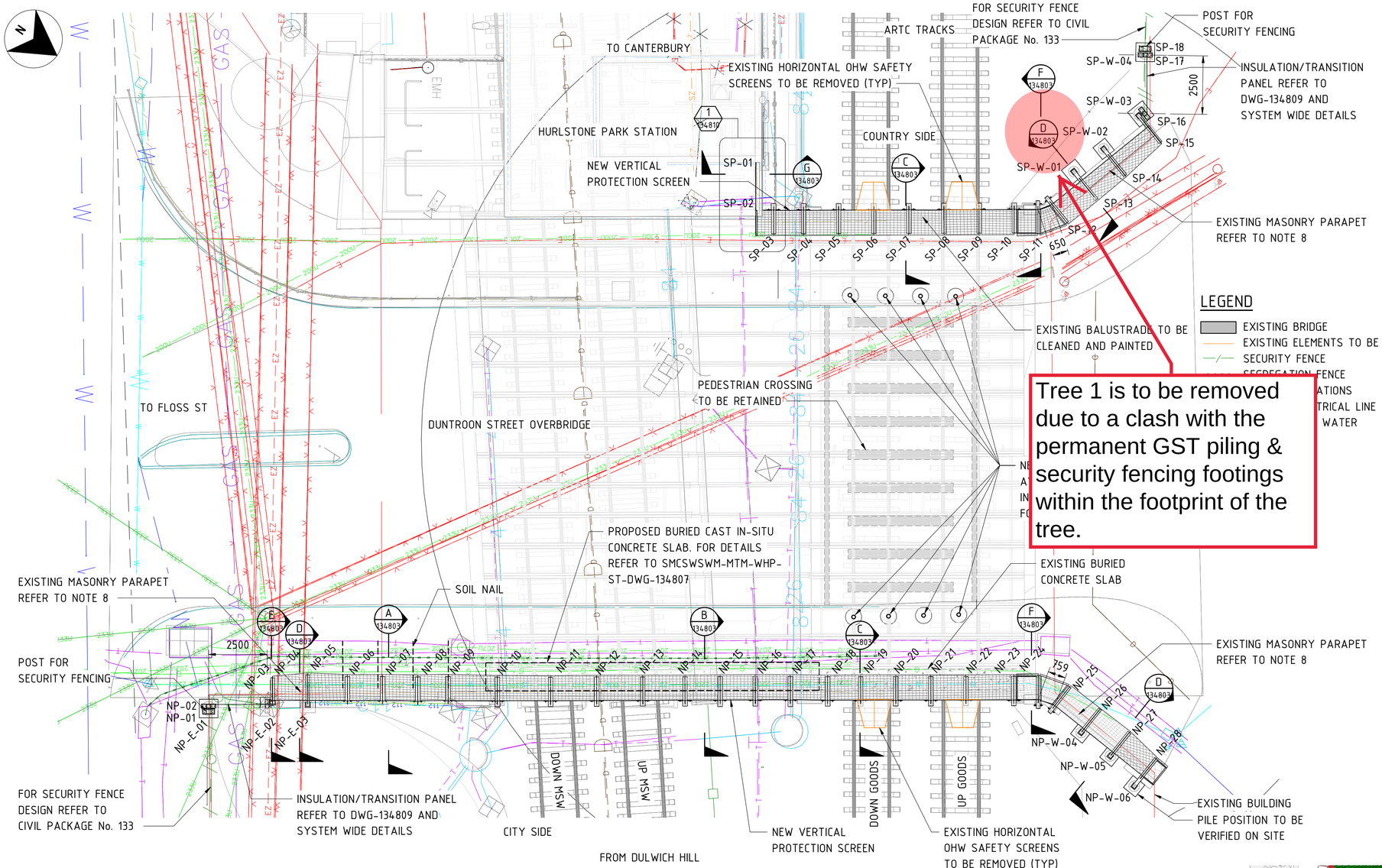
Appendix 2: Site Photographs

Photograph 1: Tree 1 *Acer negundo* (Box Elder) growing adjacent rail bridge wall on the northern side of the rail corridor.

Photograph 2: Tree 2 *Acacia* sp (Wattle) growing on the southern side of the rail corridor atop of the embankment.

Photograph 3: Tree 3 *Cinnamomum camphora* (Camphor Laurel) growing on the southern side of the rail corridor atop of the embankment. Note the kink and cavity within the trunk of tree 2.

Photograph 4: Trees 2 and 3 as seen from the rail bridge.



PLAN
SCALE 1 : 100

Tree 1 is to be removed due to a clash with the permanent GST piling & security fencing footings within the footprint of the tree.

LEGEND

- EXISTING BRIDGE
- EXISTING ELEMENTS TO BE REMOVED
- SECURITY FENCE
- SEGREGATION FENCE
- ATIONS
- TRICAL LINE
- WATER

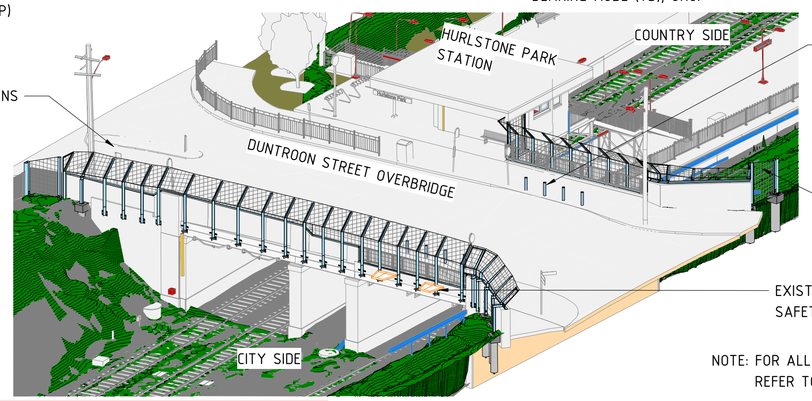
NOTES

1. FOR GENERAL NOTES AND SYSTEM WIDE TYPICAL DETAILS REFER TO DRAWINGS SMCSWSWM-MTM-WEC-ST-DWG-204850 TO 204999.
2. FOR CLASSIFICATION OF ROCK AND BORED PILE GEOTECHNICAL NOTES REFER TO GENERAL NOTES.
3. THE BRIDGE HAS BEEN ASSESSED WITH LOAD RATING FACTOR BELOW 1 FOR GENERAL ACCESS VEHICLE, WHICH SHOULD BE CONSIDERED DURING CONSTRUCTION OPERATIONS. FOR FURTHER DETAILS ON THE LOAD CAPACITY OF THE EXISTING STRUCTURE, PLEASE REFER TO 'LOAD RATING AND MANAGEMENT OF OVERBRIDGES' TECHNICAL NOTE (DOC. REF. NO. SMCSWSWM-MTM-WEC-ST-REP-104001).
4. THE HURLSTONE PARK RAILWAY STATION GROUP (INCLUDING DUNTROON STREET OVERBRIDGE) IS LISTED UNDER THE LOCAL ENVIRONMENTAL PLAN, S170 HERITAGE AND CONSERVATION REGISTER AND NATIONAL TRUST REGISTER. RAILCORP SECTION 170 REGISTER (SHI No. 4802051) AND CANTERBURY LEP 2012 (ITEM No. 1124)
5. DESIGN PARAMETERS ADOPTED FOR THE EXISTING STRUCTURAL ELEMENTS AS PER AS BUILT INFORMATION: CITY RAIL PROJECTS GROUP CIVIL DESIGN-HURLSTONE PARK FLOSS ST O/B-PARAPET WALL REPLACEMENT CONCRETE DETAILS 24/01/1994-No. 785-087
   - ASSUMED CONCRETE COMPRESSIVE STRENGTH = 32 MPa
   - DEFORMED BARS: GRADE 400
   - ROUND BAR: GRADE 230 TO AS1302
   - STRUCTURAL STEEL PLATES: GRADE 250 TO AS3678
6. ASSUMPTION OF TYPICAL 12MPa COMPRESSIVE STRENGTH OF THE EXISTING MASONRY WALL HAS BEEN TAKEN INTO ACCOUNT IN DESIGN OF THE PROTECTION SCREEN POST FIXINGS, BASED ON THE GUIDANCE PROVIDED IN AS 5100.7:2017 AND AS 3700: 2018. THE COMPRESSIVE STRENGTH OF MASONRY AT REPRESENTATIVE LOCATIONS TO BE TESTED BY THE CONTRACTOR PRIOR TO CONSTRUCTION IN ACCORDANCE WITH AS3700: 2018. A TEST REPORT TO BE PROVIDED BY THE CONTRACTOR TO THE PRINCIPALS SUPERINTENDANT TO VERIFY THE DESIGN PARAMETERS.
7. THE MASONRY WALL THICKNESS AND THE SIZE OF THE BURIED CONCRETE SLAB HAVE BEEN BASED ON POINT-CLOUD SURVEY INFORMATION AND HISTORICAL DESIGN / AS-BUILT DRAWINGS OF THE EXISTING BRIDGE STRUCTURE.
8. EXISTING MASONRY PARAPET MAY NEED TO BE TEMPORARILY DEMOLISHED AND REBUILT DURING THE PILING AND ANCHORING WORKS AS REQUIRED BY CONTRACTOR. METHODOLOGY AND EXTENT OF DEMOLITION TO BE IN ACCORDANCE WITH THE HERITAGE STATEMENT AND SHALL BE SUBMITTED TO THE PRINCIPAL'S REPRESENTATIVE FOR APPROVAL. (APPENDIX 12 OF ARCHITECTURAL DESIGN REPORT DOC. REF. No. SMCSWSWM-MTM-WHP-AT-REP-131000).
9. ASSUMPTION OF TYPICAL 20MPa COMPRESSIVE STRENGTH OF THE EXISTING CONCRETE UPSTAND HAS BEEN TAKEN INTO ACCOUNT IN THE DESIGN OF THE PROTECTION SCREEN POST FIXINGS, BASED ON THE GUIDANCE PROVIDED IN AS 5100.7;2017. THE COMPRESSIVE STRENGTH OF CONCRETE AT LOCATIONS OF FIXINGS TO BE TESTED BY THE CONTRACTOR PRIOR CONSTRUCTION, USING NON-DESTRUCTIVE TEST METHODS, SUCH AS ULTRASONIC PULSE VELOCITY AND SURFACE HARDNESS METHODS IN ACCORDANCE WITH AS 5100.8:2017. A TEST REPORT TO BE PROVIDED BY THE CONTRACTOR TO THE PRINCIPAL'S SUPIRENTENDANT TO VERIFY THE DESIGN PARAMETERS.
10. ALL BOLTS AND ANCHOR ROD CONNECTIONS TO BE TENSION CONTROLLED IN BEARING MODE (TB), UNO.

PILE SCHEDULE

PILE ID	DIAMETER (mm)	SOP EASTING	SOP NORTHING	PILE CUT OFF LEVEL (m AHD)	INDICATIVE PILE TOE LEVEL (m AHD)	INDICATIVE PILE LENGTH (m)	SOCKET MATERIAL
NP-E-01	600	327375.175	6246229.828	24.658	22.3	2.4	1m INTO CLASS V SANDSTONE
NP-E-02	600	327373.691	6246231.971	24.918	22.3	2.6	1m INTO CLASS V SANDSTONE
NP-E-03	450	327372.776	6246233.315	25.051	22.3	2.8	1m INTO CLASS V SANDSTONE
NP-W-04	450	327356.020	6246261.803	25.143	22.7	2.4	1m INTO CLASS III SANDSTONE
NP-W-05	450	327356.195	6246263.394	25.024	22.7	2.3	1m INTO CLASS III SANDSTONE
NP-W-06	450	327356.738	6246264.941	24.863	22.7	2.2	1m INTO CLASS III SANDSTONE
SP-W-01	450	327335.982	6246248.667	24.141	22.7	1.4	1m INTO CLASS III SANDSTONE
SP-W-02	450	327334.481	6246249.224	24.384	22.7	1.7	1m INTO CLASS III SANDSTONE
SP-W-03	600	327332.364	6246249.757	24.568	22.7	1.9	1m INTO CLASS III SANDSTONE
SP-W-04	600	327330.044	6246248.502	24.780	22.7	2.1	1m INTO CLASS III SANDSTONE

*PILE TOP LEVELS TO BE CONFIRMED ON SITE



ISOMETRIC VIEW

NOTE: FOR ALL OTHER UTILITY DETAILS, REFER TO CIVIL DESIGN PACKAGE NO. 133

DRAWING COLOUR CODED - PRINT ALL COPIES IN COLOUR

FOR CONSTRUCTION

REV.	BY	DATE	DESCRIPTION	APPD.
00	F.A	31.03.2021	APPROVED FOR CONSTRUCTION	L.P

1:100 FULL SIZE A1

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-WHP-ST-DWG-134801.RVT

CLIENT: NSW GOVERNMENT | sydney METRO

SERVICE PROVIDERS: METRON T2M

DRAWN F. ALPAPARA
DESIGNED E.ZHAO
DRG CHECK S. FUENTES
DESIGN CHECK I. HESPE
APPROVED L. PALMER 31.03.2021

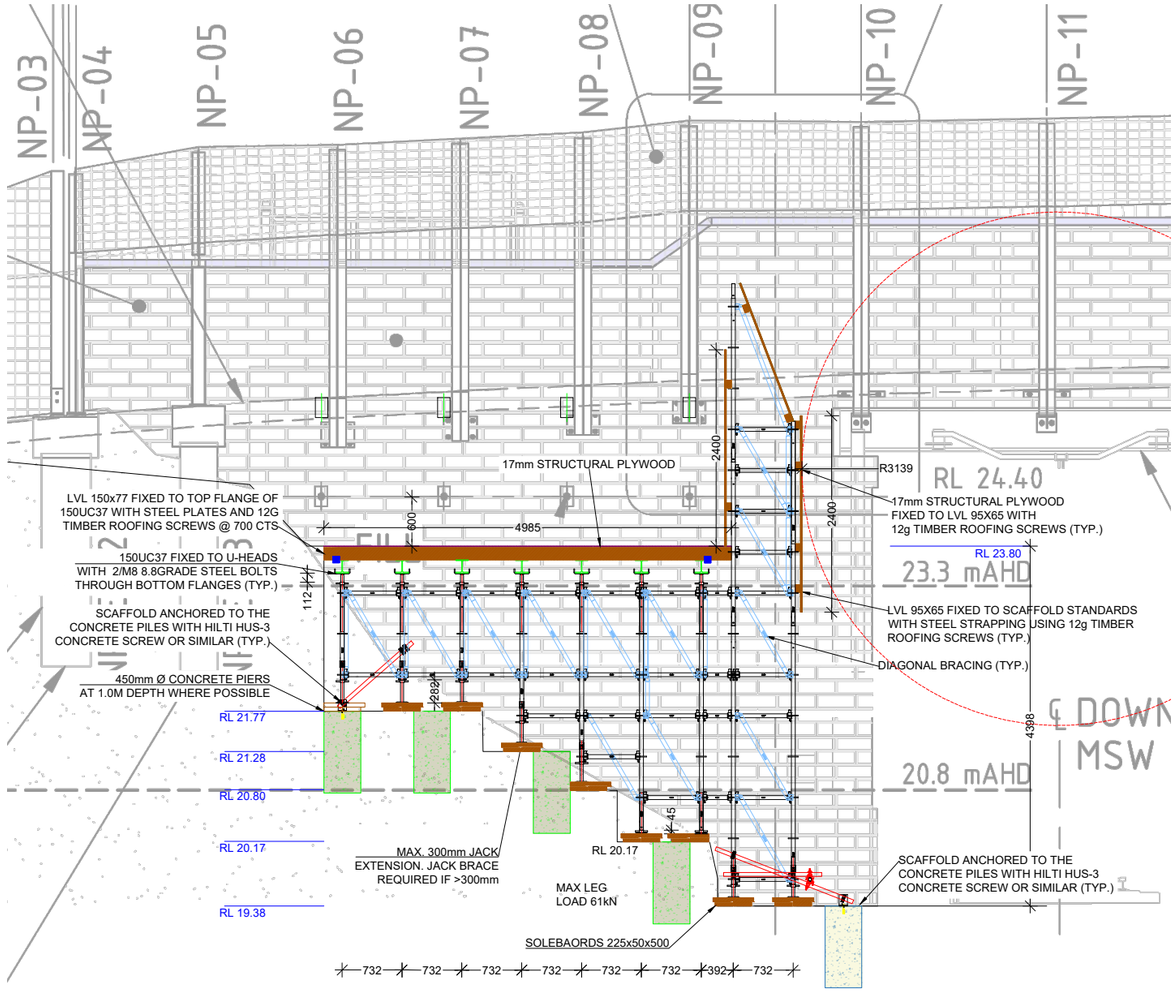
SYDNEY METRO

HURLSTONE PARK STATION
STRUCTURAL - BRIDGES
DUNTROON STREET OVERBRIDGE - HURLSTONE PARK (9.330km)
GENERAL ARRANGEMENT - SHEET 1

STATUS: FOR CONSTRUCTION | SHEET 1 OF 2 | ©

DRG No. SMCSWSWM-MTM-WHP-ST-DWG-134801 | REV. 00

Appendix 1: Tree Assessment Schedule identified tree 2 for removal and 3 for selective pruning. The removal of vegetation will allow for the construction of a loading platform next to Duntroon Street Bridge. The loading platform is required to provide a safe foundation for the soil nailing rig to undertake works on the bridge abutment.



ELEVATION VIEW
NOT TO SCALE

4 OFF SOIL NAIL AT 1500 SPACING, 1200 BENEATH WALKWAY FINISH LEVEL

DRAWING NOTES

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UNLESS NOTED OTHERWISE ON DRAWING:
- THE DISTANCE BETWEEN FACE BRACING PANELS IS NOT TO EXCEED 3 BAYS HORIZONTALLY AND EVERY 4.0M VERTICALLY.
- ALL RETURNS OR BREAKS IN THE SCAFFOLD ARE TO BE TUBE TIED, COMPLETE WITH PLANKING AND GUARDRAILS AS REQUIRED ON ADJACENT SCAFFOLD.
- SCAFFOLD TO BE A MAXIMUM OF 225MM FROM WORKING FACE UNLESS DIRECTED OTHERWISE BY LOCAL SAFETY AUTHORITY.
- HOP-UPS ARE NOT TO BE LOADED WITH MATERIAL. THEY ARE TO BE USED FOR ACCESS BY PERSONNEL ONLY.

3. PROTECTION & CLIENT RESPONSIBILITY
IT SHALL REMAIN THE CLIENTS RESPONSIBILITY TO ENSURE THAT ALL REASONABLE PRECAUTIONS ARE TAKEN TO AVOID IMPACT LOADS ON THE SCAFFOLD DURING USE. IRRESPECTIVE OF ANY RECOMMENDATIONS SHOWN ON THE DRAWINGS, THE USER IRRESPONSIBLE FOR THE STRUCTURAL ADEQUACY OF ALL MATERIAL OF HIS OWN SUPPLY AND FOR ENSURING THAT THE APPROVED WORKING LOAD LIMITS ARE NOT EXCEEDED.

4. FOUNDATIONS/SUPPORT
UNLESS OTHERWISE NOTED, NO SOLEPLATES OR OTHER MEANS OF SPREADING THE IMPOSED LOADS ARE SUPPLIED BY LANE SCAFFOLD PTY LTD. WHERE LANE SCAFFOLD PTY LTD EQUIPMENT IS SUPPORTED, SUSPENDED, ANCHORED OR TIED TO AN EXISTING STRUCTURE OR THE GROUND, THE CUSTOMER MUST ENSURE THAT THE STRUCTURE OR GROUND IS ADEQUATE TO SAFELY SUPPORT THE ADDITIONAL IMPOSED LOADS.

5. MODIFICATION
THIS DRAWING HAS BEEN PREPARED USING THE SAFE WORKING LOADS OF THE COMPONENTS SPECIFIED. NO ALTERATION TO COMPONENTS, ASSEMBLY, LOADING OR ANY OTHER ASPECT MUST BE MADE WITHOUT THE EXPRESSED WRITTEN AUTHORITY.

6. GROUND BEARING
CLIENT TO CHECK THAT GROUND IS CAPABLE OF SUSTAINING MAXIMUM LEG LOADS.

***** DO NOT TAKE RISK ! - IF IN DOUBT, ASK *****

7. BASIS OF DESIGN
THIS DRAWING HAS BEEN PREPARED FROM INFORMATION SUPPLIED TO US BY, OR ON BEHALF OF THE CUSTOMER, WHO SHOULD CHECK THAT WE HAVE CORRECTLY INTERPRETED HIS REQUIREMENTS AND THAT ALL LOADINGS, DIMENSIONS, DETAILS, ERECTION, POURING AND STRIKING SEQUENCES ETC. ARE AS REQUIRED AND PRACTICABLE.

THE FOLLOWING DOCUMENTS HAVE BEEN USED TO PREPARE THIS SCHEME:-

CUSTOMER DRAWINGS: .....
CUSTOMER DRAWINGS: .....
DESIGN BRIEF: .....
CUSTOMER METHOD STATEMENT: .....
OTHER INFORMATION: .....

TO ENABLE US TO COMPLETE THIS DRAWING, WE HAVE ALLOWED FOR THE FOLLOWING:

- SCAFFOLD RATED AT SPECIAL DUTY. DUTY LIVE LOAD OF :..... 35kPa
- MAX. SCAFFOLD HEIGHT OF TOP WORKING DECK :..... 4.4m
- NUMBER OF WORKING LEVELS :..... 1
- NUMBER OF WORKING PLATFORM BRACKET LEVELS :..... 1
- MAX. EXTENSION OF ADJUSTABLE BASES :..... 300mm
- MAX. LEG LOAD DESIGN :..... TBA
- MAX. DESIGN TIE LOAD (COMP./TENSION) :..... N/A
- MAX. SCAFFOLD HEIGHT ABOVE TOP TIE WITH NO SHEETING :..... 4.0m
- MAX. SCAFFOLD HEIGHT ABOVE TOP TIE WITH PRESCRIBED SHEETING:..... 2.0m
- WIND LOADS WHERE APPLICABLE, HAVE BEEN CALCULATED IN ACCORDANCE WITH AS1170.2 :..... TBA
- MAX. DESIGN WIND PRESSURE :..... TBA

A SCAFFOLD HANDOVER CHECKLIST TO BE COMPLETED WITH EACH STAGE
A HANDOVER CHECKLIST TO BE COMPLETED AFTER ANY ALTERATIONS, INCLEMENT WEATHER, MONTHLY SAFETY INSPECTIONS AND BEFORE DISMANTLE.

BRACING AND LACING TO BE ADDED AS EACH INDIVIDUAL SECTION OF THE STRUCTURE IS ERECTED.

BRACING FREQUENCY SHOWN IS TYPICAL AND REPEATS ON ALL LEG LINES. BRACING POSITIONS AND DIRECTIONS MAY VARY BUT RATIO OF LEGS PER BRACES MUST REMAIN.

DURING DISMANTLING OPERATIONS REMOVAL OF BRACING MUST BE CAREFULLY CONTROLLED TO ENSURE INDIVIDUAL AREAS ARE NOT DESTABILISED.

PRELIMINARY FOR DISCUSSION ONLY

PERMITTED NUMBER OF LOADED PLATFORMS AND HOP - UP PLATFORMS

MAX HEIGHT (m) TO TOP PLATFORM	MAX NUMBER OF FULLY PLANKED PLATFORMS	MAX NUMBER OF PLANKED HOP - UPS PLATFORMS 1 OR 2 PLANKS WIDE	PERMITTED NUMBER OF LOADED PLATFORMS WITH IN THE SCAFFOLD BAY			PERMITTED NUMBER OF LOADED HIP -UP PLATFORMS 1 OR 2 PLANKS WIDE (LIGHT DUTY ONLY)
			HEAVY DUTY (675 kg)	MEDIUM DUTY (450 kg)	LIGHT DUTY (225 kg)	
4.4	1	0	1	-	-	N/A

AMENDMENTS

REV.	AMENDMENT	BY	CHKD	DATE
A	PRELIMINARY	DL	AE	06/08/2021
B	RAISE DECK, MOVE PILE TIE LOCATIONS	DL	-	11/08/2021
C	-	-	-	-
D	-	-	-	-
E	-	-	-	-
F	-	-	-	-
G	-	-	-	-
H	-	-	-	-

RESIDUAL RISK ASSESSMENT
WHEREVER POSSIBLE, RISK IS DESIGNED-OUT OF THIS PROPOSAL DURING THE DESIGN PROCESS. WHERE THIS IS NOT POSSIBLE, THE RISK WILL BE MINIMISED AND ANY RESIDUAL RISK WILL BE NOTED AND INDICATED BY THE SYMBOL.

DRAWING STATUS
CONSTRUCTION STATUS FULLY VALID WHEN CHECKED AND DATED !

STATUS: **PRELIMINARY**

THIS DRAWING IS FOR DISCUSSION, PRICING AND CHECKING BY THE CUSTOMER. IT FORMS NO PART OF ANY AGREEMENT UNTIL ISSUED AND MARKED AS CHECKED IN ITS CONSTRUCTION STATUS.

Checked by: AE Date: 06/08/2021

Lane Scaffold Pty Ltd
ABN: 24 643 650 131

PO Box 320,
Liverpool NSW 1871

david.lane@lanescaffold.com.au

LANE SCAFFOLD

TITLE	
SITE :	SYDNEY METRO SOUTHWEST
STRUCTURE :	DRILL RIG PLATFORM
AREA :	EMBANKMENT DOWNLINE
EQUIPMENT :	PROSCAF ROSETTE
CUSTOMER :	DOWNER EDI WORKS

DRAWING BY : DL	DATE : 11/08/2021	DRAWING No. : TW-073-SK-002
CHECK BY : -	DATE : -	REVISION : B
CAD FILE : DLS0044	SCALE : NTS	

PLOTTING DATE : Aug 11, 2021 - 1:57pm

D:\Lane Scaffold Dropbox\David Lane\AutoCAD Drawings\Lane Scaffold\ DLS0044 - Downer - Drill Rig Access_14.07.2021.dwg <Layout:SK02>

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 crow, 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 6.2 HURLSTONE PARK AIA (PLATAEU TREES)

PLATEAUTREES
Safety. Quality. Progress.

Date: 14 December 2021

Re: Tree inspection at Hurlstone Park Station as part of the Southwest Metro works package.

At the request of Downer Group an onsite inspection was undertake at Hurlstone Park Station. It has been asked to assess the impacts of works associated with the proposed station entry concourse area upon tree 591 *Eucalyptus ficafolia* (WA Flowering Gum) and a *Murray paniculata* (Sweet Jasmine) hedge. Appendix 2 photograph 1 shows the two trees.

Works associated with the new station entry require the existing concrete slab to be extended to facilitate the concourse entry structure. The new slab extends by 1m off the existing slab, is to be 450mm deep on a strip footing. Appendix 2 photograph 2 shows the approximate alignment of the new slab.

The alignment of the new slab requires the existing Sweet Jasmine hedge to be removed. It consists of approximately eleven individual plants. The hedge was not identified within the existing Arboricultural Impact Assessment (AIA) prepared by Urban Arbor, dated 11 December 2019, Ref19/12/11/SWMMS. As such, an assessment has been undertaken and can be found as Appendix 1 Tree Assessment Schedule. Appendix 3 provides the assessment criteria. The Sweet Jasmine is not representative of an endangered or threatened species or ecological community.

Using AS4970 Protection of Trees on Development Sites as a guiding document the tree protection and structural root zone of tree 591 has been calculated at 3m

Plateau Tree Service Pty Ltd
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P: 02 9939 5350 | F: 02 9905 7569
E: info@plateautrees.com.au | W: www.plateautrees.com.au
ABN : 17 090 798 002

and 2.13m respectively. The concrete slab is aligned approximately 1.5m off the base of the trunk and is regarded as a major encroachment into the protection zone of the tree.

In order to minimise the impacts of the works an exploratory trench is to be excavated using methods that do not damage roots, along the closest alignment required for the concrete slab through the TPZ and SRZ. Appendix 2 photograph 2 shows the alignment of the exploratory trench (approximately at the limits of the existing Sweet Jasmine hedge's canopy). The trench is to be excavated to the full depth of the strip footing along its entire alignment within the garden bed. Exposed roots are to be pruned in accordance with the following method:

- The tree is to be thoroughly irrigated prior to undertaking the excavation and root pruning works. A sprinkler system is to be installed at the base of the tree and run for a minimum of one hour. This irrigation is to be undertaken within the week preceding the excavation works.
- All soil is to be cleared from around the exposed root to provide access to undertake the pruning cut
- The pruning cut is to be made into intact woody tissue perpendicular to the direction of root growth
- Pruning equipment is to be sterilised between each root cutting using an alcohol dip or a 1:10 solution of household bleach and water
- The face of the cut is to be clear of any woody splinters
- The bark at the face of the pruning cut is to be free of splits, cracks or tears
- A sharp clean pruning saw is to be used on roots ≥20mm in diameter. Roots <20mm diameter may be cut using sharp clean secateurs or pruning loppers
- Post works, additional irrigation is to be undertaken. A sprinkler system is to be installed at the base of the tree and run for a minimum of one hour per week for four weeks.

Once all root issues have been addressed bulk excavation of the slab and associated strip footing can be undertaken without additional impact upon the tree.

The proposed concourse structure's roof is aligned at the edge of the slab extension and is 4m in height. Selective pruning works shall be required to be undertaken to tree 591 to accommodate the structure.

Four branches have been identified for removal to accommodate the proposed concourse roof structure. These branches can be seen in Appendix 2 photograph 3. The selective removal of branches constitutes approximately 35% of the total love canopy volume of the tree and is considered to be a major pruning event. Appendix 2 photograph 3 shows the branches which have been identified for removal. A reduction in tree growth and physiological function can be expected as a result of branch removal. All pruning works are to be undertaken in accordance with AS4373(2007) Pruning of Amenity Trees.

The prescribed works to tree 591 are significant and are likely to result in a shortening of the trees useful life expectancy.

It should be understood that the effects of root pruning are not always predictable and can result in a decline in tree health, condition and stability. Undertaking the works in accordance with the provided method provides the best chance to minimise the impacts of the proposed works upon the tree.

Post works, any discernible change in the characteristics of the trees shall be referred to the project arborist and an inspection undertaken. These changes can include, but are not limited to:

- A change in foliage colour and or density
- Drooping, curling and/or crinkling of the foliage
- Dieback or death of branches or areas of the trees canopy
- An increase in the presence of dead branches
- Occurrence of branch failure
- Infestation by pest species

It is felt that these observations can reasonably be made by ordinary people or site personnel with no arboricultural background.

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

Plateau Trees

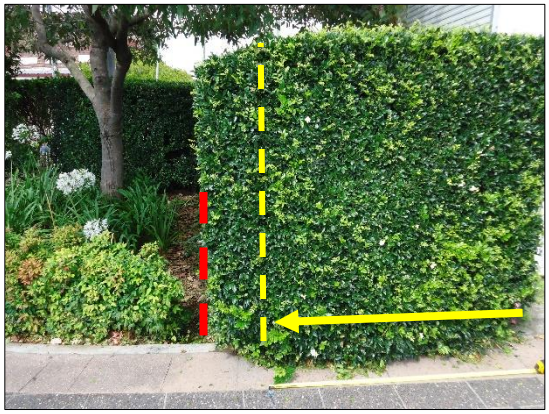
Appendix 1: Tree Assessment Schedule

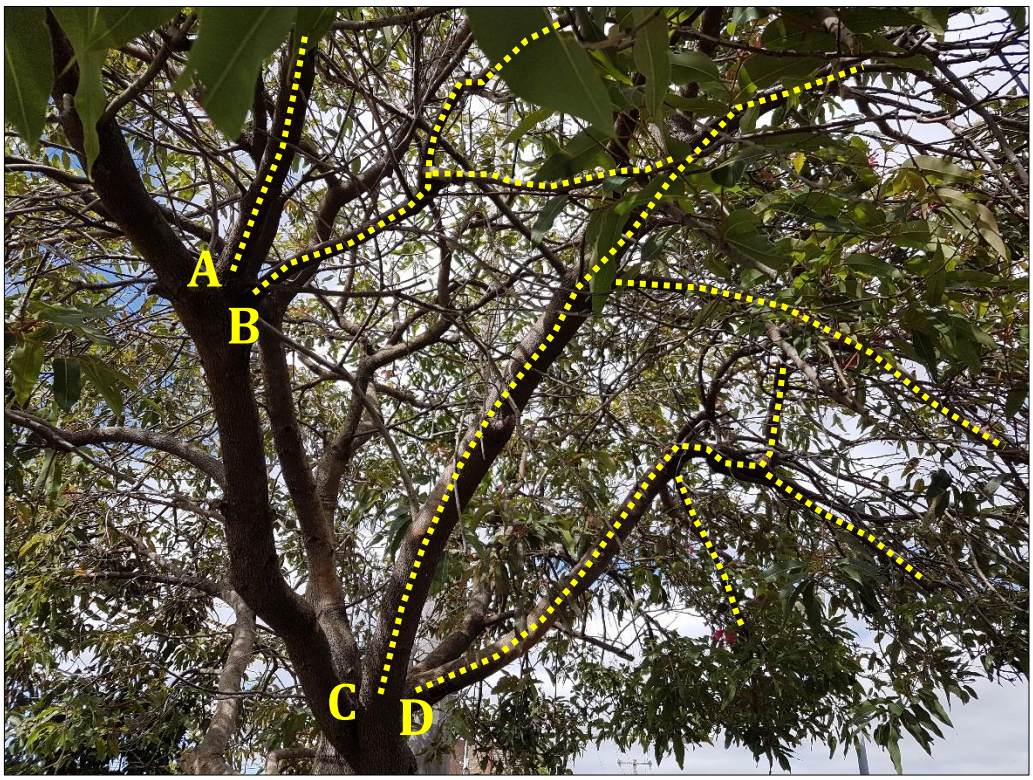
Tree number	Tree name	Tree dimensions				Vigour	Condition	Age class	ULE	Amenity and Visual Value	Native or Exotic	TPZ (m)	SRZ (m)	Comments	Remove or Retain
	Botanical name Common name	Height (m)	Spread (m)	D.B.H. (mm)	D.A.B. (mm)										
1	*Murraya paniculata* (Sweet Jasmine)	2	0.5x0.5	multi	400	N	G	M	M	M	N	2	1.5	Approx. 11 individual multi-stemmed specimens planted as a hedge. Minimum TPZ and SRZ apply. Removal of the hedge is unlikely to have a significant impact upon local visual amenity given the context of the works.	Remove

Appendix 2: Site Photographs

Photograph 1: Image showing tree 591 and the adjacent Sweet Jasmine hedge that are impacted upon by the proposed works.

Photograph 2: The yellow dashed line indicates the edge of the proposed concrete slab. The red line indicates the alignement of exploratory excavation within the garden bed. All excavateion along this line is to be undertaken using non-destructive digging methods that do not damage roots. Root exposed by the works are to be pruned in accordnace with the provided method.





Photograph 3: Branches identified for removal from tree 591 to provide clearance for the proposed concourse roof structure. Branch A is 40mm in diameter at 2.7m height, branch B is 20mm in diameter at 2.7m height, branch C is 120mm in diameter at 2.1m height, branch D is 120mm in diameter at 2.2m height. The removal of identified branches constitutes approximately 35% of the total live canopy volume of the tree.

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 crow, 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 6.3 CCBC APPROAVL FOR TREE REMOVAL AT HURLSTONE PARK

CANTERBURY BANKSTOWN

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 tress 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@cbcity.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@cbcity.nsw.gov.au>; Peter Anderson <Peter.ANDERSON@cbcity.nsw.gov.au>; Ash Jarvis <Ash.Jarvis2@transport.nsw.gov.au>; Peter D'Costa <Peter.D'Costa@Downergroup.com>; Ben Webb <Ben.Webb@cbcity.nsw.gov.au>; Peter Anderson <Peter.ANDERSON@cbcity.nsw.gov.au>; Wayne Bromfield <Wayne.Bromfield@cbcity.nsw.gov.au>
Subject: RE: Approval to Remove Trees: T1,T2,T194,T198,T199

Hi Ismet,

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

Best regards,

CANTERBURY BANKSTOWN

James Magsipoc - Project Officer
T 02 9707 9771
E James.Magsipoc@cbcity.nsw.gov.au
www.cbcity.nsw.gov.au

@ourcbcity
Like & follow us

From: Ismet Ozen <Ismet.Ozen@downergroup.com>
Sent: Thursday, 13 May 2021 4:27 PM
To: James Magsipoc <James.Magsipoc@cbcity.nsw.gov.au>
Cc: Robel Chowdhury <Robel.Chowdhury@downergroup.com>; Gareth O'Brien <Gareth.OBrien@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

Downer
Relationships creating success

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APPENDIX 7 CAMPSIE AIA (URBAN ARBOR)

URBAN ARBOR
The Trusted Name in Tree Management

Arboricultural Impact Assessment Report

Site location:
South West Metro
Campsie Station
Campsie NSW

Prepared for:
Metron T2M

Prepared by: Jack Williams and Bryce Claassens
Urban Arbor Pty Ltd
Date: 17 December 2019
Ref: 19/12/17/SWMMS

URBAN ARBOR
The Trusted Name in Tree Management

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URBAN ARBOR
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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) Landscape Design Package No. 151, Metron T2M, SMCSWSWM-MTM-WCS-LA-PKG-151000, 16 September 2019, Including:

Campsie Station		
SMCSWSWM-MTM-WCS-LA-DWG-151700	B	LANDSCAPE DESIGN - COVER SHEET AND DRAWING LIST - SHEET 1 of 10
SMCSWSWM-MTM-WCS-LA-DWG-151701	B	LANDSCAPE DESIGN - NOTES PAGE & LEGEND - SHEET 2 of 10
SMCSWSWM-MTM-WCS-LA-DWG-151702	B	LANDSCAPE DESIGN - DEMOLITION PLAN - SHEET 3 of 10
SMCSWSWM-MTM-WCS-LA-DWG-151710	B	LANDSCAPE DESIGN - GENERAL - PRECINCT PLAN - SHEET 4 of 10
SMCSWSWM-MTM-WCS-LA-DWG-151720	B	LANDSCAPE DESIGN - PRECINCT PLAN - BEAMISH STREET - SHEET 5 of 10
SMCSWSWM-MTM-WCS-LA-DWG-151721	B	LANDSCAPE DESIGN - DETAIL PLAN - BEAMISH STREET - SHEET 6 of 10
SMCSWSWM-MTM-WCS-LA-DWG-151730	B	LANDSCAPE DESIGN - PAVING PLAN - BEAMISH STREET SHEET 1 - SHEET 7 of 10
SMCSWSWM-MTM-WCS-LA-DWG-151731	A	LANDSCAPE DESIGN - PAVING PLAN - BEAMISH STREET SHEET 2 - SHEET 8 of 10
SMCSWSWM-MTM-WCS-LA-DWG-151761	A	LANDSCAPE DESIGN - TYPICAL DETAILS - SHEET 1 - SHEET 9 of 10
SMCSWSWM-MTM-WCS-LA-DWG-151771	B	LANDSCAPE DESIGN - MATERIAL SCHEDULE - SHEET 10 of 10

1.3 The trees were inspected on 5 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.

URBAN ARBOR
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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.

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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).

URBAN ARBOR
The Trusted Name in Tree Management

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) 2012[5] 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 x 50) $^{0.42}$ x 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.

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5 *Canterbury Local Environmental Plan 2012*, https://www.legislation.nsw.gov.au/#/view/EPI/2012/673, accessed 13 December 2019.

6 *Canterbury Development Control Plan 2012*, https://www.cbcity.nsw.gov.au/development/planning-control-policies/canterbury-development-control-plan-2012, accessed 13 December 2019.

7 *Canterbury Local Environmental Plan Heritage Map - Sheet HER_006*, https://www.legislation.nsw.gov.au/maps/7f4de097-5304-ece6-cc55-b2dfeeb11fdd/1550_COM_HER_006_010_20130513.pdf, 13 December 2019.

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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.

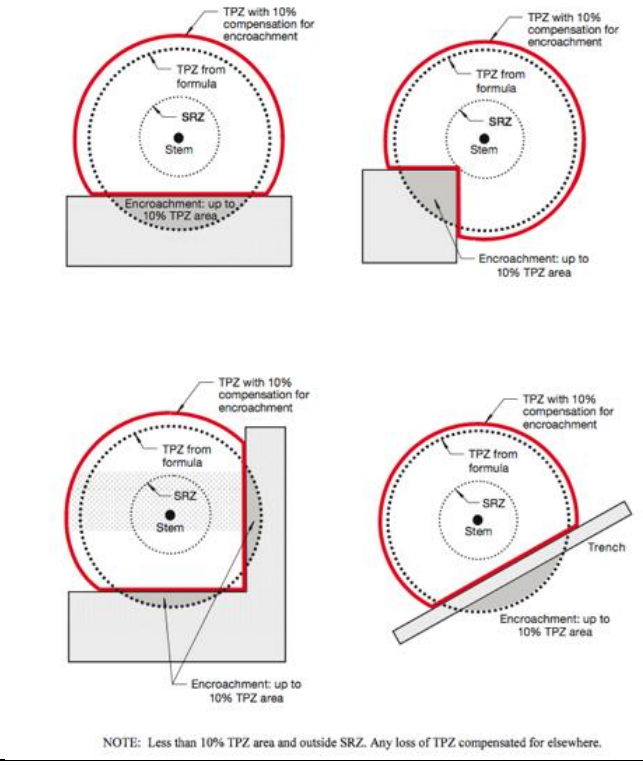

Image 1: Example minor TPZ encroachment from AS4970-2009.

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).

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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 Site 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	*Leptospermum petersonii*	A1	3.2	32.2	2.4	None	No proposed TPZ encroachment.	Retain and protect
515	*Cotoneaster spp*	Z1	2.0	12.6	1.8	None	No proposed TPZ encroachment.	Retain and protect
516	*Leptospermum petersonii*	Z1	2.0	12.6	1.6	None	No proposed TPZ encroachment.	Retain and protect
517	*Pittosporum undulatum*	A1	3.5	38.5	2.0	None	No proposed TPZ encroachment.	Retain and protect
518	*Pittosporum undulatum*	Z1	2.0	12.6	1.7	None	No proposed TPZ encroachment.	Retain and protect
519	*Callistemon viminalis*	A1	4.0	50.3	2.3	None	No proposed TPZ encroachment.	Retain and protect
520	*Callistemon viminalis*	A1	3.2	32.2	2.2	None	No proposed TPZ encroachment.	Retain and protect
521	*Leptospermum petersonii*	A2	4.1	52.8	2.2	None	No proposed TPZ encroachment.	Retain and protect
522	*Grevillea robusta*	A1	5.4	91.6	2.4	None	No proposed TPZ encroachment.	Retain and protect
610	*Platanus x acerifolia*	A1	6.5	132.7	2.7	None	No proposed TPZ encroachment.	Retain and protect
611	*Elaeocarpus reticulatus*	A1	2.7	22.9	1.9	None	No proposed TPZ encroachment.	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
612	*Elaeocarpus reticulatus*	A1	3.7	43.0	2.0	None	No proposed TPZ encroachment.	Retain and protect
613	*Elaeocarpus reticulatus*	A1	3.6	40.7	2.0	None	No proposed TPZ encroachment.	Retain and protect
614	*Triadica sebifera*	A1	3.9	47.8	2.3	None	No proposed TPZ encroachment.	Retain and protect
615	*Acacia podalyriifolia*	Z3	2.0	12.6	1.7	None	No proposed TPZ encroachment.	Retain and protect
616	*Pittosporum undulatum*	A1	4.1	52.8	2.6	None	No proposed TPZ encroachment.	Retain and protect
617	*Melaleuca bracteata*	A1	2.2	15.2	1.7	None	No proposed TPZ encroachment.	Retain and protect
618	*Callistemon viminalis*	A1	2.4	18.1	1.7	None	No proposed TPZ encroachment.	Retain and protect
619	*Melaleuca bracteata*	A1	3.1	30.2	2.0	None	No proposed TPZ encroachment.	Retain and protect
620	*Acacia podalyriifolia*	Z3	2.4	18.1	1.7	None	No proposed TPZ encroachment.	Retain and protect
621	*Syncarpia glomulifera*	A1	3.1	30.2	2.0	None	No proposed TPZ encroachment.	Retain and protect
622	*Melaleuca bracteata*	A1	2.2	15.2	1.8	None	No proposed TPZ encroachment.	Retain and protect
623	*Callistemon viminalis*	Z4	2.0	12.6	1.5	None	No proposed TPZ encroachment.	Retain and protect
624	*Melaleuca bracteata*	A1	2.2	15.2	1.7	None	No proposed TPZ encroachment.	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
625	*Callistemon viminalis*	A1	2.1	13.9	1.7	None	No proposed TPZ encroachment.	Retain and protect
626	*Melaleuca bracteata*	A1	2.0	12.6	1.6	None	No proposed TPZ encroachment.	Retain and protect
627	*Melaleuca bracteata*	A1	2.3	16.6	1.9	None	No proposed TPZ encroachment.	Retain and protect
628	*Callistemon viminalis*	A1	3.0	28.3	1.8	None	No proposed TPZ encroachment.	Retain and protect
629	*Callistemon viminalis*	A1	3.6	40.7	2.0	None	No proposed TPZ encroachment.	Retain and protect
630	*Callistemon viminalis*	A1	2.4	18.1	1.8	None	No proposed TPZ encroachment.	Retain and protect
631	*Callistemon viminalis*	A1	2.2	15.2	1.7	None	No proposed TPZ encroachment.	Retain and protect
632	*Callistemon viminalis*	A1	3.4	36.3	1.9	None	No proposed TPZ encroachment.	Retain and protect
633	*Callistemon viminalis*	A1	2.9	26.4	1.9	None	No proposed TPZ encroachment.	Retain and protect
634	*Callistemon viminalis*	A1	2.8	24.6	1.8	None	No proposed TPZ encroachment.	Retain and protect
635	*Callistemon viminalis*	A1	2.4	18.1	1.8	None	No proposed TPZ encroachment.	Retain and protect
636	*Melaleuca bracteata*	A1	2.0	12.6	1.6	None	No proposed TPZ encroachment.	Retain and protect
637	*Melaleuca quinquenervia*	A1	4.1	52.8	2.2	None	No proposed TPZ encroachment.	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
638	*Ficus rubiginosa*	A1	9.1	260.2	3.1	None	No proposed TPZ encroachment.	Retain and protect
639	*Melia azedarach*	A1	3.4	36.3	2.1	None	No proposed TPZ encroachment.	Retain and protect
640	*Schinus molle*	A1	9.8	301.7	3.4	None	No proposed TPZ encroachment.	Retain and protect
641	*Cinnamomum camphora*	A1	6.6	136.8	2.9	None	No proposed TPZ encroachment.	Retain and protect
642	*Lophostemon confertus*	A1	6.0	113.1	2.6	None	No proposed TPZ encroachment.	Retain and protect
643	*Brachychiton populneus*	A1	4.2	55.4	2.3	None	No proposed TPZ encroachment.	Retain and protect
644	*Ligustrum lucidum*	Z3	3.2	32.2	2.3	None	No proposed TPZ encroachment.	Retain and protect
645	*Cinnamomum camphora*	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
		A	Z
Trees to be removed	Building construction, new surfacing and/or proximity, or trees in poor condition.	None	None
Retained trees subject to TPZ encroachment greater than 10%	Removal of existing surfacing/structures and/or installation of new surfacing/structures.	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, 610, 611, 612, 613, 614, 616, 617, 618, 619, 621, 622, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 645 (Thirty-eight trees)	515, 516, 518, 615, 620, 623, 644 (Seven trees)

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10. RECOMMENDATIONS

10.1 This report assesses the impact of a proposed development at the subject site to forty-five (45) 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 Site Plan

10.3 No trees included in this report have been recommended for removal.

10.4 All forty-five (45) trees included in this report will be subject to minor and acceptable TPZ encroachments of 10% or less and can be retained in a viable condition.

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 No services plan has been assessed in this report. 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.

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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:** 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.

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 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 in 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.

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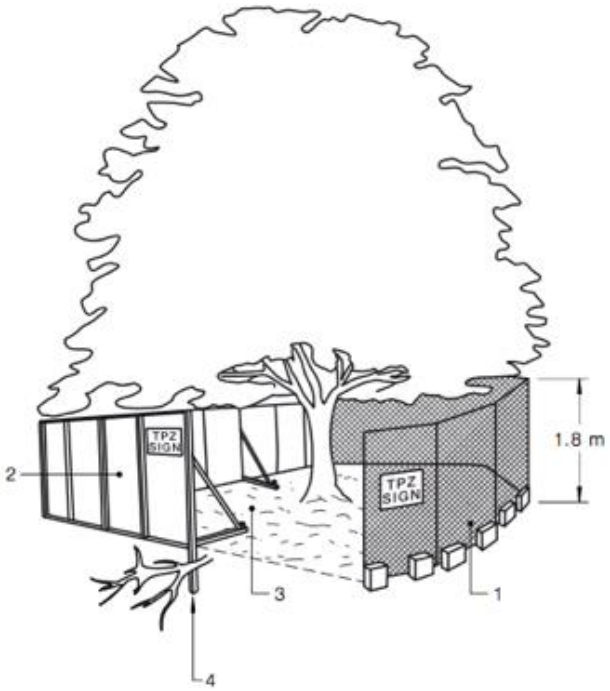

LEGEND:
1 Chain wire mesh panels with shade cloth (if required) attached, held in place with concrete feet.
2 Alternative plywood or wooden paling fence panels. This fencing material also prevents building materials or soil entering the TPZ.
3 Mulch installation across surface of TPZ (at the discretion of the project arborist). No excavation, construction activity, grade changes, surface treatment or storage of materials of any kind is permitted within the TPZ.
4 Bracing is permissible within the TPZ. Installation of supports should avoid damaging roots.

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.

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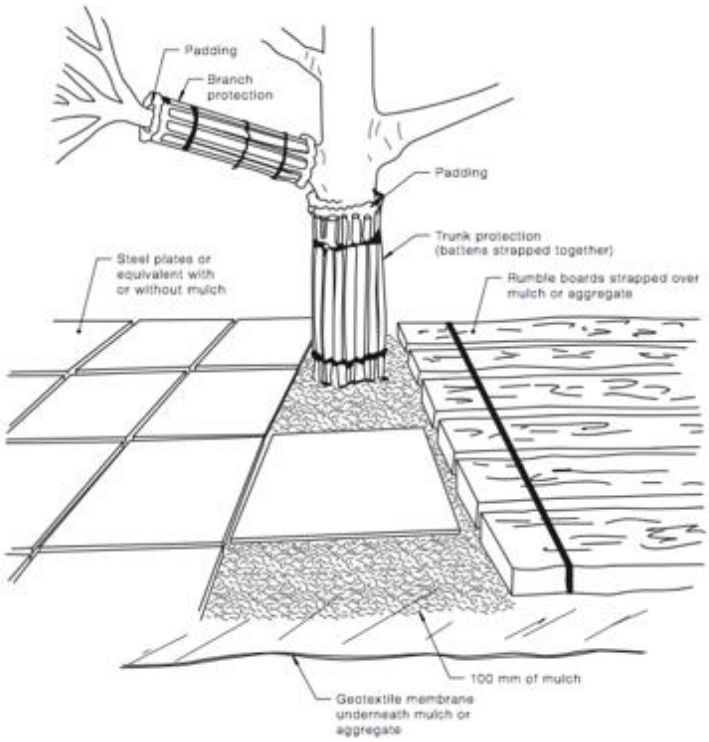

NOTES:

1 For trunk and branch protection use boards and padding that will prevent damage to bark. Boards are to be strapped to trees, not nailed or screwed.

2 Rumble boards should be of a suitable thickness to prevent soil compaction and root damage.

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

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- 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.

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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 principle 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 Overview
Appendix 1B: Proposed Site Plan
Appendix 2 - Tree Inspection Schedule
Appendix 3 - Further information of methodology

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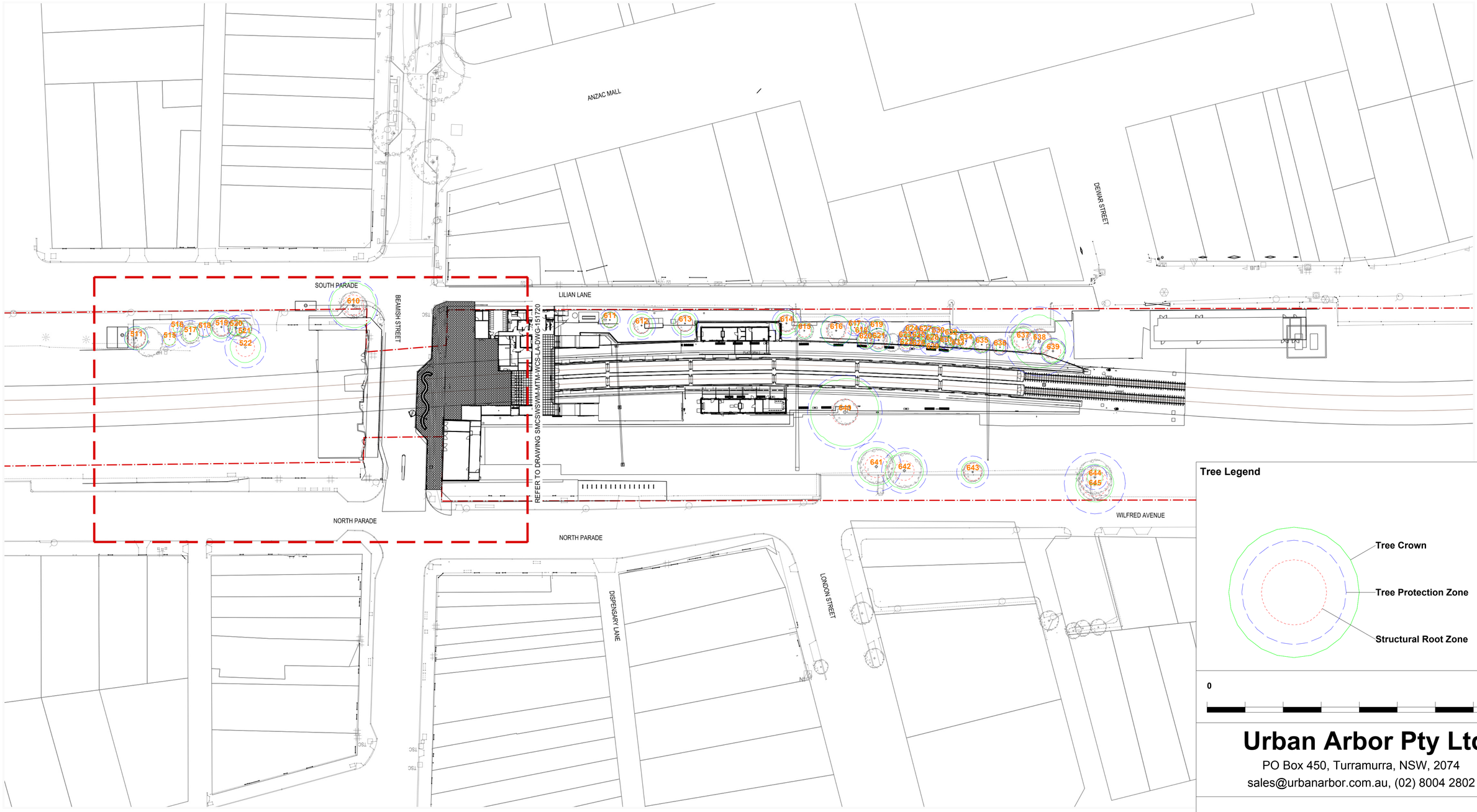
TRAQ

TO SYDNEY

TO BANKSTOWN



Tree Legend

0 80m

Urban Arbor Pty Ltd

PO Box 450, Turramurra, NSW, 2074

sales@urbanarbor.com.au, (02) 8004 2802

Site Location: Campsie Station, Campsie NSW

SCALE :	DATE :
1 : 500 @ A1	17/12/2019

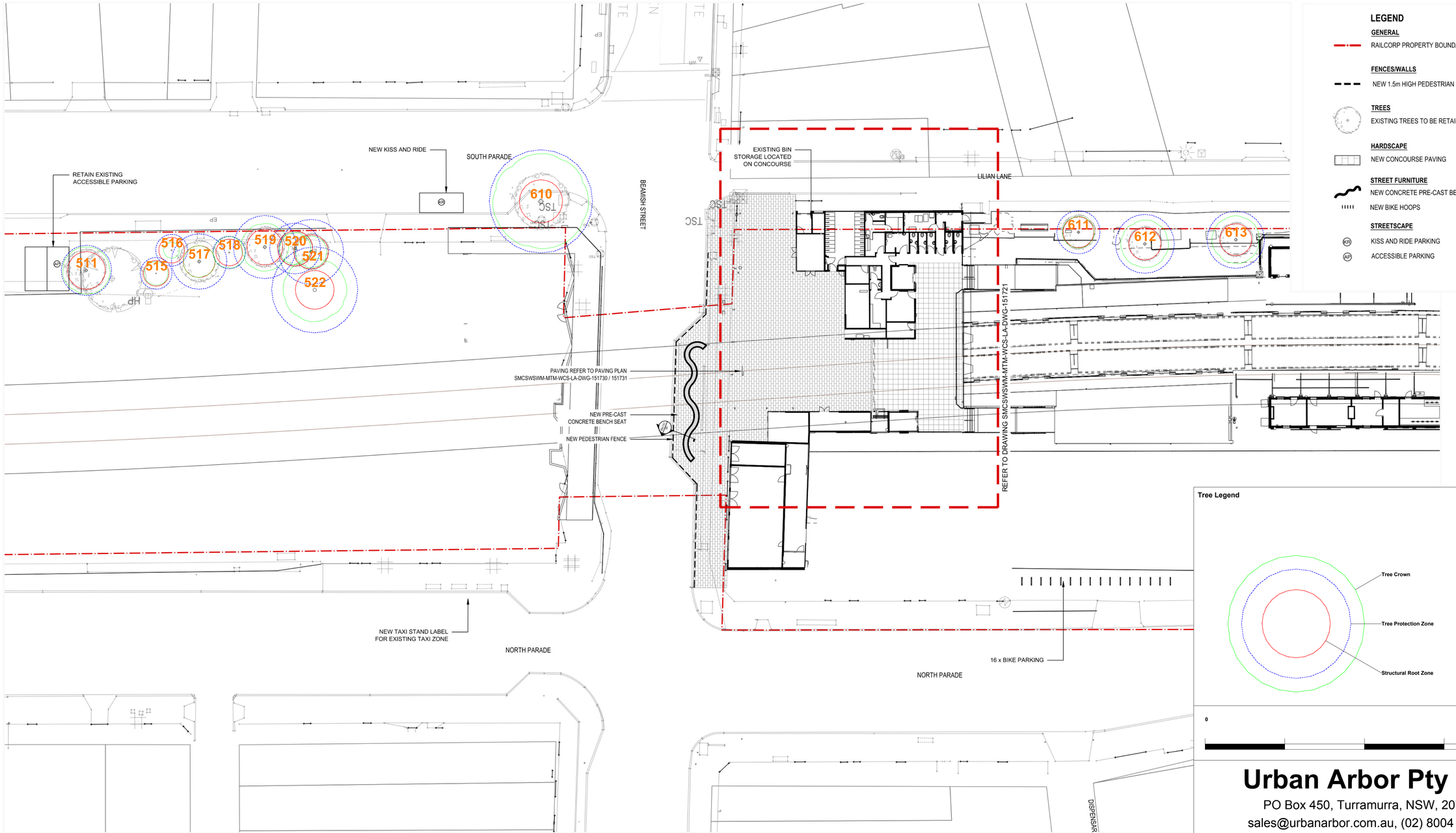
URBAN ARBOR
The Trusted Name in Tree Management

Appendix 1A: Proposed Site Plan Overview

Prepared by: Bryce Claassens

TO SYDNEY

TO BANKSTOWN



LEGEND

GENERAL
RAILCORP PROPERTY BOUNDARY

FENCES/WALLS
NEW 1.5m HIGH PEDESTRIAN FENCE

TREES
EXISTING TREES TO BE RETAINED

HARDSCAPE
NEW CONCOURSE PAVING

STREET FURNITURE
NEW CONCRETE PRE-CAST BENCH
NEW BIKE HOOPS

STREETSCAPE
KISS AND RIDE PARKING
ACCESSIBLE PARKING

Tree Legend

0 40m

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 : 250 @ A1	DATE : 17/12/2019

Appendix 1B: Proposed Site Plan

URBAN ARBOR
The Trusted Name in Tree Management

Prepared by: Bryce Claassens

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
511	Lemon Scented Teatree	*Leptospermum petersonii*	Mature	6	3	160	120	130	110		263	450	Good	Fair	Medium	2. Medium	A1	3.2	2.4	Located within nature strip. Canopy extends into corridor.
516	Lemon Scented Tea Tree	*Leptospermum petersonii*	Semi-mature	4.5	1	160					160	180	Fair	Fair	Low	5. Small/Young	Z1	2.0	1.6	Located within nature strip. Health in decline.
517	Sweet Pittosporum	*Pittosporum undulatum*	Mature	6	2	290					290	300	Good	Good	Medium	1. Long	A1	3.5	2.0	Located within nature strip.
518	Sweet Pittosporum	*Pittosporum undulatum*	Semi-mature	5	2	170					170	200	Good	Good	Low	5. Small/Young	Z1	2.0	1.7	Located within nature strip.
519	Weeping Bottlebrush	*Callistemon viminalis*	Mature	5	3	330					330	400	Good	Good	Medium	1. Long	A1	4.0	2.3	Located within nature strip.
520	Weeping Bottlebrush	*Callistemon viminalis*	Mature	5	2	150	150	160			266	380	Good	Fair	Medium	2. Medium	A1	3.2	2.2	Located within nature strip. Pruned for power lines.
521	Lemon Scented Tea Tree	*Leptospermum petersonii*	Mature	5	2	340					340	360	Good	Fair	Medium	2. Medium	A2	4.1	2.2	Located within nature strip. Trunk lean. Suppressed by adjacen tree.
522	Silky Oak	*Grevillea robusta*	Mature	10	4	450					450	480	Good	Good	Medium	1. Long	A1	5.4	2.4	Located within nature strip. Canopy extends into corridor.
610	London Plane	*Platanus x acerifolia*	Mature	19	6	540					540	620	Good	Fair	High	2. Medium	A1	6.5	2.7	Asymmetric crown shape due to power line clearance.
611	Blueberry Ash	*Elaeocarpus reticulatus*	Mature	6	2	160	160				226	280	Good	Fair	Medium	2. Medium	A1	2.7	1.9	Located within corridor. Co-dominant stems.
612	Blueberry Ash	*Elaeocarpus reticulatus*	Mature	6	3	250	180				308	310	Good	Good	Medium	1. Long	A1	3.7	2.0	Located within corridor.
613	Blueberry Ash	*Elaeocarpus reticulatus*	Mature	6	3	300					300	300	Good	Good	Medium	1. Long	A1	3.6	2.0	Located within corridor. DBH estimated at base.
614	Chinese Tallo	*Triadica sebifera*	Mature	7	3	180	220	150			321	400	Good	Fair	Medium	2. Medium	A1	3.9	2.3	Located within corridor. Co-dominant stems.
615	Queensland Silver Wattle	*Acacia podalyriifolia*	Mature	5	2	100	120				156	200	Fair	Fair	Low	5. Small/Young	Z3	2.0	1.7	Located within corridor. Exempt species.
616	Sweet Pittosporum	*Pittosporum undulatum*	Mature	6	4	260	220				341	550	Good	Good	Medium	1. Long	A1	4.1	2.6	Located within corridor. Co-dominant stems at base.
617	Black Teatree	*Melaleuca bracteata*	Semi-mature	6	1	180					180	200	Good	Good	Medium	2. Medium	A1	2.2	1.7	Located within corridor.
618	Weeping Bottlebrush	*Callistemon viminalis*	Semi-mature	6	1	200					200	200	Good	Fair	Medium	2. Medium	A1	2.4	1.7	Located within corridor. Multi stem.
619	Black Teatree	*Melaleuca bracteata*	Semi-mature	6	2	150	120	120	120		256	300	Good	Fair	Medium	2. Medium	A1	3.1	2.0	Located within corridor. Co-dominant stems.
620	Queensland Silver Wattle	*Acacia podalyriifolia*	Mature	5	2	200					200	200	Good	Fair	Low	5. Small/Young	Z3	2.4	1.7	Located within corridor. Exempt species.
621	Turpentine	*Syncarpia glomulifera*	Semi-mature	9	3	260					260	300	Good	Good	Medium	1. Long	A1	3.1	2.0	Located within corridor.
622	Black Teatree	*Melaleuca bracteata*	Semi-mature	5	1	120	100	100			185	250	Good	Fair	Medium	2. Medium	A1	2.2	1.8	Located within corridor. Multi stem.
623	Weeping Bottlebrush	*Callistemon viminalis*	Semi-mature	6	1	120					120	150	Poor	Fair	Low	4. Remove	Z4	2.0	1.5	Located within corridor. Advanced stages of decline.
624	Black Teatree	*Melaleuca bracteata*	Semi-mature	6	1.5	150	110				186	200	Good	Fair	Medium	2. Medium	A1	2.2	1.7	Located within corridor. Co-dominant stems.
625	Weeping Bottlebrush	*Callistemon viminalis*	Semi-mature	6	1	100	110	90			174	200	Good	Fair	Medium	1. Long	A1	2.1	1.7	Located within corridor. Multi stem.
626	Black Teatree	*Melaleuca bracteata*	Semi-mature	7	1.5	160					160	190	Good	Good	Medium	1. Long	A1	2.0	1.6	Located within corridor.
627	Black Teatree	*Melaleuca bracteata*	Semi-mature	6	2	160	110				194	260	Good	Fair	Medium	2. Medium	A1	2.3	1.9	Located within corridor. Co-dominant stems with bark inclusion
628	Weeping Bottlebrush	*Callistemon viminalis*	Semi-mature	5	1.5	250					250	250	Good	Good	Medium	1. Long	A1	3.0	1.8	Located within corridor. Multi stem.
629	Weeping Bottlebrush	*Callistemon viminalis*	Semi-mature	6	2	300					300	300	Good	Fair	Medium	2. Medium	A1	3.6	2.0	Located within corridor. Multi stem.
630	Weeping Bottlebrush	*Callistemon viminalis*	Semi-mature	6	2	140	140				198	220	Good	Good	Medium	1. Long	A1	2.4	1.8	Located within corridor. Multi stem.
631	Weeping Bottlebrush	*Callistemon viminalis*	Semi-mature	6	2	100	100	120			185	200	Good	Fair	Medium	2. Medium	A1	2.2	1.7	Located within corridor. Multi stem.
632	Weeping Bottlebrush	*Callistemon viminalis*	Semi-mature	6	2	180	160	150			284	260	Good	Good	Medium	1. Long	A1	3.4	1.9	Located within corridor. Multi stem.
633	Weeping Bottlebrush	*Callistemon viminalis*	Semi-mature	5	2	240					240	280	Good	Good	Medium	1. Long	A1	2.9	1.9	Located within corridor. Multi stem.
634	Weeping Bottlebrush	*Callistemon viminalis*	Semi-mature	5	2	150	140	110			233	220	Good	Good	Medium	1. Long	A1	2.8	1.8	Located within corridor. Multi stem.
635	Weeping Bottlebrush	*Callistemon viminalis*	Semi-mature	6	2	200					200	220	Good	Good	Medium	1. Long	A1	2.4	1.8	Located within corridor. Multi stem.
636	Black Teatree	*Melaleuca bracteata*	Semi-mature	6	1	160					160	180	Good	Fair	Medium	2. Medium	A1	2.0	1.6	Located within corridor. Suppressed.
637	Broad Leaved Paperbark	*Melaleuca quinquenervia*	Mature	9	3	340					340	390	Good	Fair	Medium	2. Medium	A1	4.1	2.2	Located within corridor. Suppressed by adjacent tree.
638	Port Jackson Fig	*Ficus rubiginosa*	Mature	12	7	760					760	840	Good	Good	High	1. Long	A1	9.1	3.1	Located within corridor.
639	White Cedar	*Melia azedarach*	Mature	7	3	280					280	320	Good	Good	Medium	2. Medium	A1	3.4	2.1	Located within corridor.
640	Peppercorn Tree	*Schinus molle*	Mature	15	9	500	650				820	1100	Good	Good	Medium	1. Long	A1	9.8	3.4	Located within corridor. Adjacent to platform.
641	Camphor Laurel	*Cinnamomum camphora*	Mature	10	5	350	300	300			550	750	Good	Fair	Medium	2. Medium	A1	6.6	2.9	Located within corridor. Vine cover on trunk.
642	Queensland Brushbox	*Lophostemon confertus*	Mature	10	5	500					500	550	Good	Fair	Medium	2. Medium	A1	6.0	2.6	Located within corridor. Vine cover on trunk.
643	Kurrajong	*Brachychiton populneus*	Mature	7	3	350					350	410	Good	Fair	Medium	2. Medium	A1	4.2	2.3	Vine cover on trunk.
644	Broad Leaved Privet	*Ligustrum lucidum*	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	*Cinnamomum camphora*	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.

Appendix 2 - Tree Inspection Schedule

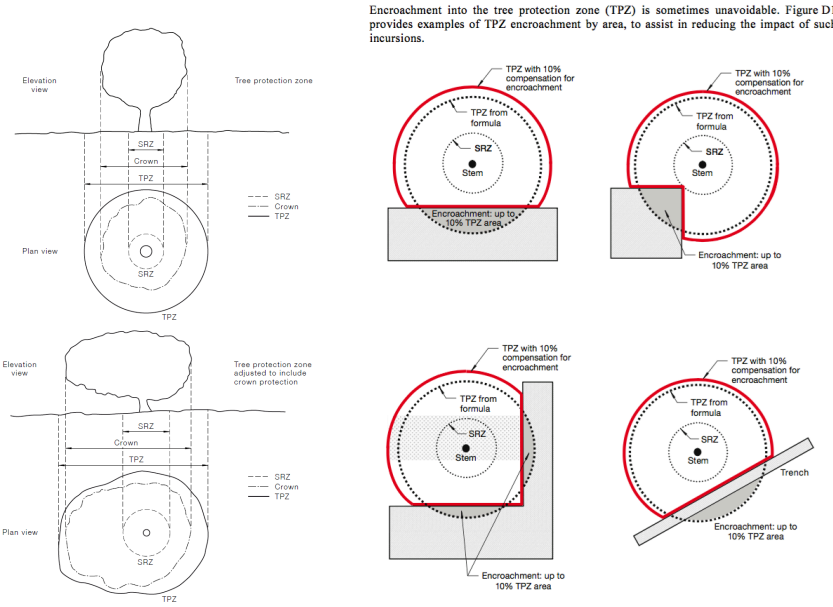
Tree ID	Common Name	Botanical Name	Age Class	Height (m)	Canopy Spread Radius (m	Stem 1	Stem 2	Stem 3	Stem 4	Stem 5	DBH (mm)	DAB (mm)	Health	Structure	Amenity Value	SULE	Retention Value	TPZ Radius (m)	SRZ Radius (m)	Notes

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.
   SRZ radius = $(D \times 50)^{0.42} \times 0.64$ (D = 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.

Category	Example condition	Summary
Good	• 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.	• The tree is in above average health and condition and no remedial works are required.
Fair	• 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.	• The tree is in below average health and condition and may require remedial works to improve the trees health.
Poor	• The 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.	• The tree is displaying low levels of health and removal or remedial works may be required.
Dead	• The tree is dead or almost dead.	• The tree should generally be removed.

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

Category	Example condition	Summary
Good	• 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.	• The tree is considered structurally good with well developed form.
Fair	• The tree may have minor structural defects within the structure of the crown that could potentially develop into more significant defects. • The tree may 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.	• 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	• 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.	• 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 statuary 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
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.

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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

Incorporating extracts from Lonsdale, D. 1999. Principles of Tree Hazard Assessment. Her Majesty's Stationary Office, London

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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

Incorporating extracts from Lonsdale, D. 1999. Principles of Tree Hazard Assessment. Her Majesty's Stationary Office, London

APPENDIX 8 CAMPSIE AIA (PLATAEU TREES)

PLATEAUTREES
Safety. Quality. Progress.

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 undertake 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.

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

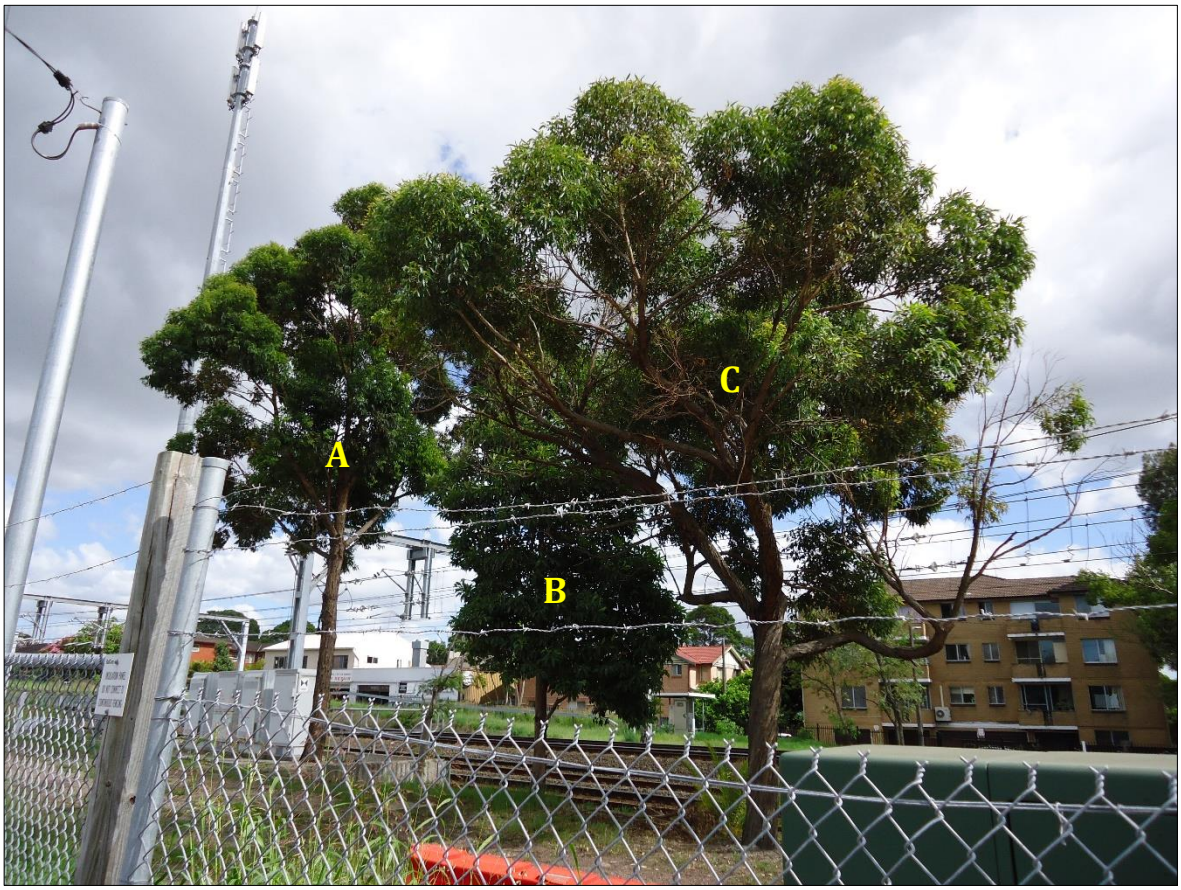
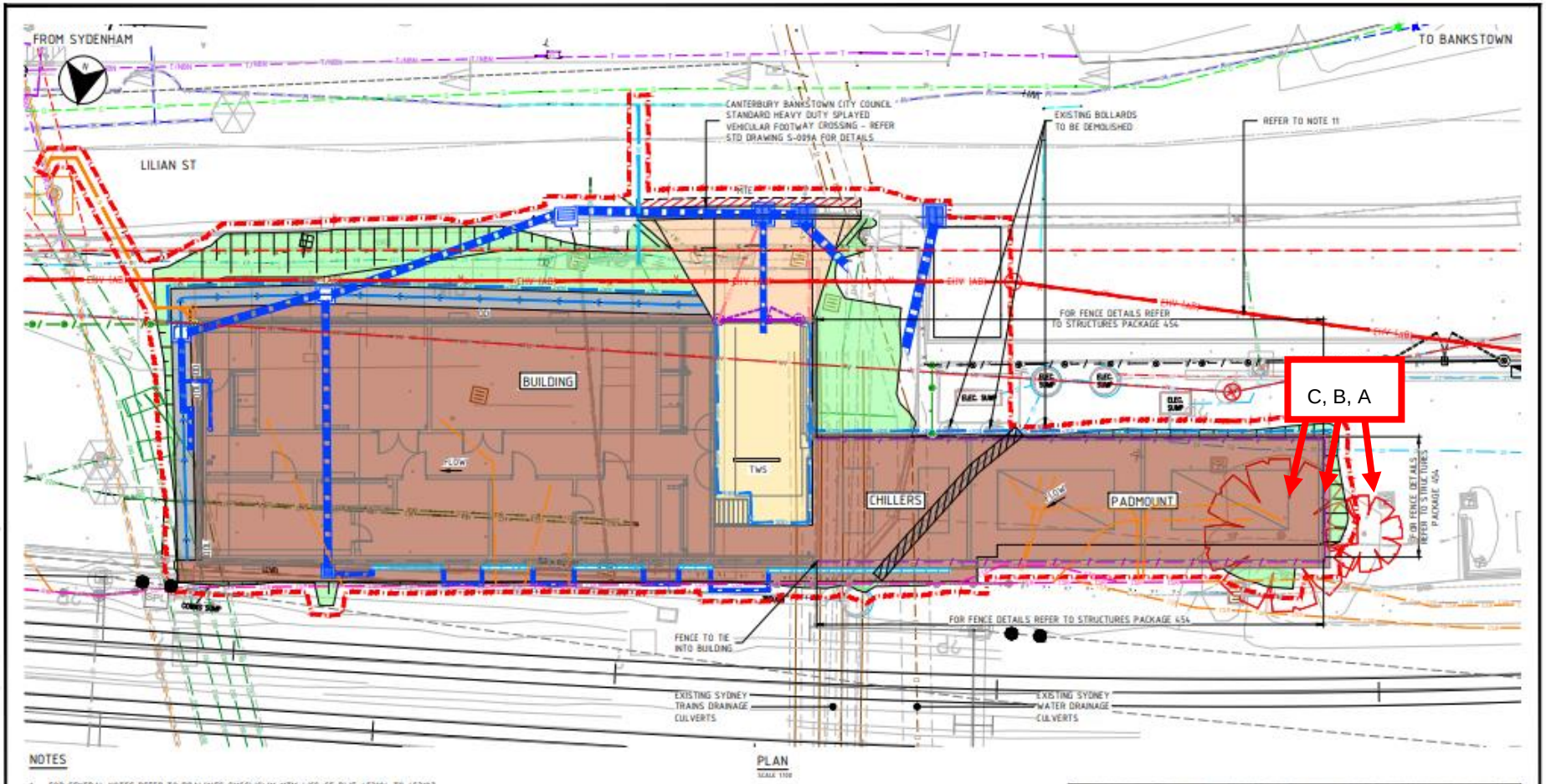


Image 2: The three additional trees identified for removal as part of the Southwest Metro Package works.



NOTES

1. FOR GENERAL NOTES REFER TO DRAWINGS SMCSWSWM-MTM-WCS-CE-DWG-453104 TO 453107.
2. FOR LEGEND REFER TO DRAWING SMCSWSWM-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 SMCSWSWM-MTM-WCS-CE-DWG-453161.
5. FOR BULK EARTHWORKS CUT AND FILL PLAN REFER DRAWING SMCSWSWM-MTM-WCS-CE-DWG-453201.
6. FOR BULK EARTHWORKS GRADING PLAN AND LONGITUDINAL SECTION REFER TO DRAWING SMCSWSWM-MTM-WCS-CE-DWG-453206.
7. FOR DRAINAGE LAYOUT REFER TO DRAWING SMCSWSWM-MTM-WCS-CE-DWG-453301.
8. FOR CSR LAYOUT REFER TO DRAWING SMCSWSWM-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 SMCSWSWM-MTM-WCS-CE-DWG-453501.
10. FOR AUSGRID LOCATION NOTES REFER TO UTILITIES LAYOUT DRAWING SMCSWSWM-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.

DRAWING COLOUR CODED - PRINT ALL COPIES IN COLOUR

NOT FOR CONSTRUCTION

REV	BY	DATE	DESCRIPTION	APPD
C	TL	18.12.2020	ISSUED FOR STAGE 3	LR
B	TL	06.06.2020	ISSUED FOR STAGE 2	LR
A	RT	08.11.2019	ISSUED FOR STAGE 1	LR

SCALES: 1 : 500 FULL SIZE A1

CLIENT: NSW GOVERNMENT | sydney METRO

SERVICE PROVIDERS: METRON T2M

DRAWN: A. BATMAN
DESIGNED: [illegible]
DRG CHECK: P. ALFORD
DESIGN CHECK: T. LEE
APPROVED: L. PALMER 18.12.2020

SYDNEY METRO
CAMPSIE STATION - SERVICE BUILDING
CIVIL ENGINEERING
SERVICE: BUILDING - CIVIL
GENERAL ARRANGEMENT PLAN

STATUS: STAGE 3 | SHEET 2 OF 2

DRG No: SMCSWSWM-MTM-WCS-CE-DWG-453111 | REV: C

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-WCS-CE-DWG-453111 0

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	*Eucalyptus microcorys* (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	*Lophostemon confertus* (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	*Eucalyptus microcorys* (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 crow, 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 (1^{st}) and possibly (2^{nd}) 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 (PLATAEU TREES)

PLATEAUTREES
Safety. Quality. Progress.

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 undertake 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

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ABN : 17 090 798 002

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 shorth term growth and physiological function can be expected as a result of the pruning works. **Appendix 2** photographs 1 to 4 shows these trees.

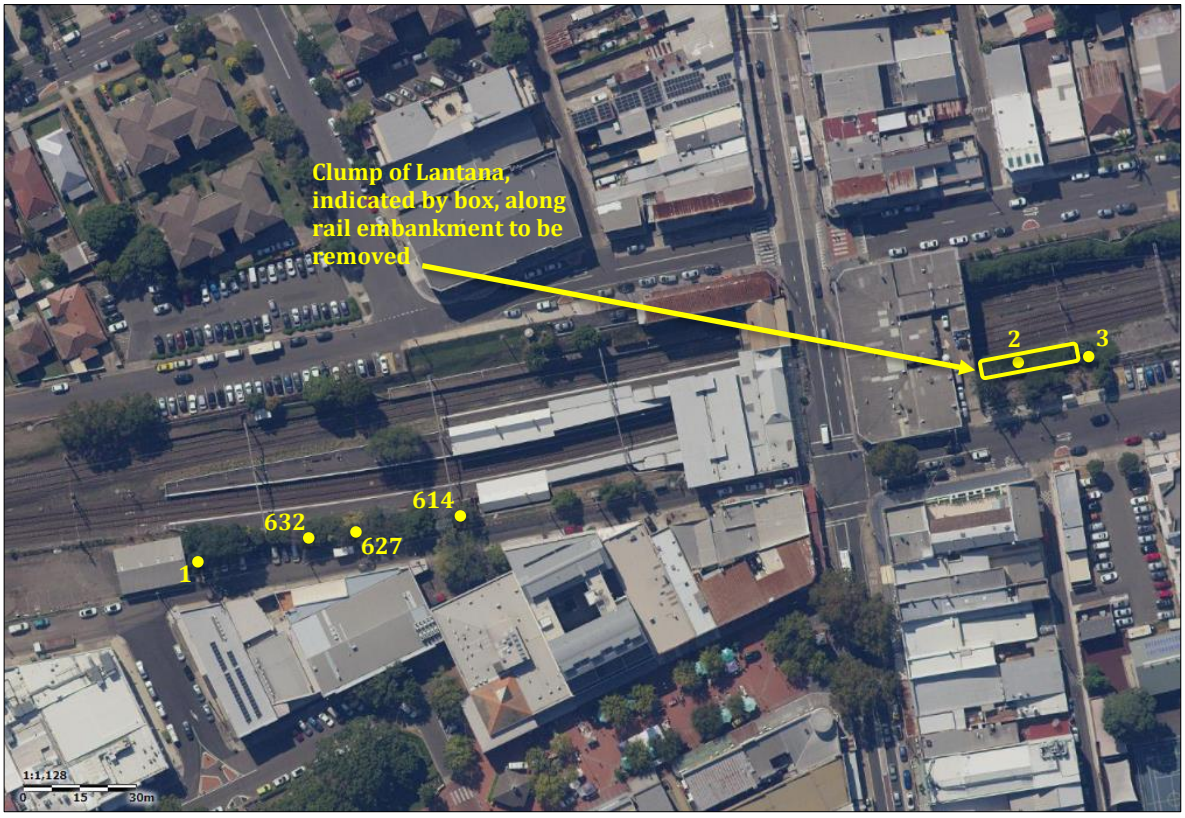


Image 1: Aerial image of Campsie station showing the approximate locations of assessed trees. (*Source: Six Maps accessed 21/06/2021*).

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 located 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

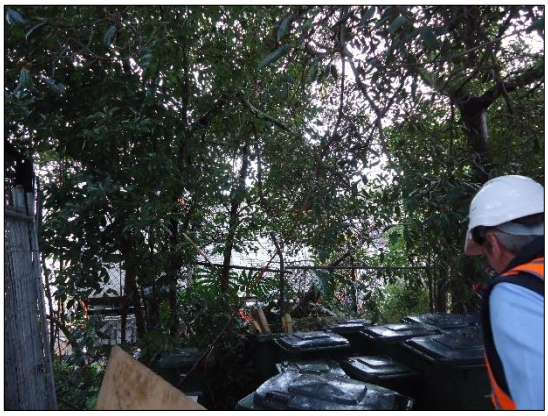
Consulting Arborist
Plateau Tree Service

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	*Cinnamomum camphora* (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	*Celtis* sinensis (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	*Celtis* sinensis (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	*Triadica sebifera* (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	*Melaleuca bracteata* (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	*Callistemon viminalis* (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.

FROM SYDENHAM

TO BANKSTOWN

PROPOSED RELOCATED ZONE FOR END OF PLATFORM STAIRS. REFER TO PACKAGE 151000

GST ALIGNMENT. GST AS PER DRAWING SMCSWSWM-MTM-WBS-CE-DWG-213435, CONTAINING A CENTRALLY POSITIONED SEPARATOR

SETOUT (324586.552, 6246126.707)

BURIED CONDUIT ROUTE TO GST TRANSITION, AS PER SPG 0705 DRAWING 112000 / 8 / 2. SETOUT (324535.275, 6246118.430)

BURIED CONDUIT ROUTE TO CONTINUE BETWEEN EXISTING FENCE & GLT

LCR TO RADIO POLE REFER TO SECTION TL04 DRAWING SMCSWSWM-MTM-WCS-CE-DWG-153451

E04 153422

A

T01 153450

T02 153450

T03 153450

E05 153422

WCS-PIT04

SETOUT (324559.717, 6246121.112)

SETOUT (324543.221, 6246120.128)

SETOUT (324514.687, 6246114.032)

DOWN MSW

UP MSW

DOWN GOODS

UP GOODS

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

DANGER SIGN AS PER CV 0282111 TO BE ATTACHED TO END OF PLATFORM GATE

DANGER SIGN AS PER CV 0282111 TO BE ATTACHED TO GST

PITLESS ULX FROM GST REFER TO SECTION A, DRAWING SMCSWSWM-MTM-WCS-CE-DWG-153461

LCR TO GAK REFER TO TL02 153451

LCR TO DCS VIA BALLAST CRIB. REFER TO SMCSWSWM-MTM-WCS-CE-DWG-153451

LIMIT OF SWM CSR DPK 453 REFER TO SWM CSR DPK 453

ADJOINS SMCSWSWM-MTM-WCS-CE-DWG-153411

ADJOINS SMCSWSWM-MTM-WCS-CE-DWG-153413

CAMPSIE DEPOT OFFICE

PUBLIC CARPARK

LILIAN

WILFRED AVENUE

12km 280 12km 300 12km 320 12km 340 12km 360 12km 380 12km 400 12km 420 12km 440 12km 460

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.
3. FOR CORRIDOR CSR WORKS, REFER TO S2B CSR DPK 660.

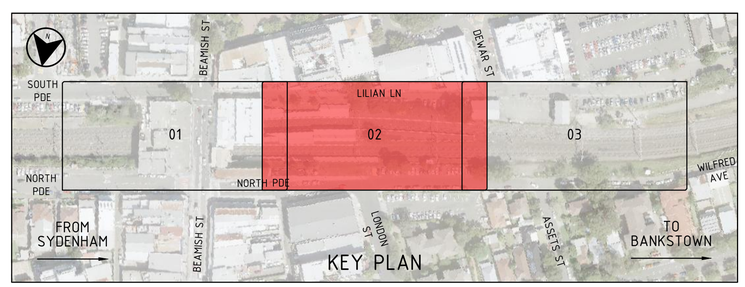
LEGEND

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
- 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: 2.5 0 2.5 5 7.5m — 1 : 250 FULL SIZE A1

CLIENT: NSW GOVERNMENT | sydney METRO

SERVICE PROVIDERS: METRON T2M

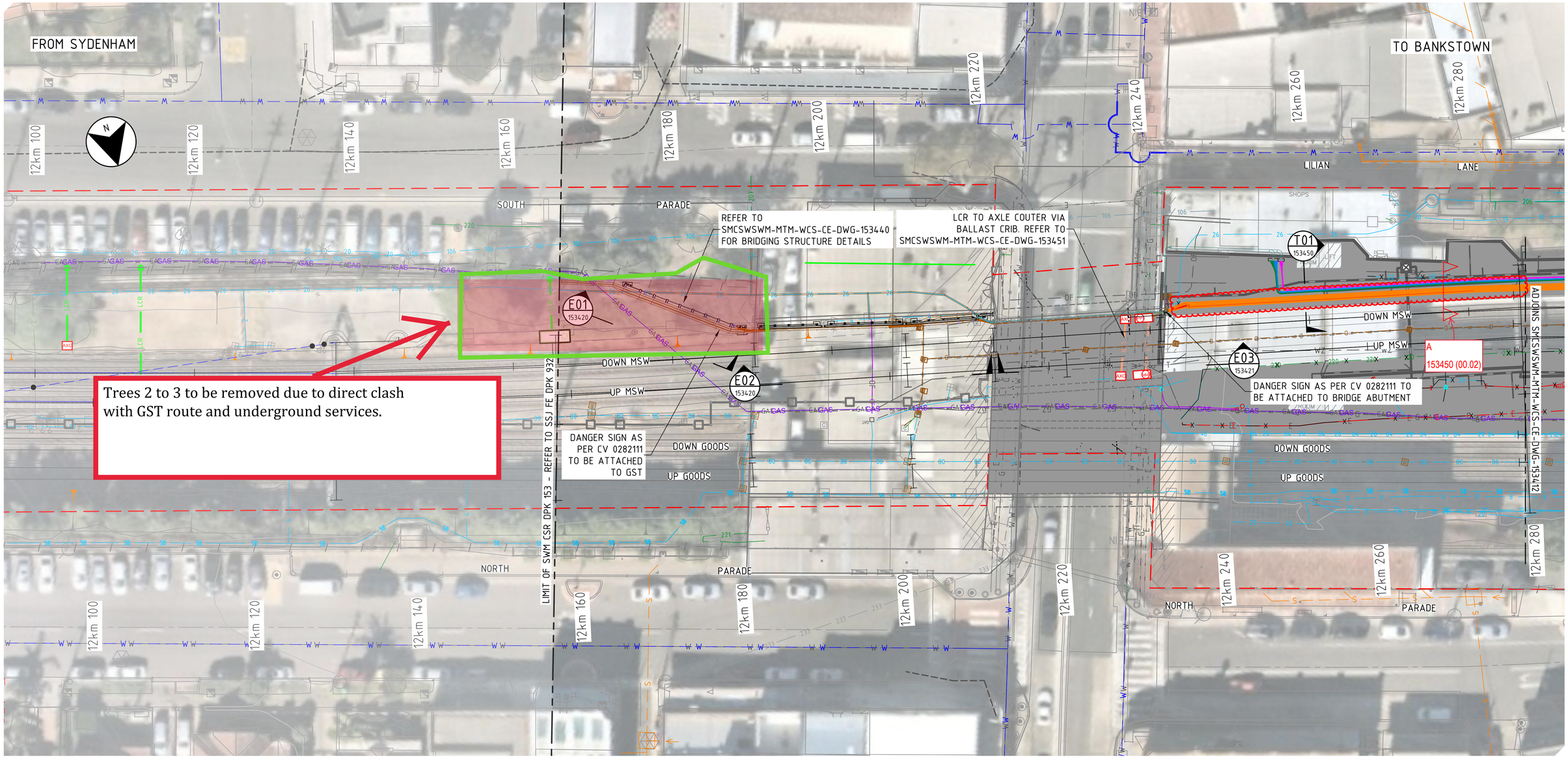
DRAWN H.HU & A.DILLON
DESIGNED N.JALILIAN
DRG CHECK P.ALFORD
DESIGN CHECK O.COLE & A.SHANTIA
APPROVED L.PALMER 20/08/2021

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

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-WCS-CE-DWG-153412



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.

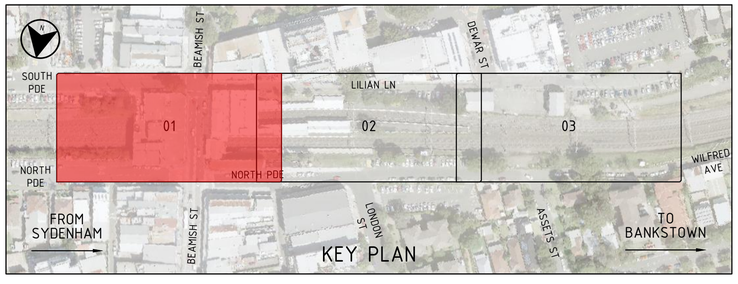
LEGEND

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 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.
00.02	OC	24/05/21	HV CONDUIT REDLINE MARKUP	LP
00	NJ	14/04/2021	APPROVED FOR CONSTRUCTION	LP

SCALES
2.5 0 2.5 5 7.5m
1 : 250 FULL SIZE A1

CLIENT: NSW GOVERNMENT | 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

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-WCS-CE-DWG-153411

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 crow, 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 (PLATAEU TREES)

PLATEAUTREES
Safety. Quality. Progress.

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 undertake 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 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

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ABN : 17 090 798 002

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 Botanical name Common name	Tree dimensions Height (m)	Spread (m)	D.B.H. (mm)	D.A.B. (mm)	Vigour	Condition	Age class	ULE	Amenity and Visual Value	Native or Exotic	TPZ (m)	SRZ (m)	Comments	Remove or Retain
515	*Cotoneaster* 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	*Leptospourum petersonii* (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	*Pittosporum undulatum* (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	*Callistemon viminalis* (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	*Acacia podalyrifolia* (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	*Pittosporum undulatum* (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	*Acacia podalyrifolia* (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	*Syncarpia glomulifera* (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	*Melaleuca bracteata* (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	*Callistemon viminalis* (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	*Melaleuca bracteata* (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	*Callistemon viminalis* (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	*Melaleuca bracteata* (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	*Callistemon viminalis* (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	*Callistemon viminalis* (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	*Callistemon viminalis* (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	*Callistemon viminalis* (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	*Callistemon viminalis* (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	*Callistemon viminalis* (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	*Callistemon viminalis* (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	*Callistemon viminalis* (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 Leptospurum 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 621 *Callistemon viminalis* (Weeping Bottlebrush) is shown for reference.

FROM SYDENHAM

TO BANKSTOWN

PROPOSED RELOCATED ZONE FOR END OF PLATFORM STAIRS. REFER TO PACKAGE 151000

GST ALIGNMENT. GST AS PER DRAWING SMCSWSWM-MTM-WBS-CE-DWG-213435, CONTAINING A CENTRALLY POSITIONED SEPARATOR

SETOUT (324586.552, 6246126.707)

BURIED CONDUIT ROUTE TO GST TRANSITION, AS PER SPG 0705 DRAWING 112000 / 8 / 2. SETOUT (324535.275, 6246118.430)

BURIED CONDUIT ROUTE TO CONTINUE BETWEEN EXISTING FENCE & GLT

LCR TO RADIO POLE REFER TO SECTION TL04 DRAWING SMCSWSWM-MTM-WCS-CE-DWG-153451

E04 153422

A

T01 153450

T02 153450

T03 153450

E05 153422

WCS-PIT04

SETOUT (324559.717, 6246121.112)

SETOUT (324543.221, 6246120.128)

SETOUT (324514.687, 6246114.032)

DOWN MSW

UP MSW

DOWN GOODS

UP GOODS

ADJOINS SMCSWSWM-MTM-WCS-CE-DWG-153411

ADJOINS SMCSWSWM-MTM-WCS-CE-DWG-153413

LIMIT OF SWM CSR DPK 453 REFER TO SWM CSR DPK 453

DANGER SIGN AS PER CV 0282111 TO BE ATTACHED TO END OF PLATFORM GATE

DANGER SIGN AS PER CV 0282111 TO BE ATTACHED TO GST

PITLESS ULX FROM GST REFER TO SECTION A, DRAWING SMCSWSWM-MTM-WCS-CE-DWG-153461

LCR TO GAK REFER TO TL02 153451

LCR TO DCS VIA BALLAST CRIB. REFER TO SMCSWSWM-MTM-WCS-CE-DWG-153451

CAMPSIE DEPOT OFFICE

PUBLIC CARPARK

LILIAN

WILFRED AVENUE

12km 280 12km 300 12km 320 12km 340 12km 360 12km 380 12km 400 12km 420 12km 440 12km 460

Trees 615, 616, 620, 621, 622, 623, 624, 625, 626, 628, 629 630, 631, 633, 635 & 636 to be removed due to direct clash with underground services, GST pathway and Platform 2 retaining wall.

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.
3. FOR CORRIDOR CSR WORKS, REFER TO S2B CSR DPK 660.

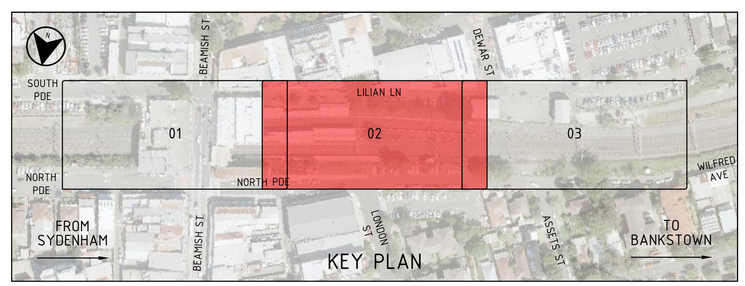
LEGEND

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
- 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: 2.5 0 2.5 5 7.5m — 1 : 250 FULL SIZE A1

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-WCS-CE-DWG-153412

CLIENT: NSW GOVERNMENT | sydney METRO

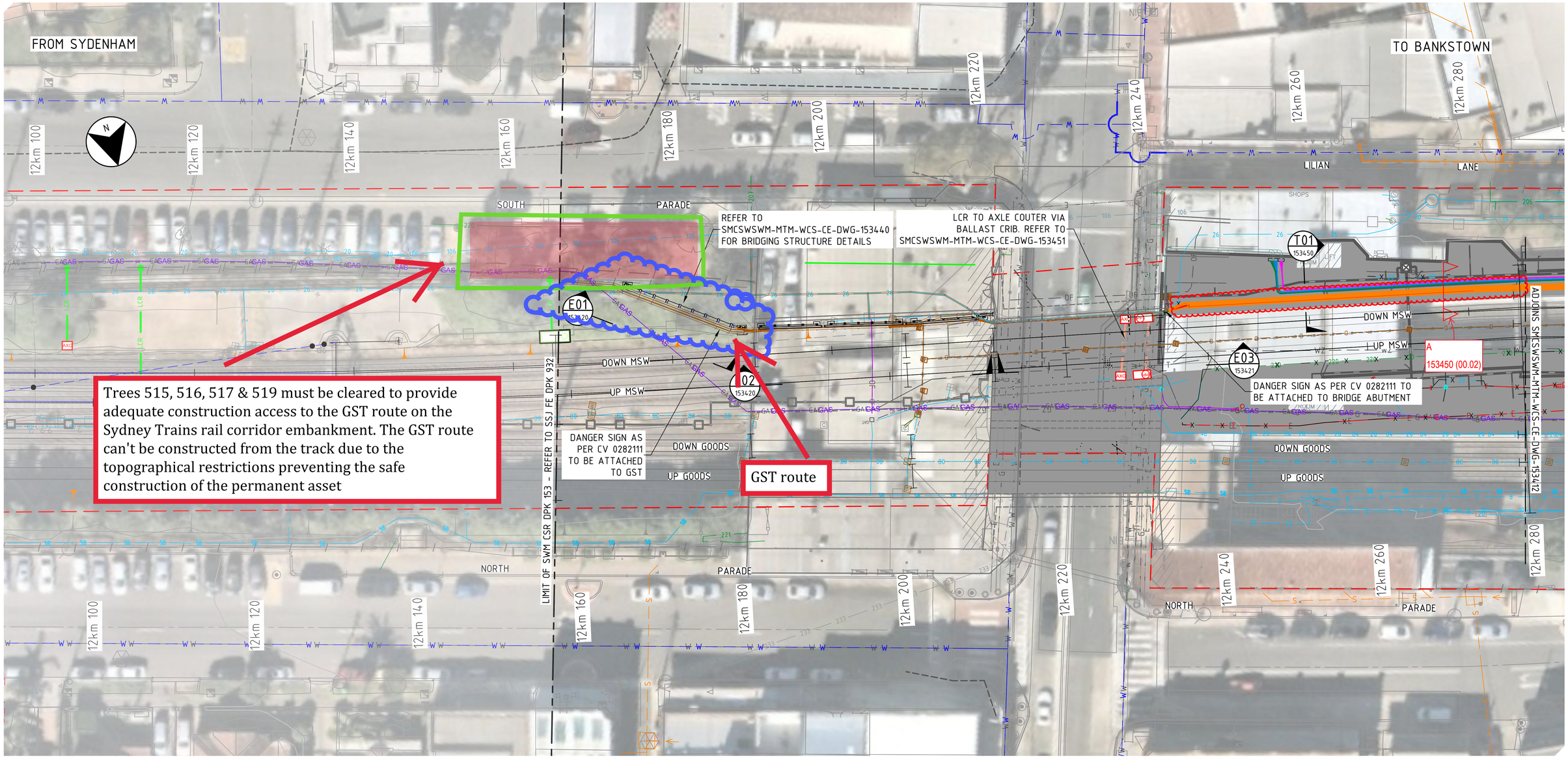
SERVICE PROVIDERS: METRON T2M

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



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

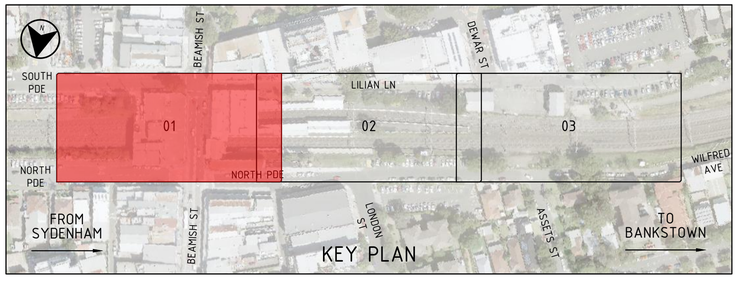
- LCR - LOW VOLTAGE
- LCR - COMMUNICATIONS
- LCR - SIGNALLING

OTHER

- CSR - PROPOSED GST ROUTE
- CSR - PROPOSED CABLE TRAY ROUTE
- CSR - PROPOSED PIT
- LCR - PROPOSED TRENCH ROUTE
- LCR - PROPOSED 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.
00.02	OC	24/05/21	HV CONDUIT REDLINE MARKUP	LP
00	NJ	14/04/2021	APPROVED FOR CONSTRUCTION	LP

SCALES
2.5 0 2.5 5 7.5m
1 : 250 FULL SIZE A1

CLIENT: NSW GOVERNMENT | 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

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-WCS-CE-DWG-153411

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 crow, 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)

URBAN ARBOR
The Trusted Name in Tree Management

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: 12 December 2019
Ref: 19/12/12/SWMMS

URBAN ARBOR
The Trusted Name in Tree Management

Table of Contents

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URBAN ARBOR
The Trusted Name in Tree Management

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) Landscape Design Package No. 11, Metron T2M, SMCSWSWM-MTM-WDH-LA-PKG-121000, 11 October 2019, Including:

Dulwich Hill Station		
SMCSWSWM-MTM-WDH-LA-DWG-121700	B	LANDSCAPE DESIGN - COVER SHEET AND DRAWING LIST - SHEET 1 of 19
SMCSWSWM-MTM-WDH-LA-DWG-121701	B	LANDSCAPE DESIGN - NOTES PAGE & LEGEND - SHEET 2 of 19
SMCSWSWM-MTM-WDH-LA-DWG-121702	B	LANDSCAPE DESIGN - DEMOLITION PLAN - SHEET 3 of 19
SMCSWSWM-MTM-WDH-LA-DWG-121710	B	LANDSCAPE DESIGN - GENERAL - PRECINCT PLAN - SHEET 4 of 19
SMCSWSWM-MTM-WDH-LA-DWG-121720	B	LANDSCAPE DESIGN - GENERAL - PRECINCT PLAN - PLAZA - SHEET 5 of 19
SMCSWSWM-MTM-WDH-LA-DWG-121725	A	LANDSCAPE DESIGN - LIGHTING PLAN - EWART LANE - SHEET 6 of 19
SMCSWSWM-MTM-WDH-LA-DWG-121726	A	LANDSCAPE DESIGN - LIGHTING PLAN - BEDFORD CRESENT - SHEET 7 of 19
SMCSWSWM-MTM-WDH-LA-DWG-121730	A	LANDSCAPE DESIGN - PAVING PLAN - EWART LANE - SHEET 8 of 19
SMCSWSWM-MTM-WDH-LA-DWG-121733	A	LANDSCAPE DESIGN - LEVELS PLAN - EWART LANE - SHEET 9 of 19
SMCSWSWM-MTM-WDH-LA-DWG-121740	A	LANDSCAPE DESIGN - PLANTING PLAN - EWART LANE - SHEET 10 of 19
SMCSWSWM-MTM-WDH-LA-DWG-121750	A	LANDSCAPE DESIGN - TYPICAL SECTIONS - SHEET 1 - SHEET 11 of 19
SMCSWSWM-MTM-WDH-LA-DWG-121751	A	LANDSCAPE DESIGN - TYPICAL SECTIONS - SHEET 2 - SHEET 12 of 19
SMCSWSWM-MTM-WDH-LA-DWG-121752	A	LANDSCAPE DESIGN - TYPICAL SECTIONS - SHEET 3 - SHEET 13 of 19
SMCSWSWM-MTM-WDH-LA-DWG-121760	A	LANDSCAPE DESIGN - TYPICAL DETAILS - SHEET 1 - SHEET 14 of 19
SMCSWSWM-MTM-WDH-LA-DWG-121761	A	LANDSCAPE DESIGN - TYPICAL DETAILS - SHEET 2 - SHEET 15 of 19
SMCSWSWM-MTM-WDH-LA-DWG-121762	A	LANDSCAPE DESIGN - TYPICAL DETAILS - SHEET 3 - SHEET 16 of 19
SMCSWSWM-MTM-WDH-LA-DWG-121763	A	LANDSCAPE DESIGN - TYPICAL DETAILS - SHEET 4 - SHEET 17 of 19
SMCSWSWM-MTM-WDH-LA-DWG-121770	B	LANDSCAPE DESIGN - PLANTING SCHEDULE - SHEET 18 of 19
SMCSWSWM-MTM-WDH-LA-DWG-121771	B	LANDSCAPE DESIGN - MATERIAL SCHEDULE - SHEET 19 of 19

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.

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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.

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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.

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[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).

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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) 2011[5] and Development Control Plan (DCP) 2011.[6] The site has been identified as a heritage item (item number I316) in the LEP heritage maps.[7] The site has been identified as containing biodiversity in the LEP Natural Resource Biodiversity maps.[8]

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 x 50) $^{0.42}$ x 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.

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5 *Marrickville Local Environmental Plan 2011*, https://www.legislation.nsw.gov.au/#/view/EPI/2011/645/full, accessed 11 December 2019.

6 *Marrickville Development Control Plan 2011*, https://www.innerwest.nsw.gov.au/develop/planning-controls/current-development-control-plans-dcp/marrickville-dcp, accessed 11 December 2019.

7 *Marrickville LEP Heritage map - Sheet HER_002*, https://legislation.nsw.gov.au/maps/14391361-91d4-4b7f-86d5-b2f4d6a79fd6/5200_COM_HER_002_010_20170707.pdf, accessed 11 December 2019.

8 *Marrickville LEP Natural Resource Biodiversity map - Sheet NRB_002*, https://legislation.nsw.gov.au/maps/df0a5a54-fe19-696a-ac57-a2dcc4b418b1/5200_COM_NRB_002_010_20130911.pdf, accessed 11 December 2019.

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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.

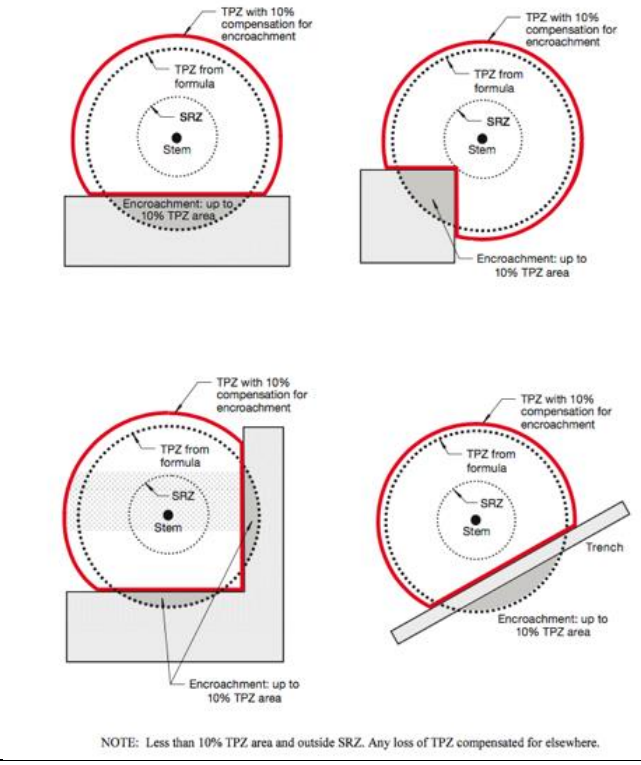

Image 1: Example minor TPZ encroachment from AS4970-2009.

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).

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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 Lighting Plan 1
- Appendix 1B: Proposed Lighting Plan 2
- Appendix 1C: Proposed Landscape 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
563	*Cupaniopsis anacardioides*	Z1	2.0	12.6	1.5	None	No proposed TPZ encroachment.	Retain and protect
564	*Cupaniopsis anacardioides*	A1	4.8	72.4	2.5	Minor	The proposed pole top lighting will encroach into the TPZ by less than 5% and not into the SRZ. This is considered to be a minor and acceptable TPZ encroachment and the proposed works will not significantly impact the tree.	Retain and protect
565	*Cupaniopsis anacardioides*	A1	4.3	58.1	2.3	Minor	The proposed shelter and seat will encroach into the TPZ by 5% (3.1m^2) but not into the SRZ. The proposed pole top lighting will encroach into the TPZ by less than 1%, bringing the total TPZ encroachment to 6%. This is considered to be a minor and acceptable TPZ encroachment and the proposed works will not significantly impact the tree.	Retain and protect
566	*Cupaniopsis anacardioides*	Z1	2.0	12.6	1.6	Major	The proposed pole top lighting will encroach into the TPZ and SRZ of the tree. 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 pole top lighting must be constructed in accordance with section 9.2.1 of this report.	Retain and protect*
567	*Cupaniopsis anacardioides*	Z1	2.0	12.6	1.8	Major	The proposed pole top lighting will encroach into the TPZ and SRZ of the tree. 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 pole top lighting must be constructed in accordance with section 9.2.1 of this report.	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
568	*Cupaniopsis anacardioides*	Z1	2.0	12.6	1.6	Major	The proposed pole top lighting will encroach into the TPZ and SRZ of the tree. 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 pole top lighting must be constructed in accordance with section 9.2.1 of this report.	Retain and protect*
569	*Cupaniopsis anacardioides*	Z1	2.0	12.6	1.5	None	No proposed TPZ encroachment.	Retain and protect
570	*Cupaniopsis anacardioides*	Z1	2.0	12.6	1.5	None	No proposed TPZ encroachment.	Retain and protect
571	*Cupaniopsis anacardioides*	Z1	2.0	12.6	1.5	None	No proposed TPZ encroachment.	Retain and protect
572	*Cupaniopsis anacardioides*	Z1	2.0	12.6	1.5	None	No proposed TPZ encroachment.	Retain and protect
573	*Cupaniopsis anacardioides*	Z1	2.0	12.6	1.5	None	No proposed TPZ encroachment.	Retain and protect
574	*Backhousia citriodora*	Z1	2.0	12.6	1.5	None	No proposed TPZ encroachment.	Retain and protect
575	*Backhousia citriodora*	Z1	2.0	12.6	1.5	None	No proposed TPZ encroachment.	Retain and protect
576	*Backhousia citriodora*	Z1	2.0	12.6	1.5	None	No proposed TPZ encroachment.	Retain and protect
577	*Cinnamomum camphora*	Z9	3.8	45.4	2.1	Major	The proposed pole top lighting will encroach into the TPZ and SRZ of the tree. 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 pole top lighting must be constructed in accordance with section 9.2.1 of this report.	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
578	*Cinnamomum camphora*	Z9	3.0	28.3	2.3	Major	The proposed pole top lighting will encroach into the TPZ and SRZ of the tree. 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 pole top lighting must be constructed in accordance with section 9.2.1 of this report.	Retain and protect*
G12	*Mixed spp*	Z3	2.0	12.6	1.6	Major	Group of mixed species trees located within the rail corridor. All species within the group are weed/exempt species. The proposed pole top lighting will encroach into the TPZ and SRZ of multiple trees within the group. This is considered to be a major TPZ encroachment and the proposed works could potentially impact the condition and stability of the trees. To reduce the impact to the tree, the proposed pole top lighting must be constructed in accordance with section 9.2.1 of this report. Minor pruning may also be required for trees located directly adjacent to the pole top lighting. Any required pruning must be assessed and approved by the project arborist/relevant authorities prior to the works commencing.	Retain and protect*
579	*Triadica sebifera*	A1	2.0	12.6	1.7	None	No proposed TPZ encroachment.	Retain and protect
580	*Liquidambar styraciflua*	A1	2.2	15.2	1.7	None	No proposed TPZ encroachment.	Retain and protect
581	*Ficus rubiginosa*	A1	3.8	45.4	2.4	Minor	The proposed pole top lighting will encroach into the TPZ by less than 5% and not into the SRZ. This is considered to be a minor and acceptable TPZ encroachment and the proposed works will not significantly impact the tree.	Retain and protect
582	*Casuarina glauca*	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

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Tree ID	Species	Retention value	TPZ radius (m)	TPZ area (m^2)	SRZ radius (m)	TPZ encroachment	Discussion/ Conclusion	Recommendation
583	*Casuarina glauca*	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	*Casuarina glauca*	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	*Casuarina glauca*	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
586	*Casuarina glauca*	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	*Casuarina glauca*	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

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Tree ID	Species	Retention value	TPZ radius (m)	TPZ area (m^2)	SRZ radius (m)	TPZ encroachment	Discussion/ Conclusion	Recommendation
588	*Casuarina glauca*	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	*Casuarina glauca*	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
590	*Casuarina glauca*	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
		A	Z
Trees to be removed	Building construction, new surfacing and/or proximity, or trees in poor condition.	None	582, 583, 584, 585, 586, 587, 588, 589, 590 (Nine trees)
Retained trees subject to TPZ encroachment greater than 10%	Removal of existing surfacing/structures and/or installation of new surfacing/structures.	None	566, 567, 568, 577, 578, G12 (Five trees and One group of trees)
Retained trees subject to TPZ encroachment of 10% or less	Removal of existing surfacing/structures and/or installation of new surfacing/structures.	564, 565, 579, 580, 581 (Five trees)	563, 569, 570, 571, 572, 573, 574, 575, 576 (Nine trees)

9.2 **Construction Design/Specification Requirements:** The proposed construction will encroach into the TPZ and SRZ of all trees included in this report. 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 **Power Pole:** To ensure the trees are not significantly impacted by the works, all footings must be excavated manually. The footing location must be flexible to avoid the severance of significant roots 40mm and greater in diameter. No footings are to be located within the SRZ or root investigations will be required to determine the post location. If underground services are required, they must be installed in accordance with section 11.11 of this report. If any canopy pruning is required to accommodate the installation of the power poles, the pruning must be completed in accordance with AS4373-2007 Pruning of Amenity Trees.

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9.3 **Photographs**

Image 1: Looking South East towards the public footpath where pole top lighting is proposed G12 is to the right of the photograph behind the fencing.

Image 2: Looking North towards trees 586, 587, 588, 589 and 590. The trees have been recommended for removal due to construction impacts from the proposed hard surfacing excavations.

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10. RECOMMENDATIONS

10.1 This report assesses the impact of a proposed development at the subject site to twenty-eight (28) 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 Lighting Plan 1
- Appendix 1B: Proposed Lighting Plan 2
- Appendix 1C: Proposed Landscape Plan

10.3 Nine (9) trees have been recommended for removal within this report, including tree 582, 583, 584, 585, 586, 587, 588, 589 and 590. These nine trees are lower value category Z retention value trees that generally should not be a constraint to development works.

10.4 Five (5) trees and one (1) group of trees will be subject to TPZ encroachments greater than 10%, including tree 566, 567, 568, 577, 578 and G12. 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 fourteen (14) trees will be subject to minor and acceptable TPZ encroachments of 10% or less and can be retained in a viable condition, including tree 563, 564, 565, 569, 570, 571, 572, 573, 574, 575, 576, 579, 580 and 581.

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 No services plan has been assessed in this report. 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.

10.9 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.

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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
563	*Cupaniopsis anacardioides*	2.0	1.5	Retain and protect. Fencing is to create a combined exclusion zone for tree 563, 564 and 565. The fencing is to run along the edge of the existing hard surfacing and is to encompass the garden bed area adjacent to the trees. TPZ signage is required on the fencing. The fencing can only be moved under the approval of the project arborist.
564	*Cupaniopsis anacardioides*	4.8	2.5	Retain and protect. See tree protection for tree 563.
565	*Cupaniopsis anacardioides*	4.3	2.3	Retain and protect. See tree protection for tree 563.

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566	*Cupaniopsis anacardioides*	2.0	1.6	Retain and protect. Fencing is to create a combined exclusion zone for tree 566, 567, 568, 569, 571, 572 and 573. The fencing is to run along the edge of the existing hard surfacing and is to encompass the garden bed area adjacent to the trees. TPZ signage is required on the fencing. The fencing can only be moved under the approval of the project arborist.
567	*Cupaniopsis anacardioides*	2.0	1.8	Retain and protect. See tree protection for tree 566.
568	*Cupaniopsis anacardioides*	2.0	1.6	Retain and protect. See tree protection for tree 566.
569	*Cupaniopsis anacardioides*	2.0	1.5	Retain and protect. See tree protection for tree 566.
570	*Cupaniopsis anacardioides*	2.0	1.5	Retain and protect. See tree protection for tree 566.
571	*Cupaniopsis anacardioides*	2.0	1.5	Retain and protect. See tree protection for tree 566.
572	*Cupaniopsis anacardioides*	2.0	1.5	Retain and protect. See tree protection for tree 566.
573	*Cupaniopsis anacardioides*	2.0	1.5	Retain and protect. See tree protection for tree 566.
574	*Backhousia citriodora*	2.0	1.5	Retain and protect. Fencing is to run along the edge of the existing hard surfacing and is to encompass the garden bed area adjacent to the tree. TPZ signage is required on the fencing. The fencing can only be moved under the approval of the project arborist.
575	*Backhousia citriodora*	2.0	1.5	Retain and protect. Fencing is to run along the edge of the existing hard surfacing and is to encompass the garden bed area adjacent to the tree. TPZ signage is required on the fencing. The fencing can only be moved under the approval of the project arborist.
576	*Backhousia citriodora*	2.0	1.5	Retain and protect. Fencing is to run along the edge of the existing hard surfacing and is to encompass the garden bed area adjacent to the tree. TPZ signage is required on the fencing. The fencing can only be moved under the approval of the project arborist.
577	*Cinnamomum camphora*	3.8	2.1	Retain. The existing fence and hard surfacing will be sufficient for tree protection.
578	*Cinnamomum camphora*	3.0	2.3	Retain. The existing fence and hard surfacing will be sufficient for tree protection.
G12	*Mixed spp*	2.0	1.6	Retain. The existing fence and hard surfacing will be sufficient for tree protection.
579	*Triadica sebifera*	2.0	1.7	Retain. The existing fence and hard surfacing will be sufficient for tree protection.
580	*Liquidambar styraciflua*	2.2	1.7	Retain. The existing fence and hard surfacing will be sufficient for tree protection.
581	*Ficus rubiginosa*	3.8	2.4	Retain. The existing fence and hard surfacing will be sufficient for tree protection.
582	*Casuarina glauca*	2.0	1.7	Remove and replace.
583	*Casuarina glauca*	2.0	1.8	Remove and replace.

584	*Casuarina glauca*	2.0	1.5	Remove and replace.
585	*Casuarina glauca*	2.0	1.5	Remove and replace.
586	*Casuarina glauca*	2.0	1.5	Remove and replace.
587	*Casuarina glauca*	2.0	1.5	Remove and replace.
588	*Casuarina glauca*	2.0	1.5	Remove and replace.
589	*Casuarina glauca*	2.0	1.5	Remove and replace.
590	*Casuarina glauca*	2.0	1.5	Remove and replace.

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 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 in 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.

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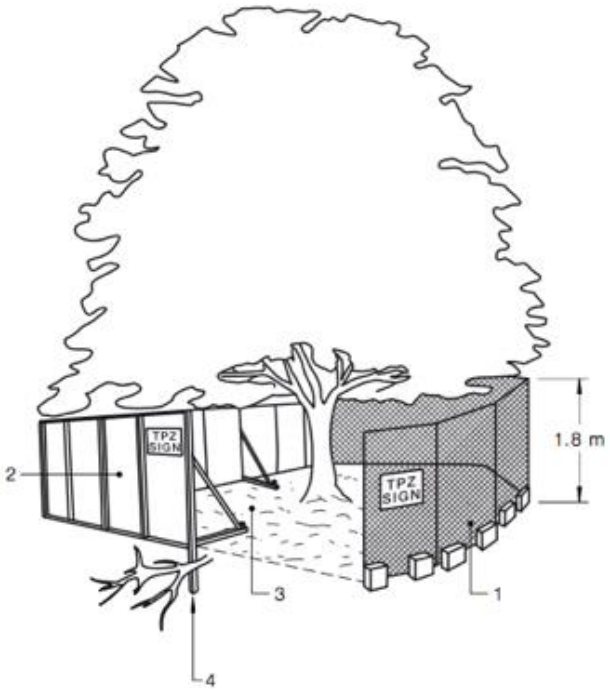
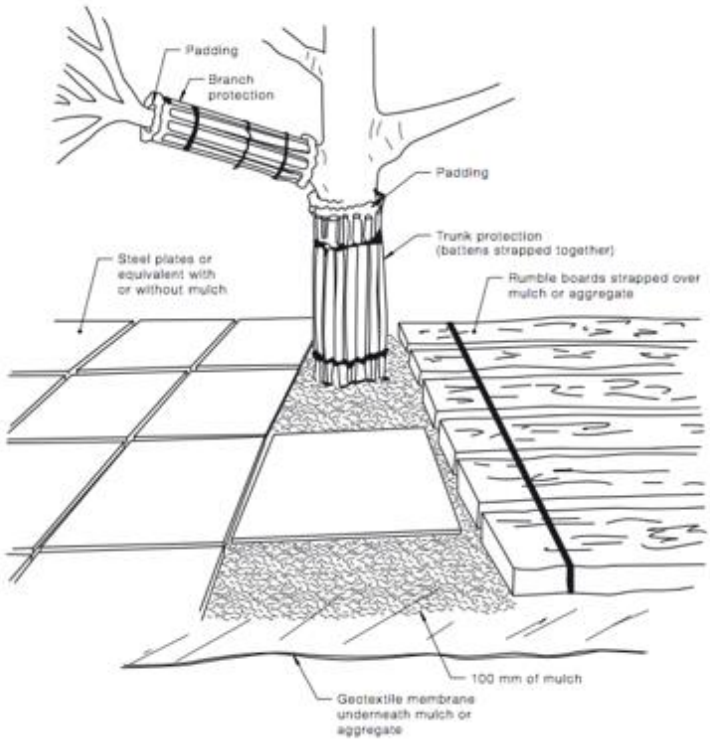


LEGEND:
1 Chain wire mesh panels with shade cloth (if required) attached, held in place with concrete feet.
2 Alternative plywood or wooden paling fence panels. This fencing material also prevents building materials or soil entering the TPZ.
3 Mulch installation across surface of TPZ (at the discretion of the project arborist). No excavation, construction activity, grade changes, surface treatment or storage of materials of any kind is permitted within the TPZ.
4 Bracing is permissible within the TPZ. Installation of supports should avoid damaging roots.

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

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



NOTES:

1 For trunk and branch protection use boards and padding that will prevent damage to bark. Boards are to be strapped to trees, not nailed or screwed.

2 Rumble boards should be of a suitable thickness to prevent soil compaction and root damage.

An image from AS4970-2009,[10] 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.

[10] 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).[11] 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.

[11] 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.

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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 principle 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 Lighting Plan 1
Appendix 1B - Proposed Lighting Plan 2
Appendix 1C - Proposed Landscape Plan
Appendix 2 - Tree Inspection Schedule
Appendix 3 - Further information of methodology

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Cert III Landscape Construction
Member Arboriculture Australia
QTRA
TRAQ

TO SYDNEY

TO BANKSTOWN

WARDELL ROAD

EWART LANE

EWART LANE

247-249 WARDELL ROAD MIXED-USE BUILDING BY OTHERS

DUDLEY STREET

EXISTING CARPARK

EXISTING SUBSTATION

UP

UP

UP

EXISTING BOOKING OFFICE

PLATFORM BUILDING REFER ARCHITECT'S PACKAGE

NEW CONCOURSE REFER TO ARCHITECTURAL PAKAGE

PLATFORM

WARDELL ROAD

NEW LIGHTING @ 6m CTS

BEDFORD CRESCENT

ADJOINS DRAWING SMCSWSWM-MTM-WDH-LA-DWG-1

LEGEND

EXISTING

- RAILCORP PROPERTY BOUNDARY
- EXISTING TREES TO BE RETAINED

PROPOSED

LIGHTING

- LP-1 PEDESTRIAN POLE TOP LIGHTING
- LIG-1 IN GROUND LIGHTING
- LW-1 LED RECESSED WALL LIGHTING
- LED LIGHT STRIPS

NOTES:
- LIGHTING DESIGN IS INDICATIVE ONLY, SUBJECT TO FURTHER DEVELOPMENT IN CONSULTATION WITH LIGHTING ENGINEER IN STAGE 3

Tree Legend

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

0 30m

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PO Box 450, Turramurra, NSW, 2074

sales@urbanarbor.com.au, (02) 8004 2802

Site Location: Dulwich Hill Station, Dullwich Hill NSW

SCALE :	DATE :
1 : 200 @ A1	12/12/2019

Appendix 1A: Proposed Lighting Plan 1

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Prepared by: Bryce Claassens

LEGEND

EXISTING

- RAILCORP PROPERTY BOUNDARY
- EXISTING TREES TO BE RETAINED

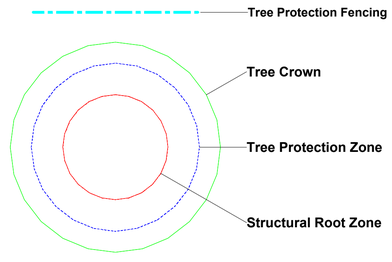
PROPOSED

LIGHTING

- LP-1 PEDESTRIAN POLE TOP LIGHTING
- LIG-1 IN GROUND LIGHTING
- LW-1 LED RECESSED WALL LIGHTING
- LED LIGHT STRIPS

NOTES:
- LIGHTING DESIGN IS INDICATIVE ONLY, SUBJECT TO FURTHER DEVELOPMENT IN CONSULTATION WITH LIGHTING ENGINEER IN STAGE 3

Tree Legend



0 — 30m

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Site Location: Dulwich Hill Station, Dullwich Hill NSW

SCALE :	DATE :
1 : 200 @ A1	12/12/2019

Appendix 1B: Proposed Lighting Plan 2

URBAN ARBOR
The Trusted Name in Tree Management

Prepared by: Bryce Claassens


TO SYDNEY
TO BANKSTOWN
WARDELL ROAD
EWART LANE
DUDLEY STREET
BEDFORD CRESCENT
247-249 WARDELL ROAD MIXED-USE BUILDING BY OTHERS
EXISTING ROCK OUTCROP
EXISTING CARPARK
EXISTING SUBSTATION
EXISTING BOOKING OFFICE
2.4m DECORATIVE SECURITY FENCE TO FUTURE DETAIL
PLATFORM BUILDING REFER ARCHITECT'S PACKAGE
NEW CONCOURSE REFER TO ARCHITECTURAL PAKAGE
PLATFORM
12m ELSHOLZ KERB AND RAISED FOOTPATH - REFER TO STRUCTURES AND CIVIL PACKAGE
PROPOSED SHELTER AND SEAT WITH PADMOUNT REFER TO ARCHITECTURAL PACKAGE
PROPOSED KISS & RIDE AND TAXI STAND REFER TO ENGINEER'S PACKAGE FOR LINEMARKING, SIGNAGE, SETOUT AND LEVEL INFORMATION
BOL-1 x 9
BR-1 x 10
BR-1 x 7
BIN-1
WF-1
PAV-1
PAV-2
PAV-3
563 564 565 566 567 568 569 570 571 572 573 574 575 576 577 578
582 583 584 585 586 587 588 589 590
LEGEND
EXISTING
RAILCORP PROPERTY BOUNDARY
EXISTING TREES TO BE RETAINED
EXISTING ELECTRICITY POLE
PLANTING
PROPOSED TREES
MASS PLANTING
PROPOSED
FENCE/WALLS
2.4m HIGH DECORATIVE SECURITY FENCE TO FUTURE DETAIL
SW-1 SPLIT FACE TOP SANDSTONE WALL
SW-2 SANDSTONE CLAD BRICKWORK WALL
SW-3 SANDSTONE LOG WALL
PAVING
PAV-1 "BRUCE" ROCK (AUSTRAL JUPERANA) GRANITE PAVING
PAV-2 SESAME COBBLESTONES WITH GRADIENT RAVEN GRANITE COBBLESTONES INSERT
PAV-3 RAVEN GRANITE COBBLESTONES
PEDESTRIAN GRADE REINFORCED CONCRETE PAVEMENT REFER TO ENGINEER'S DETAILS
SB SANDSTONE BOULDERS TO FUTURE DETAIL
TRG TREE GRATES TO FUTURE DETAIL
Tree Legend
Tree Protection Fencing
Tree Crown
Tree Protection Zone
Structural Root Zone
0
30m

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Site Location: Dulwich Hill Station, Dullwich Hill NSW

SCALE : 1 : 200 @ A1

DATE : 12/12/2019

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Appendix 1C: Proposed Landscape Plan

Prepared by: Bryce Claassens

Appendix 2 - Tree Inspection Schedule

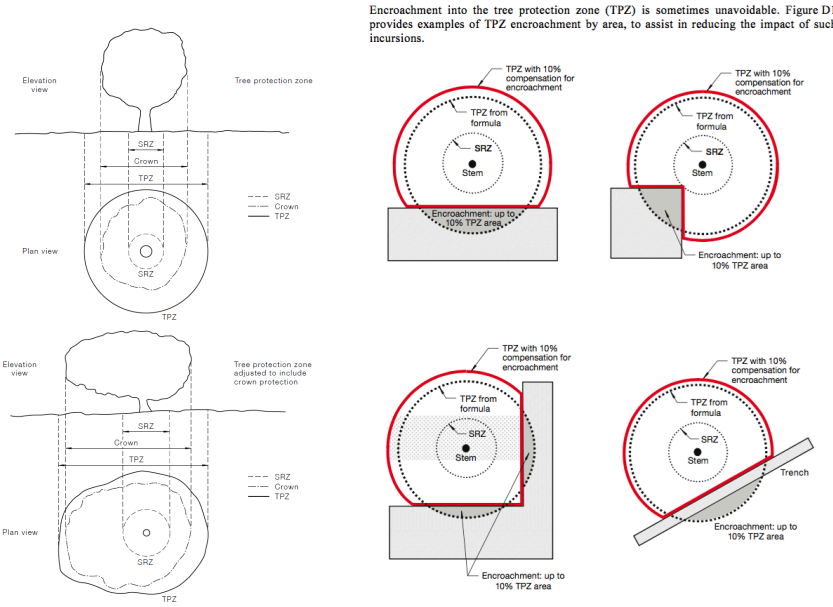
Tree ID	Common Name	Botanical Name	Age Class	Height (m)	Canopy Spread Radius (m	Stem 1	Stem 2	Stem 3	Stem 4	Stem 5	DBH (mm)	DAB (mm)	Health	Structure	Amenity Value	SULE	Retention Value	TPZ Radius (m)	SRZ Radius (m)	Notes
563	Tuckeroo	*Cupaniopsis anacardioides*	Young	3	1	90					90	120	Good	Good	Low	5. Small/Young	Z1	2.0	1.5	None.
564	Tuckeroo	*Cupaniopsis anacardioides*	Mature	6	4	280	260	110			398	490	Good	Good	Medium	1. Long	A1	4.8	2.5	Multiple pruning wounds.
565	Tuckeroo	*Cupaniopsis anacardioides*	Mature	6	4	360					360	420	Good	Good	Medium	1. Long	A1	4.3	2.3	None.
566	Tuckeroo	*Cupaniopsis anacardioides*	Young	3	1	130					130	170	Good	Good	Low	5. Small/Young	Z1	2.0	1.6	None.
567	Tuckeroo	*Cupaniopsis anacardioides*	Semi-mature	4	1.5	160					160	230	Good	Good	Low	5. Small/Young	Z1	2.0	1.8	None.
568	Tuckeroo	*Cupaniopsis anacardioides*	Semi-mature	4	1	150					150	180	Good	Good	Low	5. Small/Young	Z1	2.0	1.6	None.
569	Tuckeroo	*Cupaniopsis anacardioides*	Semi-mature	4	1.5	120					120	150	Good	Good	Low	5. Small/Young	Z1	2.0	1.5	None.
570	Tuckeroo	*Cupaniopsis anacardioides*	Young	3	1	100					100	150	Good	Fair	Low	5. Small/Young	Z1	2.0	1.5	Multi stem tree.
571	Tuckeroo	*Cupaniopsis anacardioides*	Young	3	1	120					120	150	Good	Good	Low	5. Small/Young	Z1	2.0	1.5	None.
572	Tuckeroo	*Cupaniopsis anacardioides*	Young	3	1	90					90	100	Good	Good	Low	5. Small/Young	Z1	2.0	1.5	None.
573	Tuckeroo	*Cupaniopsis anacardioides*	Young	3	1	70					70	90	Good	Fair	Low	5. Small/Young	Z1	2.0	1.5	Trunk wound to N at 1m.
574	Lemon Myrtle	*Backhousia citriodora*	Young	2	1	50					50	80	Good	Good	Low	5. Small/Young	Z1	2.0	1.5	None.
575	Lemon Myrtle	*Backhousia citriodora*	Young	2	0.5	50					50	60	Good	Good	Low	5. Small/Young	Z1	2.0	1.5	None.
576	Lemon Myrtle	*Backhousia citriodora*	Young	2	0.5	50					50	60	Good	Good	Low	5. Small/Young	Z1	2.0	1.5	None.
577	Camphor Laurel	*Cinnamomum camphora*	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	*Cinnamomum camphora*	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	*Mixed spp*	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	*Triadica sebifera*	Semi-mature	7	2	170					170	200	Good	Fair	Medium	2. Medium	A1	2.0	1.7	Located within corridor.
580	Sweetgum	*Liquidambar styraciflua*	Semi-mature	9	3	180					180	200	Good	Good	Medium	1. Long	A1	2.2	1.7	Located within corridor.
581	Port Jackson Fig	*Ficus rubiginosa*	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	*Casuarina glauca*	Young	5	1	140	80				161	200	Good	Fair	Low	5. Small/Young	Z1	2.0	1.7	None.
583	Swamp Oak	*Casuarina glauca*	Semi-mature	5	1	150	70				166	220	Good	Fair	Low	5. Small/Young	Z1	2.0	1.8	None.
584	Swamp Oak	*Casuarina glauca*	Semi-mature	5	1	100					100	150	Good	Fair	Low	5. Small/Young	Z1	2.0	1.5	None.
585	Swamp Oak	*Casuarina glauca*	Semi-mature	4.5	1	120					120	150	Good	Fair	Low	5. Small/Young	Z1	2.0	1.5	None.
586	Swamp Oak	*Casuarina glauca*	Young	2	0.5	50					50	80	Good	Fair	Low	5. Small/Young	Z1	2.0	1.5	None.
587	Swamp Oak	*Casuarina glauca*	Young	2	0.5	50					50	80	Good	Fair	Low	5. Small/Young	Z1	2.0	1.5	None.
588	Swamp Oak	*Casuarina glauca*	Young	2	0.5	50					50	80	Good	Fair	Low	5. Small/Young	Z1	2.0	1.5	None.
589	Swamp Oak	*Casuarina glauca*	Young	2	0.5	50					50	100	Good	Fair	Low	5. Small/Young	Z1	2.0	1.5	None.
590	Swamp Oak	*Casuarina glauca*	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) - $(DAB \times 50)^{0.42} \times 0.64$. 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.
   SRZ radius = $(D \times 50)^{0.42} \times 0.64$ (D = 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.

Category	Example condition	Summary
Good	• 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.	• The tree is in above average health and condition and no remedial works are required.
Fair	• 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.	• The tree is in below average health and condition and may require remedial works to improve the trees health.
Poor	• The 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.	• The tree is displaying low levels of health and removal or remedial works may be required.
Dead	• The tree is dead or almost dead.	• The tree should generally be removed.

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

Category	Example condition	Summary
Good	• 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.	• The tree is considered structurally good with well developed form.
Fair	• The tree may have minor structural defects within the structure of the crown that could potentially develop into more significant defects. • The tree may 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.	• 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	• 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.	• 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 statuary 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
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.

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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

Incorporating extracts from Lonsdale, D. 1999. Principles of Tree Hazard Assessment. Her Majesty's Stationary Office, London

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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

Incorporating extracts from Lonsdale, D. 1999. Principles of Tree Hazard Assessment. Her Majesty's Stationary Office, London

APPENDIX 10 DULWICH HILL AIA (PLATAEU TREES)

PLATEAUTREES
Safety. Quality. Progress.

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 undertake 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, rational 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.

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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.

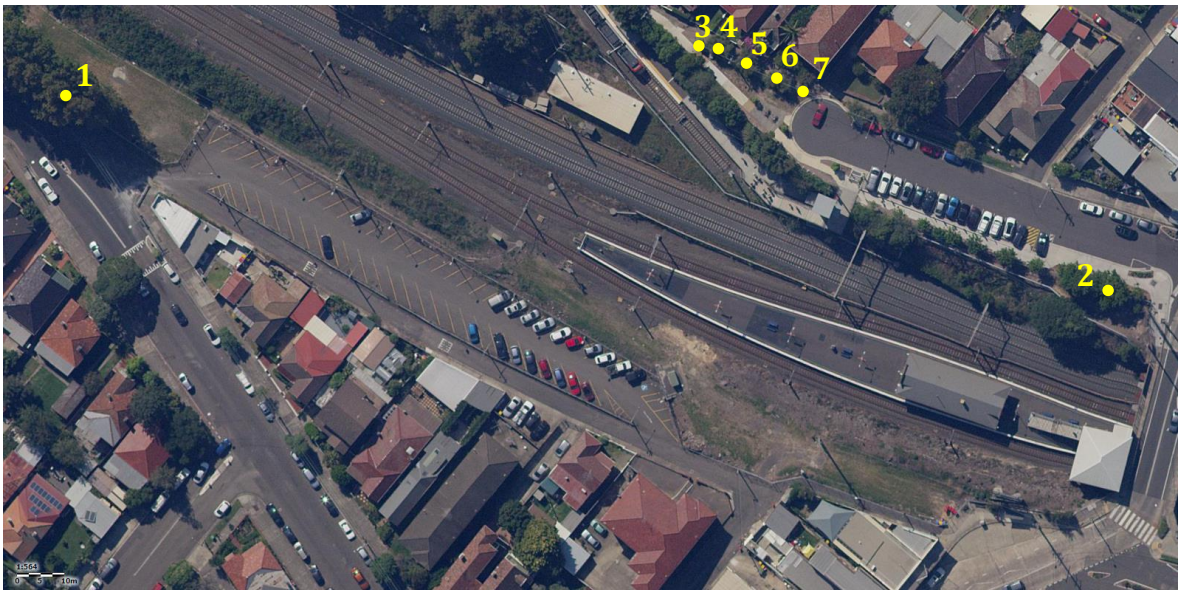


Image 1: Aerial image showing the approximate locations of additional trees. *(Source six maps accessed 19/03/2021)*.

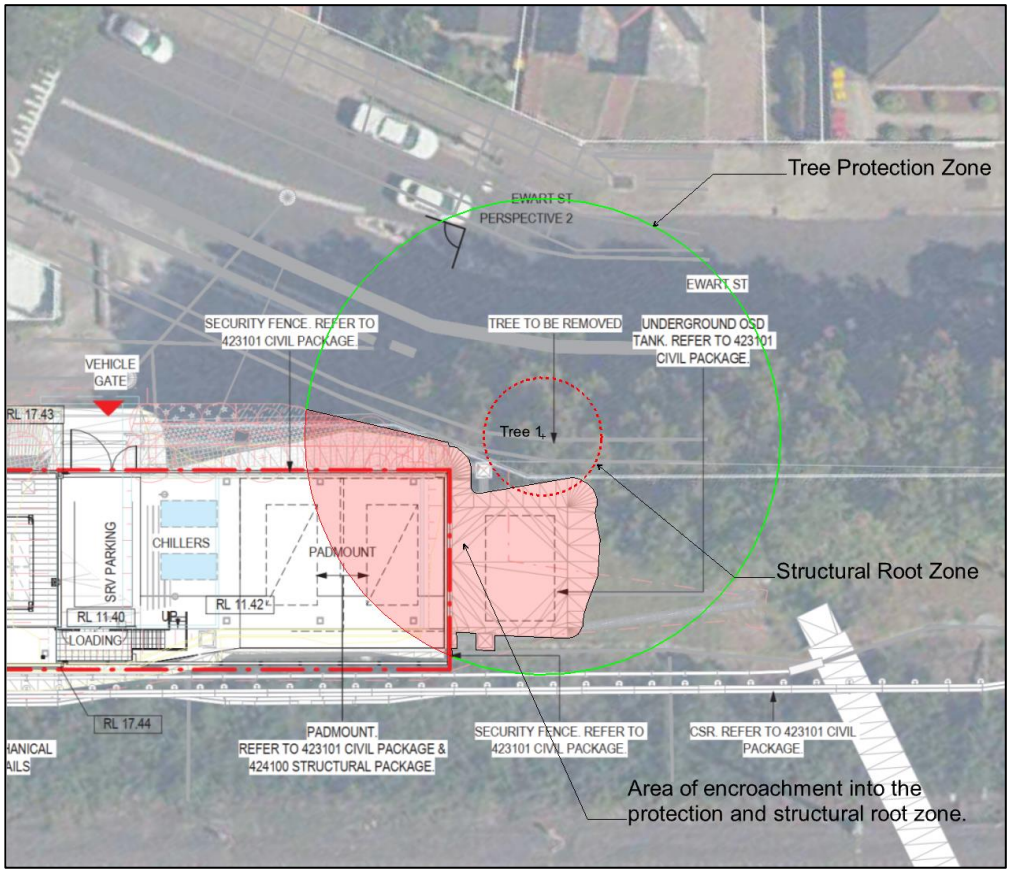


Image 2: Extract from Overall Arrangement Site Plan – Service Building showing the encroachment into the TPZ and SRZ of tree 1.

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.

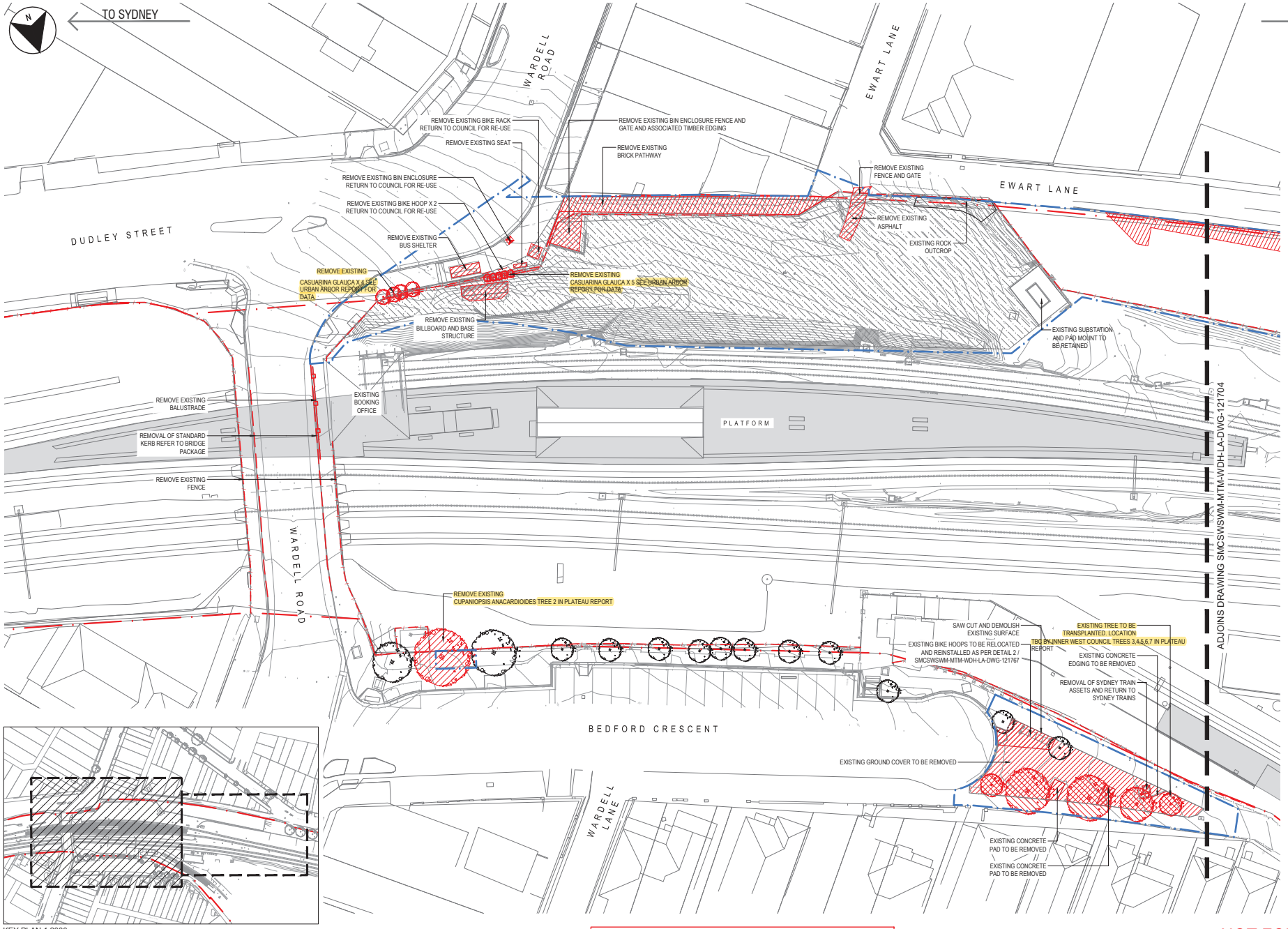
Regards.
Owen Tebbutt

Consulting Arborist
Plateau Tree Service

Appendix 1: Tree Assessment Schedule

PLATEAUTREES
Safety. Quality. Progress.

Tree number	Tree name Botanical name Common name	Tree dimensions Height (m)	Spread (m)	D.B.H. (mm)	D.A.B. (mm)	Vigour	Condition	Age class	ULE	Amenity and Visual Value	Native or Exotic	TPZ (m)	SRZ (m)	Comments	Remove or Retain
1	*Platanus x acerifolia* (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	*Cupaniopsis anacardioides* (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	*Backhousia citriodora* (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	*Callistemon viminalis* (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	*Callistemon viminalis* (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	*Callistemon viminalis* (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	*Callistemon viminalis* (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 *Sydney Metro City & Southwest Sydenham to Bankstown Instrument of Approval* due to height. SAPLING until matured.	Remove



KEY PLAN 1:2000

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.

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 2.5 0 2.5 5 7.5m
1 : 250 FULL SIZE A1

CLIENT: NSW GOVERNMENT | sydney METRO

SERVICE PROVIDERS: METRON T2M

DRAWN	J.HUANG	30/10/2020
DESIGNED	M. ENOCH	30/10/2020
DRG CHECK	M. ENOCH	30/10/2020
DESIGN CHECK	G. DAVIES	30/10/2020
APPROVED	L. PALMER	30/10/2020

SYDNEY METRO
DULWICH HILL (8.374km to 8.718km)
LANDSCAPE DESIGN

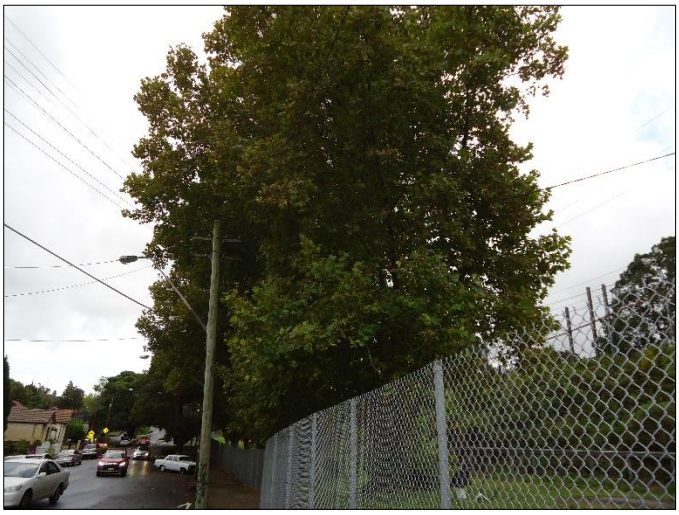
DEMOLITION PLAN

STATUS: STAGE 3 | SHEET 4 of 47 | ©

DRG No. SMCSWSWM-MTM-WDH-LA-DWG-121703 | REV. C

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-WDH-LA-DWG-121703 P01

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 transplnated 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 crow, 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 (PLATAEU TREES)

PLATEAUTREES
Safety. Quality. Progress.

Date: 25 May 2021

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

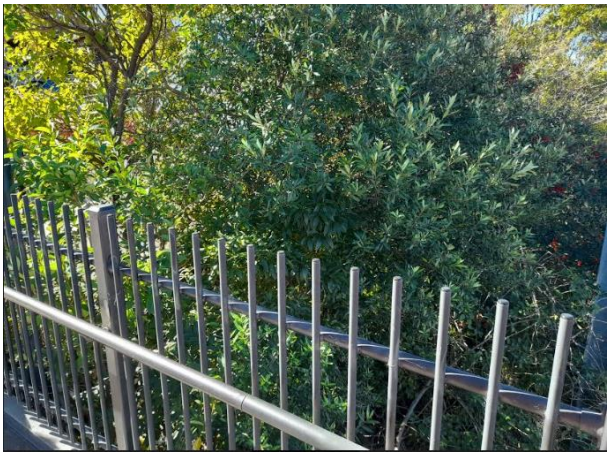
At the request of Downer Group an onsite arboricultural inspection at Dulwich Hill Station was conducted on the 18th May 2021.Weather conditions were fine.
The reason for this inspection was to assess and identify additional trees within the area proposed for the construction of New Bridge Footing Abutment.
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

PLATEAUTREES
Safety. Quality. Progress.

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	*Cupaniopsis anacardioides* (Tuckeroo)	3	2	8	10	N	F	Y	M	L	N	2	1.5	Clash with permanent fencing at Bedford Crescent.	Remove
B	*Cinnamomum camphora* (Camphor Laurel)	3	2	<10	<10	N	F	Y	S	L	E	2	1.5	Clash with permanent footbridge.	Remove
C	*Olea europaea* (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	(*Ligustrum sp.*) (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	(*Cotoneaster sp.*) 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	(*Pittosporum undulatum*) 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.

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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 crow, 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 (PLATAEU 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 diametre 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 assement.

Best Regards
Colin Curtis

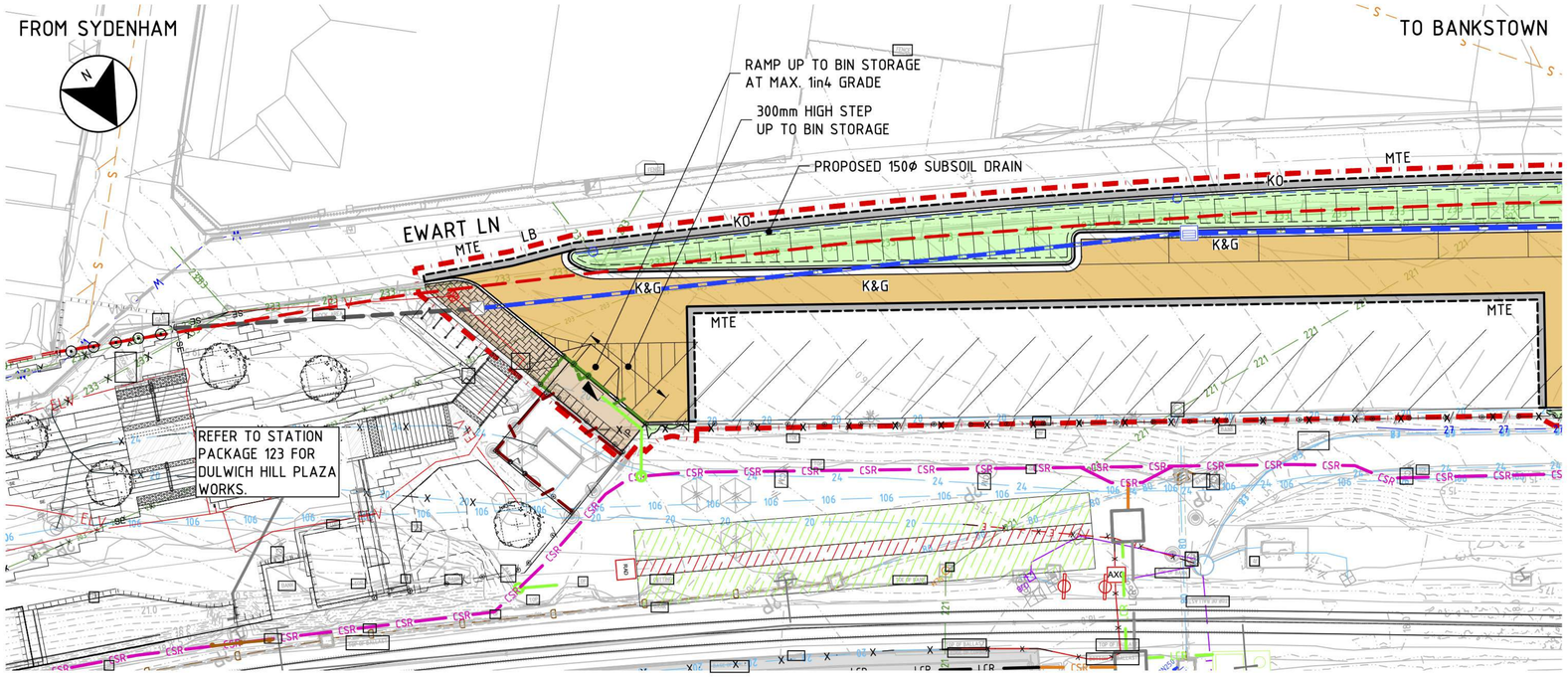
Level 5 Consulting Arborist
Tree Risk Assessment Qualification (TRAQ)
Member of Arboriculture Australia #2332
Member of the International Society of Arboriculture (ISA) # 228182

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

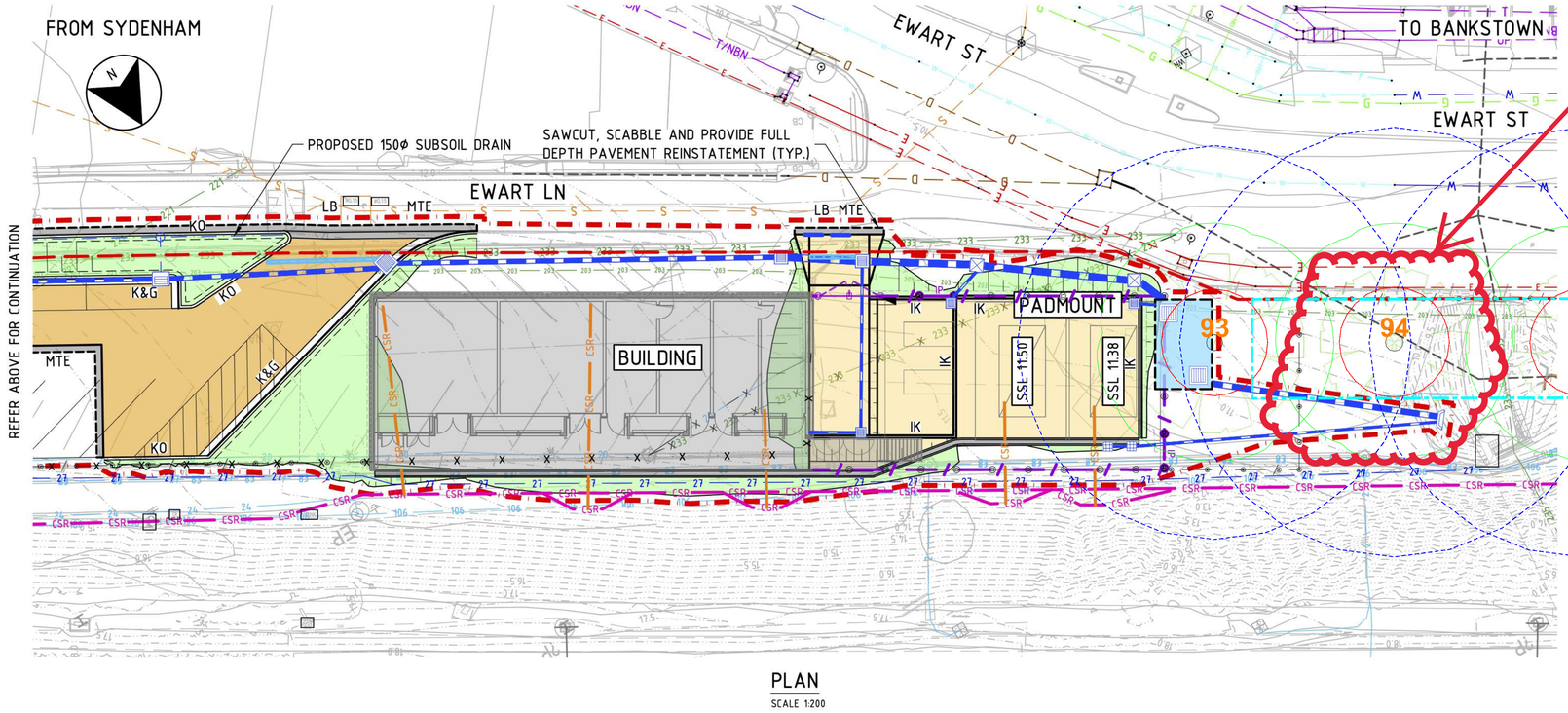
Location of the subject tree (tree 94) circled in red (*Metromap 2021*).

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
	Botanical name **Common name**	**Height (m)**	**Spread (m)**	**DBH (cm)**	**DAB (cm)**										
94	*Platanus x Hybrida* 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

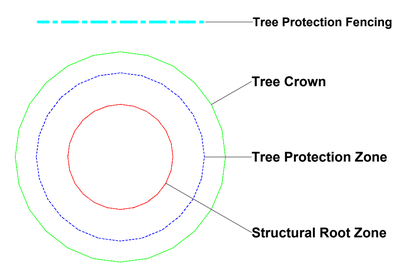


PLAN
SCALE 1:200



PLAN
SCALE 1:200

Tree Legend



0 30m

Urban Arbor Pty Ltd

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

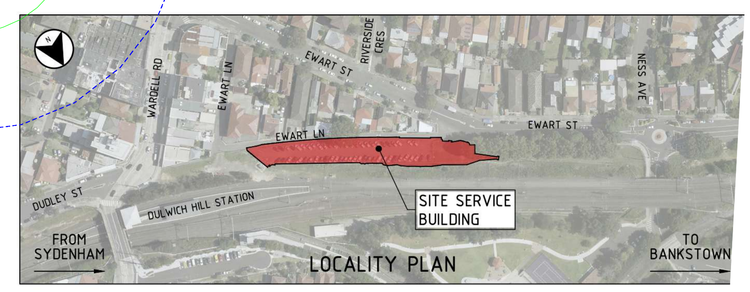
Site Location: Dulwich Hill Station, Dullwich Hill NSW

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

2/2020

uilding

ryce Claassens



LOCALITY PLAN

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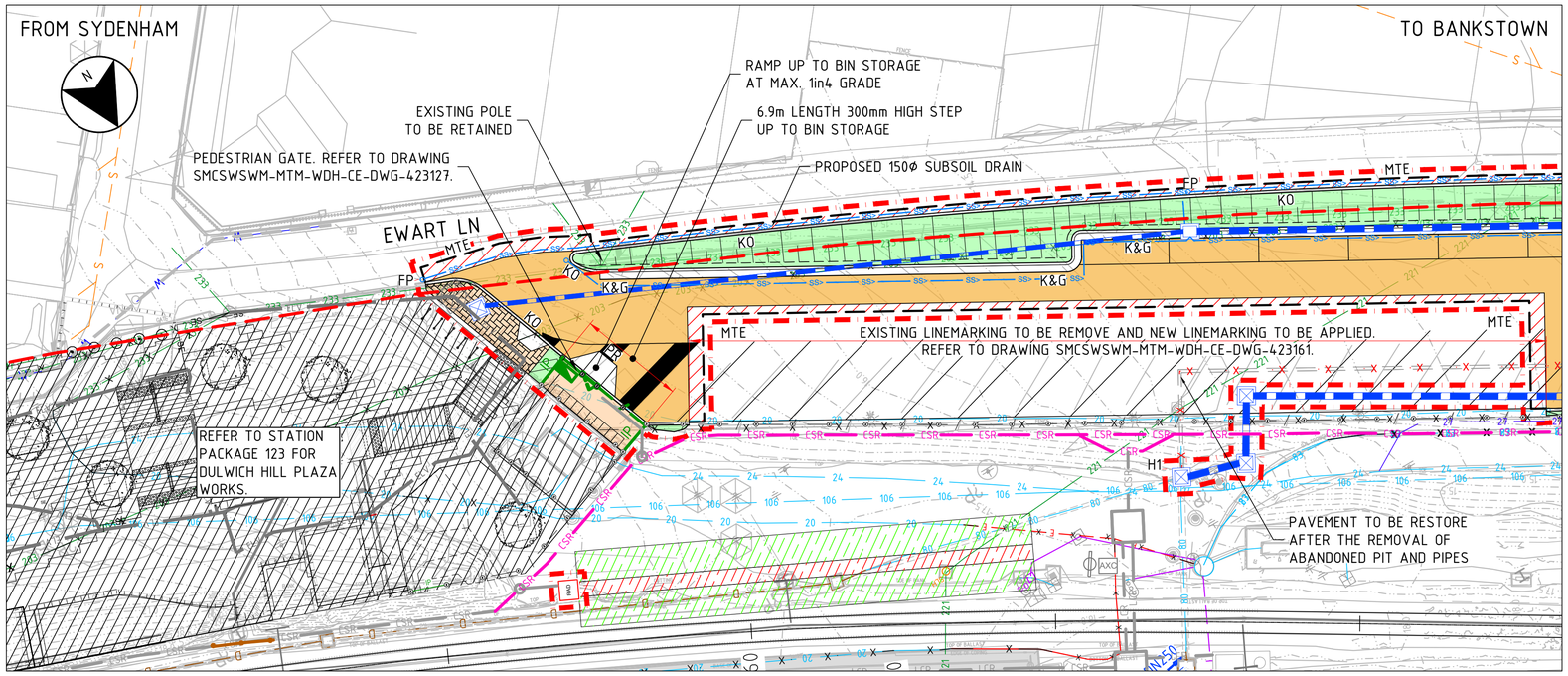
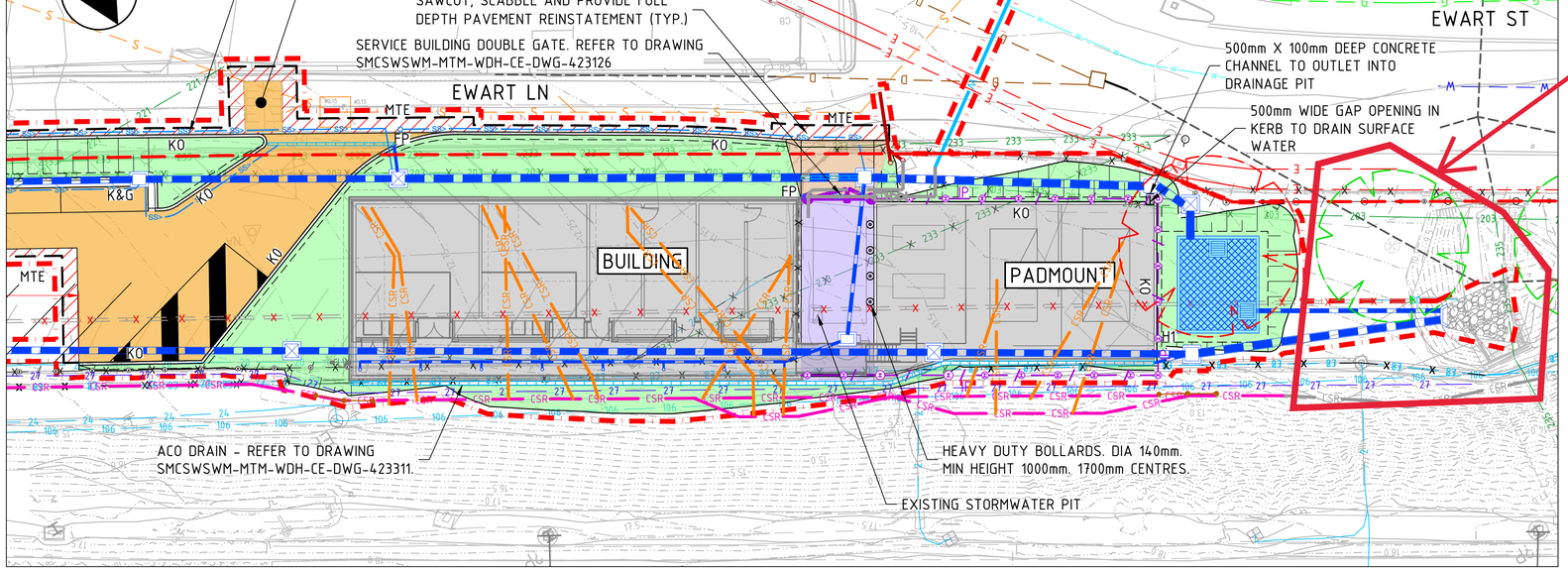
NOT FOR CONSTRUCTION



PLAN
SCALE 1:200

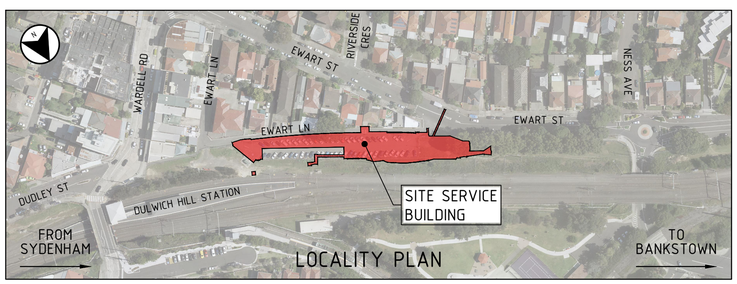


PLAN
SCALE 1:200

NOTES

1. FOR GENERAL NOTES REFER TO DRAWINGS SMCSWSWM-MTM-WDH-CE-DWG-423104 TO 423107.
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.

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



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FOR CONSTRUCTION

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

SCALES: 1 : 200 (2 0 2 4 6 8m) FULL SIZE A1

CLIENT: NSW GOVERNMENT | sydney METRO

SERVICE PROVIDERS: 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

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-WDH-CE-DWG-423111 0

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 crow, 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 (1^{st}) and possibly (2^{nd}) 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 APPROAVL 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 precents 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

Downer
Relationships creating success

M | 0437495678
E | Luke.Fraser@Downergroup.com
Unit 2, 6-16 Galleghan 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

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

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.

Reconciliation Week
27 May - 3 June

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

Downer
Relationships creating success

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

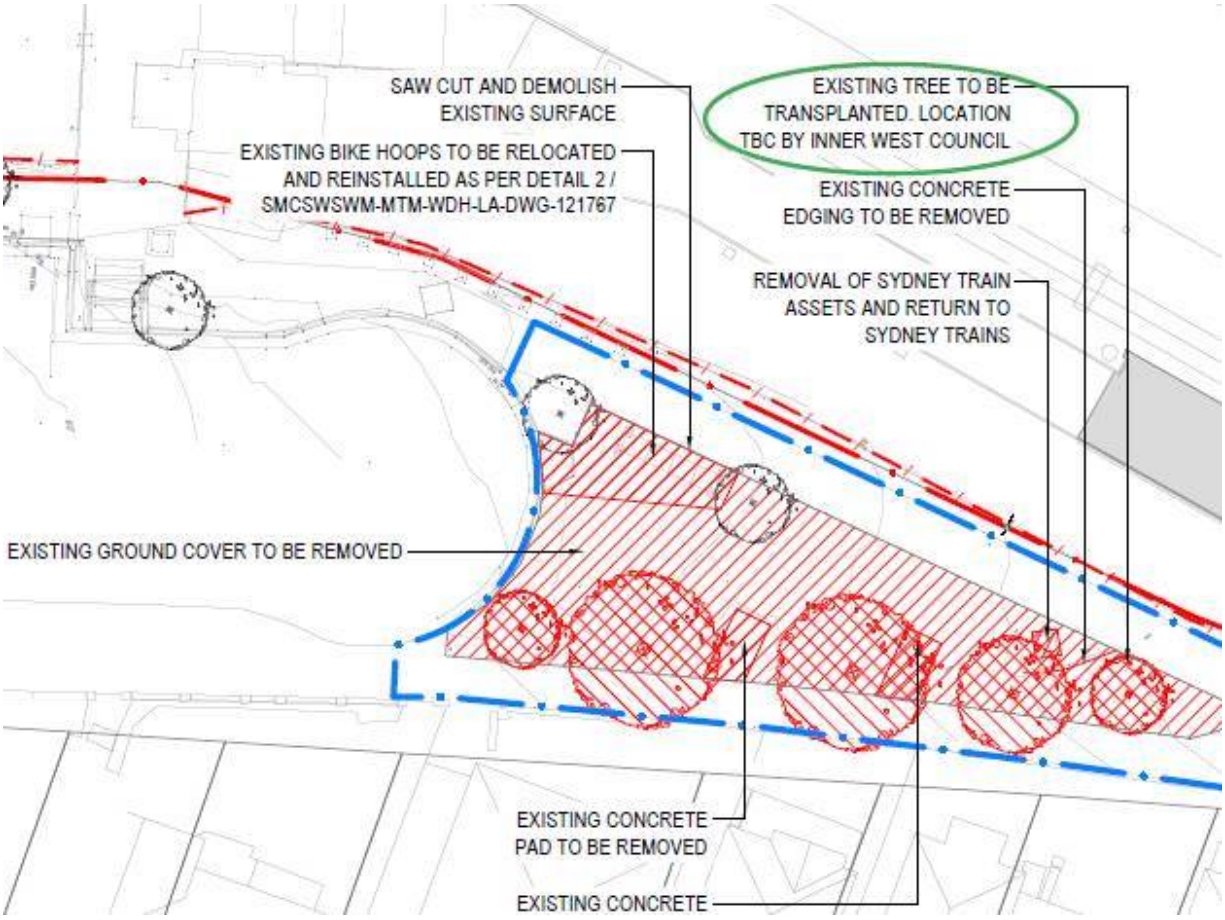
From: Luke Fraser
Sent: Tuesday, 25 May 2021 2:50 PM
To: david.crosby@innerwest.nsw.gov.au
Cc: Julie Henderson <Julie.Henderson@Downergroup.com>; Mark Trethewy <Mark.Trethewy@Downergroup.com>; Gareth O'Brien <Gareth.OBrien@Downergroup.com>
Subject: Tree removal - Dulwich Hill Station

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

Downer
Relationships creating success

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

Downer

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

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

INNER WEST

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

Downer
Relationships creating success

T | +61 427 299 517
E | Mark.Trethewy@downergroup.com
T3, Triniti 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.Leet@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 tress 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 tress 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

NSW Government 24

Department of Planning and Environment
Conditions of Approval for Sydney Metro Sydenham to Bankstown Upgrade CSSI 8256
CSSI 8256 MOD 1 determined 22 October 2020

Regards,

Mark Trethewy
Environment and Sustainability Advisor
Infrastructure Projects

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

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

INNER WEST

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

Downer
Relationships creating success

T | +61 427 299 517
E | Mark.Trethewy@downergroup.com
T3, Triniti 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.Leet@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

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E5 The Proponent must commission an independent experienced and suitably qualified arborist, to prepare a comprehensive Tree Report(s) before removing any tress 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

NSW Government 24

Department of Planning and Environment
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CSSI 8256 MOD 1 determined 22 October 2020

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

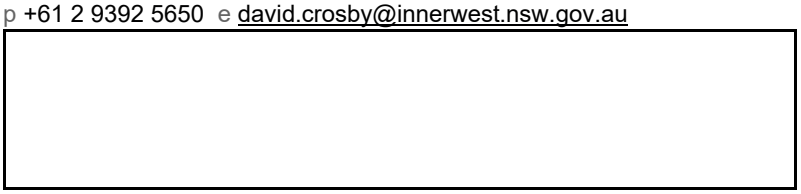
From: David Crosby <david.crosby@innerwest.nsw.gov.au>
Sent: Thursday, 10 June 2021 11:19 AM
To: Mark Trethewy <Mark.Trethewy@downergroup.com>
Cc: Luke Fraser <Luke.Fraser@Downergroup.com>; Julie Henderson <Julie.Henderson@Downergroup.com>; Rachel Leet <Rachel.Leet@Downergroup.com>
Subject: RE: Tree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

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.Leet@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

Downer
Relationships creating success

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

T3, Triniti Business Campus, 39 Delhi Road
North Ryde NSW 2113

_____

Downer

_____

APPENDIX 11 PUNCHBOWL AIA (URBAN ARBOR)

URBAN ARBOR
The Trusted Name in Tree Management

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: 15 January 2020
Ref: 20/01/15/SWMPB

URBAN ARBOR
The Trusted Name in Tree Management

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URBAN ARBOR
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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) Landscape Design Package No. 221, Metron T2M, SMCSWSWM-MTM-WLS-LA-PKG-241000, Issue B - 25 October 2019, Including:

Punchbowl Station		
SMCSWSWM-MTM-WPS-LA-DWG-241700	B	LANDSCAPE DESIGN - COVER SHEET AND DRAWING LIST - SHEET 1 of 16
SMCSWSWM-MTM-WPS-LA-DWG-241701	B	LANDSCAPE DESIGN - NOTES PAGE & LEGEND - SHEET 2 of 16
SMCSWSWM-MTM-WPS-LA-DWG-241702	B	LANDSCAPE DESIGN - DEMOLITION PLAN - SHEET 3 of 16
SMCSWSWM-MTM-WPS-LA-DWG-241710	B	LANDSCAPE DESIGN - GENERAL - PRECINCT PLAN - SHEET 4 of 16
SMCSWSWM-MTM-WPS-LA-DWG-241720	B	LANDSCAPE DESIGN - DETAIL PLAN - THE BOULEVARDE - SHEET 5 of 16
SMCSWSWM-MTM-WPS-LA-DWG-241721	B	LANDSCAPE DESIGN - DETAIL PLAN - PUNCHBOWL ROAD - SHEET 6 of 16
SMCSWSWM-MTM-WPS-LA-DWG-241722	A	LANDSCAPE DESIGN - DETAIL PLAN - RENDERED PLAN - THE BOULEVARDE - SHEET 7 of 16
SMCSWSWM-MTM-WPS-LA-DWG-241723	A	LANDSCAPE DESIGN - DETAIL PLAN - RENDERED PLAN - PUNCHBOWL ROAD - SHEET 8 of 16
SMCSWSWM-MTM-WPS-LA-DWG-241730	A	LANDSCAPE DESIGN - PAVING PLAN - THE BOULEVARDE - SHEET 9 of 16
SMCSWSWM-MTM-WPS-LA-DWG-241731	A	LANDSCAPE DESIGN - PAVING PLAN - PUNCHBOWL ROAD - SHEET 10 of 16
SMCSWSWM-MTM-WPS-LA-DWG-241740	A	LANDSCAPE DESIGN - PLANTING PLAN - THE BOULEVARDE - SHEET 11 of 16
SMCSWSWM-MTM-WPS-LA-DWG-241741	A	LANDSCAPE DESIGN - PLANTING PLAN - PUNCHBOWL ROAD - SHEET 12 of 16
SMCSWSWM-MTM-WPS-LA-DWG-241750	A	LANDSCAPE DESIGN - TYPICAL SECTIONS - SHEET 1 - SHEET 13 of 16
SMCSWSWM-MTM-WPS-LA-DWG-241760	B	LANDSCAPE DESIGN - TYPICAL DETAILS - SHEET 1 - SHEET 14 of 16
SMCSWSWM-MTM-WPS-LA-DWG-241770	B	LANDSCAPE DESIGN - PLANTING SCHEDULE - SHEET 15 of 16
SMCSWSWM-MTM-WPS-LA-DWG-241771	B	LANDSCAPE DESIGN - MATERIAL SCHEDULE - SHEET 16 of 16

1.3 The trees were inspected on 16 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.

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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.

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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.

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[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).

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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) 2012[5] 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 x 50) $^{0.42}$ x 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 13 January 2020.

6 *Canterbury Development Control Plan 2012*, https://www.cbcity.nsw.gov.au/development/planning-control-policies/canterbury-development-control-plan-2012, accessed 13 January 2020.

7 *Canterbury Local Environmental Plan Heritage Map - Sheet HER_001*, https://www.legislation.nsw.gov.au/maps/ecdecb04-2dcb-cdf6-9473-8ead35532c54/1550_COM_HER_001_010_20121105.pdf, 13 January 2020.

URBAN ARBOR
The Trusted Name in Tree Management

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.

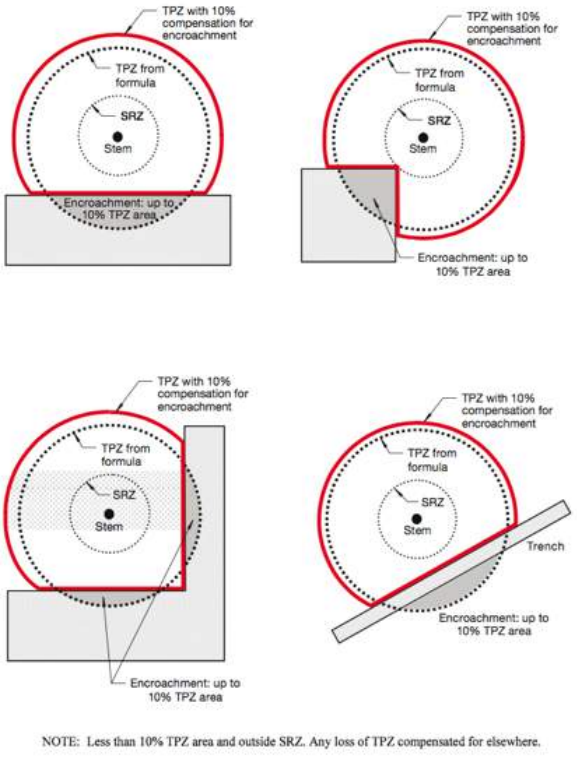

Image 1: Example minor TPZ encroachment from AS4970-2009.

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).

URBAN ARBOR
The Trusted Name in Tree Management

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 proposed plans provided by the client. The following plan is included in appendix 1;

- Appendix 1A: Proposed Site Plan North
- Appendix 1B: Proposed Site Plan South

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	*Corymbia maculata*	A1	4.8	72.4	2.4	None	No encroachment into the TPZ.	Retain and protect
723	*Corymbia citriodora*	A1	3.6	40.7	2.2	None	No encroachment into the TPZ.	Retain and protect
724	*Lophostemon confertus*	A1	4.9	76.0	2.4	None	No encroachment into the TPZ.	Retain and protect
725	*Corymbia citriodora*	A1	4.1	52.3	2.3	None	No encroachment into the TPZ.	Retain and protect
726	*Lophostemon confertus*	A1	5.4	91.6	2.5	None	No encroachment into the TPZ.	Retain and protect
727	*Corymbia citriodora*	Z10	3.9	46.9	2.4	None	No encroachment into the TPZ.	Retain and protect
728	*Corymbia citriodora*	A1	4.0	49.3	2.2	Minor	Proposed plaza paving encroaches into the TPZ by less than 5%, which is minor TPZ encroachment and will not impact the tree.	Retain and protect
729	*Callistemon viminalis*	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	*Callistemon viminalis*	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*

URBAN ARBOR
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Tree ID	Species	Retention value	TPZ radius (m)	TPZ area (m^2)	SRZ radius (m)	TPZ encroachment	Discussion/ Conclusion	Recommendation
731	*Lophostemon confertus*	A1	6.1	117.7	2.6	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*
G 15	*Elaeocarpus reticulatus*	Z1	2.0	12.6	1.5	None	No encroachment into the TPZ.	Retain and protect
732	*Corymbia citriodora*	A1	5.3	87.6	2.5	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*
733	*Eucalyptus moluccana*	A1	4.9	76.0	2.3	Footprint	The trunk is within the footprint of proposed plaza paving.	Remove
734	*Eucalyptus spp*	A1	3.6	40.7	2.3	Major	A proposed retaining wall and plaza paving encroach into the TPZ by 41% (16.7m^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
735	*Grevillea spp*	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	*Grevillea spp*	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	*Callistemon viminalis*	A1	3.6	40.7	2.1	Major	A proposed security fence encroaches into the TPZ by 20% (8.3m^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*

URBAN ARBOR
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Tree ID	Species	Retention value	TPZ radius (m)	TPZ area (m^2)	SRZ radius (m)	TPZ encroachment	Discussion/ Conclusion	Recommendation
738	*Callistemon viminalis*	A1	3.6	40.7	2.1	Major	A proposed security fence encroaches into the TPZ by 24% (9.8m^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*
739	*Callistemon viminalis*	A1	4.2	55.4	2.3	Major	A proposed security fence encroaches into the TPZ by 28% (15.3m^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*

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
		A	Z
Trees to be removed	Building construction, new surfacing and/or proximity, or trees in poor condition.	733, 734 (Two trees)	735, 736 (Two trees)
Retained trees subject to TPZ encroachment greater than 10%	Removal of existing surfacing/structures and/or installation of new surfacing/structures.	731, 732, 737, 738, 739 (Five trees)	729, 730 (Two 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 (Six trees)	727, G15 (One tree and one group)

9.2 **Construction Design/Specification Requirements:** The proposed construction will encroach into the TPZ and SRZ of seven trees, including tree 729, 730, 731, 732, 737, 738 and 739. 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 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.

9.2.2 **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.

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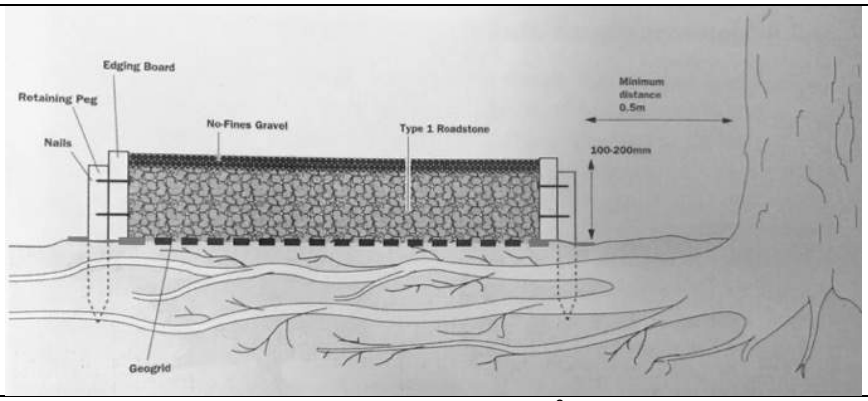

Image A: An image from 'Tree Roots in the Built Environment'[8], showing how to construct hard surfacing above a trees root system without excavation. Type 1 Roadstones are an example of blue metal or crushed sandstone.

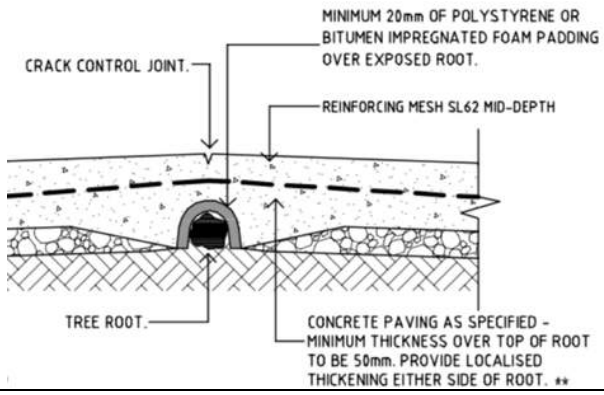

Image B: Example method for bridging concrete footpaths over tree roots provided in the Canterbury Bankstown Council standard drawings.[9]

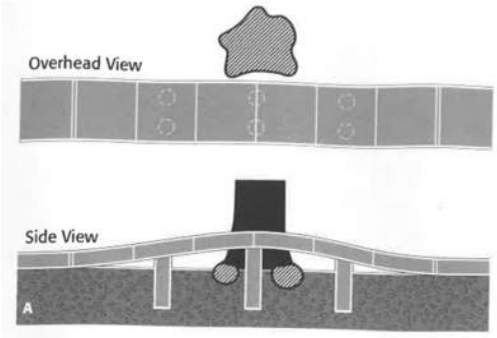

Image C: Example method from Reducing infrastructure damage by tree roots: A compendium of strategies.[10]

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.cbcity.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.

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10. RECOMMENDATIONS

10.1 This report assesses the impact of a proposed development at the subject site to eighteen (18) 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 A site plan has been included in appendix 1, where the indicative TPZ and SRZ of the Site plans have been included in appendix 1, where the indicative TPZ and SRZ of the trees have been overlaid onto the proposed plans provided by the client. The following plan is included in appendix 1;

- Appendix 1A: Proposed Site Plan North
- Appendix 1B: Proposed Site Plan South

10.3 Four (4) trees have been recommended for removal within this report, including tree 733, 734, 735 and 736. Tree 733 and 744 are higher value category A retention value trees.

10.4 Seven (7) trees will be subject to TPZ encroachments greater than 10%, including tree 729, 730, 731, 732, 737, 738 and 739. 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 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 and G15.

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 No services plan has been assessed in this report. 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.

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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
722	*Corymbia maculata*	4.8	2.4	Retain and protect. Trunk protection only.
723	*Corymbia citriodora*	3.6	2.2	Retain and protect. Trunk protection only.
724	*Lophostemon confertus*	4.9	2.4	Retain and protect. Trunk protection only.
725	*Corymbia citriodora*	4.1	2.3	Retain and protect. Trunk protection only.
726	*Lophostemon confertus*	5.4	2.5	Retain and protect. Trunk protection only.
727	*Corymbia citriodora*	3.9	2.4	Retain and protect. Prior to demolition of the log retaining wall in the TPZ, trunk protection only. After demolition of the retaining wall, fencing should be installed to create a combined TPZ exclusion zone for

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				tree 727 and 728. The fencing should be aligned at the extent of the TPZ of each tree, or as close as practical to the area of paving that is to be replaced. TPZ signage on fencing.
728	*Corymbia citriodora*	4.0	2.2	Retain and protect. See tree 727 for tree protection requirements.
729	*Callistemon viminalis*	2.0	1.5	Retain and protect*. Fencing should be installed to create a combined TPZ exclusion zone for tree 729 and 730. The fencing should be aligned at the extent of the TPZ of each tree, or as close as practical to the area of paving that is to be replaced. TPZ signage on fencing.
730	*Callistemon viminalis*	2.0	1.5	Retain and protect*. See tree 729 for tree protection requirements.
731	*Lophostemon confertus*	6.1	2.6	Retain and protect*. Trunk protection only.
G15	*Elaeocarpus reticulatus*	2.0	1.5	Retain and protect. Fencing should be installed to create a combined TPZ exclusion zone for G15 and tree 732. The fencing should be aligned at the extent of the TPZ of each tree. TPZ signage on fencing.
732	*Corymbia citriodora*	5.3	2.5	Retain and protect*. See G15 for tree protection requirements.
733	*Eucalyptus moluccana*	4.9	2.3	Remove and replace.
734	*Eucalyptus spp*	3.6	2.3	Remove and replace.
735	*Grevillea spp*	2.0	1.5	Remove and replace.
736	*Grevillea spp*	2.0	1.5	Remove and replace.
737	*Callistemon viminalis*	3.6	2.1	Retain and protect*. Fencing should be installed to create a combined TPZ exclusion zone for tree 737, 738 and 739. The fencing should be aligned at the extent of the TPZ of each tree, or as close as practical to the proposed fence. TPZ signage on fencing.
738	*Callistemon viminalis*	3.6	2.1	Retain and protect*. See tree 737 for tree protection requirements.
739	*Callistemon viminalis*	4.2	2.3	Retain and protect*. See tree 737 for tree protection requirements.

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 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 in 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.

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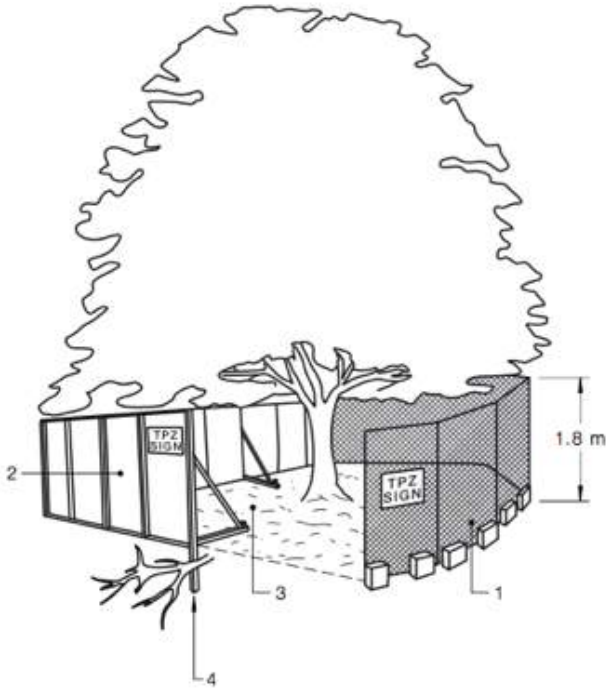

LEGEND:
1 Chain wire mesh panels with shade cloth (if required) attached, held in place with concrete feet.
2 Alternative plywood or wooden paling fence panels. This fencing material also prevents building materials or soil entering the TPZ.
3 Mulch installation across surface of TPZ (at the discretion of the project arborist). No excavation, construction activity, grade changes, surface treatment or storage of materials of any kind is permitted within the TPZ.
4 Bracing is permissible within the TPZ. Installation of supports should avoid damaging roots.

An image from AS4970-2009,[11] with example tree protection.

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

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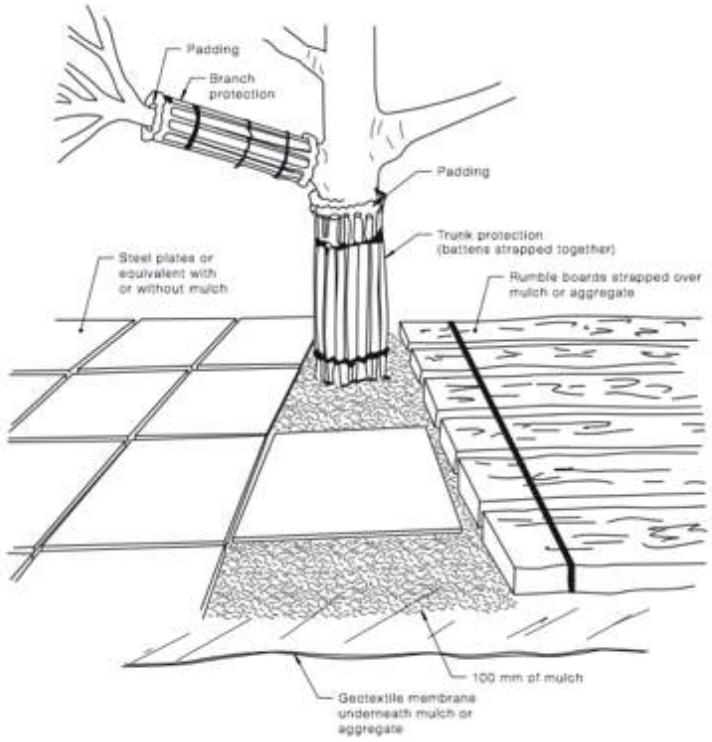

NOTES:

1 For trunk and branch protection use boards and padding that will prevent damage to bark. Boards are to be strapped to trees, not nailed or screwed.

2 Rumble boards should be of a suitable thickness to prevent soil compaction and root damage.

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.

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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.

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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 principle 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 2 - Tree Inspection Schedule
Appendix 3 - Further information of methodology

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ISA Tree Risk Assessment Qualification (TRAQ)

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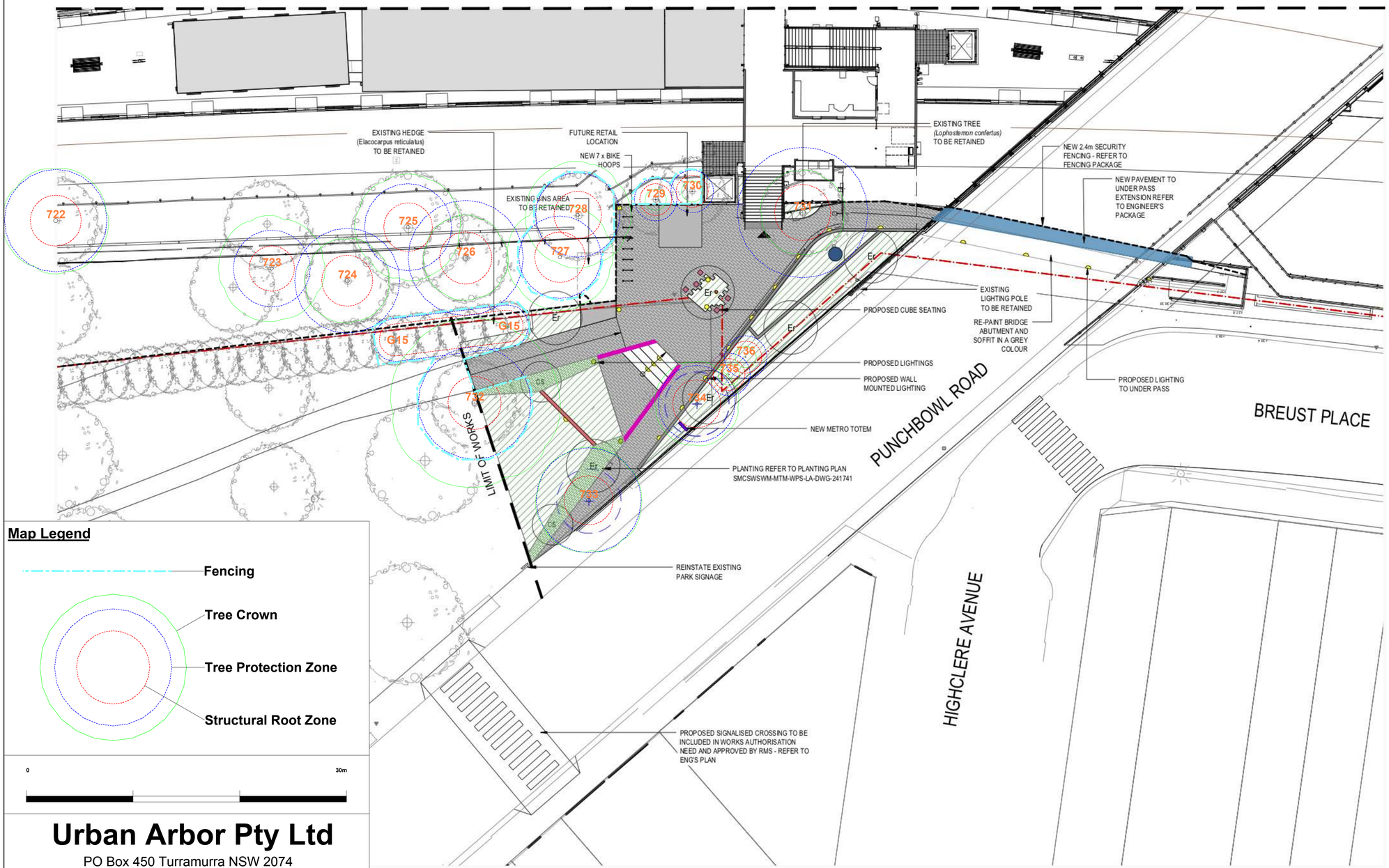
Member Arboriculture Australia
QTRA
TRAQ

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
- Er *Elaeocarpus reticulatus*
- CS *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

0 — 30m

Urban Arbor Pty Ltd
PO Box 450 Turramurra NSW 2074
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Site Location: Punchbowl Station
Punchbowl NSW

SCALE :	DATE :
1 : 200 @ A1	1/14/2020

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The Trusted Name in Tree Management

Appendix 1A - Proposed Site Plan North

Prepared by: Jack Williams, Urban Arbor Pty Ltd

TO SYDNEY

TO BANKSTOWN

ARTHUR STREET

EXISTING TAXI BAY TO BE RETAINED

THE BOULEVARDE

NEW KISS AND RIDE BAY

PLANTING REFER TO PLANTING PLAN SMCSWSWM-MTM-WPS-LA-DWG-241740

NEW CAR PARKING LINE WORK - REFER TO ENGINEER'S PLAN

NEW UNIT PAVING EXTENSION TO LIFT LANDING AND CARPARK EDGE REFER TO PAVING PLAN SMCSWSWM-MTM-WPS-LA-DWG-241730

EXISTING ASHTRAY TO BE RETAINED

EXISTING TREES *(3 x Callistemon viminalis)* TO BE RETAINED

NEW 2.4m SECURITY FENCING - REFER TO FENCING PACKAGE

PROVIDE NEW PLANTING TO CAR PARK REFER TO PLANTING PLAN SMCSWSWM-MTM-WPS-LA-DWG-241740

EXISTING CAR PARKING LIGHTING TO BE RETAINED

EXISTING CAR PARK

EXISTING PHONE BOOTH / CONC. PADMOUNT TO BE RETAINED

NEW 1 x SEAT

EXISTING GATE TO RETAIL TO BE RETAINED

737 738 739

NEW DRINKING FOUNTAIN

PROPOSED LIGHTINGS

NEW 7 x BIKE PARKING

ACCESSIBLE PARKING

SHARED ZONE

METRO TOTEM

TURNING BAY

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

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
- Er *Elaeocarpus reticulatus*

HARDSCAPE
- EXISTING UNIT PAVING
- NEW UNIT PAVING TO MATCH EXISTING
- NEW TACTILES

STREET FURNITURE
- BIKE PARKING (HOOPS)
- NEW DRINKING FOUNTAIN
- NEW BOLLARDS
- NEW SEATS
- NEW METRO TOTEM

LIGHTING
- NEW LIGHTING TO BE CO-ORDINATED WITH LIGHTING ENGINEER

STREETSCAPE
- KR KISS AND RIDE PARKING
- T TAXI PARKING
- EXISTING PHONE BOOTH

Map Legend

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

0 30m

Urban Arbor Pty Ltd

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Site Location: Punchbowl Station
Punchbowl NSW

SCALE :	DATE :
1 : 200 @ A1	1/14/2020

Appendix 1B - Proposed Site Plan South

URBAN ARBOR
The Trusted Name in Tree Management

Prepared by: Jack Williams, Urban Arbor Pty Ltd

Appendix 2 - Tree Inspection Schedule

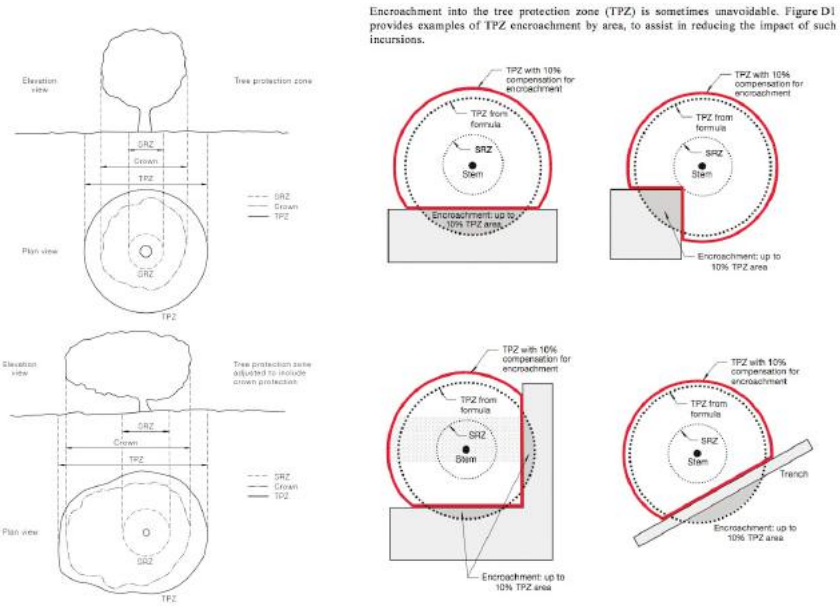
Tree ID	Common Name	Botanical Name	Age Class	Height (m)	Canopy Spread Radius (m)	Stem 1	Stem 2	Stem 3	Stem 4	Stem 5	DBH (mm)	DAB (mm)	Health	Structure	Amenity Value	SULE	Retention Value	TPZ Radius (m)	SRZ Radius (m)	Notes
722	Spotted Gum	*Corymbia maculata*	Mature	22	5	400					400	460	Good	Good	High	1. Long	A1	4.8	2.4	Located within corridor. DBH estimated.
723	Lemon Scented Gum	*Corymbia citriodora*	Mature	24	5	300					300	360	Good	Good	High	1. Long	A1	3.6	2.2	Located within corridor. DBH estimated.
724	Queensland Brushbox	*Lophostemon confertus*	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	*Corymbia citriodora*	Mature	21	5	340					340	410	Good	Good	High	1. Long	A1	4.1	2.3	Located within corridor. DBH estimated.
726	Queensland Brushbox	*Lophostemon confertus*	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	*Corymbia citriodora*	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	*Corymbia citriodora*	Mature	18	5	330					330	390	Good	Good	High	1. Long	A1	4.0	2.2	Located within corridor. DBH estimated.
729	Weeping Bottlebrush	*Callistemon viminalis*	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	*Callistemon viminalis*	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	*Lophostemon confertus*	Mature	9	4	240	450				510	580	Good	Good	High	1. Long	A1	6.1	2.6	Asymmetric crown shape.
G15	Blueberry Ash	*Elaeocarpus reticulatus*	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	*Corymbia citriodora*	Mature	20	8	440					440	510	Good	Good	High	1. Long	A1	5.3	2.5	None.
733	Grey Box	*Eucalyptus moluccana*	Semi-mature	10	5	410					410	420	Good	Good	High	1. Long	A1	4.9	2.3	Asymmetric crown shape.
734	Eucalypt	*Eucalyptus spp*	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	*Grevillea spp*	Young	2	1	100					100	120	Good	Good	Low	5. Small/Young	Z1	2.0	1.5	None.
736	Grevillea	*Grevillea spp*	Young	2	1	100					100	120	Good	Good	Low	5. Small/Young	Z1	2.0	1.5	None.
737	Weeping Bottlebrush	*Callistemon viminalis*	Mature	8	3	300					300	350	Good	Good	Medium	1. Long	A1	3.6	2.1	Located within corridor. DBH estimated.
738	Weeping Bottlebrush	*Callistemon viminalis*	Mature	8	3	300					300	350	Good	Good	Medium	1. Long	A1	3.6	2.1	Located within corridor. DBH estimated.
739	Weeping Bottlebrush	*Callistemon viminalis*	Mature	8	4	350					350	400	Good	Good	Medium	1. Long	A1	4.2	2.3	Located within corridor. DBH estimated.

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.

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.
   SRZ radius = $(D \times 50)^{0.42} \times 0.64$ (D = 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.

Category	Example condition	Summary
Good	• 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.	• The tree is in above average health and condition and no remedial works are required.
Fair	• 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.	• The tree is in below average health and condition and may require remedial works to improve the trees health.
Poor	• The 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.	• The tree is displaying low levels of health and removal or remedial works may be required.
Dead	• The tree is dead or almost dead.	• The tree should generally be removed.

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

Category	Example condition	Summary
Good	• 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.	• The tree is considered structurally good with well developed form.
Fair	• The tree may have minor structural defects within the structure of the crown that could potentially develop into more significant defects. • The tree may 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.	• 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	• 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.	• 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 statuary 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, such as manual excavations or ground penetrating radar (GPR). 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
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.

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

Incorporating extracts from Lonsdale, D. 1999. Principles of Tree Hazard Assessment. Her Majesty's Stationary Office, London

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 bas 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

Incorporating extracts from Lonsdale, D. 1999. Principles of Tree Hazard Assessment. Her Majesty's Stationary Office, London

APPENDIX 12 PUNCHBOWL AIA (PLATAEU TREES)

PLATEAUTREES
Safety. Quality. Progress.

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 undertake 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, rational 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

Plateau Tree Service Pty Ltd
PO BOX 1522, DEE WHY NSW 2099 Australia
P: 02 9939 5350 | F: 02 9905 7569
E: info@plateautrees.com.au | W: www.plateautrees.com.au
ABN : 17 090 798 002

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

TO BANKSTOWN

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

PLATFORM

PLATFORM BUILDING

EXISTING TREE (*Callistemon viminalis*) TO BE REMOVED TREE 729 AND 730 IN URBAN ARBOR REPORT

BIN (BIN-1)

DRINKING FOUNTAIN (DF-1)

EXISTING SYDNEY TRAINS COMMUNICATION CABINET TO BE RETAINED ENSURE 1.5m CLEAR ZONE MAINTAINED SURROUNDING UNIT

FUTURE RETAIL LOCATION

EXISTING TREE (*Elaeocarpus reticulatus*) TO BE REMOVED

BIN STORAGE AREA

10 x BIKE HOOPS (BH-1)

EXISTING HEDGE (Elaeocarpus reticulatus) TO BE RETAINED

FUTURE POP UP RETAIL

2 NOS. ELEAOCARPUS RETICULATUS TRANSPLANTED FROM SITE. REFER TO SMCSWSWM-MTM-WPS-LA-DWG-241702 FOR EXISTING LOCATION.

ELEVATED WALKWAY REFER TO DETAIL PLAN SMCSWSWM-MTM-WPS-LA-DWG-241764

REST PARK

REINSTATE EXISTING PARK SIGNAGE

EXISTING BUS STOP

LIMIT OF WORKS

KERB DETAIL - REFER TO CIVIL PACKAGE 243
STAIR HANDRAIL DETAIL - REFER TO ARCHITECTURAL DRAWING NO. SMCSWSWM-MTM-WPS-AT-DWG-241501

GARDEN BED PLANTING WITH COIR MESH (MS-1) - REFER TO DETAIL ON SMCSWSWM-MTM-WPS-LA-DWG-241753

EXISTING TREE (*Lophostemon confertus*) TO BE REMOVED

EXISTING LIGHT POLE TO BE RETAINED

PROPOSED SEATING (ST-2)

IN-SITU CONCRETE WALL (W-2)

CONCRETE STAIR

METRO TOTEM TO WAYFINDING PACAKGE

PLANTING REFER TO PLANTING PLAN SMCSWSWM-MTM-WPS-LA-DWG-241741

IN-SITU CONCRETE WALL (W-1)

EXISTING CONCRETE FOOTPATH TO BE RETAINED

PROPOSED PEDESTRIAN CROSSING SUBJECT TO FURTHER INVESTIGATION

THROW SCREEN - REFER TO URBAN DESIGN PACKAGE 241810

NEW 2.4m SECURITY FENCING - REFER TO FENCING PACKAGE

PUNCHBOWL ROAD UNDERPASS PATHWAY WIDENING - REFER TO CIVIL PACKAGE 243 FOR DETAILS AND SET OUT

PUNCHBOWL ROAD OVERBRIDGE

EXISTING UNDERPASS

RE-PAINT BRIDGE ABUTMENT AND SOFFIT REFER TO MATERIAL SCHEDULE

PUNCHBOWL ROAD

BREUST PLACE

HIGHCLERE AVENUE

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

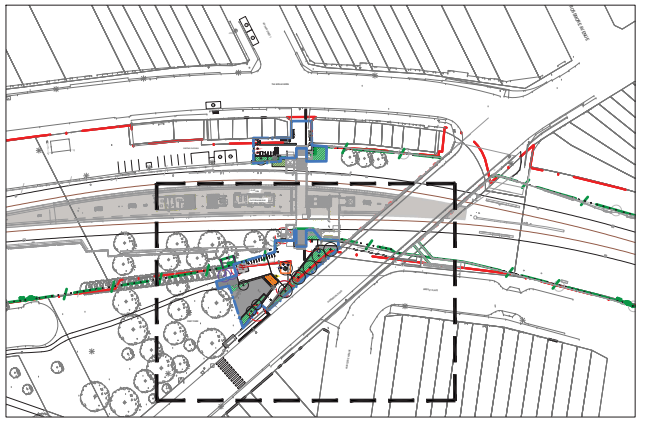
LANDSCAPE
- NEW PLANTING
- PROPOSED TREE
- RELOCATED TREE
- SV-1 STRATAVAULT CELL
- LAWN

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)
- BIN-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

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.



KEY PLAN
1:1000

DRAWING COLOUR CODED - PRINT ALL COPIES IN COLOUR

NOT FOR CONSTRUCTION

REV.	BY	DATE	DESCRIPTION	APPD.
E	ME	06/11/2020	UPDATED STAGE 3 ISSUE	LP
D	ME	17/06/2020	ISSUED FOR STAGE 3	LP
C	ME	08/05/2020	ISSUED FOR STAGE 3	LP
B	ME	25/10/2019	ISSUED FOR STAGE 2	LP
A	ME	05/07/2019	ISSUED FOR STAGE 1	LP

SCALES
2 0 2 4 6 8m
1 : 200 FULL SIZE A1

CLIENT: NSW GOVERNMENT | sydney METRO

SERVICE PROVIDERS: METRON T2M

DRAWN	D. LEE	06/11/2020
DESIGNED	M. ENOCH	06/11/2020
DRG CHECK	M. ENOCH	06/11/2020
DESIGN CHECK	G. DAVIES	06/11/2020
APPROVED	L. PALMER	06/11/2020

SYDNEY METRO
PUNCHBOWL (16.886km to 17.217km)
LANDSCAPE DESIGN
DETAIL PLAN
PUNCHBOWL ROAD

STATUS: STAGE 3 | SHEET 6 of 37 | ©

DRG No. SMCSWSWM-MTM-WPS-LA-DWG-241721 | REV. E

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-LA-DWG-241721 P01

Cad File: X:\2 Projects\2019P181671 Southwest\Metro Design Services\02 CAD\80_WPS_Punchbowl\Plots\SMCSWSWM-MTM-WPS-LA-DWG-241721.dwg
Plot Date: 12/11/20 - 17:25
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 (PLATAEU TREES)

PLATEAUTREES
Safety. Quality. Progress.

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

PLATEAUTREES
Safety. Quality. Progress.

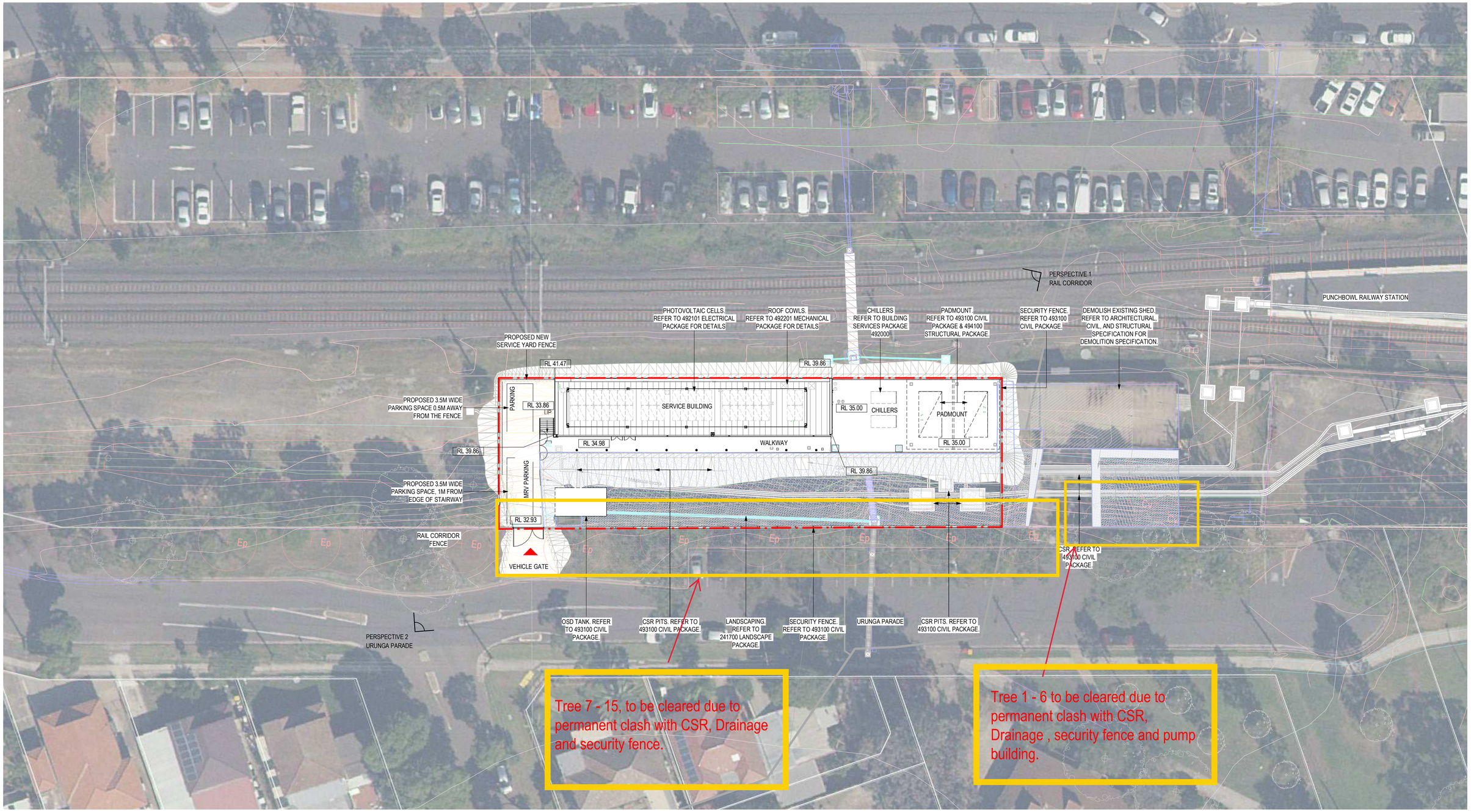
Tree number	Tree name	Tree dimensions				Vigour	Condition	Age class	ULE	Amenity and Visual Value	Native or Exotic	TPZ (m)	SRZ (m)	Comments	Remove or Retain
	Botanical name **Common name**	**Height (m)**	**Spread (m)**	**D.B.H. (mm)**	**D.A.B. (mm)**										
1	*Cinnamomum camphora* (Camphor Laurel)	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	*Cinnamomum camphora* (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	*Cinnamomum camphora* (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	*Cinnamomum camphora* (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	*Cinnamomum camphora* (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	*Phoenix canariensis* (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	*Phoenix canariensis* (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	*Cinnamomum camphora* (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	*Pittosporum undulatum* (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	*Cinnamomum camphora* (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	*Cinnamomum camphora* (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	*Cinnamomum camphora* (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	*Olea europaea* (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	*Cinnamomum camphora* (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	*Cinnamomum camphora* (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

N

CENTRAL / CITY

BANKSTOWN



FOR CONSTRUCTION

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NOTE: Do not scale from this drawing. | ALT. DRG No. SMCSWSWM-MTM-WPS-AT-DWG-491120

CLIENT

NSW GOVERNMENT | sydney METRO

SERVICE PROVIDERS

METRON T2M

DRAWN E. GUYOT
DESIGNED B. NOVANTO
DRG CHECK M. LODGE
DESIGN CHECK G. DAVIES
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 crow, 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 (PLATAEU TREES)

PLATEAUTREES
Safety. Quality. Progress.

ARBORICULTURAL IMPACT ASSESSMENT

PUNCHBOWL TRAIN STATION UPGRADE

Prepared by Colin Curtis
AQF 5 Arboriculture Diploma
Tree Risk Assement Qualified (TRAQ)
Member of Arboriculture Australia #2332
Member of the International Society of Arboriculture #228182
completearbor@gmail.com
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 AQF[1] 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

CONTENTS

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 *Genus Species*	Age	Height	Spread	DBH	DAB	SRZ	TPZ	Vigour / Condition	Native or Exotic	ULE	Amenity & Visual Value	Comments
1	Blackbutt *Eucalyptus pilularis*	M	12	8	36	44	2.34	4.32	F/F	N	S	M	Clash with permanent CSR, drainage and security fence.
2	Blackbutt *Eucalyptus pilularis*	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 *Cinnamomum camphora*	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 *Cinnamomum camphora*	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 *Eucalyptus haemastoma*	M	12	10	57	64	2.74	6.84	F/F	N	S	M	Clash with permanent CSR, drainage and security fence.
6	Tallowood *Eucalyptus microcorys*	M	10	10	50	56	2.59	6	F/F	N	S	M	Clash with permanent CSR, drainage and security fence.
7	Blackbutt *Eucalyptus pilularis*	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 *Eucalyptus scoporia*	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 lilkehood 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

IACA, 2010. *IACA Significance of a Tree, Asessment Rating System (STARS), Institute of Australian Consulting Arboriculturists, Australia.* [Online] Available at: www.iaca.org.au [Accessed 19th June 2015].

Nearmap, 2016. [Online] Available at: http://maps.au.nearmap.com/ [Accessed 1/06/2021].

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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.

APPENDIX B: SIGNIFICANCE OF A TREE, ASSESSMENT RATING SYSTEM* (IACA 2010) – S.T.A.R.S. ©

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.

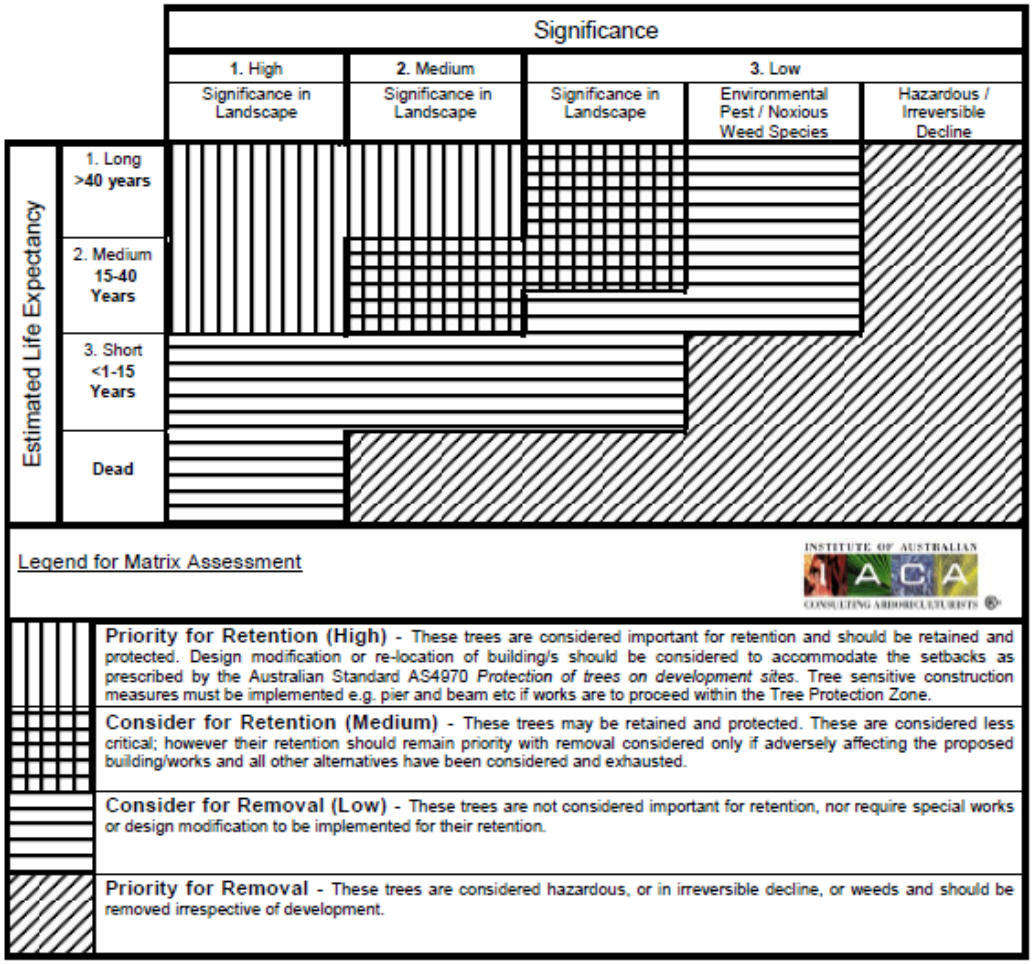
Hazardous/Irreversible Decline
- The tree is structurally unsound and/or unstable and is considered potentially dangerous,
- The tree is dead, or is in irreversible decline, or has the potential to fail or collapse in full or part in the immediate to short term.

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.



USE OF THIS DOCUMENTAND 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 Ltd2001, *Footprint Green Tree Significance & Retention Value Matrix*, Avalon, NSW Australia, www.footprintgreen.com.auIACA 2010, *IACA Significance of a Tree, Assessment Rating System (STARS)*, Institute of Australian Consulting Arboriculturists, www.iaca.org.au

APPENDIX 12.3 PUNCHBOWL AIA (PLATAEU 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*)

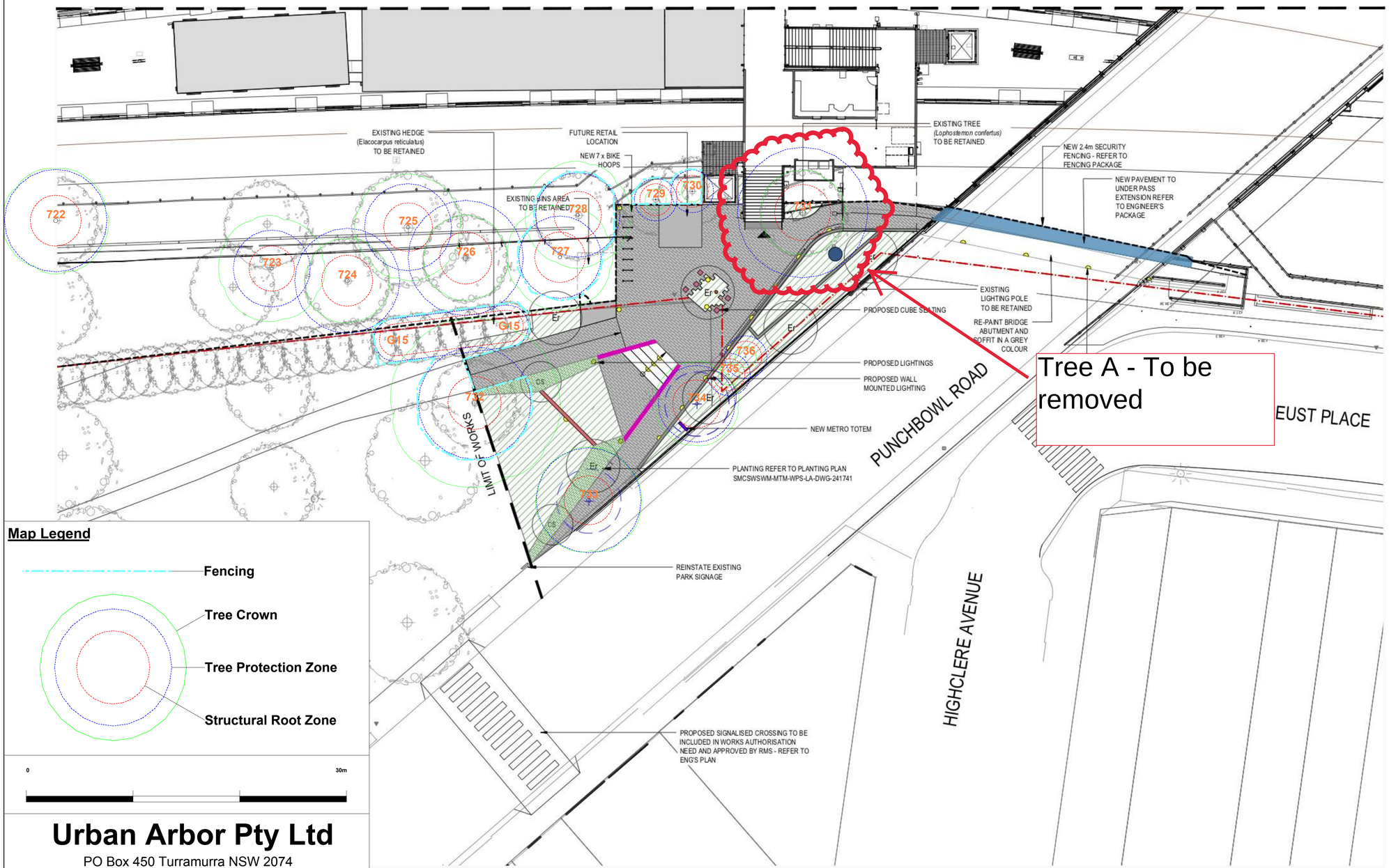
Appendix 1: Tree Assessment Schedule

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
	Botanical name **Common name**	**Height (m)**	**Spread (m)**	**DBH (mm)**	**DAB (mm)**										
A	*Lophostemon confertus* 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
- Er *Elaeocarpus reticulatus*
- Cs *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

0 30m

Urban Arbor Pty Ltd
PO Box 450 Turramurra NSW 2074
sales@urbanarbor.com.au

Site Location: Punchbowl Station
Punchbowl NSW

SCALE :	DATE :
1 : 200 @ A1	1/14/2020

URBAN ARBOR
The Trusted Name in Tree Management

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 crow, 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 (1^{st}) and possibly (2^{nd}) 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 (PLATAEU TREES)

PLATEAUTREES
Safety. Quality. Progress.

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 undertake 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.

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E: info@plateautrees.com.au | W: www.plateautrees.com.au
ABN : 17 090 798 002

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.

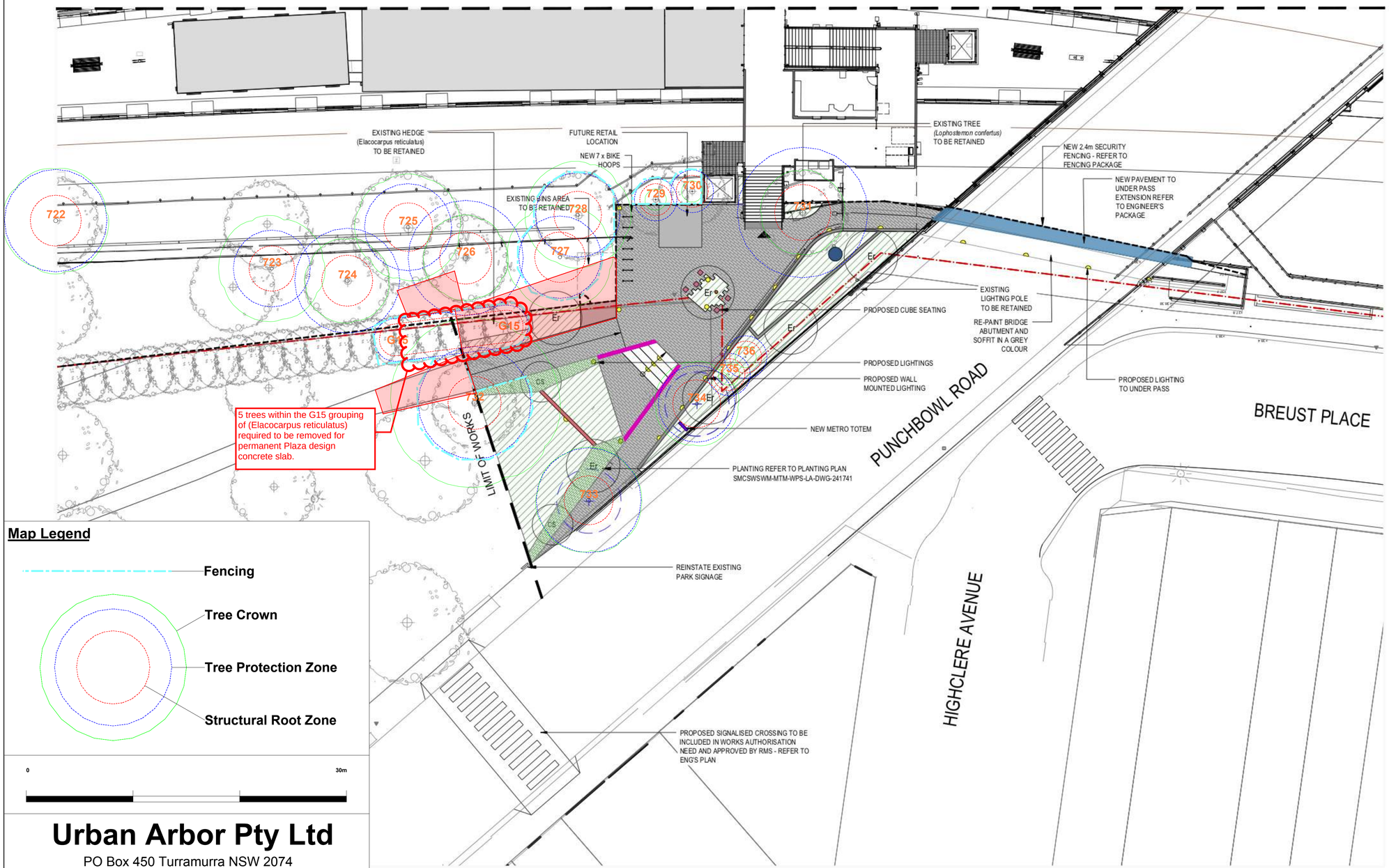
Appendix 2: Tree Assessment Schedule

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	*Elaeocarpus reticulatus* (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
- *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

0 30m

Urban Arbor Pty Ltd
PO Box 450 Turramurra NSW 2074
sales@urbanarbor.com.au

Site Location: Punchbowl Station
Punchbowl NSW

SCALE :	DATE :
1 : 200 @ A1	1/14/2020

URBAN ARBOR
The Trusted Name in Tree Management

Appendix 1A - Proposed Site Plan North

Prepared by: Jack Williams, Urban Arbor Pty Ltd

APPENDIX 12.5 PUNCHBOWL AIA (PLATAEU TREES)

PLATEAUTREES
Safety. Quality. Progress.

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 undertake 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.

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ABN : 17 090 798 002

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

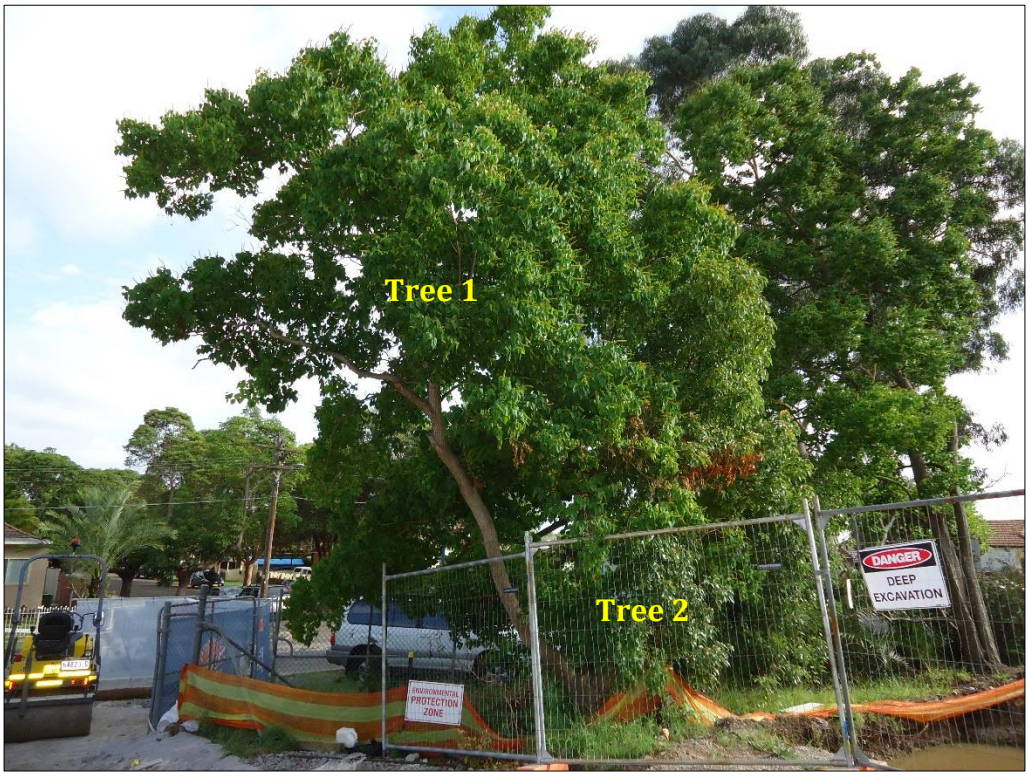
All appropriate approvals and consents are to be obtained prior to tree and vegetation removal works commencing. All tree removal works are to be undertaken by suitably qualified tree workers in accordance with Safe Work Australia's Guide to Managing Risks of Tree Trimming and Removal Works.

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 Botanical name Common name	Tree dimensions Height (m)	Spread (m)	D.B.H. (mm)	D.A.B. (mm)	Vigour	Condition	Age class	ULE	Amenity and Visual Value	Native or Exotic	TPZ (m)	SRZ (m)	Comments	Remove or Retain
1	*Sapium sebiferum* (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	*Cinnamomum camphora* (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 crow, 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.

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- **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.
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APPENDIX 12.6 PUNCHBOWL AIA (PLATAEU TREES)

PLATEAUTREES
Safety. Quality. Progress.

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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Table of Contents

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 Boulevarde 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

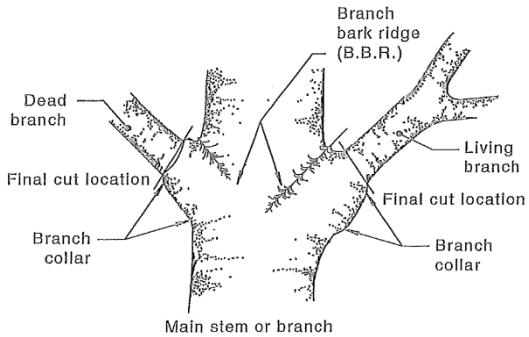
collar. Branch C is 150mm diameter located at 4m height. The branch is to be reduced to suitable growth point. Various epicormic shoots originating from the base of the trunk shall require removal. Additional second order branches less than 60mm in diameter may require removal to achieve clearances. 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 Boulevarde and Mathews Street.

5.0 Pruning Method

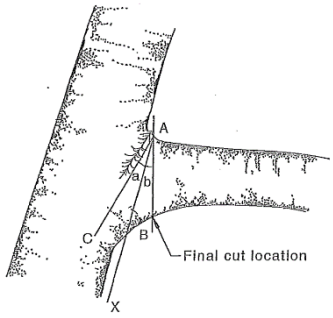
5.1 All tree pruning works are to be undertaken by suitably qualified tree workers (minimum AQF level 3 or equivalent) and in accordance with AS4373-2007 Pruning of Amenity Trees and Safe Work Australia's Guide to Managing Risks of Tree Trimming and Removal Works. All appropriate approvals and consents 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.

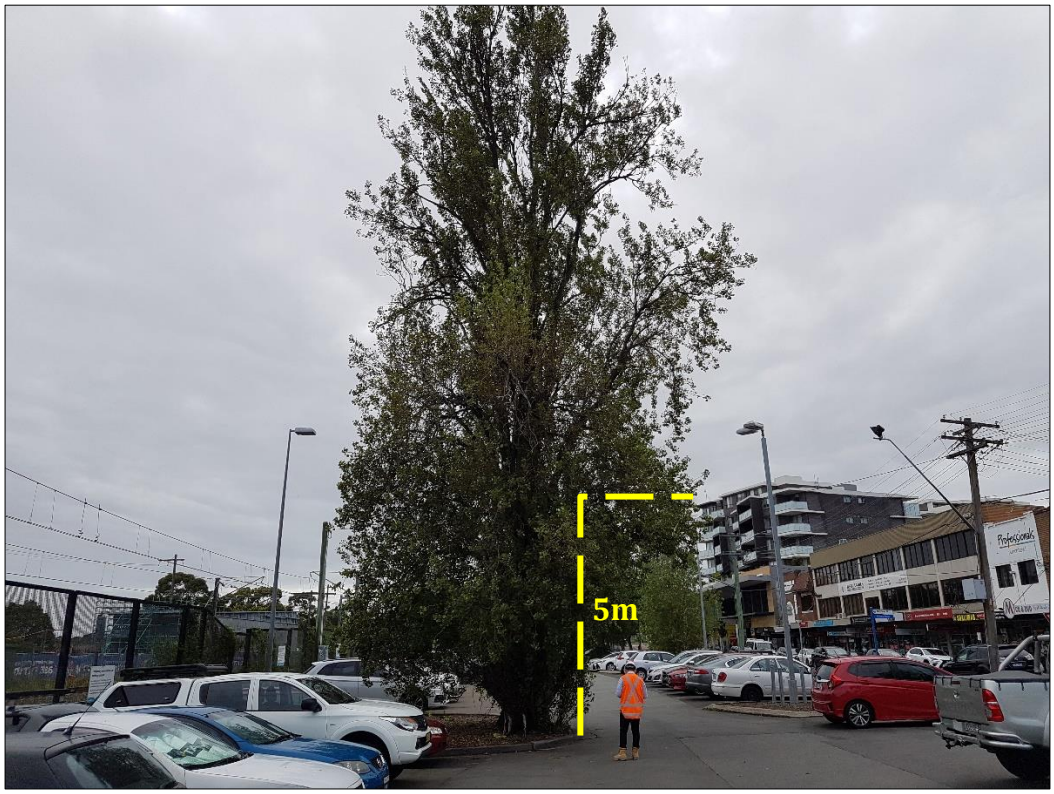
6.5 The trees are to be inspected by a suitably qualified arborist (minimum AQF 5 or equivalent) 12 months after completion of pruning works. At a minimum the inspection is to include:

- 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

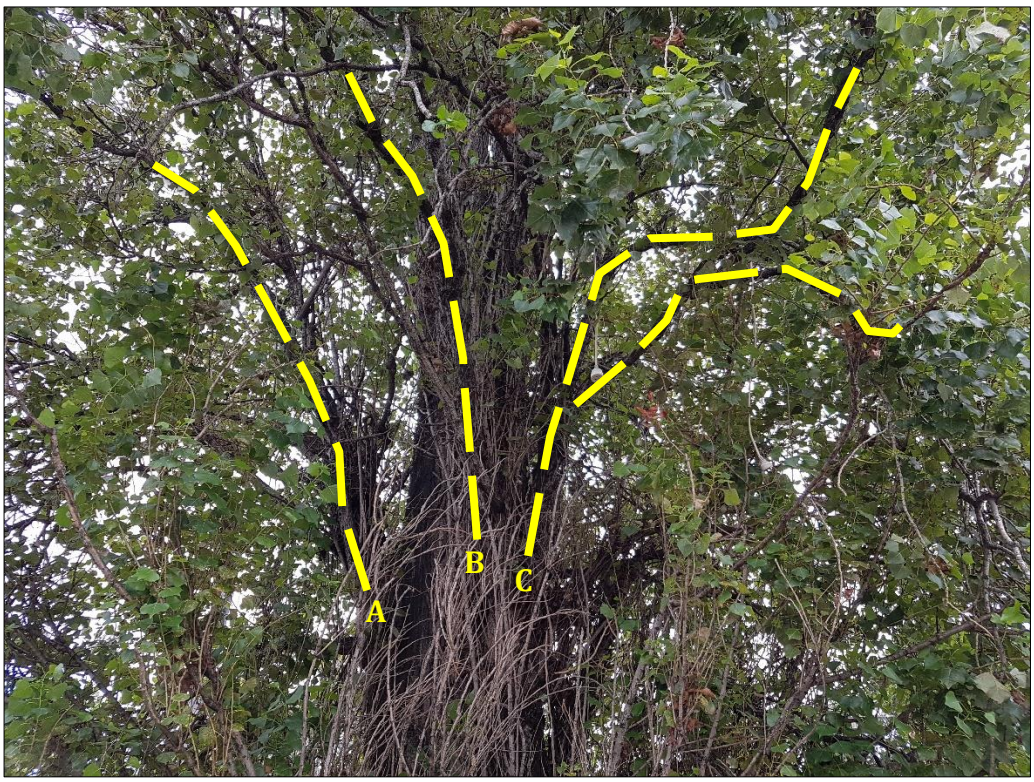
Appendix 1: Tree Assessment and Pruning Schedule

Tree number	Tree name Botanical name Common name	Tree dimensions Height (m)	 Spread (m)	 D.B.H. (mm)	Vigour	Condition	Age class	ULE	Landscape Significance	Pruning Requirements	Estimated % of Live Canopy Loss	Impacts/Comments
1	*Populus nigra 'Italica'* (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.

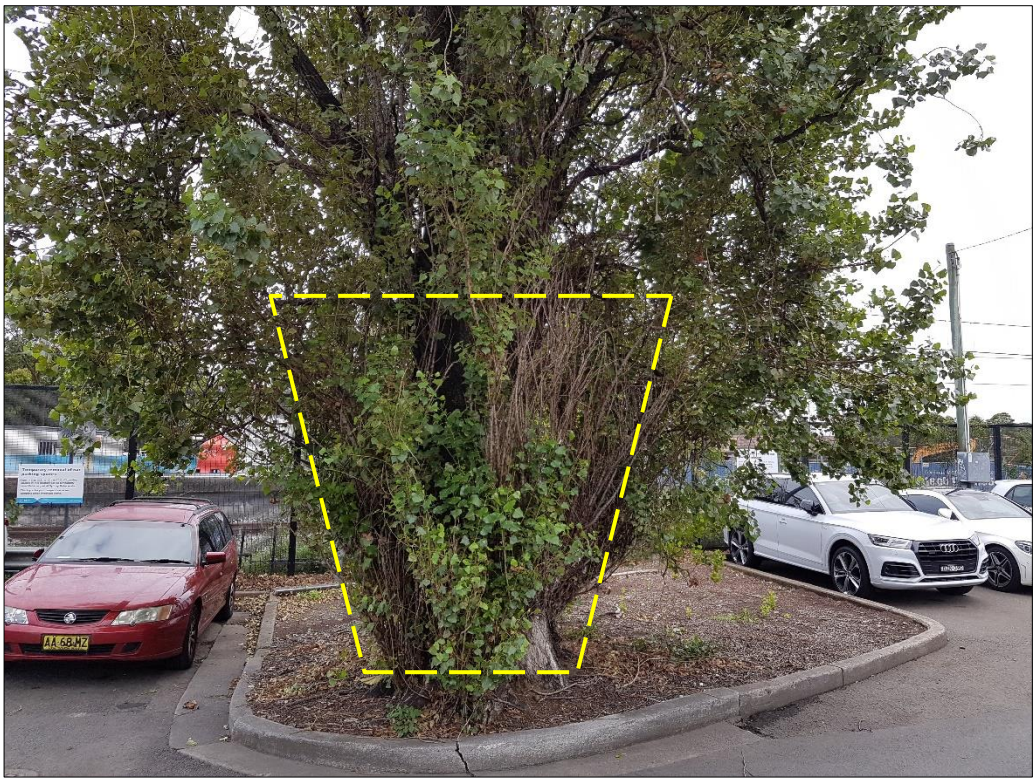
Appendix 2: Photographs



Photograph 1: Tree 1 *Populus nigra 'Italica'* (Lombardy Poplar as seen from the carpark area adjacent The Boulevarde. 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 crow, 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.

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.