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REPORT

Main Works Arborist Report

PREPARED FOR

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1. EXECUTIVE SUMMARY

1.1 Central West Project Management Pty Ltd (CWPM), commissioned a main works arborist report to evaluate the potential impacts on trees by The Main Works and if viable to make recommendations that reduce the impacts on trees at Cowra Health Services, Liverpool Street Cowra NSW 2794.

1.2 The assessment was conducted on the 3rd of June and 11th of July 2022, by Gregor van Emmerik Dip. Arb AQF L5 (Ryde), Visual Tree Risk Assessment Qualified (vTRA) & Tree Contractors Association of Australia (TCAA) member, engaged by McArdle Arboricultural Consultancy Pty Ltd.

1.3 Seventy-five (75) trees were assessed on site and on the adjacent surroundings area. Five (5) of these trees were removed prior to the submission of the MWAR Dec 2022 without following proper protocol

1.4 The **retention values** of the trees were determined as follows:

1.4.2 Seven (7) trees of **moderate** retention value are numbered 14, 20, 36, 52, 59, 70 and 71.

1.4.3 Twenty-three (23) trees of **moderate to low** retention value are numbered 9, 11, 13, 22, 23, 37, 38, 39, 40, 40a, 43, 44, 45, 46, 49, 50, 53, 54, 55, 56, 57, 61a and 66.

1.4.4 Forty-four (44) trees of **low** retention value are numbered, 1, 2, 3, 4, 5, 6, 7, 8, 10, 15, 16, 17, 18, 19, 21, 24, 25, 26a, 26b, 27, 28, 29, 30, 31, 32, 33, 34, 35, 42, 48, 51, 58, 60, 61, 63, 64, 65, 67, 68, 69, 72, 73, 74 and 75.

1.4.5 Tree 12 has a **very low** retention value.

1.5 The impacts for The Main Works anticipate the following;

1.5.1 Thirty-nine (39) trees have **major TPZ encroachments** from The Main Works, that is, more than 10%, these trees are numbered 6, 7, 9, 10, 11, 12, 13, 15, 16, 21, 22, 23, 24, 25, 26a, 26b, 27, 28, 29, 30, 31, 37, 38, 39, 40, 40a, 42, 43, 44, 45, 46, 48, 49, 50, 51, 60, 61, 61a and 67.

1.6 Recommendations for Tree Management are required protect trees during development as follows;

1.6.1 **Retain** thirty-three (33) trees numbered 1, 2, 3, 4, 5, 8, 13, 14, 16, 17, 18, 19, 20, 32, 33, 34, 35, 36, 52, 58, 59, 63, 64, 65, 66, 68, 69, 70, 71, 72, 73, 74 and 75.

1.6.2 **Remove** thirty-seven (37) trees numbered 6, 7, 9, 10, 11, 12, 15, 21, 22, 23, 24, 25, 26a, 26b, 27, 28, 29, 30, 31, 37, 38, 39, 40, 40a, 42, 43, 44, 45, 46, 48, 49, 50, 51, 60, 61, 61a and 67. Of these, seven (7) are **exempt** from preservation numbered 12, 15, 22, 24, 30, 31 and 48.

1.6.3 **Replenishment planting** of thirty-five (35) trees with a mature canopy greater than 8 meters. Some suggested species are *Eucalyptus blakelyi*, (Blakely's red gum), *Eucalyptus melliodora*, (Yellow box) and *Acacia decora* (Western Silver Wattle).

1.6.4 Ensure the existing grade is maintained during the main works for two (2) trees numbered 13 and 16.

1.6.5 If fencing is replaced on the Northern boundary, ensure the posts are placed outside the SRZ of tree 16.

1.7 A summary of protection measures for trees on The Main Works. Is listed in Table 1 below;

Table 1 Tree Protection Measures

Tree	Intended Works
6, 7, 9, 10, 11, 21, 23, 25, 26a, 26b, 27, 28, 29, 37, 38, 39, 40, 40a, 42, 43, 44, 45, 46, 49, 50, 51, 60, 61, 61a and 67.	Replenish the removal of these trees.
12, 15, 22, 24, 30, 31 and 48.	Remove (exempt).
1, 2, 3, 32, 33, 58, 68, 69, 70, 71, 72, 73, 74 and 75.	Located sufficiently far enough away from the development as to not require protection measures in this initial stage of development
63, 64, 65 and 66.	Retain and protect. Tree trunk protection.
36, 52 and 59.	Retain and protect. Tree trunk protection. Exclusion zone.
4, 5, 8, 13, 14, 34 and 35.	Retain and protect. Tree protective fencing.
16, 17, 18, 19 and 20.	Retain and protect. Tree protective fencing. Exclusion zone.

2. INTRODUCTION

2.1 AIMS

The aim of the report is to:

- 2.1.1 To assess tree health, condition, retention value and evaluate impacts on trees by The Main Works.
- 2.1.2 To provide options, if viable to reduce the impacts of The Main Works on the existing trees and make recommendations for tree management and protection during development.

2.2 SCOPE

2.2.1 Central West Project Management Pty Ltd, commissioned a main works arborist report for the site at Cowra Health Services, Liverpool Street Cowra NSW 2794.

2.2.2 The assessment was conducted on the 3rd of June and 11th of July 2022, by a senior AQF level 5 arborist from McArdle Arboricultural Consultancy.

2.2.3 Tree management measures are regulated by the Cowra Council Development Control Plan 2014 (DCP) and the Local Environmental Plan 2012 (LEP).

2.2.4 Thirty-nine (39) trees were assessed on site and on the adjacent surrounding area and twenty (20) trees are impacted by The Main Works. The Main Works encompasses the construction of the new hospital.

2.2.5 The inspection, does not include below ground root excavation, no expert laboratory analysis was conducted, including internal diagnostics, inaccessible trunk and aerial inspection. No pathology test or soil analysis were conducted. Sketches, diagrams, graphs, and photographs in this report, being intended as visual aids, are not necessarily to scale.

2.2.6 The owner or manager of this site has provided a site survey prepared by Premise (dated 3rd of Feb 2022) with tree numbers, location, height, crown spread and trunk diameter.

2.3. METHODOLOGY

2.3.1 The inspection was primarily conducted using ground-based collection of data to identify visible signs of tree health, structure and potential hazards. Collection data methods may include; a mallet for sound test, trowel, screw driver for compaction and probing cavities to identify pathogens pests and disease. The assessments do not involve laboratory analysis. Methods may include the following;

2.3.2 **Visual Tree Assessment (VTA)** (Mattheck and Breloer 1994), a method assessing for biological and lower level mechanical functions and signs of decay, damage or defects (Appendix A).

2.3.3 **Tree AZ Categories** (Barrell 2010) classifies importance of trees on development sites, (Appendix B).

- **Category A-** suitable for retention and
- **Category Z- (Z1 to Z12):** not worthy of constraint.

2.3.4 **Tree Useful Life Expectancy (TULE)** (Barrell 1993; adapted with permission for TCAA 2014), (Appendix C) measures its remaining lifespan and assigns a category as;

1. **Long-** >40 years
2. **Medium-** 15-40years,
3. **Short-** 5-15years,
4. **Remove-** next 5yrs,
5. **No potential for retention and**
6. **Small, young or regularly clipped.**

2.3.5 **Landscape Significance Rating** (Morton 2006), (Appendix D) measures its contribution to the amenity, heritage and ecological criteria and is classified as;

1. **Significant-** listed heritage or ecological item,
2. **Very high-** strong historical association with heritage or other value,
3. **High-** suspected heritage item or status strong historical or other value,
4. **Moderate-** no historical association but does not detract value of the item,
5. **Low-** the tree detracts from heritage value or exempt species,
6. **Very low-** causing significant damage to a heritage item and
7. **Insignificant-** dead and no visible habitat.

2.3.6 **Retention Value Rating** (Morton 2011) is determined once the TULE category and Landscape Significance ratings have been determined (Appendix E). the values are rated as;

- **High-** considered worthy of preservation,
- **Moderate-** retention of these trees is desirable,
- **Low-** are generally not a constraint to development and
- **Very Low-** potentially hazardous or very poor specimens.

2.3.7 **Standards Australia**, AS 4970 2009– Protection of trees on development sites and AS 4373 2007- Pruning of Amenity Trees.

2.3.8 **Planting Specifications from NATSPEC** (Clark 2003) and Australian Standard ® AS 2303-2018 Tree Stock for Landscape Use. (Appendix H).

2.3.9 **Tree Contractors** must have a minimum AQF Level 3 Certificate in arboriculture and work in accordance with Australian Standard® AS 4373 2007 Pruning of Amenity Trees, the Work Health & Safety (WHS) Act 2011 and the WHS Regulations 2017, the Safe Work Guide to Managing Risks of Tree Trimming and Removal Work 2016 and the Code of Practice for The Amenity Tree Industry 1998. Work near powerlines should be carried out in accordance with the Code of Practice for Work Near Overhead Power Lines.

3. RESULTS

3.1 THE SITE

3.1.1 The site is Cowra Health Services, Liverpool St Cowra NSW 2794.

3.1.2 The soils¹ are classified generally as light clay. The site has an Eastern aspect and an approximate gradual 8 degrees slope.

3.1.3 The first impression is that the hospital grounds have a few mature trees and several stressed young introduced trees, some of self-sown noxious nature. The tree group 37, 38, 39, 40 and 40a are small but healthy and are estimated to be 40 year's old. Due to water runoff and poor cultural conditions most of the *Fraxinus species* are drought affected. The council trees on the Nature-strip are small and represent moderate to low retention value.

3.1.4 Figure 1 shows a scaled site map



Figure 1: Aerial map of Cowra Health Services. Yellow line indicates site.

¹ Espade.environment.nsw.gov.au

3.2 LEGISLATION AND SIGNIFICANCE IN THE ENVIRONMENT

Trees are subject to the following commonwealth and State legislation:

3.2.1 Commonwealth Legislation regulates the **Biosecurity Act 2015**, (diseases and pests) and the **Environmental Protection & Biodiversity Conservation Act 1999 (EPBC Act)** which manages nationally endangered ecological communities (EEC) and national heritage items. The EPBC Act delegates to the **NSW Biodiversity Conservation Act 2016 (BC Act)**² and allows state and local authorities to manage ecological and heritage matters of significance. The BC Act repealed (but still has some transitional arrangements) the NSW Threatened Species Conservation Act, 1995. The BC Act may require Species Impact Statement and Biodiversity Banking and Offset Scheme agreements determined by the Biodiversity Assessment Method (BAM).

3.2.2 NSW State Legislation³ is regulated under the **NSW Environmental Planning and Assessment Act 1979 (EP&A Act)**, which manages significant development and infrastructure in NSW. The EP&A Act utilises **Environmental Planning Instruments (EPI)**³, These instruments include, **State Environment Planning Policies (SEPP)** that deal with matters of state or regional environmental planning significance and **Local Environmental Plans (LEP)** that provide local Councils a framework for land usage.

3.2.3 **NSW Rural Fire Act 1997**⁴ regulates a **10/50 Vegetation Clearing Code**, may allow a designated area to clear trees within 10 metres of a home and clear underlying vegetation such as shrubs (but not trees), within 50 metres of a home to reduce risk from bushfires.

3.2.4 An analysis of state and local legislation, development controls and planning instruments concludes the following:

- **Tree management measures**⁴ are regulated by the Cowra Council Development Control Plan 2014 (DCP) and the Local Environmental Plan 2012 (LEP).
- The Local **Aboriginal Land Council** is Cowra.
- **Land zoning** is R1: General Residential.

3.3 LOCAL PLANNING AND ZONING CONTROLS

Site Address: Cowra Health Services



Figure 2: Land Zoning

R1: General Residential

² <https://www.environment.nsw.gov.au>

³ <https://www.planningportal.nsw.gov.au/>

⁴ <https://www.cowracouncil.nsw.gov.au/>

3.4 TREE SCHEDULE

Table 2: Tree Schedule - Health and Structural Condition of Trees.

(* DBH- Diameter Breast Height, Diameter Root Collar. * TPZ- Tree Protection Zone. SRZ- Structural Root Zone. * TULE-Tree Useful Life Expectancy)

Tree	Location	Botanical Name Common Name	Crown (m)	Height (m)	DBH * DRC (cm)	TPZ * SRZ (m)	VTA-Tree Health & Condition	TULE *	Retention Value	Intended Works
1	Brisbane street	<u>Quercus robur</u> English oak	5	5	25	3.00 1.90	Immature, good condition, 15 years old	1a	Low	Retain and protect.
2		<u>Quercus robur</u> English oak	5	5	23	2.10 1.85	Immature, good condition, 15 years old	1a	Low	Retain and protect.
3		<u>Quercus robur</u> English oak	5	5	23- 3x>10	2.00 1.50	Immature, good condition, 15 years old	1a	Low	Retain and protect.
4		<u>Lagerstroemia indica</u> Crepe myrtle	5	4	>15	2.00 1.50	Mature, good condition, 15 years old	1a	Low	Retain and protect. Tree protective fencing.
5		<u>Lagerstroemia indica</u> Crepe myrtle	5	4	>15	2.00 1.50	Mature, good condition, 15 years old	1a	Low	Retain and protect. Tree protective fencing.
6		<u>Lagerstroemia indica</u> Crepe myrtle	3	4	>15	2.00 1.50	Mature, good condition, 15 years old	1a	Low	Remove and replenish.
7		<u>Lagerstroemia indica</u> Crepe myrtle	3	4	>15	2.00 1.50	Mature, good condition, 15 years old	1a	Low	Remove and replenish.
8		<u>Lagerstroemia indica</u> Crepe myrtle	5	4	>15	2.00 1.50	Mature, good condition, 15 years old	1a	Low	Retain and protect. Tree protective fencing.
9		<u>Corymbia citriodora</u> Lemon Scented Gum	7	11	26 32	3.12 2.05	Immature, good condition, 15 years old.	1a	Low to Moderate	Remove and replenish.
10		<u>Corymbia citriodora</u> Lemon Scented Gum	5	10	5x>15 37	4.08 2.18	Immature, fair condition, 15 years old, Co-dominant.	2b	Low	Remove and replenish.
11		<u>Corymbia citriodora</u> Lemon Scented Gum	4	9	25 32	3 2.05	Immature, good condition, 15 years old.	1a	Low to Moderate	Remove and replenish.
12		<u>Ligustrum lucidum</u> Privet	9	6	24x22x14x 10 42	4.44 2.3	Immature, good condition, 25 years old, Noxious weed.	4e	Very Low	Remove (Exempt species – Weed).

Tree	Location	Botanical Name Common Name	Crown (m)	Height (m)	DBH ⁺ DRC (cm)	TPZ ⁺ SRZ (m)	VTA-Tree Health & Condition	TULE ⁺	Retention Value	Intended Works
13	Northern Boundary	<u>Celtis australis</u> European nettle tree	11	10	27x3x10 52	3.84 2.51	Immature good condition, 25 years old, Co-dominant.	2b	Low to Moderate	Retain and protect. Tree protective fencing.
14	Tresillian care centre	<u>Brachychiton</u> <u>popelneus</u> Illawara flame tree	6	9	40	4.80 2.30	Semi Mature, good condition, 25 years old	1a	Moderate	Retain and protect. Tree protective fencing.
15	Tresillian care centre	<u>Oliva europea</u> Wild Olive Tree	1	3	>10	2.00 1.50	Regrowth of removed tree	4e	Low	Remove (Exempt species – Weed).
16		<u>Oliva europea</u> Wild Olive Tree	2	2	3X>15	3.12 2.00	Juvenile, Fair, recently pruned, 20 years old	3b	Low	Retain and protect. Tree protective fencing.
17		<u>Oliva europea</u> Wild Olive Tree	2	2	3X>15	3.12 2.00	Juvenile, Fair, recently pruned, 20 years old	3b	Low	Retain and protect. Tree protective fencing. Exclusion zone.
18		<u>Lagerstroemia</u> <u>indica</u> Crepe myrtle	5	5	7X>15	4.08 2.00	Semi Mature, good condition, 25 years old	1a	Low	Retain and protect. Tree protective fencing. Exclusion zone.
19		<u>Lagerstroemia</u> <u>indica</u> Crepe myrtle	5	5	4X>15	4.08 2.00	Semi Mature, good condition, 25 years old	2a	Low	Retain and protect. Tree protective fencing. Exclusion zone.
20		<u>Saphora japonicum</u> Japanese pagoda	7	7	4X>15	4.08 2.00	Semi Mature, good condition, 25 years old	2a	Moderate	Retain and protect. Tree protective fencing. Exclusion zone.
21	Carpark	<u>Fraxinus oxycarpa</u> Claret Ash	3	5	2x>15 >15	2.52 1.5	Immature, fair condition, 10 years old, Co-dominant.	1a	Low	Remove and replenish.
22	Northern Boundary	<u>Celtis australis</u> European nettle tree	10	11	36x32 58	5.76 2.63	Immature good condition, 30 years old, Co-dominant.	1a	Low to Moderate	Remove (Exempt species – Weed).
23		<u>Juniperus chinensis</u> Chinese juniper	6	7	28 36	3.36 2.15	Immature good, fair condition, 25 years old.	1a	Low to Moderate	Remove and replenish.
24		<u>Fraxinus oxycarpa</u> 'Raywoodii' Claret Ash	8	10	45 51	5.4 2.49	Immature, poor condition, 25 years old.	4a	Low	Remove (exempt from replenishment due to decline).
25		<u>Liquidambar</u> <u>styraciflora</u> Liquid Amber	6	6	2x>15 22	2.52 1.75	Immature, fair condition, 15 years old.	2a	Low	Remove and replenish.
26 a	Carpark	<u>Fraxinus oxycarpa</u> Claret Ash	6	6	3x>15 36	3.12 2.15	Immature, fair condition, 15 years old, Co-dominant.	1a	Low	Remove and replenish.

Tree		Botanical Name Common Name	Crown (m)	Height (m)	DBH ⁺ DRC (cm)	TPZ ⁺ SRZ (m)	VTA-Tree Health & Condition	TULE ⁺	Retention Value	Intended Works
26		<i>Fraxinus oxycarpa</i> Claret Ash	3	5	>15 >15	2 1.5	Immature, fair condition, 10 years old, Co-dominant.	1a	Low	Remove and replenish.
27		<i>Fraxinus oxycarpa</i> Claret Ash	8	7	2x>15 37	2.52 2.18	Immature, fair condition, 15 years old, Co-dominant.	1a	Low	Remove and replenish.
28		<i>Fraxinus oxycarpa</i> Claret Ash	5	7	4x>15 27	3.6 1.91	Immature good condition, 15 years old, Co-dominant.	1a	Low	Remove and replenish.
29	Carpark	<i>Fraxinus oxycarpa</i> 'Raywoodii' Claret Ash	6	8	10x20x23 33	3.84 2.08	Immature, good condition, 15 years old, Co-dominant.	1a	Low	Remove and replenish.
30	In lane	<i>Cotoneaster species</i>	5	3	30	N/A	Immature, good condition, 30 years old	4e	Low	Remove (Exempt species).
31		<i>Cotoneaster species</i>	5	3	30	N/A	Immature, good condition, 30 years old	4e	Low	Remove (Exempt species – Weed).
32	Brisbane street	<i>Shinus mole</i> Peppercorn	20	8	70x53	10.56 3.38	Mature, good condition, 10 years old	2b	low	Retain and protect.
33		<i>Prunus seraciflua</i> Turkish plum	5	4	>15	2.00 1.50	Immature, Fair condition, 15 years old	4e	Low	Retain and protect.
34		<i>Lagerstroemia indica</i> Crepe myrtle	5	4	>10	2.00 1.50	Immature, Good condition, 15 years old	1a	Low	Retain and protect. Tree protective fencing.
35		<i>Lagerstroemia indica</i> Crepe myrtle	5	4	>10	2.00 1.50	Immature, Good condition, 15 years old	1a	Low	Retain and protect. Tree protective fencing.
36		<i>Celtis australis</i> European nettle tree	10	12	51	6.12 2.67	Mature, Fair condition, directional pruned powerlines	2b	Moderate	Retain and protect. Tree trunk protection. Exclusion zone.
37	Laundry carpark	<i>Chamaecyparis obtusa</i> Hinoke Cypress	4	6	4x>15 30	3.6 2	Semi mature, good condition, 40 years old.	1c	Low to Moderate	Remove and replenish.
38		<i>Chamaecyparis obtusa</i> Hinoke Cypress	4	6	6x>15 40	4.44 2.25	Semi mature, good condition, 40 years old.	1c	Low to Moderate	Remove and replenish.
39		<i>Chamaecyparis obtusa</i> Hinoke Cypress	4	6	6x>15 42	4.44 2.3	Semi mature, good condition, 40 years old.	1c	Low to Moderate	Remove and replenish.
40		<i>Chamaecyparis obtusa</i> Hinoke Cypress	4	5	4x>15 28	3.6 1.94	Semi mature, Fair condition, 40 years old.	1c	Low to Moderate	Remove and replenish.

Tree		Botanical Name Common Name	Crown (m)	Height (m)	DBH ⁺ DRC (cm)	TPZ ⁺ SRZ (m)	VTA-Tree Health & Condition	TULE ⁺	Retention Value	Intended Works
40 a		<u>Chamaecyparis</u> <u>obtusa</u> Hinok Cypress	4	5	6x>15 38	4.44 2.2	Semi mature, good condition, 40 years old.	1c	Low to Moderate	Remove and replenish.
42	Conference room	<u>Jacaranda</u> <u>mimosifolia</u> Jacaranda	4	5	2x>15 >15	2.52 1.5	Good condition, 10 years old, Co-dominant.	1a	Low	Remove and replenish.
43		<u>Callistemon viminalis</u> Bottlebrush	6	6	3x>15 24	3.12 1.82	Good condition, 15 years old.	1a	Low to Moderate	Remove and replenish.
44	Conference room	<u>Fraxinus oxycarpa</u> 'Raywoodii' Claret Ash	7	10.5	20x20x15 36	4.32 1.88	Good condition, 15 years old.	1a	Low to Moderate	Remove and replenish.
45		<u>Callistemon viminalis</u> Bottlebrush	4	7	2x>15 26	2.52 2.05	Good condition, 15 years old.	1a	Low to Moderate	Remove and replenish.
46		<u>Callistemon viminalis</u> Bottlebrush	6	7	3x>15 24	3.12 1.82	Good condition, 15 years old.	1a	Low to Moderate	Remove and replenish.
48	Boiler house	<u>Fraxinus oxycarpa</u> 'Raywoodii' Claret Ash	6	12	59 64	7.08 2.74	Poor condition, 50 years old.	4a	Low	Remove (exempt from replenishment due to decline).
49	Conference room	<u>Callistemon viminalis</u> Bottlebrush	6	8	2x>15 32	2.52 2.05	Good condition, 15 years old, Co-dominant.	1a	Low to Moderate	Remove and replenish.
50	In Drive	<u>Lagerstroemia indica</u> Crepe Myrtle	5	6	4x>15 26	3.6 1.88	Good condition, 15 years old.	1a	Low to Moderate	Remove and replenish.
51		<u>Lagerstroemia indica</u> Crepe Myrtle	3	2	2x>10	2.52 1.85	Immature, Good condition, 15 years old	1a	Low	Remove and replenish.
52	Brisbane street	<u>Celtis australis</u> European nettle tree	11	12	76	9.12 3.17	Mature, Good condition, 70 years old	2b	Moderate	Retain and protect. Tree trunk protection. Exclusion zone.
53 - 57	Laundry - carpark	<u>Chamaecyparis</u> <u>obtuse</u> Hinok cypress					Removed prior to the main works report without following proper protocols due to infrastructure conflict.			
58	Brisbane street	<u>Celtis australis</u> European nettle tree	8	10	23x32	4.68 2.47	Mature, Good condition, 15 years old	1a	Low	Retain and protect.
59		<u>Celtis australis</u> European nettle tree	12	8	60x35	8.28 2.90	Mature, Good condition, 70 years old	2b	Moderate	Retain and protect. Tree trunk protection. Exclusion zone.
60	Main Hospital	<u>Robinia pseudoacacia</u> 'Umbraculifera' Mop Top	8	6	36 38	4.32 2.2	Immature, good condition, 25 years old.	2b	Low	Remove and replenish.

Tree	Botanical Name		Crown	Height	DBH *	TPZ *	VTA-Tree Health & Condition	TULE *	Retention	Intended Works
	Common Name		(m)	(m)	DRC (cm)	SRZ (m)		Value		
61		<u>Ulmus glabra</u> 'Pendula' The Weeping Elm	5	3	>15 >15	2 1.5	Immature, good condition, 25 years old.	2b	Low	Remove and replenish.
61	Main entrance	<u>Acer palmatum</u> Japanese Maple	6	8	6x>15 20	4.44 1.68	Immature, good condition, 25 years old.	1a	Low to Moderate	Remove and replenish.
62		Removed prior to this report or not found.								
63	Main entrance	<u>Liquidambar styraciflau</u> Liquid Amber	3	3.5	2x>15 15	2.52 1.5	Immature, poor condition, 10 years old, Co-dominant.	1a	Low	Retain and protect. Tree trunk protection.
64		<u>Triadica sebifera</u> Chinese Tallow	3	4	>15 20	2 1.68	Immature, good condition, 10 years old.	2a	Low	Retain and protect. Tree trunk protection.
65		<u>Triadica sebifera</u> Chinese Tallow	3	4	>15 25	2 1.85	Immature, good condition, 10 years old.	2a	Low	Retain and protect. Tree trunk protection.
66		<u>Triadica sebifera</u> Chinese Tallow	7	7	22x15 40	3.24 2.25	Immature, good condition, 20 years old.	2a	Low to Moderate	Retain and protect. Tree trunk protection.
67		<u>Triadica sebifera</u> Chinese Tallow	4	5	2x>15 36	2.52 2.15	Immature, poor condition, 20 years old.	3a	Low	Remove and replenish.
68	Liverpool street	<u>Melaleuca bracteate</u> Paperbark	1	2	>10	N/A	Regrowth tree removed	4b	Low	Retain and protect.
69		<u>Malus species</u> Crepe apple	3	5	20	2.40 1.75	Semi mature, good condition.15 years old	1a	Low	Retain and protect.
70		<u>Brachychiton popelues</u> Kurrajong	8	8	64	7.68 3.57	Mature, good condition 60 years old	2d	Moderate	Retain and protect.
71		<u>Brachychiton popelues</u> Kurrajong	10	7	63	7.20 3.00	Mature, good condition 60 years old	2d	Moderate	Retain and protect.
72		<u>Grevilia robusta</u> Silky oak	5	6	46	5.52 2.67	Semi mature, Poor condition, 15 years old	3d	Low	Retain and protect.
73		<u>Callistemon viminalis</u> Weeping Bottle brush	5	6	25x15x15	3.96 2.39	Mature, Poor condition, 15 years old	2d	Low	Retain and protect.
74		<u>Grevilia robusta</u> Silky oak	5	6	32	3.34 2.39	Semi mature, Poor condition, 15 years old	3d	Low	Retain and protect.
75		<u>Callistemon viminalis</u> Weeping Bottle brush	5	6	4x15	3.60 2.13	Mature, Fair condition, 25 years old	2d	Low	Retain and protect.

3.5 OBSERVATIONS



Plate 1: Tree 1, 2, and 3, Quercus robur (English oak).



Plate 2: Tree 4, 5, 6, and 7 Lagerstroemia indica (Crepe myrtle).



Plate 3: Tree 11, 10, 9, Corymbia citriodora (Lemon Scented Gum).



Plate 4: Tree 12, Ligustrum lucidum (Privet).



Plate 5: Tree 13, Celtis australis (European nettle tree).



Plate 6: Tree 14, Brachychiton populneus (Illawarra flame tree).



Plate 7: Tree 15, Oliva europaea (Wild Olive Tree).



Plate 8: Tree 16 and 17, Oliva europaea (Wild Olive Tree).



Plate 9: Tree 18 and 19, Lagerstroemia indica (Crepe myrtle).



Plate 10: Tree 20, Saphora japonicum (Japanese pagoda).



Plate 11: Tree 26ab, 21, from the left, *Fraxinus oxycarpa* (Claret Ash).



Plate 12: Tree 22, *Celtis australis* (European nettle tree).



Plate 13: Tree 23, *Juniperus chinensis* (Chinese juniper).



Plate 14: Tree 24, *Fraxinus oxycarpa* 'Raywoodii' (Claret Ash).



Plate 15: Tree 25, *Liquidambar styraciflua* (Liquid Amber).



Plate 16: Tree 27, *Fraxinus oxycarpa* (Claret Ash).



Plate 17: Tree 28, *Fraxinus oxycarpa* (Claret Ash).



Plate 18: Tree 29, *Fraxinus oxycarpa* 'Raywoodii' (Claret Ash).



Plate 19: Tree 30 and 31, *Cotoneaster* species.



Plate 20: Tree 32, *Shinus mole* (Peppercorn).



Plate 21: Tree 33, *Prunus seraciflua* (Turkish plum).



Plate 22: Tree 34 and 35, *Lagerstroemia indica* (Crepe myrtle).



Plate 23: Tree 36, *Celtis australis* (European nettle tree).



Plate 24: Tree 37, 38, 39 and 40, *Chamaecyparis obtusa* (Hinok Cypress).



Plate 25: Tree 37 to 40a, Chamaecyparis obtusa (Hinoke Cypress).



Plate 26: Tree 42, Jacaranda mimosifolia (Jacaranda).



Plate 27: Tree 43, Callistemon viminalis (Bottlebrush).



Plate 28: Tree 46, Callistemon viminalis (Bottlebrush).



Plate 29: Tree 48, *Fraxinus oxycarpa* 'Raywoodii' (Claret Ash).



Plate 30: Tree 50, *Lagerstroemia indica* (Crepe Myrtle).



Plate 31: Tree 51, *Lagerstroemia indica* (Crepe Myrtle).



Plate 32: Tree 52, *Celtis australis* (European nettle tree).



Plate 33: Tree 58, *Celtis australis* (European nettle tree) .



Plate 34: Tree 60, *Ulmus glabra* 'Pendula' (The Weeping Elm).



Plate 35: Tree 61, *Robinia pseudoacacia* 'Umbraculifera' (Mop Top).



Plate 36: Tree 61a, *Acer palmatum* (Japanese Maple).



Plate 37: Tree 63, *Liquidambar styraciflua*, (Liquid Amber).



Plate 38: Tree 64, *Triadica sebifera* (Chinese Tallow).



Plate 39: Tree 65, *Triadica sebifera* (Chinese Tallow).



Plate 40: Tree 66, *Triadica sebifera* (Chinese Tallow).



Plate 41: Tree 67, Triadica sebifera (Chinese Tallow).



Plate 42: Tree 68, Melaleuca bracteata (Paperbark).



Plate 43: Tree 69, Malus species (Crepe apple).



Plate 44: Tree 71, Brachychiton popelues (Kurrajong).



Plate 45: Tree 72 and 74, *Grevilia robusta* (Silky oak) 73, and 75, *Callistemon viminalis* (Weeping Bottle brush).



Plate 46: Hospital path and access.



Plate 47: *Cotoneaster* sp. shrub

4. DISCUSSION

4.1 General Discussion Of Trees On Site

4.1.1 Seventy-five (75) trees were assessed on site and on the adjacent surrounding area and thirty-nine (39) trees are impacted by The Main Works.

4.1.2 Five (5) trees numbered 53, 54, 55, 56 and 57 have been removed prior to the main works report without following proper protocols. These removals were due to infrastructure conflict with the slab required for the container placement. We would encourage replenishment and communication prior to further tree removal as the community expectations are to manage and maintain trees. The remaining trees are important to be retained as they may have cultural or indigenous value.

4.1.3 The area of The Main Works was provided (by Jamie Pinkerton, Project Manager CWPM) to McArdle Arboricultural consultancy in the diagram below (Figure 3), with the blue shading indicating the development area. This area is going to be re-levelled and thus all trees within the blue shading are required to be removed. This impact assessment is based on Figure 3.



Figure 3: The Main Works area for Cowra Health Services

4.1.4 Trees that are impacted are numbered 6, 7, 9, 10, 11, 12, 13, 15, 16, 21, 22, 23, 24, 25, 26a, 26b, 27, 28, 29, 30, 31, 37, 38, 39, 40, 40a, 42, 43, 44, 45, 46, 48, 49, 50, 51, 60, 61, 61a and 67. Of these, seven trees (7) numbered 12, 13, 15, 16, 22, 30 and 31 are exempt from replenishment due to weed status and, two (2) trees numbered 24 and 48 are exempt from replenishment due to decline.

4.2 Tree Useful Life Expectancy (TULE)

4.2.1 The sustainability of a tree is a measure of a tree quality and remaining lifespan, consideration to its health, condition and suitability to the locality and site conditions which is expressed as it's a **TULE category** located in appendix C.

4.2.2 Trees with a **long TULE** rating indicate a retention of 40 or more years. Thirty-four (34) trees numbered 1, 2, 3, 4, 5, 6, 7, 8, 9, 11, 14, 18, 21, 22, 23, 26a, 26b, 27, 28, 29, 34, 35, 42, 43, 44, 45, 46, 49, 50, 51, 58, 61a, 63 and 69 have a **long (1a)** TULE as they are structurally sound trees located in positions that can accommodate future growth. Ten (10) trees numbered 37, 38, 39, 40, 40a, 53, 54, 55, 56 and 57 have a **long (1c)** TULE as they are trees of special significance for historical, commemorative or rarity reasons that would warrant extraordinary efforts to secure their long-term retention.

4.2.3 Trees with a **medium TULE** rating indicate a retention of 15 to 40 years. Six (6) trees numbered 19, 20, 25, 64, 65 and 66 have a **medium (2a)** TULE as they are trees that may only live for between 15 and 40 more years. Eight (8) trees numbered 10, 13, 32, 36, 52, 59, 60 and 61 have a **medium (2b)** TULE as they are trees that may live for more than 40 years, but would need to be removed for safety or Nuisance reasons. Four (4) trees numbered 70, 71, 73 and 75 have a **medium (2d)** TULE as they are trees that could be made suitable for retention in the medium term by Intervention works.

4.2.4 Trees with a **short TULE** rating indicate a retention of 5 to 15 years. One (1) tree numbered 67 has a **short (3a)** TULE as it may only live for between 5 and 15 more years. Two (2) trees numbered 16, and 17 have a **short (3b)** TULE as they are trees that may live for more than 15 years but would need to be removed for safety or nuisance reasons. Two (2) trees numbered 72 and 74 have a **short (3d)** TULE as they are trees that require substantial Intervention works and are only suitable for retention in the short term.

4.2.5 Trees with a **remove TULE** rating indicate removal recommended within 5 years. Two (2) trees numbered 24 and 48 have a **remove within 5 years (4a)** TULE as they are dead, dying, suppressed or declining trees through disease or inhospitable conditions. One (1) tree numbered 68 has a **remove within 5 years (4b)** TULE as it is dangerous through instability or recent loss of adjacent trees. Five (5) trees numbered 12, 15, 30, 31 and 33 have a **remove within 5 years (4e)** TULE as they are trees that may live for more than 5 years but should be removed to prevent interference with more suitable individuals or to provide space for new planting.

4.3 The **Landscape Significance** of a tree is a measure of its contribution to amenity, heritage an ecological value and is assigned a Landscape Significance Rating based on criterion in appendix D.

4.3.1 **Moderate amenity value** in the landscape trees are numbered 27 and 70 due to the live crown size exceeding 40m² and its frequently visible location by staff, patients or general public.

4.3.2 **Low amenity value** in the landscape trees are numbered 2, 4, 6, 8, 10, 14, 20, 26a, 29, 33, 35, 37, 39, 40a, 43, 45, 49, 51, 53, 55, 57, 61, 68, 72 and 74 due to the live crown size less than 40m².

4.3.3 **Insignificant amenity value** in the landscape trees are numbered 12, 13, 15, 16, 17, 22, 24, 30, 31, 32, 36, 48, 52, 58, 59, 60, 64, 65, 66, 67 as they are exempt either from decline or as they are listed as weeds on the NSW Biosecurity act⁵.

⁵ <https://www.dpi.nsw.gov.au/biosecurity/weeds>

4.4 Retention Values

4.4.1 The retention values of a tree are a balance between its sustainability in the current setting (the landscape) and its significance within that setting (landscape significance). Retention values are determined once the TULE category and Landscape Significance ratings have been determined (Appendix E). The retention for the trees is determined as follows;

4.4.2 Seven (7) trees of **moderate** retention value are numbered 14, 20, 36, 52, 59, 70 and 71. This value is assigned to trees that are considered desirable for retention and should be retained if possible.

4.4.3 Twenty-three (23) trees of **moderate to low** retention value are numbered 9, 11, 13, 22, 23, 37, 38, 39, 40, 40a, 43, 44, 45, 46, 49, 50, 53, 54, 55, 56, 57, 61a and 66. This value assigned because the trees require substantial remediation and are only suitable for retention in the short term.

4.4.4 Forty-four (44) trees of **low** retention value are numbered, 1, 2, 3, 4, 5, 6, 7, 8, 10, 15, 16, 17, 18, 19, 21, 24, 25, 26a, 26b, 27, 28, 29, 30, 31, 32, 33, 34, 35, 42, 48, 51, 58, 60, 61, 63, 64, 65, 67, 68, 69, 72, 73, 74 and 75. The value is primarily due to the trees not having special ecological or amenity value and not considered to be worthy of preservation.

4.4.5 Tree 12 has a **very low** retention value. This is a weed and thus marked **exempt** from preservation.

4.4.6 A summary of retention Values is itemised in Table 3 below;

Table 3 Retention Value Table

Retention Values	High	Moderate	Moderate-Low	Low	Very Low
Tree	-	Trees 14, 20, 36, 52, 59, 70 and 71.	Trees 9, 11, 13, 22, 23, 37, 38, 39, 40, 40a, 43, 44, 45, 46, 49, 50, 53, 54, 55, 56, 57, 61a and 66.	Trees 1, 2, 3, 4, 5, 6, 7, 8, 10, 15, 16, 17, 18, 19, 21, 24, 25, 26a, 26b, 27, 28, 29, 30, 31, 32, 33, 34, 35, 42, 48, 51, 58, 60, 61, 63, 64, 65, 67, 68, 69, 72, 73, 74 and 75.	Tree 12.

4.5 TPZ Encroachments

4.5.1 The assessment determines how The Main Works will impact on the Tree Protection Zone (TPZ) and canopy. The impacts are classified as minor or major TPZ encroachments.

4.5.2 Thirty-nine (39) trees have **major TPZ encroachments** from The Main Works, that is, more than 10%, these trees are numbered 6, 7, 9, 10, 11, 12, 13, 15, 16, 21, 22, 23, 24, 25, 26a, 26b, 27, 28, 29, 30, 31, 37, 38, 39, 40, 40a, 42, 43, 44, 45, 46, 48, 49, 50, 51, 60, 61, 61a and 67.

4.6 Impact Assessment

4.6.1 Of these trees impacted, the following retention values are determined;

4.6.1.1 Seventeen (17) trees of **low to moderate retention value** are positioned within The Main Works, these trees are numbered 9, 11, 13, 22, 23, 37, 38, 39, 40, 40a, 43, 44, 45, 46, 49, 50 and 61a.

4.6.1.2 Twenty-one (21) trees of **low retention value** are positioned within The Main Works, these trees are numbered 6, 7, 10, 15, 16, 21, 24, 25, 26a, 26b, 27, 28, 29, 30, 31, 42, 48, 51, 60, 61 and 67.

4.6.1.3 One (1) tree of **very- low retention value** is positioned within The Main Works; numbered 12.

4.6.2 The TPZ encroachment zones of thirty-nine (39) trees are summarised in Table 4 below;

Table 4: TPZ Encroachments Table

Tree	Botanical Name Common Name	TPZ Encroachment Category	Retention Value	Discussion of Impacts
6	<u>Lagerstroemia indica</u> Crepe myrtle	Major (greater than 10%)	Low	Impacts: Major impacts from the proposed driveway crossing. Recommendation: Remove and replenish.
7	<u>Lagerstroemia indica</u> Crepe myrtle	Major (greater than 10%)	Low	Impacts: Major impacts from the proposed driveway crossing. Recommendation: Remove and replenish.
9	<u>Corymbia citriodora</u> Lemon Scented Gum	Major (greater than 10%)	Low to Moderate	Impacts: Major impacts from The Main Works development area. Recommendation: Remove and replenish.
10	<u>Corymbia citriodora</u> Lemon Scented Gum	Major (greater than 10%)	Low	Impacts: Major impacts from The Main Works development area. Recommendation: Remove and replenish.
11	<u>Corymbia citriodora</u> Lemon Scented Gum	Major (greater than 10%)	Low to Moderate	Impacts: Major impacts from The Main Works development area. Recommendation: Remove and replenish.
12	<u>Ligustrum lucidum</u> Privet	Major (greater than 10%)	Very Low	Impacts: Major impacts from The Main Works development area. Recommendation: Remove (Exempt species – Weed).
13	<u>Celtis australis</u> European nettle tree	Major (greater than 10%)	Low to Moderate	Impacts: Major impacts from The Main Works development area. Recommendation: Retain and protect maintain existing grade from path.
15	<u>Oliva europea</u> Wild Olive Tree	Major (greater than 10%)	Low	Impacts: Major impacts from The Main Works development area. Recommendation: Remove (Exempt species – Weed).
16	<u>Oliva europea</u> Wild Olive Tree	Major (greater than 10%)	Low	Impacts: Major impacts from The Main Works development area. Recommendation: Retain and protect placement of posts for boundary fence should be kept outside the SRZ. Maintain existing grade.
21	<u>Fraxinus oxycarpa</u> Claret Ash	Major (greater than 10%)	Low	Impacts: Major impacts from The Main Works development area. Recommendation: Remove and replenish.
22	<u>Celtis australis</u> European nettle tree	Major (greater than 10%)	Low to Moderate	Impacts: Major impacts from The Main Works development area. Recommendation: Remove (Exempt species – Weed).
23	<u>Juniperus chinensis</u> Chinese juniper	Major (greater than 10%)	Low to Moderate	Impacts: Major impacts from The Main Works development area. Recommendation: Remove and replenish.
24	<u>Fraxinus oxycarpa</u> 'Raywoodii' Claret Ash	Major (greater than 10%)	Low	Impacts: Major impacts from The Main Works development area. Recommendation: Remove (exempt from replenishment due to decline).
25	<u>Liquidambar styraciflua</u> Liquid Amber	Major (greater than 10%)	Low	Impacts: Major impacts from The Main Work development area. Recommendation: Remove and replenish.
26 a	<u>Fraxinus oxycarpa</u> Claret Ash	Major (greater than 10%)	Low	Impacts: Major impacts from The Main Works development area. Recommendation: Remove and replenish.
26 b	<u>Fraxinus oxycarpa</u> Claret Ash	Major (greater than 10%)	Low	Impacts: Major impacts from The Main Works development area. Recommendation: Remove and replenish.
27	<u>Fraxinus oxycarpa</u> Claret Ash	Major (greater than 10%)	Low	Impacts: Major impacts from The Main Works development area. Recommendation: Remove and replenish.
28	<u>Fraxinus oxycarpa</u> Claret Ash	Major (greater than 10%)	Low	Impacts: Major impacts from The Main Works development area. Recommendation: Remove and replenish.
29	<u>Fraxinus oxycarpa</u> 'Raywoodii' Claret Ash	Major (greater than 10%)	Low	Impacts: Major impacts from The Main Works development area. Recommendation: Remove and replenish.
30	<u>Cotoneaster species</u>	Major (greater than 10%)	Low	Impacts: Major impacts from The Main Works development area. Recommendation: Remove (Exempt species – Weed).
31	<u>Cotoneaster species</u>	Major	Low	Impacts: Major impacts from The Main Works development area.

		(greater than 10%)		Recommendation: Remove (Exempt species – Weed).
37	<u><i>Chamaecyparis obtusa</i></u> Hinoke Cypress	Major (greater than 10%)	Low to Moderate	Impacts: Major impacts from The Main Works development area. Recommendation: Remove and replenish.
38	<u><i>Chamaecyparis obtusa</i></u> Hinoke Cypress	Major (greater than 10%)	Low to Moderate	Impacts: Major impacts from The Main Works development area. Recommendation: Remove and replenish.
39	<u><i>Chamaecyparis obtusa</i></u> Hinoke Cypress	Major (greater than 10%)	Low to Moderate	Impacts: Major impacts from The Main Works development area. Recommendation: Remove and replenish.
40	<u><i>Chamaecyparis obtusa</i></u> Hinoke Cypress	Major (greater than 10%)	Low to Moderate	Impacts: Major impacts from The Main Works development area. Recommendation: Remove and replenish.
40 a	<u><i>Chamaecyparis obtusa</i></u> Hinoke Cypress	Major (greater than 10%)	Low to Moderate	Impacts: Major impacts from The Main Works development area. Recommendation: Remove and replenish.
42	<u><i>Jacaranda mimosifolia</i></u> Jacaranda	Major (greater than 10%)	Low	Impacts: Major impacts from The Main Works development area. Recommendation: Remove and replenish.
43	<u><i>Callistemon viminalis</i></u> Bottlebrush	Major (greater than 10%)	Low to Moderate	Impacts: Major impacts from The Main Works development area. Recommendation: Remove and replenish.
44	<u><i>Fraxinus oxycarpa</i></u> <i>'Raywoodii'</i> Claret Ash	Major (greater than 10%)	Low to Moderate	Impacts: Major impacts from The Main Works development area. Recommendation: Remove and replenish.
45	<u><i>Callistemon viminalis</i></u> Bottlebrush	Major (greater than 10%)	Low to Moderate	Impacts: Major impacts from The Main Works development area. Recommendation: Remove and replenish.
46	<u><i>Callistemon viminalis</i></u> Bottlebrush	Major (greater than 10%)	Low to Moderate	Impacts: Major impacts from The Main Works development area. Recommendation: Remove and replenish.
48	<u><i>Fraxinus oxycarpa</i></u> <i>'Raywoodii'</i> Claret Ash	Major (greater than 10%)	Low	Impacts: Major impacts from The Main Works development area. Recommendation: Remove (exempt from replenishment due to decline).
49	<u><i>Callistemon viminalis</i></u> Bottlebrush	Major (greater than 10%)	Low to Moderate	Impacts: Major impacts from The Main Works development area. Recommendation: Remove and replenish.
50	<u><i>Lagerstroemia indica</i></u> Crepe Myrtle	Major (greater than 10%)	Low to Moderate	Impacts: Major impacts from The Main Works development area. Recommendation: Remove and replenish.
51	<u><i>Lagerstroemia indica</i></u> Crepe Myrtle	Major (greater than 10%)	Low	Impacts: Major impacts from The Main Works development area. Recommendation: Remove and replenish.
60	<u><i>Robinia pseudoacacia</i></u> <i>'Umbraculifera'</i> Mop Top	Major (greater than 10%)	Low	Impacts: Major impacts from The Main Works development area. Recommendation: Remove and replenish.
61	<u><i>Ulmus glabra 'Pendula'</i></u> The Weeping Elm	Major (greater than 10%)	Low	Impacts: Major impacts from The Main Works development area. Recommendation: Remove and replenish.
61 a	<u><i>Acer palmatum</i></u> Japanese Maple	Major (greater than 10%)	Low to Moderate	Impacts: Major impacts from The Main Works development area. Recommendation: Remove and replenish.
67	<u><i>Triadica sebifera</i></u> Chinese Tallow	Major (greater than 10%)	Low	Impacts: Major impacts from the proposed driveway crossing. Recommendation: Remove and replenish.

4.7 Canopy Cover Loss

Replenish tree removals with new tree plants within the site to compensate for loss of amenity in accordance with council requirements. To compensate for the reduction canopy cover, planting of indigenous trees which are appropriate to the local environment and provide koala habitat should be considered using the canopy cover formula $((\frac{1}{2} \times \text{canopy diameter})^2 \times \pi)$ as follows.

Table 5: Canopy Cover Loss Table

Trees	Canopy Diameter (m)	Canopy Loss (m ²)	Total Canopy Loss	New Planting
6	3	7	694 m²	Plant thirty-five (35) trees with a canopy size at maturity of at least 8 metres.
7	3	7		
9	7	38		
10	5	20		
11	4	13		
21	3	7		
23	6	28		
25	6	28		
26a	6	28		
26b	3	7		
27	8	50		
28	5	20		
29	6	28		
37	4	13		
38	4	13		
39	4	13		
40	4	13		
40a	4	13		
42	4	13		
43	6	28		
44	7	38		
45	4	13		
46	6	28		
49	6	28		
50	5	20		
51	3	7		
53	4	13		
54	4	13		
55	4	13		
56	4	13		
57	4	13		
60	8	50		
61	5	20		
61a	6	28		
67	4	13		

5. RECOMMENDATION

5.1 Tree Works Specifications

Seventy-five (75) trees were assessed on site and on the adjacent surrounding area.

See Maps B to I Tree Management Plan.

Tree works is recommended as follows;

5.1.1 Retain thirty-three (33) trees numbered 1, 2, 3, 4, 5, 8, 13, 14, 16, 17, 18, 19, 20, 32, 33, 34, 35, 36, 52, 58, 59, 63, 64, 65, 66, 68, 69, 70, 71, 72, 73, 74 and 75.

5.1.2 Remove thirty-seven (37) trees numbered 6, 7, 9, 10, 11, 12, 15, 21, 22, 23, 24, 25, 26a, 26b, 27, 28, 29, 30, 31, 37, 38, 39, 40, 40a, 42, 43, 44, 45, 46, 48, 49, 50, 51, 60, 61, 61a and 67. Of these, seven (7) are **exempt** from preservation numbered 12, 15, 22, 24, 30, 31 and 48.

5.1.3 Suitably Qualified Arborist: Most councils require written consent prior to tree pruning or removal. Tree contractors must have a minimum AQF Level 3 and work in accordance with Australian Standard® AS 4373 2007 Pruning of Amenity Trees, the Work Health & Safety (WHS) Act 2011 and the WHS Regulations 2017, the Safe Work Guide to Managing Risks of Tree Trimming and Removal Work 2016 and the Code of Practice for The Amenity Tree Industry 1998. Work near powerlines should be carried out in accordance with the Code of Practice for Work Near Overhead Power Lines.

Tree contractors shall be members of Tree Contractors Association Australia (TCAA) or Arborists Australia (AA) and hold Workers Compensation and Public Liability Insurance. Tree contractors must liaise with the consulting arborist to ensure that pruning and / or removal is in accordance to specification.

5.1.4 Replenishment planting of thirty-five (35) trees with mature canopy of 8 meters in 45L volume pots in accordance with Council requirements new tree plantings should be a native species or from a vegetation community present on site to compensate for loss of amenity. Replenishment is to be completed in accordance with Planting Specifications from NATSPEC (Clark 2003) and Australian Standard® AS 2303-2018 Tree Stock for Landscape Use. (Appendix F).

Some suggested species:

1. *Eucalyptus blakelyi*, (Blakely's red gum).
2. *Eucalyptus melliodora*, (Yellow box).
3. *Acacia decora* (Western Silver Wattle).

5.1.5 Maintain aged eucalyptus **mulch** to all retained and replenished trees in accordance with Australian Standards® AS 4454- 2003 Compost, Soil Conditioners and Mulches.

5.1.6 Maintain a **watering schedule** for replenished trees; for example, a 45L pot requires approximately 35L of daily water. (Trees Impact: 2021).

5.2 Tree Protection Plan Specifications

See Maps B to I Tree Management Plan.

5.2.1 Tree Protection Measures are structures used to protect and isolate the TPZ. Of the retained trees, seventeen (17) trees are required to be protected during development. The remaining fourteen (14) trees are located sufficiently far enough away from the development as to not require protection measures in this initial stage of development.

5.2.2 Twelve (12) trees require **tree protection fencing** around the TPZ to preserve the root zone around the TPZ and mature certified **mulch** spread 50-75mm deep to the extent of the dripline, (never exceed 100mm depth). Mulch should not have contact with the tree trunk, these trees are numbered 4, 5, 8, 13, 14, 16, 17, 18, 19, 20, 34 and 35.

5.2.3 Seven (7) trees require **trunk protection** (as protection fencing is impractical and would block access to the worksite). These trees are numbered 36, 52, 59, 63, 64, 65 and 66.

5.2.4 Eight (8) trees require **an exclusion zone to prevent works or litter/hoarding within the TPZ**. These trees are numbered 16, 17, 18, 19, 20, 36, 52 and 59.

5.2.5 Ensure the existing grade is maintained during the main works for two (2) trees numbered 13 and 16.

5.2.6 If fencing is replaced on the Northern boundary, ensure the posts are placed outside the SRZ of tree 16.

5.2.7 Minor TPZ encroachments must be compensated for elsewhere and contiguous with the TPZ.

5.2.8 All measures must be certified by an AQF level 5 arborist in accordance with AS® 4970-2009 Protection of Trees on Development Sites.

Table 6: Tree Protection Measures Table

Tree	Intended Works
6, 7, 9, 10, 11, 21, 23, 25, 26a, 26b, 27, 28, 29, 37, 38, 39, 40, 40a, 42, 43, 44, 45, 46, 49, 50, 51, 60, 61, 61a and 67.	Replenish the removal of these trees.
12, 15, 22, 24, 30, 31 and 48.	Remove (exempt).
1, 2, 3, 32, 33, 58, 68, 69, 70, 71, 72, 73, 74 and 75.	Located sufficiently far enough away from the development as to not require protection measures in this initial stage of development
63, 64, 65 and 66.	Retain and protect. Tree trunk protection.
36, 52 and 59.	Retain and protect. Tree trunk protection. Exclusion zone.
4, 5, 8, 13, 14, 34 and 35.	Retain and protect. Tree protective fencing.
16, 17, 18, 19 and 20.	Retain and protect. Tree protective fencing. Exclusion zone.

5.3 Holding Points

5.3.1 Site Monitoring: The following table outlines the stages in the development process where the AQF level 5 Arborist project arborist is required monitor or certify trees. The site manager should notify the project arborist prior to works within the TPZ.

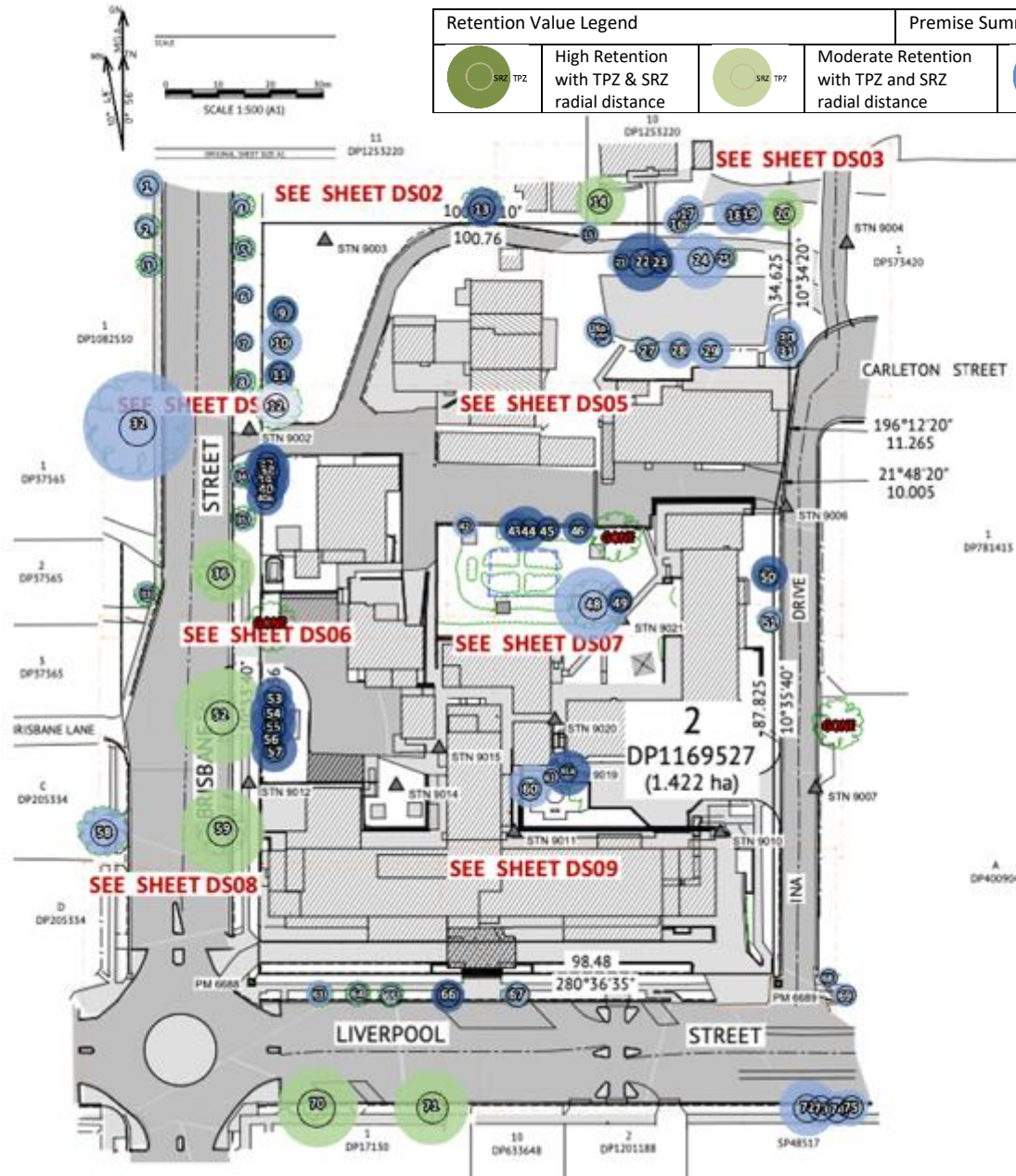
Table 7 Site Inspections During Construction Table (Project Arborist)

Stage	General Schedule of Work	Person Responsible	Certification by Project Arborist
Pre-construction	Prior to demolition, earthworks or site clearing, clearly mark trees for removal (spray paint on trunks).	Competent Person	n/a
	Tree Protection Systems (for retained trees) must be installed prior to demolition, include mulching in TPZ.	Competent Person	Pre-construction Tree Protection Certificate
Construction	Scheduled inspection of trees during construction-usually monthly.	Project Arborist	Inspection and Certification
	Supervise and protect any excavations within the TPZ of retained trees.	Project Arborist	Supervision and Certification
Post-construction	Final inspection after construction and prior to the removal of protection measures.	Project Arborist	Final Tree Protection Certificate

5.3.2 All retained trees should be protected by fencing and / or ground protection before any demolition, development, or soil stripping starts. The protected area is an exclusion zone. Fencing and ground protection should not be removed or altered unless agreed by the supervising arborist.

5.3.3 Ground protection should support all anticipated loading and prevent compaction in the TPZ.

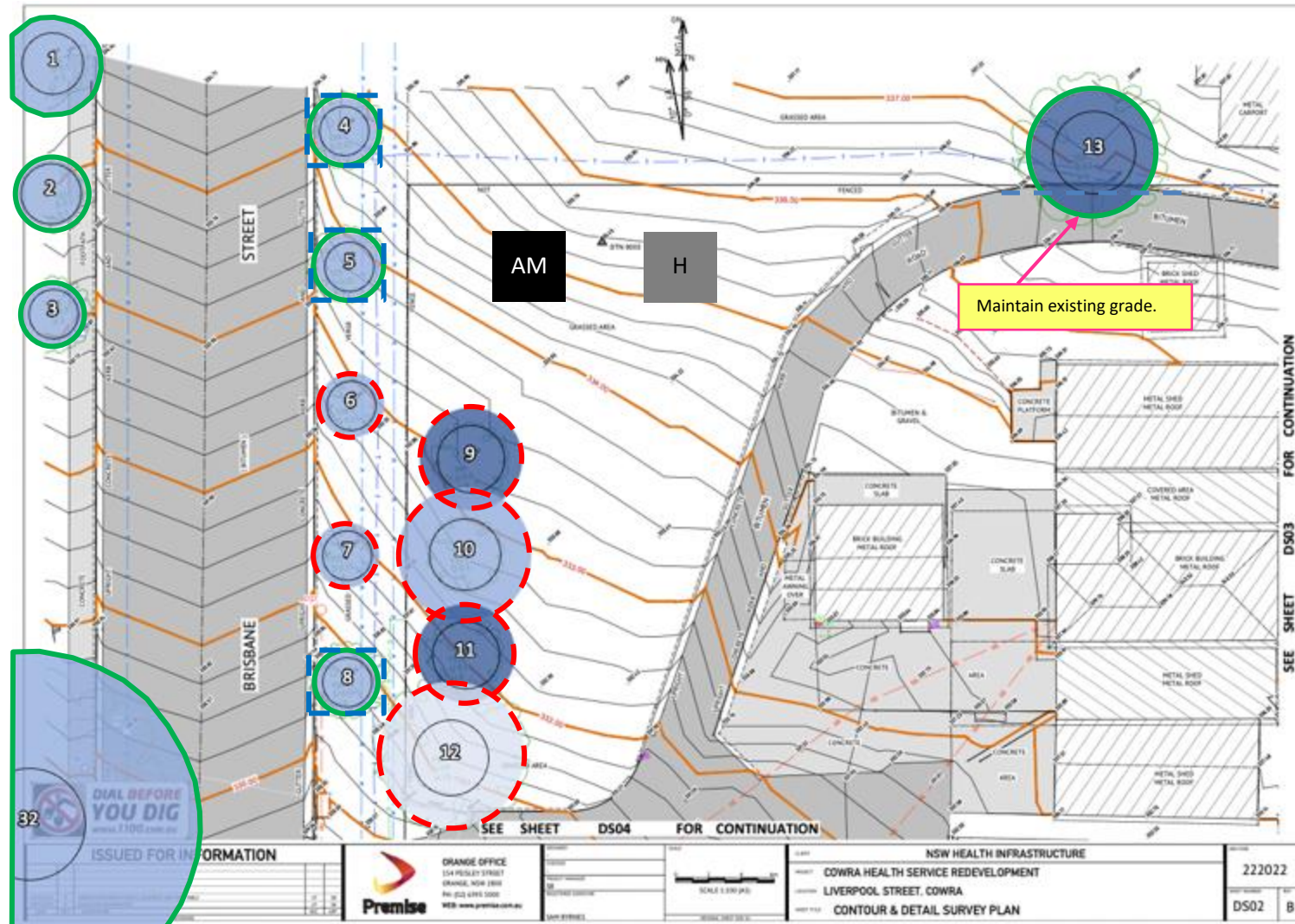
5.4 Map A Retention Value Plan



Retention Value Legend				Premise Summary Sheet		Approx Scale 1:1300 @A4			
	High Retention with TPZ & SRZ radial distance		Moderate Retention with TPZ and SRZ radial distance		Low -Moderate with TPZ and SRZ radial distance		Low Retention with TPZ and SRZ radial distance		Very-Low Retention with TPZ and SRZ radial distance

Tree	TPZ* SRZ (m)	Tree	TPZ* SRZ (m)	Tree	TPZ* SRZ (m)	Tree	TPZ* SRZ (m)	Tree	TPZ* SRZ (m)
1	3.00 1.90	20	4.08 2.00	38	4.44 2.25	55	4.44 2.3	73	3.96 2.39
2	2.10 1.85	21	2.52 1.5	39	4.44 2.3	56	3.6 1.94	74	3.34 2.39
3	2.00 1.50	22	5.76 2.63	40	3.6 1.94	57	4.44 2.2	75	3.60 2.13
4	2.00 1.50	23	3.36 2.15	40a	4.44 2.2	58	4.68 2.47		
5	2.00 1.50	24	5.4 2.49	42	2.52 1.5	59	8.28 2.90		
6	2.00 1.50	25	2.52 1.75	43	3.12 1.82	60	4.32 2.2		
7	2.00 1.50	26a	3.12 2.15	44	4.32 1.88	61	2 1.5		
8	2.00 1.50	26b	2 1.5	45	2.52 2.05	61a	4.44 1.68		
9	3.12 2.05	27	2.52 2.18	46	3.12 1.82	63	2.52 1.5		
10	4.08 2.18	28	3.6 1.91	48	7.08 2.74	64	2 1.68		
11	3 2.05	29	3.84 2.08	49	2.52 2.05	65	2 1.85		
12	4.44 2.3	30	2 1.5	50	3.6 1.88	66	3.24 2.25		
13	3.84 2.51	31	2 1.5	51	2.52 1.85	67	2.52 2.15		
14	4.80 2.30	32	10.56 3.38	52	9.12 3.17	68	N/A		
15	2.00 1.50	33	2.00 1.50	53	3.6 2	69	2.40 1.75		
16	3.12 2.00	34	2.00 1.50	54	4.44 2.25	70	7.68 3.57		
17	3.12 2.00	35	2.00 1.50			71	7.20 3.00		
18	4.08 2.00	36	6.12 2.67			72	5.52 2.67		
19	4.08 2.00	37	3.6 2						

5.5 Map B Tree Management Plan DS02



Tree	TPZ* SRZ (m)
1	3.00 1.90
2	2.10 1.85
3	2.00 1.50
4	2.00 1.50
5	2.00 1.50
6	2.00 1.50
7	2.00 1.50
8	2.00 1.50
9	3.12 2.05
10	4.08 2.18
11	3 2.05
12	4.44 2.3
13	3.84 2.51
32	10.56 3.38

Tree Management Legend

High Retention	Moderate Retention	Low to Moderate Retention	Low Retention	Very Low Retention

Premise

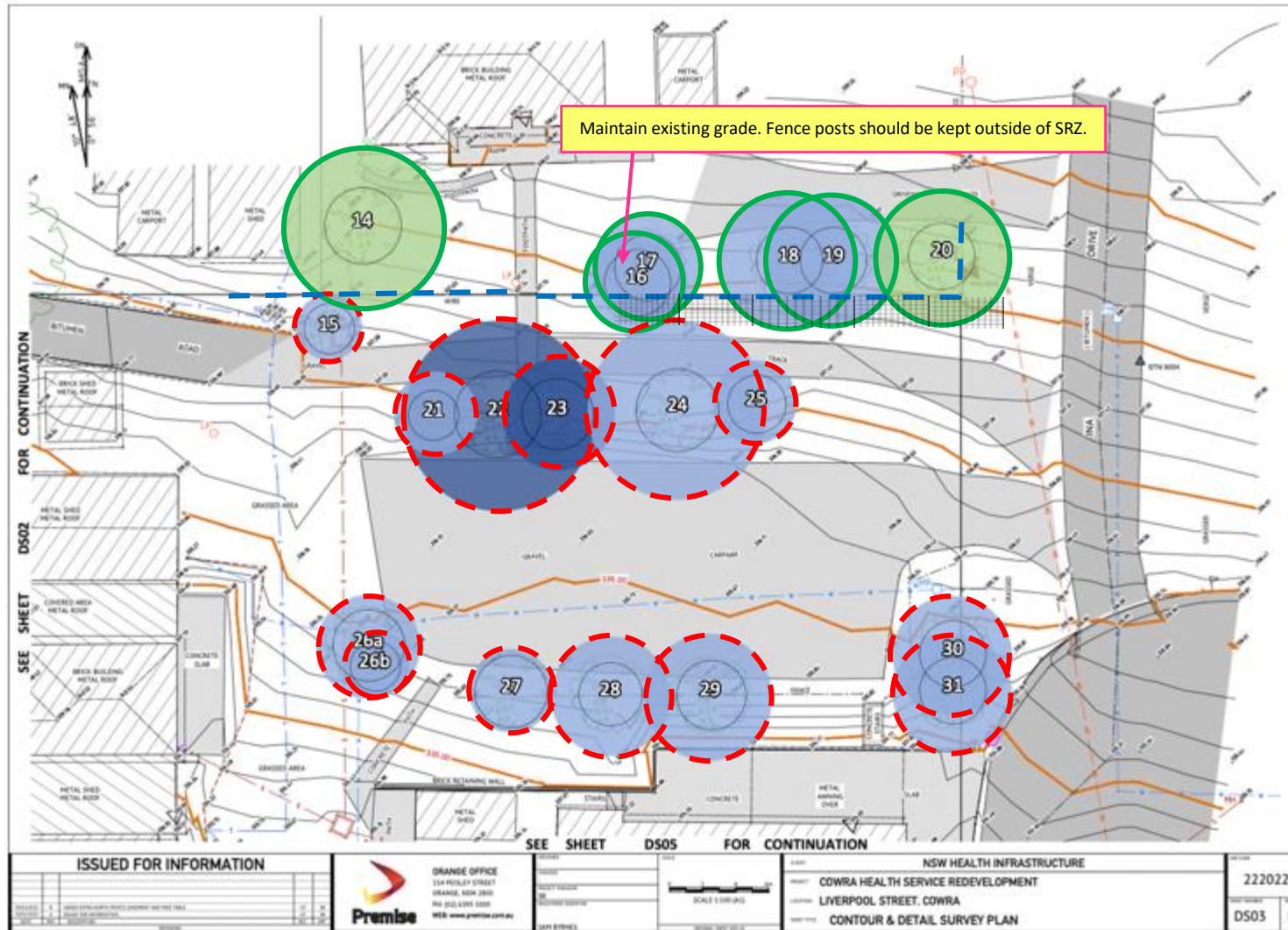
Tree for Removal with TPZ and SRZ radial distance	Tree for Retention with TPZ and SRZ radial distance

Approx scale is 1:300 @A4

















Tree for Pruning with TPZ and SRZ radial distance		

					AM	H	
Protection Fencing	Trunk Protection	Replenishment	Rumble Boards	Exclusion Zone	Amenities	Hoarding	Mulch

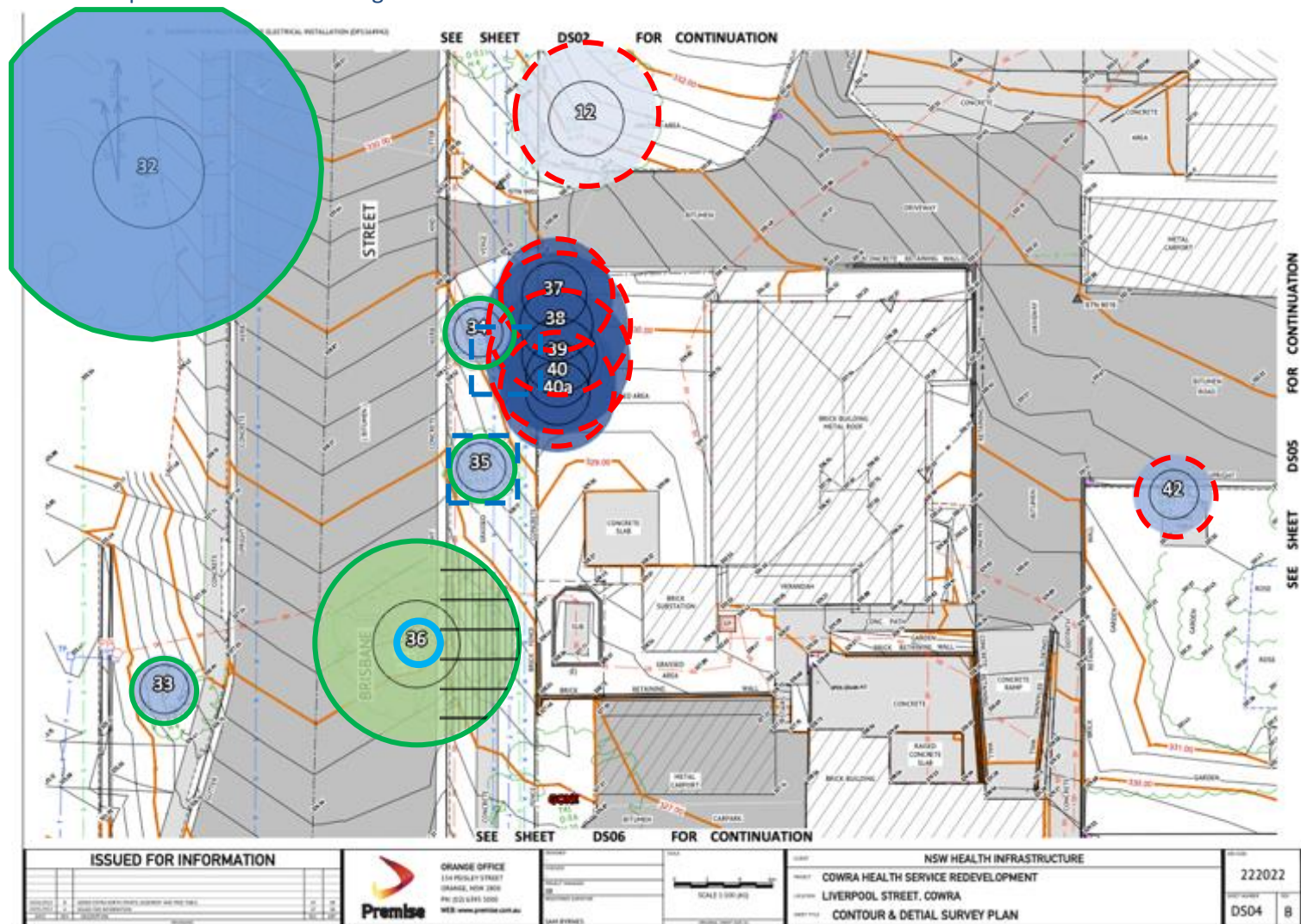
5.6 Map C Tree Management Plan DS03



Tree	TPZ* SRZ (m)
14	4.80 2.30
15	2.00 1.50
16	3.12 2.00
17	3.12 2.00
18	4.08 2.00
19	4.08 2.00
20	4.08 2.00
21	2.52 1.5
22	5.76 2.63
23	3.36 2.15
24	5.4 2.49
25	2.52 1.75
26a	3.12 2.15
26b	2 1.5
27	2.52 2.18
28	3.6 1.91
29	3.84 2.08
30	2 1.5
31	2 1.5

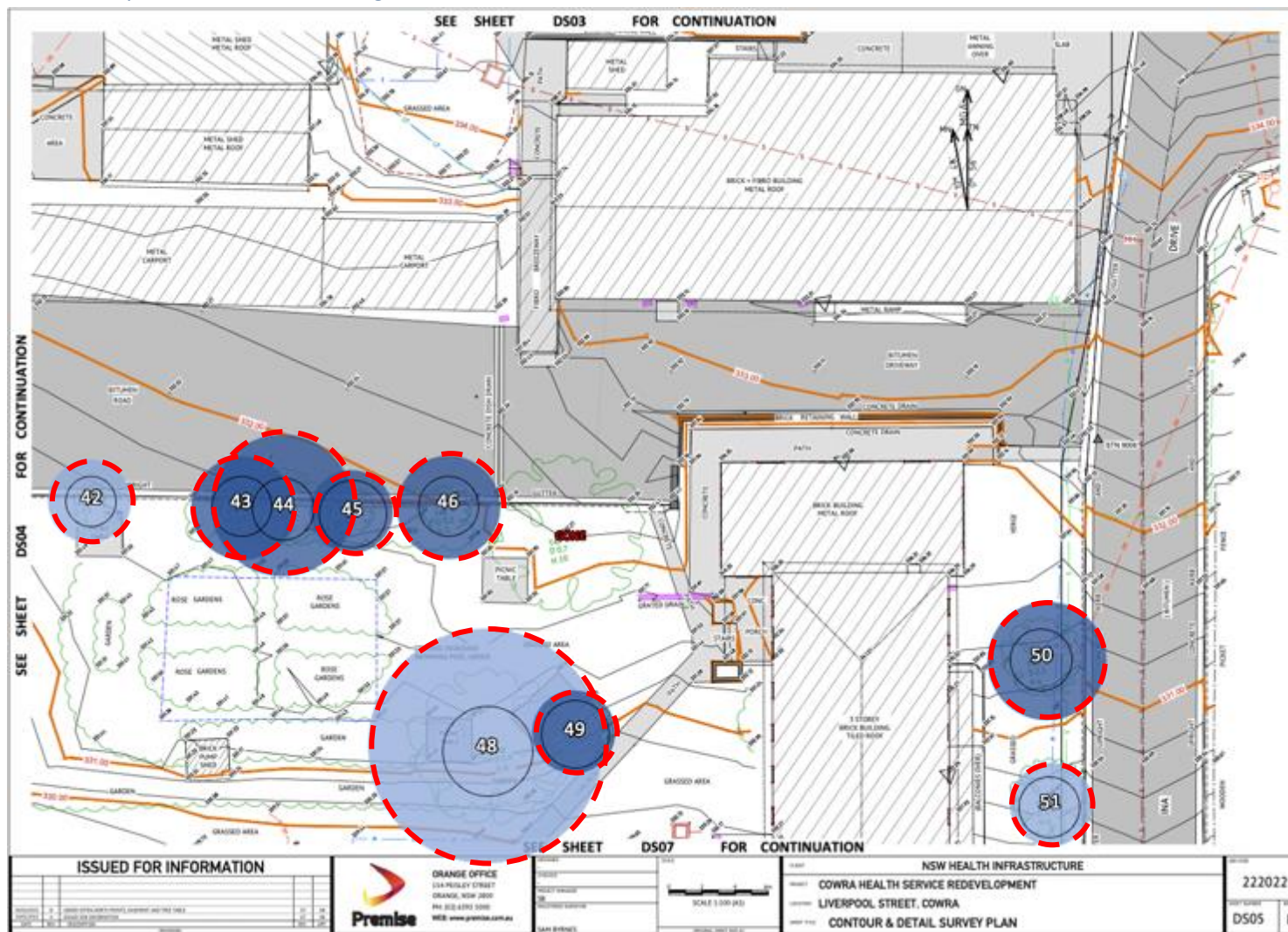
Tree Management Legend					Premise			Approx scale is 1:300 @A4				
						Tree for Removal with TPZ and SRZ radial distance		Tree for Retention with TPZ and SRZ radial distance		Tree for Pruning with TPZ and SRZ radial distance		
High Retention	Moderate Retention	Low to Moderate	Low Retention	Very Low Retention								
												
					Protection Fencing	Trunk Protection	Replenish ment	Rumble Boards	Exclusion Zone	Amenities	Hoarding	Mulch

5.7 Map D Tree Management Plan DS04



Tree	TPZ* SRZ (m)
12	4.44 2.3
32	10.56 3.38
33	2.00 1.50
34	2.00 1.50
35	2.00 1.50
36	6.12 2.67
37	3.6 2
38	4.44 2.25
39	4.44 2.3
40	3.6 1.94
40a	4.44 2.2
42	2.52 1.5

5.7 Map E Tree Management Plan DS05



Tree	TPZ ^{SR} SRZ (m)
42	2.52 1.5
43	3.12 1.82
44	4.32 1.88
45	2.52 2.05
46	3.12 1.82
48	7.08 2.74
49	2.52 2.05
50	3.6 1.88
51	2.52 1.85

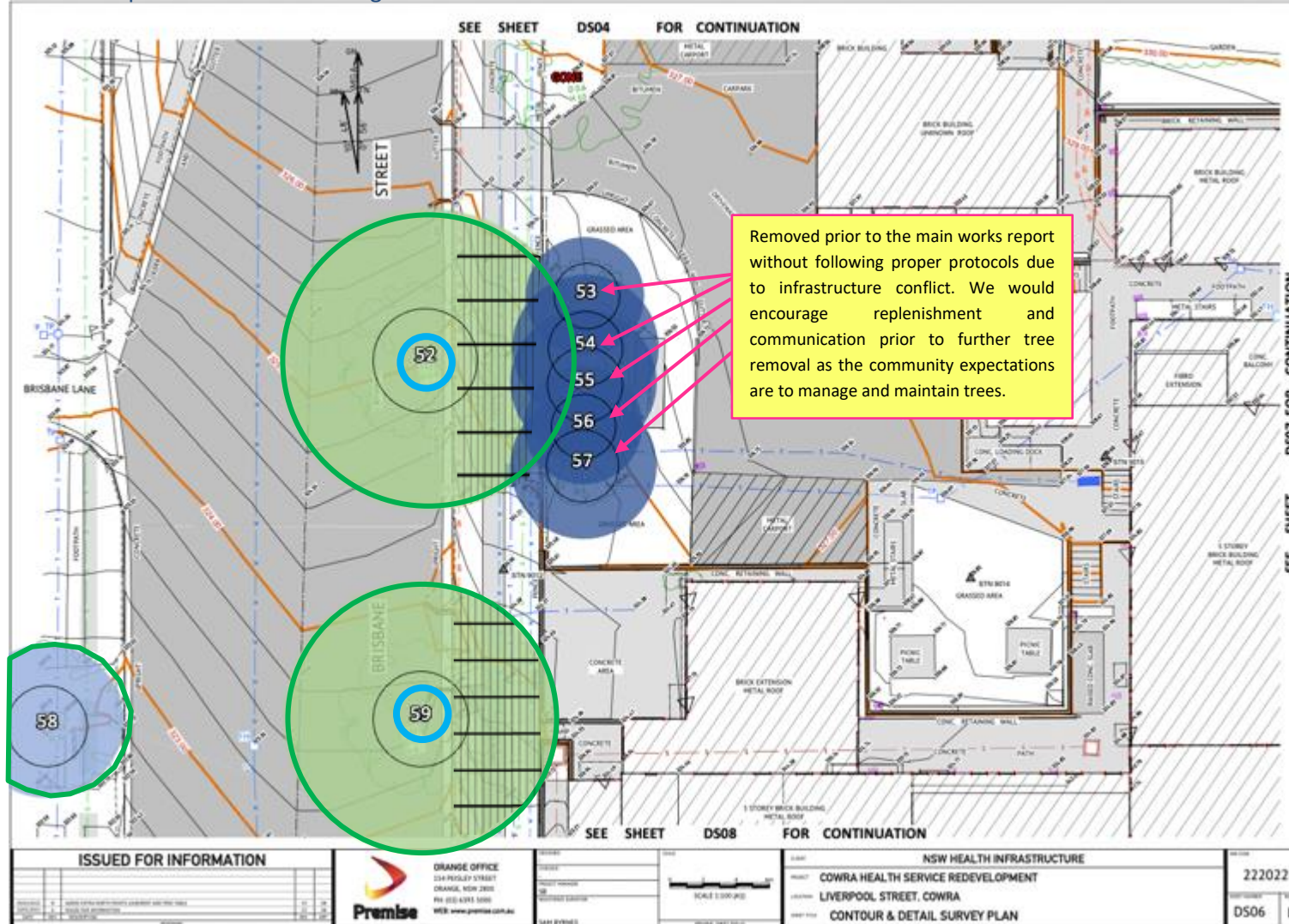
Tree Management Legend

High Retention	Moderate Retention	Low to Moderate Retention	Low Retention	Very Low Retention	Tree for Removal with TPZ and SRZ radial distance	Tree for Retention with TPZ and SRZ radial distance	Tree for Pruning with TPZ and SRZ radial distance

Premise

Protection Fencing	Trunk Protection	Replenishment	Rumble Boards	Exclusion Zone	Amenities	Hoarding	Mulch

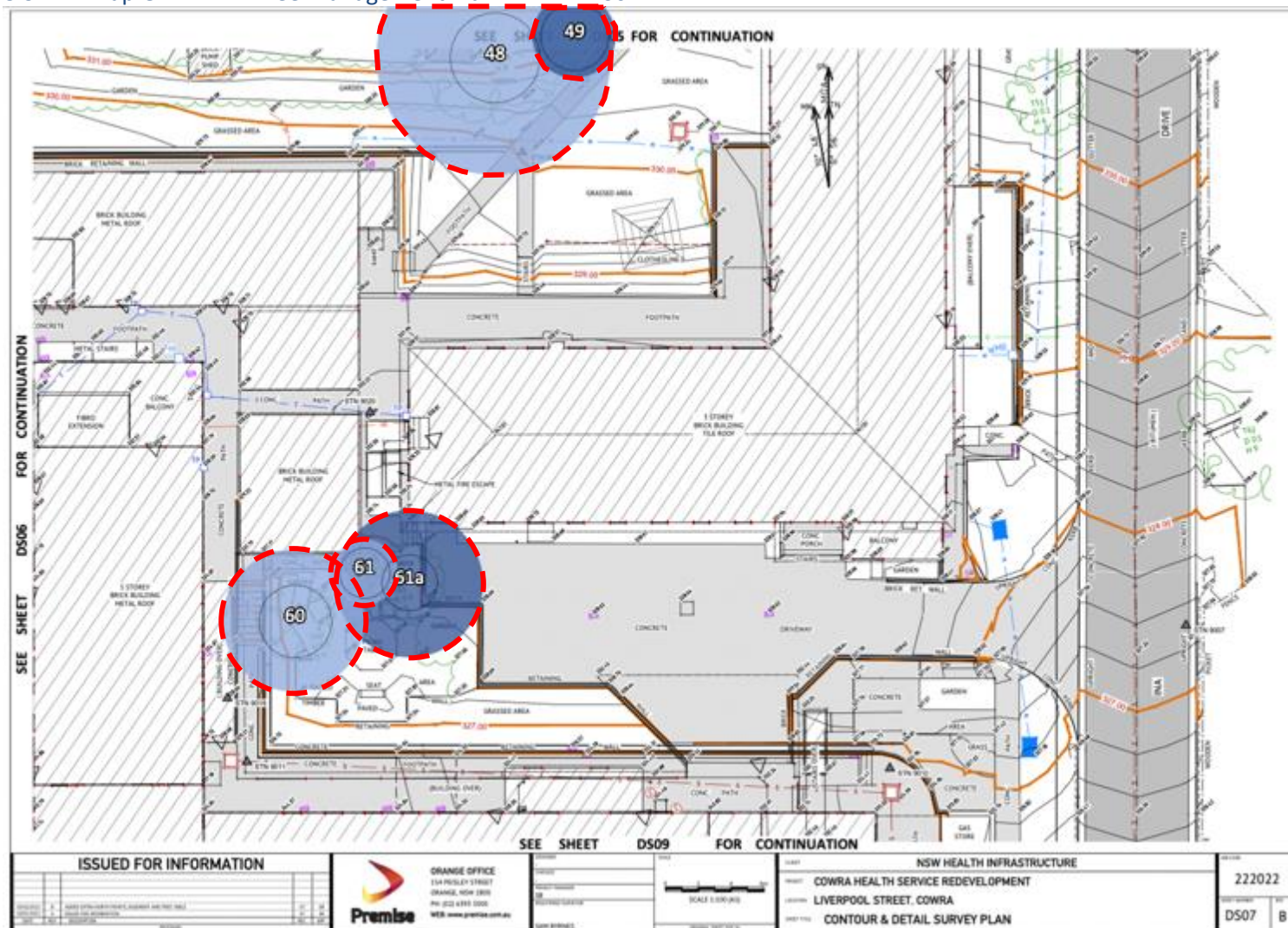
5.8 Map F Tree Management Plan DS06



Tree Management Legend					Premise			Approx scale is 1:300 @A4		
						Tree for Removal with TPZ and SRZ radial distance		Tree for Retention with TPZ and SRZ radial distance		Tree for Pruning with TPZ and SRZ radial distance
High Retention	Moderate Retention	Low to Moderate	Low Retention	Very Low Retention		SRZ TPZ		SRZ TPZ		SRZ TPZ
						AM		H		Mulch
Protection Fencing	Trunk Protection	Replenishment	Rumble Boards	Exclusion Zone	Amenities	Amenities	Hoarding	Hoarding	Mulch	Mulch

Tree	TPZ* SRZ (m)
52	9.12 3.17
53	3.6 2
54	4.44 2.25
55	4.44 2.3
56	3.6 1.94
57	4.44 2.2
58	4.68 2.47
59	8.28 2.90

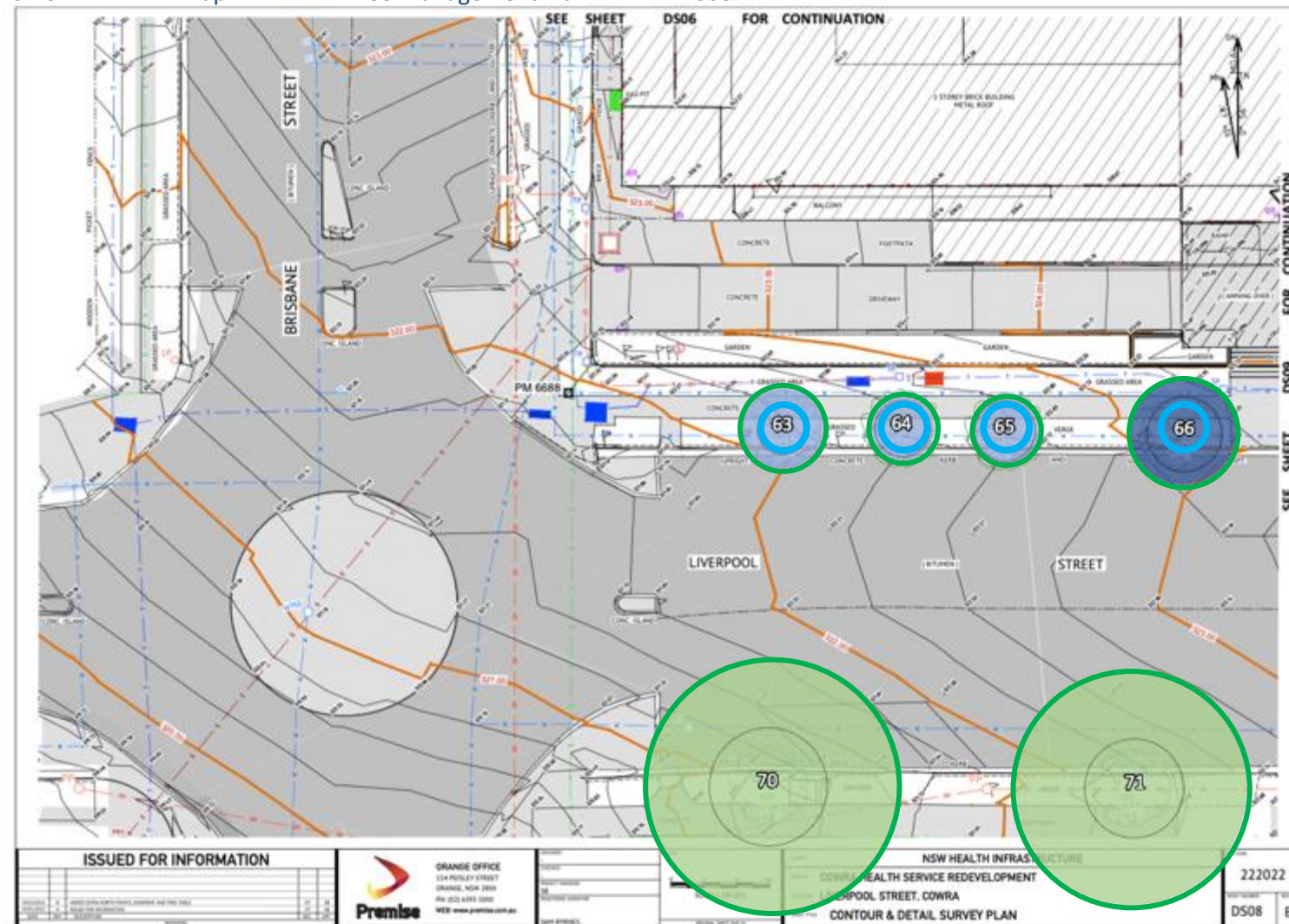
5.9 Map G Tree Management Plan DS07



Tree	TPZ* SRZ (m)
48	7.08 2.74
49	2.52 2.05
60	4.32 2.2
61	2 1.5
61a	4.44 1.68

Tree Management Legend					Premise		Approx scale is 1:300 @A4		
	High Retention		Moderate Retention		Low to Moderate		Low Retention		Very Low Retention
	Tree for Removal with TPZ and SRZ radial distance					Tree for Retention with TPZ and SRZ radial distance		Tree for Pruning with TPZ and SRZ radial distance	
	Protection Fencing		Trunk Protection		Replenishment		Rumble Boards		Exclusion Zone
	AM		H		Mulch				

5.10 Map H Tree Management Plan DS08



Tree	TPZ* SRZ (m)
63	2.52 1.5
64	2 1.68
65	2 1.85
66	3.24 2.25
70	7.68 3.57
71	7.20 3.00

Tree Management Legend

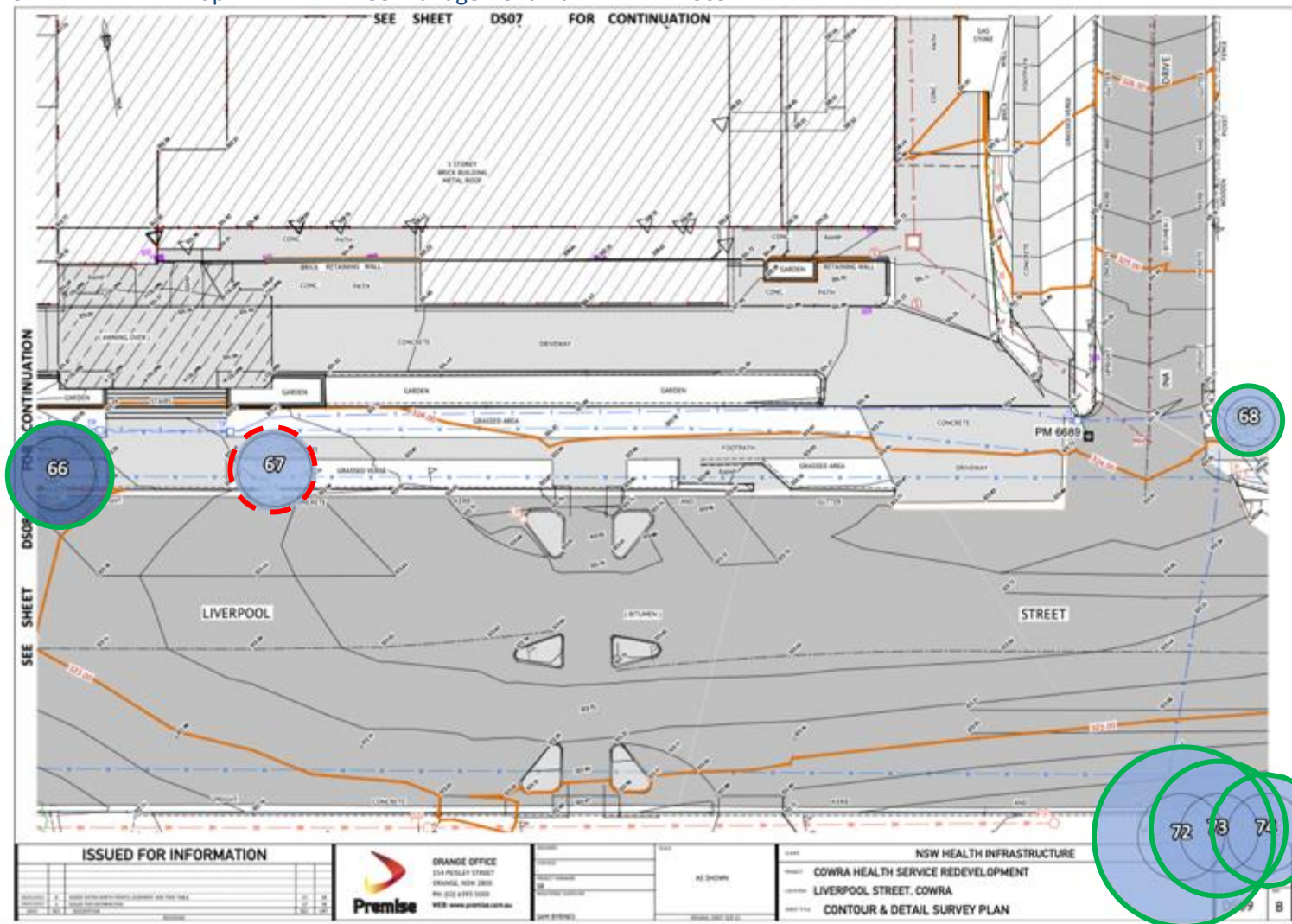
						Tree for Removal with TPZ and SRZ radial distance		Tree for Retention with TPZ and SRZ radial distance		Tree for Pruning with TPZ and SRZ radial distance
High Retention	Moderate Retention	Low to Moderate	Low Retention	Very Low Retention	SRZ TPZ		SRZ TPZ		SRZ TPZ	

Premise

Approx scale is 1:300 @A4

					AM	H	
Protection Fencing	Trunk Protection	Replenish ment	Rumble Boards	Exclusion Zone	Amenities	Hoarding	Mulch

5.11 Map I Tree Management Plan DS09



Tree	TPZ* SRZ (m)
66	3.24 2.25
67	2.52 2.15
68	2 1.5
69	2.40 1.75
72	5.52 2.67
73	3.96 2.39
74	3.34 2.39

Tree Management Legend

						Tree for Removal with TPZ and SRZ radial distance		Tree for Retention with TPZ and SRZ radial distance		Tree for Pruning with TPZ and SRZ radial distance
High Retention	Moderate Retention	Low to Moderate	Low Retention	Very Low Retention	SRZ TPZ					

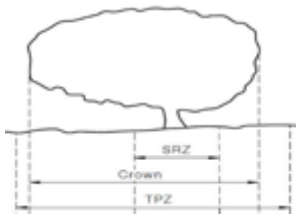
Premise

Approx scale is 1:300 @A4

					AM	H	
Protection Fencing	Trunk Protection	Replenishment	Rumble Boards	Exclusion Zone	Amenities	Hoarding	Mulch

5.12 Tree Protection Specifications

Tree Protection Zone (TPZ) Specifications: Australian standards AS 4970 -2009 Protection of Trees On Development Sites.



A Tree Protection fencing ensures construction does not encroach the TPZ.

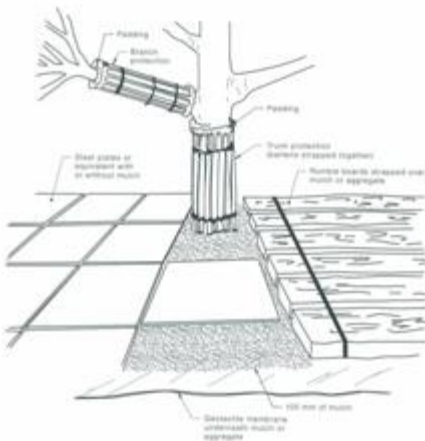
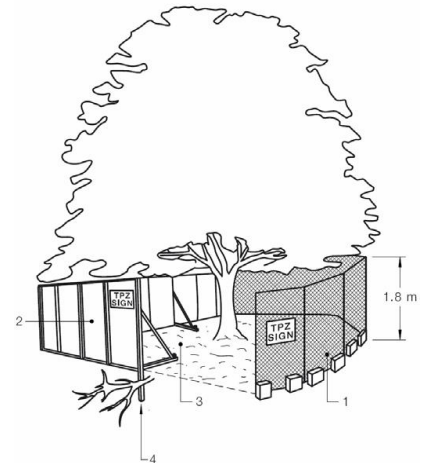
Structural Root Zone (SRZ) is the area essential for tree stability. Works conducted within the SRZ may destabilize the tree and lead to potential failure.

Protective Fencing: Fencing must not be removed or altered. Specifications for fencing protection must be as follows:

- Installed prior to development and certified by a project arborist.
- Fully enclosed to the TPZ.
- Temporary chain wire mesh 1.8-meter cyclone fencing.
- Signposted with 300 x 450 signage. "No Entry Tree Protection Zone".
- Add mulch across surface of TPZ and water regularly.

Specifications for fencing on sloping/ uneven ground must be as follows:

- Star pickets spaced at 2m intervals with a minimum height of 1m.
- Connected by a continuous high-visibility barrier/hazard mesh.
- Alternative plywood or wooden paling fence panels.



Trunk and Branch Protection:

Specifications for trunk protection when fencing is impractical Must be as follows:

- A layer of padding, geotextile fabric or similar wrapped around the trunk to a minimum height of 2m.
- 1.8m lengths of timbers aligned vertically and spaced -with a small gap -evenly around the trunk.
- Boards are to be strapped to trees, not nailed or screwed to the tree.

Prohibitions for Tree Protection Zones: The following activities shall **not** be carried out within any TPZ:

- Disposal of chemicals and liquids (including concrete and mortar slurry, solvents, paint, fuel or oil);
- Stockpiling, storage or mixing of materials;
- Refuelling, parking, storing, washing and repairing tools, equipment, machinery and vehicles;
- Disposal of building materials and waste;

The following activities shall **not** be carried out within any TPZ **unless** under the supervision of a Project arborist:

- Increasing or decreasing soil levels (including cut and fill);
- Soil cultivation, excavation or trenching;
- Placing offices or sheds;
- Assembly of scaffolding or hoardings; and/or another act that may adversely affect the tree.

Root Protection Specifications: If temporary access for machinery is required within the TPZ, ground protection measure will be required to prevent root damage and soil compaction within the TPZ. Specifications for ground protection are as follows.

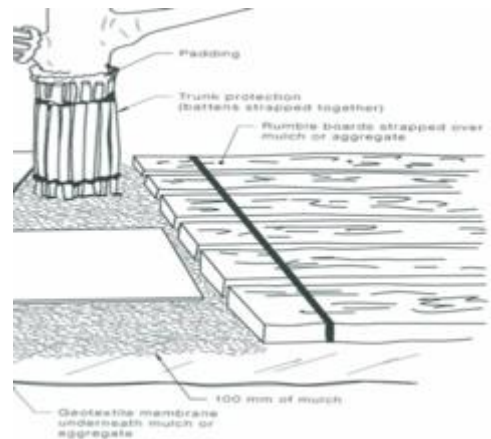
- Permeable membrane such as geotextile fabric
- Layer of mulch or crushed rock (at minimum depth of 100mm)
- Or rumble boards strapped over mulch or aggregate.



Mulch Within TPZ: Maintain aged eucalyptus mulch to retained trees for the duration of the development in accordance with Australian Standards® AS 4454- 2003 Compost, Soil Conditioners and Mulches. .

- Mulch should have at least 70% by mass of its particles, with a maximum size of greater than 16 mm and spread 50-75mm deep to the extent of the dripline, (never exceed 100mm depth). Mulch should not have contact with the tree trunk, apply 200mm from trunk and shaping a soil berm dish close to the root ball to

facilitate establishment of watering.



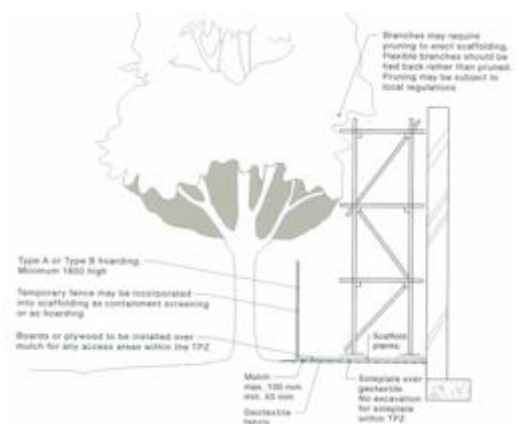
Watering Schedule: Maintain a watering schedule for retained trees at a rate of approx. 45L daily (Trees Impact: 2021).

Excavation Within TPZ's: excavations shall be undertaken under supervision of the project arborist, using sensitive, non-destructive methods (e.g. Manual excavation (hand tools), Air-spade or Hydro-vacuum excavations (sucker-truck).

- no roots greater than 40mm in diameter are damaged, pruned or removed. All care shall be taken to preserve and avoid damaging roots; excavation should not occur within the SRZ.
- Exposed roots shall be protected from direct sunlight by covering with hessian or similar fabric and kept moist at all times.
- Hand excavation and root mapping shall be undertaken along excavation lines within the TPZ Any conflicting roots (>40mm in diameter) shall be pruned using clean, sharp secateurs or a pruning saw to ensure a clean cut, free from tears.

Installing Underground Services Within TPZ: All services should be routed outside the TPZ.

- If underground services must be routed within the TPZ, they should be installed by directional drilling or in manually excavated trenches.
- The directional drilling boring methods, such as horizontal drilling (HDD) may be at least 600 mm deep. The project arborist should assess the likely impacts of boring and bore pits on retained trees.
- Excavations for entry/exit pits must be located outside the TPZ.



6. GLOSSARY

Aerial Inspection: Where a tree is climbed by an arborist to inspect upper stem and crown for signs or symptoms of defects and disease.

Assets Protection Zone APZ: is a fuel reduced area surrounding a built asset or structure.

Bracket fungus: The rigid fruiting body of some fungus species.

Branch collar: The ring of wood tissue which forms around the base of a branch (near the branch attachment).

Cavity: A void, initiated by a wound within the trunk, branches or roots. These voids are referred to as hollows.

Canker: Fungal infections of the bark and cambium that can occur on all parts of the tree.

Co-dominant: Stems or branches equal in size and relative importance.

Crown: All the parts of a tree arising above the trunk where it terminates by its division forming branches, e.g. the branches, leaves, flowers and fruit: or the total amount of foliage supported by branches.

Crown Lifting: The removal of the lower branches of the tree.

Dead wood: Refers to any whole limb that no longer contains living tissues

Decay: Process of degradation of woody tissues by fungi or bacteria through decomposition of cellulose and lignin.

Deciduous: Describes trees and bushes that shed their leaves in the autumn. (opposite to evergreen)

Dieback: Tree deterioration where the branches and leaves die.

Drip line: Where the canopy releases water shed from the foliage during precipitation.

DBH/Diameter: Diameter at breast height, about 1.4 meters of trunk height.

Epicormic Shoots: These shoots often have a weak point of attachment. Epicormic growth/shoots are generally a survival mechanism, often indicating the presence of a current, or past stress event such as fire, pruning, drought, etc.

Flush cut: A cut that damages or removes the branch collar or removes the branch and stem tissue and is inconsistent with the branch attachment as indicated by the bark branch ridge.

Genus/ Species: Identified using its botanical name. Where the species name is not known, species is used. The common name for trees may vary considerably in each area of geographical differences.

Height: Height has been estimated to + / - 2 meters.

Inclusion: The pattern of development at branch or stem junctions where bark is turned inward rather than pushed out. This fault is located at the point where the stems/branches meet.

Maturity: Tree age, Assessed as over-mature (last 1/3 of life expectancy), mature (1/3 to 2/3 life expectancy) and semi mature (less than 1/3 life expectancy).

Remedial (restorative) pruning: includes: Removing damaged, dead wood; trimming diseased or infested branches. Trimming branches back to undamaged tissue in order to induce shoots, from which a new crown will be established.

Resistograph® testing A Resistograph® is a specialised machine that measures timber density by drilling a 3mm diameter probe through the wood, simultaneously plotting the results on a graph at full scale.

Structural Integrity: Describes the internal supporting timber. (Substantial to frail)

Structural root zone (SRZ): Refers to the radial distance in metres, measured from the centre of the tree stem, which defines the critical area required to maintain stability of the tree.

Target: Are people, property, or activities that could be injured, damaged, or disrupted by a tree.

Tree Protection Zone (TPZ): Refers to the radius distance in metres, measured from the centre of the tree stem which defines the *tree protection zone* for a tree to be retained. This is generally the minimum distance from the centre of the tree trunk where protective fencing is to be installed to create an exclusion zone associated with construction works.

Vigour: Refers to the tree's health as exhibited by the crown density, leaf colour, presence of epicormic shoots, ability to withstand disease invasion, and the degree of dieback.

Windthrow: Tree failure when a force exerted by wind against the foliage crown and trunk overcomes resistance to that force in the root plate.

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APPENDIXES

Appendix A Visual Tree Assessment (Vta)

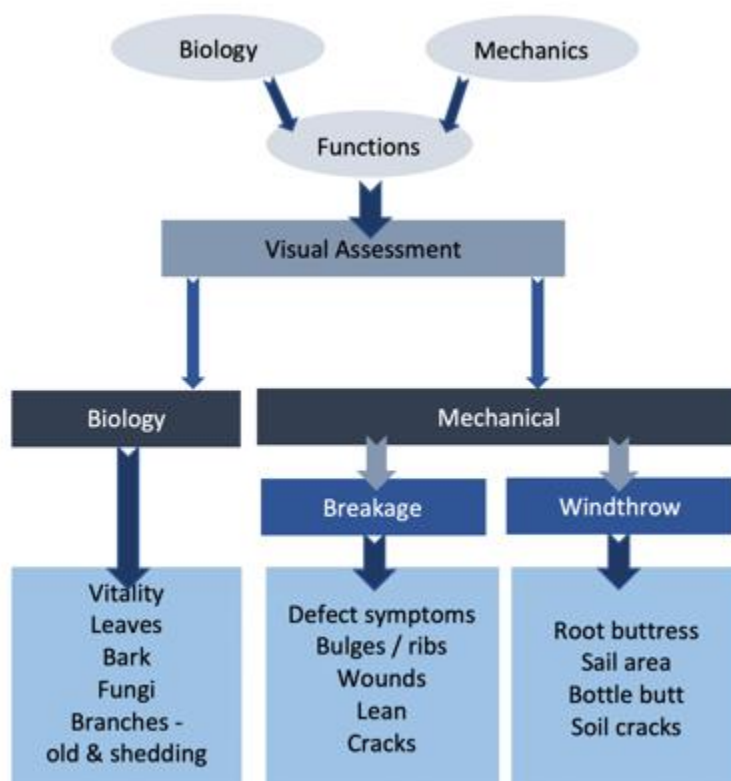


Diagram 1: VTA Chart by Claus Mattheck (1994) *The Body Language of Trees* adapted

Schedule 1: Categorises for VTA

VISUAL TREE DIAGNOSTICS	
1 Maturity: J - Juvenile; IM - Immature; SM - Semi-Mature; M - Mature	
Health & Vigour	Condition of Tree
KEY	KEY
4 Dieback is more than 20%.	2 Good Condition
4b Epicormics	3 Good Condition but poor development
5 Sparse Foliage Crown	3b Moderate.
7 Insect damage-foliage	5b Unbalanced Canopy
7b Borers	6 Physical Damage
8 Fungal Attack -pathogen	
10 Termite activity	9 Cavity
12b Dying	10b Inclusions
	11 Lean
14 Parasitic Vine Present	12 Heavily pruned
15 Damage by Climbing Plant	13 Damage to roots
	13b Encroachment
17 Habitat Tree	
18 Endangered Species	16 Inclusions

Appendix B Tree A-Z Categories

Schedule 2: Tree A-Z Categories Field Sheet (version 10.04-U8C) (Jeremy Burrell 2010)

Barrell (2019) Criteria for Assessing the importance of Trees on Development Sites.

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.

Further explanations to assist categorization

Z1	Any existing statutory definitions of trees that are too small to be legally protected should be applied and trees less than those heights or diameters will be Z1. If there are none, then if the tree has been planted for less than 5 years it is Z1. If it is less than 20 feet in height, it will be Z1 unless it is significant, i.e. clearly mature, but small trees are not Z1. If it is greater than 35 feet in height it is not Z1 unless it was planted in the last 5 years. Applying Z1 to trees between 20 and 35 feet is a matter of judgment; the most obvious test being that the tree could be easily and reliably moved or replaced. Ideally, the replacement tree should not be less than 20% of the replaced tree's dimensions.
Z2	Any existing statutory rules that prevent protection of trees within a fixed distance of a structure will allow a tree to be subcategorized as Z2.
Z3	Any existing statutory rules or guidance that prevent protection of trees for reasons other than size and proximity dictate Z3, i.e. invasive or alien species. If none exist, then Z3 cannot be applied.
Z4	This subcategory is for trees that are unlikely to recover from a serious health problem. The condition must be terminal with no obvious potential to recover, i.e. severe crown dieback related to excavation damage or root decay, to the extent that the structural branch framework is compromised. Trees that are likely to recover or improve should not be placed in this subcategory, i.e. trees suffering from a foliar problem that has little impact on the branch framework and varies from year to year.
Z5	Severe means so bad that there is no realistic chance of the tree achieving its full potential and there is a high risk of failure. In many cases, the risk of failure can be reduced by dramatic reduction in tree size, but this has severe health, maintenance cost and amenity implications, so is unlikely to be a sustainable management option. A common example is a severely unbalanced tree within a group that will be particularly vulnerable in adverse weather conditions and the adjacent trees mean there is no hope of remedial works resulting in an improvement. Topped trees do not automatically fit into this subcategory, although there is an obvious temptation. Species prone to decay, such as willow and poplar, often have severe decay at the origin of vigorous re-growth, creating a high risk of failure in adverse weather conditions. Z5 is clearly appropriate for them. However, this needs to be a careful judgment because topping in itself does not necessarily condemn a tree to this

Appendix C Tree Useful Life Expectancy – (TULE)

Schedule 3: SULE (Jeremy Barrell 1993) adapted with permission for TCAA Consulting Arborists 2014.

Tree Useful Life Expectancy (TULE)						
	1 LONG TULE	2 MEDIUM TULE	3 SHORT TULE	4 REMOVAL	5 NO POTENTIAL FOR RETENTION	6 SMALL, YOUNG OR REGULARLY CLIPPED
	Trees that appeared to be retainable at the time of the assessment for more than 40 years or with low level of risk.	Trees that appeared to be retainable at the time of the assessment for 15 to 40 years or with low to medium level risk.	Trees that appeared to be retainable at the time of the assessment for 5 to 15 years or with medium to high level of risk.	Trees that should be removed within the next 5 years or with high to very high level of risk.	Trees that must be removed immediately or with very high to extreme level of risk.	Trees that can be reliably transplanted or replaced.
a	Structurally sound trees located in positions that can accommodate future growth.	Trees that may only live for between 15 and 40 more years.	Trees that may only live for between 5 and 15 more years.	Dead, dying, suppressed or declining trees through disease or inhospitable conditions.	Dead, dying suppressed or declining trees diseased or inhospitable conditions.	Small trees less than 5 metres in height.
b	Trees that could be made suitable for retention in the long term by Intervention Works.	Trees that may live for more than 40 years, but would need to be removed for safety or Nuisance reasons	Trees that may live for more than 15 years, but would need to be removed for safety or nuisance reasons	Dangerous trees through instability or recent loss of adjacent trees.	Dangerous trees through instability or recent loss of adjacent trees.	Young trees less than 15 years old but over 5 metres in height.
c	Trees of special significance for historical, commemorative or rarity reasons that would warrant extraordinary efforts to secure their long-term retention.	Trees that may live for more than 40 years, but should be removed to prevent interference with more suitable individuals or to provide space for new planting.	Trees that may live for more than 15 years, but should be removed to prevent interference with more suitable individuals or to provide space for new planting.	Dangerous trees through structural defects including cavities, decay, included bark, wounds or poor form.	Dangerous trees through structural defects including cavities, decay, included bark, wounds or poor form.	Trees that have been regularly pruned to artificially control growth.
d		Trees that could be made suitable for retention in the medium term by Intervention works.	Trees that require substantial Intervention works, and are only suitable for retention in the short term.	Damaged trees that are clearly not safe to retain.	Damaged trees that are clearly not safe to retain and must be removed immediately.	
e				Trees that may live for more than 5 years, but should be removed to prevent interference with more suitable individuals or to provide space for new planting.	High Toxicity Allegan trees, asthmatic and poisonous trees and must be removed immediately.	
f				Trees that may cause damage to existing structures within 5 years.	OTHER, with legitimate explanation to be removed immediately.	
g				Trees that will become dangerous after removal of other trees for reasons given in 1A-1F.		
INSPECTION FREQUENCY						
	1-5 Years by competent inspector or event monitored.	1-5 Years by competent inspector or event monitored.	1-3 years by competent inspector or event monitored.	Annually by competent inspector or event monitored.	1-7 days by competent inspector and event monitored.	Bi-annually by competent inspector

Appendix D

Landscape Significance Rating

Schedule 4: Determining Heritage, Ecological and Amenity Value for Landscape Significance. (Morton 2006)

Landscape Significance Criteria			
RATING	HERITAGE VALUE	ECOLOGICAL VALUE	AMENITY VALUE
SIGNIFICANT	The subject tree is listed as a Heritage Item under the Local Environment Plan (LEP) with a local, state or national level of significance or is listed on Council's Significant Tree Register.	The subject tree is scheduled as a Threatened Species as defined under the Threatened Species Conservation Act 1995 (NSW) or the Environmental Protection and Biodiversity Conservation Act 1999.	The subject tree has a very large live crown size exceeding 300m ² with normal to dense foliage cover, is located in a visually prominent position in the landscape, exhibits very good form and habit typical of the species.
	The subject tree forms part of the curtilage of a Heritage Item (building/structure/artefact as defined under the LEP) and has a known or documented association with that item.	The tree is a locally indigenous species, representative of the original vegetation of the area and is known as an important food, shelter or nesting tree for endangered or threatened fauna species.	The subject tree makes a significant contribution to the amenity and visual character of the area by creating a sense of place or creating a sense of identity.
	The subject tree is a Commemorative Planting having been planted by an important historical person (s) or to commemorate an important historical event.	The subject tree is a remnant tree, being a tree in existence prior to development of the area.	The tree is visually prominent in view from surrounding areas, being a landmark or visible from a considerable distance.
1. VERY HIGH	The tree has a strong historical association with a heritage item (building/structure/artefact/garden etc..) within or adjacent the property and/or exemplifies a particular era or style of landscape design associated with the original development of the site.	The tree is a locally indigenous species, representative of the original vegetation of the area and is a dominant or associated canopy species of an Endangered Ecological Community (EEC) formerly occurring in the area occupied by the site.	The subject tree has a very large live crown size exceeding 200m ² , a crown density exceeding 70% (normal-dense), is a very good representative of the species in terms of its form and branching habit or is aesthetically distinctive and makes a positive contribution to the visual character and the amenity of the area.
2. HIGH	The tree has a suspected historical association with a heritage item or landscape supported by anecdotal or visual evidence.	The tree is a locally indigenous species and representative of the original vegetation of the area and the tree is located within a defined Vegetation Link/Wildlife Corridor or has known wildlife habitat value.	The subject tree has a large live crown size exceeding 100m ² ; The tree is a good representative of the species in terms of its form and branching habit with minor deviations from normal (e.g. Crown distortion/suppression) with a crown density of at least 70% (normal); The subject tree is visible from the street and surrounding properties and makes a positive contribution to the visual character and the amenity of the area.
3. MODERATE	The tree has no known or suspected historical association, but does not detract or diminish the value of the item and is sympathetic to the original era of planting.	The subject tree is a non-local native or exotic species that is protected under the provisions of this DCP.	The subject tree has a medium live crown size exceeding 40m ² ; The tree is a fair representative of the species, exhibiting moderate deviations from typical form (distortion/suppression etc..) with a crown density of more than 50% (thinning to normal); and The tree is visible from surrounding properties, but is not visually prominent – view may be partially obscured by other vegetation or built forms. The tree makes a fair contribution to the visual character and amenity of the area.
4. LOW	The subject tree detracts from heritage values or diminishes the value of a heritage item.	The subject tree is scheduled as exempt (not protected) under the provisions of this DCP due to its species, nuisance or position relative to building or other structures.	The subject tree has a small live crown size of less than 40m ² and can be replaced within the short term (5-10 years) with new tree planting.
VERY LOW	The subject tree is causing significant damage to a heritage item.	The subject tree is listed as an Environment Weed Species in the relevant Local Government Area, being invasive, or is a known nuisance species.	The subject tree is not visible from surrounding properties (visibility obscured) and makes a negligible contribution or has a negative impact on the amenity and visual character of the area. The tree is a poor representative of the species, showing significant deviations from the typical form and branching habit with a crown density of less than 50% (sparse).
7. INSIGNIFICANT	The tree is completely dead and has no visible habitat value.	The tree is a declared Noxious Weed under the Noxious Weeds Act (NSW) 1993 within the relevant Local Government Area.	The tree is completely dead and represents a potential hazard.

Appendix E Retention Value Rating

Schedule 5: Determining the Tree Retention Value (Morton, A 2011)

Tree Retention Priorities	
RETENTION VALUE	RECOMMENDED ACTION
HIGH	<p>These trees considered worthy of preservation; as such careful consideration should be given to their retention as a priority.</p> <p>Proposed site design and placement of buildings and infrastructure should consider the Tree Protection Zones as discussed in the following section to minimise any adverse impact.</p> <p>In addition to Tree Protection Zones, the extent of the canopy (canopy dripline) should also be considered, particularly in relation to a high-rise development. Significant pruning of the trees to accommodate the building envelope or temporary scaffolding is generally not acceptable.</p>
MODERATE	<p>The retention of these trees is desirable.</p> <p>These trees should be retained as part of any proposed development if possible, however these trees are considered less critical for retention.</p> <p>If these trees must be removed, replacement planting should be considered in accordance with Council's Tree Replacement Policy to compensate for loss of amenity.</p>
LOW	<p>These trees are not considered to be worthy of any special measures to ensure their preservation, due to current health, condition or suitability. They do not have any special ecological, heritage or amenity value, or these values are substantially diminished due to their SULE.</p> <p>These trees should not be considered as a constraint to the future development of the site.</p>
VERY LOW	<p>These trees are considered potentially hazardous or very poor specimens, or may be environmental or noxious weeds.</p> <p>The removal of these trees is therefore recommended regardless of the implications of any proposed development.</p>

Appendix F Tree Planting Specifications

Tree planting specifications are in accordance with *NATSPEC specification for Trees*, Ross Clark (2003) and *Australian Standard® AS 2303-2018 Tree Stock for Landscape Use*.

BEFORE PLANTING

- Don't plant trees too close to buildings, in-ground pools, avoid planting under power lines and over drainage pipes or near other large trees.
- A consider the effect on neighbouring properties (i.e. shade, loss of views, impact on foundations, fences and services).
- Plant deciduous trees if you want in summer shade and winter sun. Consider shadows cast from evergreen trees.
- Use locally native to attract native fauna and to reduce watering required.

BASIC TREE PLANTING

1. Dig the hole at least twice as wide as the pot size.
2. Loosen the soil at the sides of the hole. Fill hole with water and allow to drain away.
3. Place the loosened root ball in the hole. Fill back soil. The top of the root ball should be level with the surrounding soil.
4. Water the plant deeply after planting, once a week for the first two months.

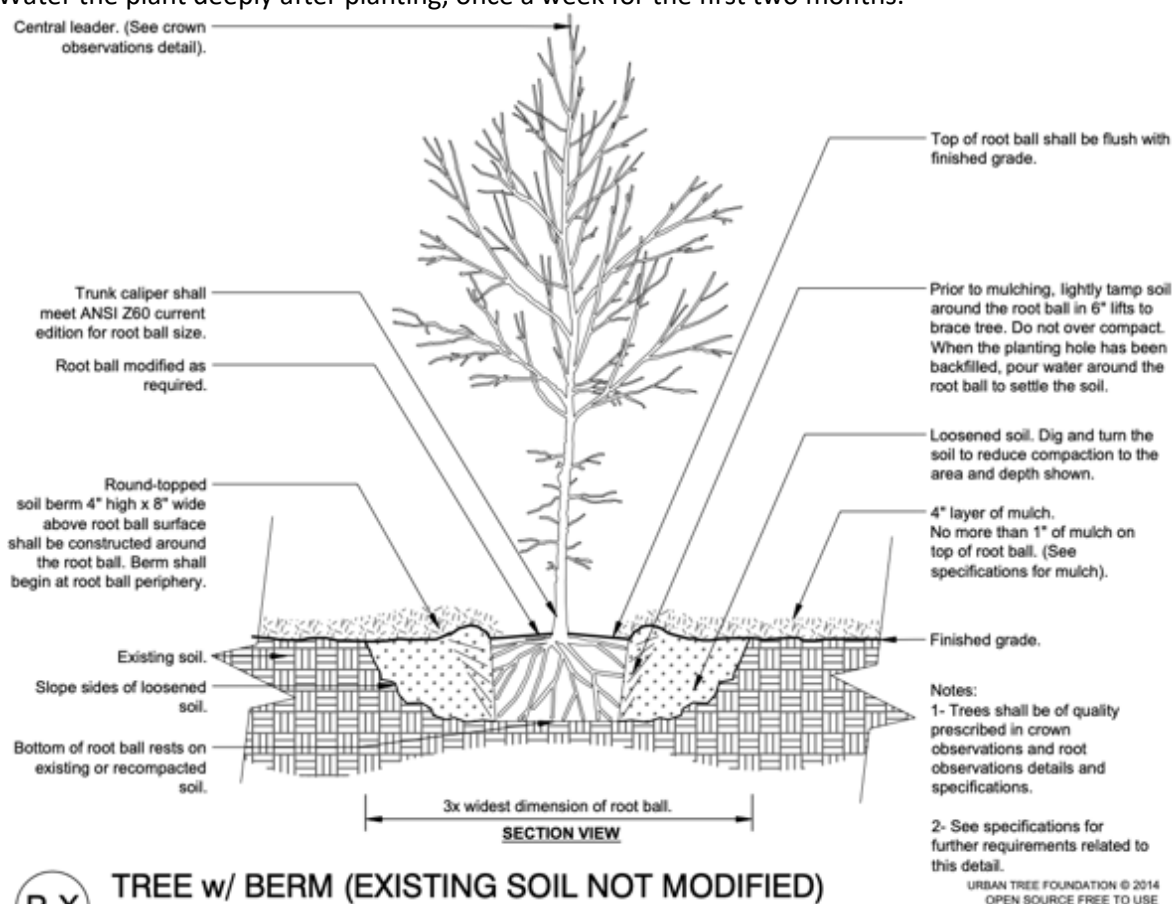


Diagram 2 Urban J (2014) Tree Planting Specification diagram

Schedule 6: Watering Frequency Table

Watering frequency for 45L pot			
Time of year	1 st month	2nd and 3rd month	4th to 6th month
Sept-Feb.	4x week	3 x week	2 x week
Mar-May	3 x week	2 x week	1 x week
Jun-August	2 x week	1 x week	1x fortnight

Appendix G Replenishment of Native Trees Species

Schedule 7: Tree Species and Sizes.

Botanical Name	Common Name	Height (m) at maturity	Crown Spread (m)
<u><i>Leptospermum petersonii</i></u>	Lemon-Scented Tea Tree	5	6
<u><i>Agonis flexuosa</i></u>	Willow Myrtle	7	6
<u><i>Elaeocarpus eumundi</i></u>	Quandong	8	4
<u><i>Corymbia ficifolia</i></u>	Red Flowering Gum	8	5
<u><i>Syzygium luehmannii</i></u>	Riberry	8	5
<u><i>Waterhousea floribunda</i></u>	Weeping Lilly Pilly	8	5
<u><i>Acacia implexa</i></u>	Hickory Wattle	8	6
<u><i>Hymenosporum flavum</i></u>	Native Frangipani	8	6
<u><i>Tristaniaopsis laurina</i></u>	Water Gum	9	5
<u><i>Corymbia eximia</i></u>	Yellow Bloodwood	10	7
<u><i>Callistemon viminalis</i></u>	Weeping Bottlebrush	10	8
<u><i>Melaleuca linariifolia</i></u>	Narrow-Leaved Paperbark	10	8
<u><i>Cupaniopsis anacardioides</i></u>	Tuckeroo	10	10
<u><i>Callistemon salignus</i></u>	Willow Bottlebrush	12	6
<u><i>Eucalyptus cinerea</i></u>	Argyle Apple	12	7
<u><i>Elaeocarpus reticulatus</i></u>	Blueberry Ash	15	8
<u><i>Flindersia australis</i></u>	Australian Teak	15	10
<u><i>Brachychiton populneus</i></u>	Kurrajong Tree	15	12
<u><i>Backhousia citriodora</i></u>	Lemon Myrtle	18	6
<u><i>Angophora costata</i></u>	Sydney Red Gum	20	10
<u><i>Lophostemon confertus</i></u>	Brush Box	20	16

MULCH: Adding a layer of mulch to reach 75mm, encourages water retention and microbes, that will break down and incorporate organic matter into the soil. Organic mulch will reduce weeds and root development.



- Add at least 70% by mass of its particles with a maximum size of greater than 16 mm in accordance to as 4454/2003 *Compost, Soil Conditioners and Mulches*. Apply 200mm from trunk and shaping a soil berm dish close to the root ball to facilitate establishment of watering.
- The TPZ of retained trees should be maintained with a 75mm depth of organic, certified, coarse Eucalyptus mulch.
- Mulch should be retained at 5075mm depth and never exceed 100mm in depth.
- Do not allowed mulch to contact the tree trunk. Retain a mulch free gap of not less than 75mm and preferably 200mm clear from the base of the tree trunk.

Disclaimer

McArdle Arboricultural Consultancy Pty Ltd does not assume responsibility for liability associated with the tree on/or adjacent to this project site, the future demise and/or any damage which may result therefrom. They take care to obtain all information from reliable sources. All data has been verified insofar as possible; however, the consultant can neither guarantee nor be responsible for the accuracy of information provided by others.

McArdle Arboricultural Consultancy Pty Ltd cannot be held responsible for any consequences as result of work carried out outside specifications, not in compliance with Australian Standards® or by inappropriately qualified staff. If further investigations such as, aerial, drill and root test are recommended, the report shall not be considered final until all investigations have been completed, as further defects may be found.

STATEMENT OF LIMITATIONS

McArdle Arboricultural Consultancy Pty Ltd makes every effort to accurately identify current tree health and hazards. Results may or may not correlate to actual tree structural integrity. There are many factors that may contribute to limb or total tree failure. Not all these symptoms are visible. There can be hidden defects that may result in a failure even though it would seem that other, more obvious defects would be the likely cause of failure. All standing trees have an element of unpredictable risk.

The inspection was limited to a visual ground examination of the tree, without aerial inspections and below ground excavations. The assessments are limited and do not include specialised analysis. No internal diagnostics, aerial inspection and pathology test were conducted. Sketches, diagrams, graphs, and photographs in this report, being intended as visual aids, are not necessarily to scale.



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