

REPORT:

A): ARBORICULTURAL IMPACT
ASSESSMENT

and

B). TREE MANAGEMENT PLAN
(Trees to be retained and protected)

68-80 O'Connell Street,
Caddens NSW

Prepared 23 July 2025 / Our Ref: 25222
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1.0 EXECUTIVE SUMMARY

This Arboricultural Impact Assessment Report has been prepared by Redgum Horticultural for Caddens Estate Pty Ltd to accompany a State Significant Development Application (SSDA) for a mixed-use development (including in-fill affordable housing) at 68-80 O'Connell Street, Caddens, within the Penrith Local Government Area (LGA). Mr. Andrew Thor (*the author*) attended the site on 10 March 2025 and the trees and their growing environment were examined. This report takes into consideration the trees within the site and within five metres of the common boundary affected by the development.

This report has been prepared to address the Secretary's Environmental Assessment Requirements (SEARs) issued for the project (SSD-80875966) on 14 March 2025

This report concludes that the proposed mixed-use development is suitable subject to the implementation of the following mitigation measures.

This report involves 172 trees (*the trees*), as indicated on Site Plan A - Survey of Subject Trees (Appendix C) and considers the removal of one-hundred and fifteen (115) trees within the property and the retention of fifty-seven (57) trees within the property and a neighbouring property. The trees will be considered as 6 stands to encompass all trees within and immediately adjacent to the site, where appropriate, as marked on Appendix C, Survey of Subject Trees. **Tree Protection Zone (TPZ)** fences or works are marked on Appendix F, Trees to be Retained and Tree Protection Zones.

This report considers 172 trees, 150 trees within the site and 22 trees within neighbouring land with Trees 1, 4 to 7, 11 to 39 (threatened EEC), 40^{x19}, 41, 42, 43 & 50 (group) to be retained and protected and Trees 2, 3, 8, 9, 10, 40^{x7}, 44^{x88}, 45^{x9}, 46, 47, 48 & 49^{x3} are recommended to be removed. For Tree 1, the alignment of the terracing walls is on the compressions side of the specimen and an acceptable major encroachment into the TPZ of this specimen. The section of terracing walls within the TPZ of the specimen have been designed to provide stable level change down to the common open space and are not intended to be walls with significant associated structure or footings. They are to be constructed using tree sensitive excavation (for posts) and construction techniques to comply with AS4970 2009 *Protection of Trees on Development Sites* to engineers' specifications with works to be supervised by a qualified Arborist. Trees 4, 5 & 7, the alignment of the basement will be a minor encroachment to these specimens. The section of the basement within the TPZ of the specimens is to be constructed using tree sensitive excavation and construction techniques such as a vertical cut with shotcrete and contiguous pilings to reduce any impact on their stability. Minor crown raising of these specimens may be required to clear access over the proposed boardwalk, with work to be undertaken by a qualified Arborist. Tree 6, the alignment of the basement is sufficiently setback to not impact this Cumberland Shale Plains Woodland / Cumberland Red Gum River flat Forest specimen with the Rain Garden and deck / elevated boardwalk are within the structural root zone of this specimen. Trees 4, 5, 6 & 7: Rain Garden - the design intent for the retained trees in the Forest Green is for existing ground levels to be retained, including the distinct swale below the trees, and to retain the water runoff regime. Catchment of natural water flow across the area is to be with a stormwater culvert below the area of the TPZ area of the retained trees. Raingarden type planting would be groundcovers and low strappy planting consistent with native species of the local area, intended to have similar impacts to the existing grass with limited additional planting in the structural root zones of the retained trees, so that they are suitably retained in good health. **Timber Decking** - the timber decking proposed to provide access below the trees is shown indicatively. A non-destructive **Root Mapping investigation** is recommended to be undertaken for the location of the supporting posts and their footings. The structures are to be flexible in outcome and complement the elevated deck structures and can accommodate design adjustment to suit tree protection requirements with a minimum clearance of 300mm from any structural roots of 200mm or more. This investigation could be undertaken prior to commencement of works to minimise disturbance to the root zone of these specimens with all works to be supervised by the project Arborist. Trees 11, 12, 13, 15, 17, 18, 19, 22, 24, 26, 28, 29 & 32, the alignment of the proposed gabion walls within the threatened ecological community is an acceptable major encroachment into the tree protection zones of these specimens providing the existing natural ground levels are to be retained, with no cut or fill to maintain the growing environment for these specimens. Trees 14, 16, 20, 21, 25, 27, 30, 33 & 35, the alignment of the proposed gabion walls is an acceptable encroachment into the tree protection zones of these specimens providing the existing natural ground levels are to be retained, with no cut, fill with the exiting ground levels maintained within the growing environment for these specimens. Trees 23, 31, 34, 36, 37, 38 & 39, these specimens are sufficiently setback from the proposed landscape works providing the existing natural ground levels are maintained with no cut or fill within the TPZ of these specimens. Trees 40^{x19}, these neighbouring specimens are an avenue planting and are sufficiently setback from the development works to not be affected. Tree 41, 43 & 50 (group), the alignment of the development is sufficiently setback to not affect these specimens.

Tree 42, the alignment of the proposed development works is a minor encroachment to this specimen but are sufficiently setback to not impact to specimen.

If boundary fences are to be installed within the tree protection zone of retained specimens, they are to be constructed using tree sensitive excavation and construction techniques such as post and rail construction with suspended panels to reduce any impact on the stability of retained trees, with posts to be dug by hand using non-motorised equipment to further assist in the protection of the trees.

If associated infrastructure (pipe works) is to be installed within the Tree Protection Zone of any retained specimen, they are to be installed by hand with non-motorised equipment. If structural roots are found within the trench, they are to be left intact and dug around retaining this specimen's structural integrity with works to be undertaken in consultation with the project arborist.

Proposed Development Impacts: There will be no impact to Trees 23, 31, 34, 36, 37, 38, 39, 40^{x19} 41, 43 & 50 (group) with a minor encroachment for Trees 14, 16, 33 & 42 while Trees 1, 4, 5, 6, 7, 21, 25, 27, 30 & 35 will be subject to major encroachment into the TPZ while Trees 11, 12, 13, 15, 17, 18, 19, 22, 24, 26, 28, 29 & 32 are subject to an acceptable encroachment into the structural root zone by proposed landscape works. Retained specimens are to be protected as per AS 4970 (2009) Section 3, 3.3.3 Major Encroachments from development works within >10% of the area of the Tree Protection Zone and as per discussion points in section 14 in part B of this report. **Demolition Impacts:** There is an existing major encroachment within the threatened ecological community by the existing stormwater channel which is believed to be stable and expected to be retained, and at most would be a task of clearing out rubbish, debris and weeds which should improve the growing conditions for these specimens. Any demolition, excavations or construction work carried out within the TPZ of retained specimens must be supervised and certified by the Project Arborist in accordance with AS4970 (2009).

Setbacks for the new works and associated infrastructure should provide sufficient space to protect the existing growing environments both above and below ground for trees to be retained, and so that trees within the property and on adjoining properties will not be adversely affected. The proposed design has considered the spatial requirements for the trees to be retained based on the information available or provided at the time of compiling this report, and those areas to be protected will be discussed further. The Summary lists the general condition of trees and a summary of works in Table 1.0. In section 7.0 each individual tree is described in greater detail including protective or remedial works. Tree maintenance works including pruning, removal or transplantation are detailed in section 14.0.

Following the implementation of the above mitigation measures, the remaining impacts are considered appropriate.

2.0 INTRODUCTION

The SSDA seeks development consent for a mixed-use development (including in-fill affordable housing) comprising a combination of shop-top housing, residential flat buildings and a commercial premises (shop) at 68-80 O'Connell Street, Caddens. The proposed works include site preparation works, excavation, infrastructure, construction of the buildings and associated landscaping works.

Specifically, the SSDA seeks development consent for:

- demolition of an existing at grade car park
- construction of 4 x 4 - 6 storey shop top housing buildings at 68 O'Connell Street, Caddens, comprising:
 - 177 residential dwellings
 - ground floor commercial, retail and medical uses
- construction of a single storey commercial premises (shop) located at the south western corner of 68 O'Connell Street
- construction of basement carparking to service the shop top housing, ground floor commercial and commercial premises at the southwestern corner
- construction of 11 x 4 – 7 storey residential flat buildings at 80 O'Connell Street, including
 - 305 residential dwellings
 - basement carparking
- internal roads
- associated infrastructure and services
- landscaping and communal open spaces including a 'public square'

The proposal also incorporates 15% affordable housing and seeks to utilise the incentive controls under Chapter 2, Part 2, Division 1, Section 18 of the *State Environmental Planning Policy (Housing) 2021* (Housing SEPP) to achieve 30% additional building height.

This SSDA also seeks to modify DA17/0995 (pursuant to Clause 4.17(5) of the *Environmental Planning and Assessment Act 1979* (EP&A Act) by amending the description of works and removing reference to the Concept DA and Stage 2 works to avoid inconsistency of the proposed works on the existing at-grade car park and southwestern corner of the site with that approval.

This report has been prepared in response to the requirements contained within the Secretary’s Environmental Assessment Requirements (SEARs) dated 14 March 2025 (SSD-80875966). Specifically, this report has been prepared to respond to the SEARs requirement issued below.

Item	Description of requirement	Section reference (this report)
8. <i>Trees and Landscaping</i>	<p><i>Assess the number, location, condition and significance of trees to be removed and retained and note any existing canopy coverage to be retained on-site.</i></p> <p><i>Provide a detailed site-wide landscape plan, that:</i></p> <ul style="list-style-type: none"> • <i>details the proposed site planting, including location, number and species of plantings, heights of trees at maturity and proposed canopy coverage (as a percentage of the site area).</i> • <i>provides evidence that opportunities to retain significant trees have been explored and/or informs the plan.</i> • <i>demonstrates how the proposed development would contribute to long term landscape amenity in respect of the site</i> 	<p><i>Tree Assessment page 13.</i></p> <p><i>As per the associated landscape plan within package for approval.</i></p> <p><i>Within the summary on page 32.</i></p> <p><i>As per the associated landscape plan within package for approval.</i></p>

Table 1 SEARs Requirements

3.0 SUBJECT SITE

The site is located at 68-80 O’Connell Street, Caddens, within the Penrith LGA. It is legally described as Lot 1 and 2 in DP 1268507. The site has an area of 54,032m² and is generally rectangular in shape.

The western portion of the site (68 O’Connell Street) currently comprises an approved commercial shopping centre development and associated carpark, commonly known as ‘Caddens Corner’. It is zoned E1 Local Centre pursuant to the *Penrith Local Environmental Plan 2010 (PLEP 2010)*. This portion of the site is subject to a Concept DA (DA17/0995). A portion of 68 O’Connell Street, that is currently used for at-grade carparking, is subject to this SSDA.

The eastern portion of the site (80 O’Connell Street) is a cleared vacant lot, historically occupied by rural residential land uses. It is zoned R4 High Density Residential pursuant to the PLEP 2010. The site itself is not identified as a heritage item; however, it is located to the east of the ‘Teacher’s residence (former)’ (Item 670), a local heritage item which is identified under Schedule 5 of the PLEP 2010.

High biodiversity value land is present at the site at its north-eastern corner, pursuant to the *Biodiversity Conservation Act 2016*.



Figure 1: The site (Base source: Group GSA)

The site is located within the Caddens Release Area within the *Penrith Development Control Plan 2014* (PDCP 2014), and, under the Caddens Release Area Structure Plan, is strategically identified as the precinct centre with adjoining residential areas.

The site is approximately 2.2 kilometres (km) from Werrington Station and 1.8km from Kingswood Station. It is also well serviced by local buses with stops in proximity to the site along O'Connell Street in both directions.

SURROUNDING CONTEXT

The site is surrounded by established and newly developed low density residential areas of Caddens, Claremont Meadows, Werrington and Kingswood, as envisioned by the Caddens Release Area plan within the PDCP 2014.

A staged residential subdivision for 119 residential lots is located immediately to the north of the site at 46-66 O'Connell Street.

The area is interspersed with a variety of uses, including Western Sydney University (WSU), TAFE NSW and sporting fields.

The site is located 5.5km east of Penrith City Centre and 30km west from Parramatta CBD.

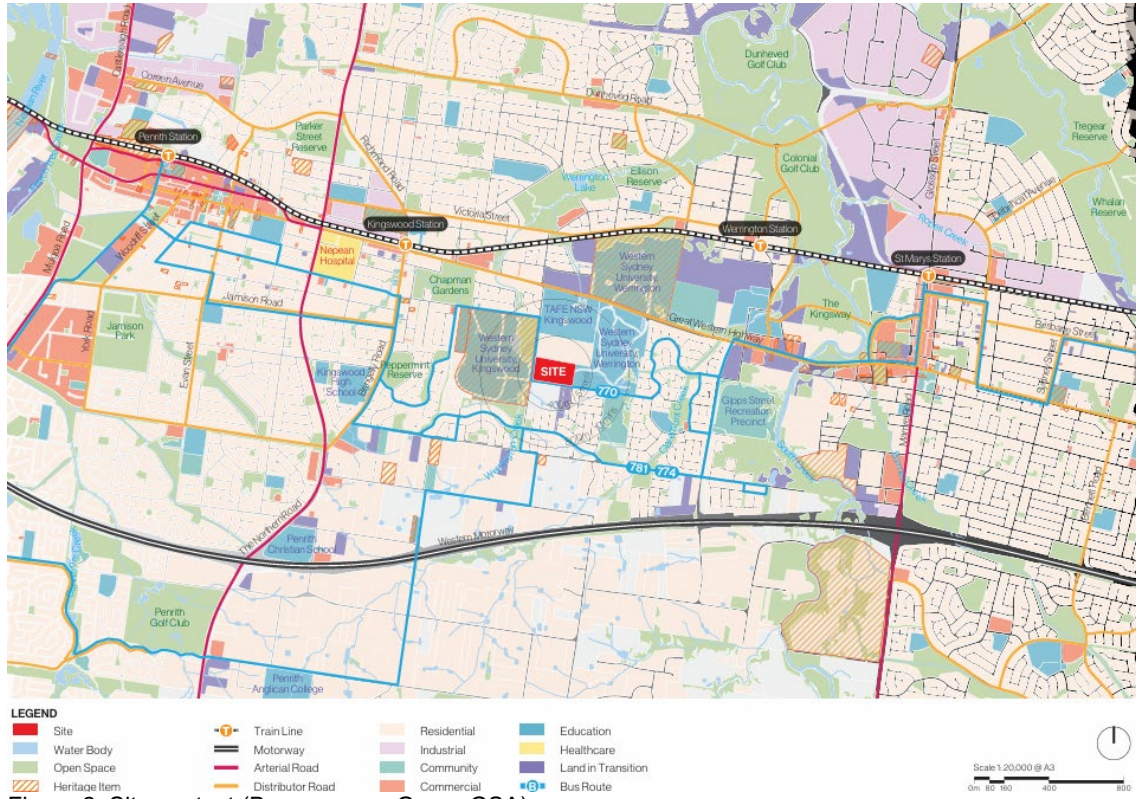


Figure 2: Site context (Base source: Group GSA)

Documentation Referenced for the Preparation of this Report.

Architectural Plan Set – Project No. A252106, Issue A, Date 01/08/2025
 Group GSA Pty Ltd, Level 7, 80 William Street, East Sydney NSW 2011
 T: 02 9361 4144.

68-80 O'CONNELL ST, CADDENS - SSSA DRAWING LIST		
SHEET NUMBER	SHEET NAME	CURRENT REVISION
0000 - 1199 SITE PLANS		
SSDA 0000	COVER SHEET	A
SSDA 1000	ZONING	A
SSDA 1100	EXISTING PLAN	A
SSDA 1200	DEMOLITION PLAN	A
SSDA 1300	SITE PLAN	A
SSDA 1400	STAGING DIAGRAMS	A
2000 - 2199 - FLOOR PLANS		
SSDA 2000	GA PLAN OVERALL - RL 40.10	A
SSDA 2001	GA PLAN OVERALL - RL 43.30	A
SSDA 2002	GA PLAN OVERALL - RL 46.50	A
SSDA 2003	GA PLAN OVERALL - RL 50.70	A
SSDA 2004	GA PLAN OVERALL - RL 54.70	A
SSDA 2005	GA PLAN OVERALL - RL 57.20	A
SSDA 2006	GA PLAN OVERALL - RL 60.20	A
SSDA 2007	GA PLAN OVERALL - RL 63.40	A
SSDA 2008	GA PLAN OVERALL - RL 66.60	A
SSDA 2009	GA PLAN OVERALL - RL 69.80	A
SSDA 2010	GA PLAN OVERALL - RL 73.00	A
SSDA 2011	GA PLAN OVERALL - RL 76.20	A
SSDA 2012	GA PLAN OVERALL - ROOF	A
SSDA 2050	B - J BASEMENT - 02	A
SSDA 2051	B - J BASEMENT - 01	A
SSDA 2090	K - N BASEMENT - 03	A
SSDA 2091	K - N BASEMENT - 02	A
SSDA 2092	K - N BASEMENT - 01	A
SSDA 2070	P - U BASEMENT - 03	A
SSDA 2071	P - U BASEMENT - 02	A
SSDA 2072	P - U BASEMENT - 01	A
SSDA 2073	P - U BASEMENT - RETAIL LEVEL	A
SSDA 2100	BUILDING PLANS - BUILDING B	A
SSDA 2101	BUILDING PLANS - BUILDING C	A
SSDA 2102	BUILDING PLANS - BUILDING E	A
SSDA 2103	BUILDING PLANS - BUILDING F	A
SSDA 2104	BUILDING PLANS - BUILDING G	A
SSDA 2105	BUILDING PLANS - BUILDING H	A
SSDA 2106	BUILDING PLANS - BUILDING J	A
SSDA 2107	BUILDING PLANS - BUILDING K	A
SSDA 2109	BUILDING PLANS - BUILDING L SHEET 1	A
SSDA 2110	BUILDING PLANS - BUILDING L SHEET 2	A
SSDA 2111	BUILDING PLANS - BUILDING M SHEET 1	A
SSDA 2112	BUILDING PLANS - BUILDING M SHEET 2	A
SSDA 2113	BUILDING PLANS - BUILDING N SHEET 1	A
SSDA 2114	BUILDING PLANS - BUILDING N SHEET 2	A
SSDA 2115	BUILDING PLANS - BUILDING P SHEET 1	A
SSDA 2116	BUILDING PLANS - BUILDING P SHEET 2	A
SSDA 2117	BUILDING PLANS - BUILDING R	A

68-80 O'CONNELL ST, CADDENS - SSSA DRAWING LIST		
SHEET NUMBER	SHEET NAME	CURRENT REVISION
SSDA 2118	BUILDING PLANS - BUILDING S_SHEET 1	A
SSDA 2119	BUILDING PLANS - BUILDING S_SHEET 2	A
SSDA 2120	BUILDING PLANS - BUILDING T_SHEET 1	A
SSDA 2121	BUILDING PLANS - BUILDING T_SHEET 2	A
SSDA 2122	BUILDING PLANS - BUILDING U	A
3000 - 3099 - ELEVATIONS		
SSDA 3000	OVERALL ELEVATIONS	A
SSDA 3001	OVERALL ELEVATIONS	A
SSDA 3010	BUILDING ELEVATIONS - BUILDING B	A
SSDA 3011	BUILDING ELEVATIONS - BUILDING C	A
SSDA 3012	BUILDING ELEVATIONS - BUILDING E	A
SSDA 3013	BUILDING ELEVATIONS - BUILDING F	A
SSDA 3014	BUILDING ELEVATIONS - BUILDING G	A
SSDA 3015	BUILDING ELEVATIONS - BUILDING H	A
SSDA 3016	BUILDING ELEVATIONS - BUILDING J	A
SSDA 3017	BUILDING ELEVATIONS - BUILDING K	A
SSDA 3018	BUILDING ELEVATIONS - BUILDING L	A
SSDA 3019	BUILDING ELEVATIONS - BUILDING M	A
SSDA 3020	BUILDING ELEVATIONS - BUILDING N	A
SSDA 3021	BUILDING ELEVATIONS - BUILDING P	A
SSDA 3022	BUILDING ELEVATIONS - BUILDING R	A
SSDA 3023	BUILDING ELEVATIONS - BUILDING S	A
SSDA 3024	BUILDING ELEVATIONS - BUILDING T	A
SSDA 3025	BUILDING ELEVATIONS - BUILDING U	A
SSDA 3026	RETAIL BOX ELEVATIONS	A
3100 - 3199 - SECTIONS		
SSDA 3101	SITE SECTIONS - SHEET 1	A
SSDA 3102	SITE SECTIONS - SHEET 2	A
4000 - 4099 - FACADE SECTIONS		
SSDA 4000	FACADE SECTIONS - SHEET 1	P1
SSDA 4001	FACADE SECTIONS - SHEET 2	P1
SSDA 4002	FACADE SECTIONS - SHEET 3	P1
5100 - 5199 - RENDERERS AND MATERIALS & FINISHES		
SSDA 5100	RENDER 01 - VILLAGE QUARTER	P1
SSDA 5101	RENDER 02 - COMMUNITY FOREST	P1
SSDA 5102	RENDER 03 - O'CONNELL STREET	P1
SSDA 5103	RENDER 04 - RETAIL BOX	P1
SSDA 5104	RENDER 05 - AVENUE ROAD	P1
SSDA 5200	MATERIALS AND FINISHES	P1
9100 - 9199 - COMPLIANCE		
SSDA 9100	GFA DIAGRAMS - 01	P1
SSDA 9101	GFA DIAGRAMS - 02	P1
SSDA 9102	GFA DIAGRAMS - 03	P1
SSDA 9110	DEEP SOIL	P1
SSDA 9120	COMMUNAL OPEN SPACE	P1
SSDA 9121	PROPOSED COS - SOLAR ANALYSIS (21ST JUNE)	P1
SSDA 9130	CROSS VENTILATION COMPLIANCE - 01	P1

68-80 O'CONNELL ST, CADDENS - SSSA DRAWING LIST		
SHEET NUMBER	SHEET NAME	CURRENT REVISION
SSDA 9131	CROSS VENTILATION COMPLIANCE - 02	P1
SSDA 9140	SUN EYE VIEWS - 30 VIEWS - SHEET 1	P1
SSDA 9141	SUN EYE VIEWS - 30 VIEWS - SHEET 2	P1
SSDA 9142	SOLAR COMPLIANCE DIAGRAM - 01	P1
SSDA 9143	SOLAR COMPLIANCE DIAGRAM - 02	P1
SSDA 9150	BUILDING SEPARATION DIAGRAMS	P1
SSDA 9160	STORAGE SCHEDULE	P1
SSDA 9162	STORAGE DIAGRAM - 01	P1
SSDA 9163	STORAGE DIAGRAM - 02	P1
SSDA 9164	STORAGE DIAGRAM - 03	P1
SSDA 9165	STORAGE DIAGRAM - 04	P1
SSDA 9166	STORAGE DIAGRAM - 05	P1
SSDA 9170	HEIGHT PLANE COMPLIANCE - 01	P1
SSDA 9171	HEIGHT PLANE COMPLIANCE - 02	P1
SSDA 9200	P - U RAMP DETAIL_RAMP 1, RAMP 2, RAMP 4	P1
SSDA 9201	P - U RAMP DETAIL_RAMP 3	P1
SSDA 9202	B - J RAMP DETAIL_RAMP 1, RAMP 2	P1
SSDA 9203	K - N RAMP DETAIL_RAMP 1, RAMP 2	P1
SSDA 9300	TYPE B LG 01 ADAPTABLE APARTMENT	P1
SSDA 9301	TYPE B LG 03 ADAPTABLE APARTMENT	P1
SSDA 9302	TYPE B LG 04 ADAPTABLE APARTMENT	P1
SSDA 9303	TYPE C LG 01 ADAPTABLE APARTMENT	P1
SSDA 9304	TYPE E G 03 ADAPTABLE APARTMENT	P1
SSDA 9305	TYPE E G 05 ADAPTABLE APARTMENT	P1
SSDA 9306	TYPE F 1.05 ADAPTABLE APARTMENT	P1
SSDA 9307	TYPE G G 01 ADAPTABLE APARTMENT	P1
SSDA 9308	TYPE G 1.01 ADAPTABLE APARTMENT	P1
SSDA 9309	TYPE J LG 03 ADAPTABLE APARTMENT	P1
SSDA 9310	TYPE J G 05 ADAPTABLE APARTMENT	P1
SSDA 9311	TYPE K G 01 ADAPTABLE APARTMENT	P1
SSDA 9312	TYPE L 1.01 ADAPTABLE APARTMENT	P1
SSDA 9313	TYPE M 1.02 ADAPTABLE APARTMENT	P1
SSDA 9314	TYPE N LG 01 ADAPTABLE APARTMENT	P1
SSDA 9315	TYPE N LG 03 ADAPTABLE APARTMENT	P1
SSDA 9316	TYPE N G 04 ADAPTABLE APARTMENT	P1
SSDA 9317	TYPE R2 1 01 ADAPTABLE APARTMENT	P1
SSDA 9318	TYPE S 1.02 ADAPTABLE APARTMENT	P1
SSDA 9319	TYPE S 1.07 ADAPTABLE APARTMENT	P1
SSDA 9320	TYPE U 2 04 ADAPTABLE APARTMENT	P1
SSDA 9500	PROPOSED SHADOW DIAGRAMS - AE (20TH MAR)	P1
SSDA 9501	PROPOSED SHADOW DIAGRAMS - AE (20TH MAR)	P1
SSDA 9502	PROPOSED SHADOW DIAGRAMS - WS (21ST JUNE)	P1
SSDA 9503	PROPOSED SHADOW DIAGRAMS - WS (21ST JUNE)	P1
SSDA 9504	PROPOSED SHADOW DIAGRAMS - SE (22ND SEPT)	P1
SSDA 9505	PROPOSED SHADOW DIAGRAMS - SE (22ND SEPT)	P1

SSDA SUBMISSION

Landscape Masterplan – Job No. SS22-4919, Issue K, Date 23/07/2025
 Site Image (NSW) Pty Ltd, Level 1, 3-5 Baptist Street, Redfern NSW 2016
 T: 02 8332 5600

DRAWING SCHEDULE

Dwg No.	Drawing Title	Scale
000	Coversheet	N/A @ A1
001	Existing Tree Management Plan	1:500 @ A1
002	Tree Canopy Coverage	1:500 @ A1
C100	Landscape Masterplan (render)	1:500 @ A1
100	Landscape Masterplan	1:500 @ A1
101	Village Green - Retail level interface	1:300 @ A1
102	Landscape plan - GF P,R,S,T,U	1:300 @ A1
103	Landscape plan - GF K,L,M,N	1:300 @ A1
104	Landscape plan - GF B,C,D,E,F,G,H,J	1:300 @ A1
105	Threatened Ecological Community Area	1:300 @ A1
106	Landscape plan - Rooftop terrace S, T	1:100 @ A1

DRAWING INDEX	
Drawing No.	DESCRIPTION
000	COVER SHEET PLAN
101	STORMWATER CONCEPT PLAN SITE PLAN
102	STORMWATER CONCEPT PLAN BUILDING PLAN - BUILDING B - J
103	STORMWATER CONCEPT PLAN BUILDING PLAN - BUILDING K - N
104	STORMWATER CONCEPT PLAN BUILDING PLAN - BUILDING P - U
105	STORMWATER CONCEPT PLAN BUILDING PLAN - RETAIL
106	WSUD CATCHMENT PLAN AND MUSIC RESULTS
107	OSD CATCHMENT PLAN
108	ON-SITE DETENTION DETAILS AND CALCULATIONS SHEET 1 OF 6

109	ON-SITE DETENTION DETAILS AND CALCULATIONS SHEET 2 OF 6
110	ON-SITE DETENTION DETAILS AND CALCULATIONS SHEET 3 OF 6
111	ON-SITE DETENTION DETAILS AND CALCULATIONS SHEET 4 OF 6
112	ON-SITE DETENTION DETAILS AND CALCULATIONS SHEET 5 OF 6
113	ON-SITE DETENTION DETAILS AND CALCULATIONS SHEET 6 OF 6
114	MISCELLANEOUS DETAILS SHEET

4.0 AIMS

Part A: (AIA) Arboricultural Impact Assessment

4.1 Detail the condition of the trees or large shrubs on the site or on adjoining sites where such trees or large shrubs may be affected by the proposed works, by assessment of individual specimens or stands.

4.2 Provide as an outcome of the visual tree assessment (VTA), the following: a description of the trees or large shrubs, observations made, discussion of the effects the location of the proposed building works may have on the trees or large shrubs and make recommendations required for remedial or other works to the trees or large shrubs, if and where appropriate.

Part B: (TPP) Tree Protection Specification & Tree Protection Plan

4.3 Provide a detailed specification for remedial works or protection measures for their retention in a safe and healthy condition, or a condition not less than that at the time of initial inspection for this report, or in a reduced but sustainable condition due to the impact of the development but ameliorated through tree protection measures able to be applied, and will consider the location and condition of the trees or large shrubs in relation to the proposed building works, or recommend removal and replacement where appropriate.

4.4 Determine from the assessment the works or measures required to ameliorate the impact upon the trees or large shrubs to be retained, by the proposed building works or future impacts the trees or large shrubs may have upon the new building works if and where appropriate, or the benefits of removal and replacement if appropriate for the medium to long term safety and amenity of the site.

5.0 OBJECTIVES

Part A: Arboricultural Assessment Report

- 5.1 Assess the condition of the subject trees.
- 5.2 Determine impact of development on the subject trees.
- 5.3 Provide recommendations for retention or removal of the subject trees.

Part B: Tree Protection Plan

- 5.3 Provide recommendations for retention or removal of the subject trees or large shrubs.

6.0 METHODOLOGY (This Methodology, where utilised, is applied to both Parts A and B).

6.1 The method of assessment of tree/s applied is adapted from the principles of visual tree assessment undertaken from the ground, which considers:

- Tree health and subsequent stability, both long and short term
- Sustainable Retention Index Value (SRIV) Version 4 (IACA 2010) ©
- Hazard potential to people and property
- Amenity values
- Habitat values
- Significance

6.2 This assessment is undertaken using standard tree assessment criteria for each tree based on the values above and is implemented as a result of at least one comprehensive and detailed site inspection to undertake a visual tree assessment from the ground of each individual tree, or stand of trees, or a representative population sample. Any dimensions recorded as averages, or by approximation are noted accordingly.

- 6.3 This report adopts Australian Standard AS4970 2009 *Protection of trees on development sites* as a point of reference and guide for the recommended minimum setbacks (Table 2 – Part B) from the centre of a tree's trunk to development works and the distances may be increased or decreased by the author in accordance with AS4970 – Section 3.3.4 as a result of other factors providing mitigating circumstances or constraints as indicated by but not restricted to the following:
1. Condition of individual trees,
 2. Tolerance of individual species to disturbance,
 3. Geology e.g. physical barriers in soil, rock floaters, bedrock to surface
 4. Topography e.g. slope, drainage,
 5. Soil e.g. depth, drainage, fertility, structure,
 6. Microclimate e.g. due to landform, exposure to dominant wind,
 7. Engineering e.g. techniques to ameliorate impact on trees such as structural soil, gap graded fill, lateral boring,
 8. Construction e.g. techniques to ameliorate impact on trees such as pier and beam, bridge footings, suspended slabs,
 9. Root mapping,
 10. Physical limitations - existing modifications to the environment and any impact to tree/s by development e.g. property boundaries, built structures, houses, swimming pools, road reserves, utility services easements, previous impact by excavation, or construction in other directions, soil level changes by cutting or filling, existing landscaping works within proximity, modified drainage patterns,
 11. Extraneous factors e.g. potential future impacts from development on adjoining land when the tree is located on or near to a property boundary.
- 6.4 Trees in groups may be referred to as stands and a stand may exclusively contain specimens to be either retained or removed or a combination of both. A stand may be used to discuss all the trees on a given site to expedite their assessment or refer to trees growing proximate to one another or within a defined space. Stands may be comprised by mass boundary or screen plantings, to form a group of the same or a mixture of taxa. Each stand is considered as a single unit with each component tree assessed and expressed in tabular form or indicated by a given percentage as a population sample of each stand. Where it is appropriate for a stand of trees to be retained in full or part, the location and setback of Tree Protection Zone fences or works, are prescribed to provide for the preservation of the stand or selected component trees, in a condition not less than that at the time of initial inspection for its incorporation into the landscape works for the site, or in a reduced but sustainable condition due to the impact of the development but ameliorated through tree protection measures.
- 6.5 The meanings for terminology used herein are taken from the IACA Dictionary for Managing Trees in Urban Environments 2009. An extract from the IACA Dictionary forms a glossary of terms included as Appendix E.

Table 1.0 General condition and Schedule of works of trees or large shrubs. Trees described in greater detail in section 7.0.

Tree / Stand No.	Genus and species	Common name	Condition G = Good, F = Fair P = Poor, D = Dead W= Weed	Description of work to be done
1	<i>Eucalyptus amplifolia</i>	Cabbage Gum	G	Retain and protect within a Tree Protection Zone (TPZ) as per the Tree Protection Plan.
2	<i>Eucalyptus tereticornis</i>	Forest Red Gum	G	Remove and replace with new plantings as per Landscape Plan
3	<i>Populus deltoides</i>	<i>Eastern Cottonwood</i>	G	Remove and replace with new plantings as per Landscape Plan
4	<i>Populus deltoides</i>	<i>Eastern Cottonwood</i>	G	Retain and protect within a Tree Protection Zone (TPZ) as per the Tree Protection Plan.
5	<i>Populus deltoides</i>	<i>Eastern Cottonwood</i>	G	Retain and protect within a Tree Protection Zone (TPZ) as per the Tree Protection Plan.
6	<i>Eucalyptus amplifolia</i>	Cabbage Gum	G	Retain and protect within a Tree Protection Zone (TPZ) as per the Tree Protection Plan.
7	<i>Populus deltoides</i>	Eastern Cottonwood	G	Retain and protect within a Tree Protection Zone (TPZ) as per the Tree Protection Plan.
8	<i>Populus deltoides</i>	Eastern Cottonwood	G	Remove and replace with new plantings as per Landscape Plan
9	<i>Populus deltoides</i>	Eastern Cottonwood	G	Remove and replace with new plantings as per Landscape Plan
10	<i>Populus deltoides</i>	Eastern Cottonwood	G	Remove and replace with new plantings as per Landscape Plan
11	<i>Eucalyptus amplifolia</i>	Cabbage Gum	G	Retain and protect within a Tree Protection Zone (TPZ) as per the Tree Protection Plan.
12	<i>Eucalyptus amplifolia</i>	Cabbage Gum	G	Retain and protect within a Tree Protection Zone (TPZ) as per the Tree Protection Plan.
13	<i>Eucalyptus amplifolia</i>	Cabbage Gum	G	Retain and protect within a Tree Protection Zone (TPZ) as per the Tree Protection Plan.
14	<i>Eucalyptus amplifolia</i>	Cabbage Gum	G	Retain and protect within a Tree Protection Zone (TPZ) as per the Tree Protection Plan.
15	<i>Eucalyptus amplifolia</i>	Cabbage Gum	G	Retain and protect within a Tree Protection Zone (TPZ) as per the Tree Protection Plan.
16	<i>Eucalyptus amplifolia</i>	Cabbage Gum	G	Retain and protect within a Tree Protection Zone (TPZ) as per the Tree Protection Plan.
17	<i>Eucalyptus amplifolia</i>	Cabbage Gum	G	Retain and protect within a Tree Protection Zone (TPZ) as per the Tree Protection Plan.

Tree / Stand No.	Genus and species	Common name	Condition G = Good, F = Fair P = Poor, D = Dead W= Weed	Description of work to be done
18	<i>Eucalyptus amplifolia</i>	Cabbage Gum	G	Retain and protect within a Tree Protection Zone (TPZ) as per the Tree Protection Plan.
19	<i>Eucalyptus amplifolia</i>	Cabbage Gum	G	Retain and protect within a Tree Protection Zone (TPZ) as per the Tree Protection Plan.
20	<i>Eucalyptus amplifolia</i>	Cabbage Gum	G	Retain and protect within a Tree Protection Zone (TPZ) as per the Tree Protection Plan.
21	<i>Eucalyptus amplifolia</i>	Cabbage Gum	G	Retain and protect within a Tree Protection Zone (TPZ) as per the Tree Protection Plan.
22	<i>Eucalyptus amplifolia</i>	Cabbage Gum	F	Retain and protect within a Tree Protection Zone (TPZ) as per the Tree Protection Plan.
23	<i>Eucalyptus amplifolia</i>	Cabbage Gum	G	Retain and protect within a Tree Protection Zone (TPZ) as per the Tree Protection Plan.
24	<i>Eucalyptus amplifolia</i>	Cabbage Gum	G	Retain and protect within a Tree Protection Zone (TPZ) as per the Tree Protection Plan.
25	<i>Eucalyptus amplifolia</i>	Cabbage Gum	G	Retain and protect within a Tree Protection Zone (TPZ) as per the Tree Protection Plan.
26	<i>Eucalyptus amplifolia</i>	Cabbage Gum	G	Retain and protect within a Tree Protection Zone (TPZ) as per the Tree Protection Plan.
27	<i>Eucalyptus amplifolia</i>	Cabbage Gum	G	Retain and protect within a Tree Protection Zone (TPZ) as per the Tree Protection Plan.
28	<i>Eucalyptus amplifolia</i>	Cabbage Gum	G	Retain and protect within a Tree Protection Zone (TPZ) as per the Tree Protection Plan.
29	<i>Eucalyptus amplifolia</i>	Cabbage Gum	G	Retain and protect within a Tree Protection Zone (TPZ) as per the Tree Protection Plan.
30	<i>Eucalyptus amplifolia</i>	Cabbage Gum	G	Retain and protect within a Tree Protection Zone (TPZ) as per the Tree Protection Plan.
31	<i>Eucalyptus amplifolia</i>	Cabbage Gum	G	Retain and protect within a Tree Protection Zone (TPZ) as per the Tree Protection Plan.
32	<i>Eucalyptus amplifolia</i>	Cabbage Gum	G	Retain and protect within a Tree Protection Zone (TPZ) as per the Tree Protection Plan.
33	<i>Eucalyptus amplifolia</i>	Cabbage Gum	G	Retain and protect within a Tree Protection Zone (TPZ) as per the Tree Protection Plan.
34	<i>Eucalyptus amplifolia</i>	Cabbage Gum	G	Retain and protect within a Tree Protection Zone (TPZ) as per the Tree Protection Plan.

Tree / Stand No.	Genus and species	Common name	Condition G = Good, F = Fair P = Poor, D = Dead W= Weed	Description of work to be done
35	<i>Eucalyptus amplifolia</i>	Cabbage Gum	G	Retain and protect within a Tree Protection Zone (TPZ) as per the Tree Protection Plan.
36	<i>Eucalyptus amplifolia</i>	Cabbage Gum	G	Retain and protect within a Tree Protection Zone (TPZ) as per the Tree Protection Plan.
37	<i>Eucalyptus amplifolia</i>	Cabbage Gum	P	Retain and protect within a Tree Protection Zone (TPZ) as per the Tree Protection Plan.
38	<i>Eucalyptus amplifolia</i>	Cabbage Gum	G	Retain and protect within a Tree Protection Zone (TPZ) as per the Tree Protection Plan.
39	<i>Eucalyptus amplifolia</i>	Cabbage Gum	G	Retain and protect within a Tree Protection Zone (TPZ) as per the Tree Protection Plan.
40/2	<i>Ficus macrocarpa</i> x26	Morton Bay Fig	G	Retain and protect within a Tree Protection Zone (TPZ) as per the Tree Protection Plan x19 Remove and replace with new plantings as per Landscape Plan x7
41	<i>Corymbia citriodora</i>	Lemon Scented Gum	G	Retain and protect within a Tree Protection Zone (TPZ) as per the Tree Protection Plan.
42	<i>Ficus benjamina</i>	Weeping Fig	G	Retain and protect within a Tree Protection Zone (TPZ) as per the Tree Protection Plan.
43	<i>Jacaranda mimosifolia</i>	Jacaranda	G	Retain and protect within a Tree Protection Zone (TPZ) as per the Tree Protection Plan.
44/3	<i>Eucalyptus sp.</i> x88	Eucalypt	G	Remove and replace with new plantings as per Landscape Plan
45/4	<i>Eucalyptus sp.</i> x9	Eucalypt	G	Remove and replace with new plantings as per Landscape Plan
46	<i>Melaleuca linariifolia</i>	Snow in Summer	G	Remove and replace with new plantings as per Landscape Plan
47	<i>Eucalyptus sp.</i>	Eucalypt	G	Remove and replace with new plantings as per Landscape Plan
48	<i>Eucalyptus sp.</i>	Eucalypt	G	Remove and replace with new plantings as per Landscape Plan
49 / 5	<i>Pyrus ussuriensis</i> x3	Manchurian Pear	G	Remove and replace with new plantings as per Landscape Plan
50 / 6	Group 3 (Elke Haege 2017 AIA)	Ironbark, Smooth bark & Stringybark	G	Retain and protect within a Tree Protection Zone (TPZ) as per the Tree Protection Plan.

7.0 TREE ASSESSMENT – 7.1 - ASSESSMENT OF A STAND OF TREES

Tree/ Stand No.	Genus & Species Common Name	Age Y = Young M = Mature O = Overmature	Vigour GV = Good Vigour LV = Low Vigour	Condition G = Good F = Fair P = Poor D = Dead	1. SRIV Age, Vigour, Condition / Index Rating www.iaca.org.au / 2. Estimated Life Expectancy 1. Long 2. Medium 3. Short	Crown Form D = Dominant C = Co-dominant I = Intermediate S = Suppressed F = Forest E = Emergent	Ht. Approx. metres	Crown Spread approx. metres / Orientation N= north S= South E= East W=West				Crown Cover % / Crown Density % / D = dormant	DBH in mm @ 1.4m, or other, as indicated / Trunk Orientation other than R = radial, e.g. N/S g = ground	Trunk Lean 1 = Upright-Slight 2 = Moderate 3 = Severe 4 = Critical. 5 = Acaulescent / Orientation / ST = Static P = Progressive Sc = Self- correcting	Roots Evident at Root Crown 1. = None 2. = Adventitious 3. = Basal Flare 4. = Buttresses 5. = First Order Roots (FOR), No. & distribution e.g. R = radial, or one each to N, S, E and W	Pests, Diseases & Damage No or Yes If Yes see comments	Branch Bark Included No or Yes or N/A	Form G = Good Form F = Fair Form P = Poor Form	Significance scale 1=High 2=Medium 3=Low / Retention Value 1=High 2=Medium 3=Low 4=Remove
								10	5	12	10								
1	<i>Eucalyptus amplifolia</i>	M	GV	G	MGVG - 10 1	D	15	10	5	12	10	100	800	1/R ST	1	NO	NO	G	1 1
	Cabbage Gum	Comments:																	
2	<i>Eucalyptus tereticornis</i>	M	GV	G	MGVG - 10 1	D	10	5	5	5	5	100	600	1/R ST	1	NO	NO	G	1 1
	Forest Red Gum	Comments:																	
3	<i>Populus deltoides</i>	M	GV	G	MGVG - 10 1	D	13	6	6	6	6	100	650	1/R ST	1	NO	NO	G	1 1
	Eastern Cottonwood	Comments:																	
4	<i>Populus deltoides</i>	M	GV	G	MGVG - 10 1	D	15	10	6	5	10	100	800	1/R ST	1	NO	NO	G	1 1
	Eastern Cottonwood	Comments:																	
5	<i>Populus deltoides</i>	M	GV	G	MGVG - 10 1	D	15	4	5	4	10	100	800	1/R ST	1	NO	NO	G	1 1
	Eastern Cottonwood	Comments: Deadwood less than 5%																	
6	<i>Eucalyptus amplifolia</i>	M	GV	G	MGVG - 10 1	D	15	10	0	3	5	100	800	1/R ST	1	NO	NO	G	1 1
	Cabbage Gum	Comments:																	
7	<i>Populus deltoides</i>	M	GV	G	MGVG - 10 1	D	15	10	4	4	10	100	900	1/R ST	1	NO	NO	G	1 1
	Eastern Cottonwood	Comments: Deadwood 5%																	
8	<i>Populus deltoides</i>	M	GV	G	MGVG - 10 1	D	20	6	6	6	6	100	850	1/R ST	1	NO	NO	G	1 1
	Eastern Cottonwood	Comments:																	
9	<i>Populus deltoides</i>	M	GV	G	MGVG - 10 1	D	20	10	10	10	10	100	900	1/R ST	1	NO	NO	G	1 1
	Eastern Cottonwood	Comments:																	
10	<i>Populus deltoides</i>	M	GV	G	MGVG - 10 1	D	20	10	2	0	8	100	600	1/R ST	1	NO	NO	G	1 1
	Eastern Cottonwood	Comments: Deadwood less than 5%																	

Tree/ Stand No.	Genus & Species Common Name	Age Y = Young M = Mature O = Overmature	Vigour GV = Good Vigour LV = Low Vigour	Condition G = Good F = Fair P = Poor D = Dead	1. SRIV Age, Vigour, Condition / Index Rating www.iaca.org.au / 2. Estimated Life Expectancy 1. Long 2. Medium 3. Short	Crown Form D = Dominant C = Co-dominant I = Intermediate S = Suppressed F = Forest E = Emergent	Ht. Approx. metres	Crown Spread approx. metres / Orientation N= north S= South E= East W=West				Crown Cover % / Crown Density % / D = dormant	DBH in mm @ 1.4m, or other, as indicated / Trunk Orientation other than R = radial, e.g. N/S g = ground	Trunk Lean 1 = Upright-Slight 2 = Moderate 3 = Severe 4 = Critical. 5 = Acaulescent / Orientation / ST = Static P = Progressive Sc = Self- correcting	Roots Evident at Root Crown 1. = None 2. = Adventitious 3. = Basal Flare 4. = Buttresses 5. = First Order Roots (FOR), No. & distribution e.g. R = radial, or one each to N, S, E and W	Pests, Diseases & Damage No or Yes If Yes see comments	Branch Bark Included No or Yes or N/A	Form G = Good Form F = Fair Form P = Poor Form	Significance scale 1=High 2=Medium 3=Low / Retention Value 1=High 2=Medium 3=Low 4=Remove
11	<i>Eucalyptus amplifolia</i>	M	GV	G	MGVG - 10 1	C	23	5 N	5 S	5 E	5 W	100 100	700 R	1/R ST	3	NO	NO	G	1 1
	Cabbage Gum	Comments:																	
12	<i>Eucalyptus amplifolia</i>	M	GV	G	MGVG - 10 1	C	15	3 N	10 S	6 E	2 W	100 100	2x500 (710) R	1/R ST	1	NO	NO	G	1 1
	Cabbage Gum	Comments: Deadwood less than 10%																	
13	<i>Eucalyptus amplifolia</i>	M	GV	G	MGVG - 10 1	C	15	3 N	10 S	0 E	10 W	100 100	400x350 (530) R	5/R ST	1	NO	NO	G	1 1
	Cabbage Gum	Comments:																	
14	<i>Eucalyptus amplifolia</i>	M	GV	G	MGVG - 10 1	C	20	1 N	1 S	1 E	1 W	40 40	600 R	1/R ST	1	NO	NO	P	3 3
	Cabbage Gum	Comments:																	
15	<i>Eucalyptus amplifolia</i>	M	GV	G	MGVG - 10 1	C	20	3 N	10 S	10 E	5 W	100 100	1000 R	1/R ST	1	NO	NO	G	1 1
	Cabbage Gum	Comments:																	
16	<i>Eucalyptus amplifolia</i>	M	GV	G	MGVG - 10 1	C	15	3 N	3 S	3 E	3 W	80 80	300 R	1/R ST	1	NO	NO	G	1 1
	Cabbage Gum	Comments:																	
17	<i>Eucalyptus amplifolia</i>	M	GV	G	MGVG - 10 1	C	15	0 N	5 S	0 E	4 W	50 50	300 R	1/R ST	1	NO	NO	F	2 2
	Cabbage Gum	Comments:																	
18	<i>Eucalyptus amplifolia</i>	M	GV	G	MGVG - 10 1	C	20	10 N	10 S	10 E	10 W	100 100	700 R	1/R ST	1	NO	NO	G	1 1
	Cabbage Gum	Comments:																	
19	<i>Eucalyptus amplifolia</i>	M	GV	G	MGVG - 10 1	C	20	3 N	2 S	0 E	4 W	80 80	500 R	1/R ST	1	NO	NO	G	1 1
	Cabbage Gum	Comments:																	
20	<i>Eucalyptus amplifolia</i>	Y	GV	G	YGVG - 9 1	D	9	3 N	5 S	2 E	3 W	100 100	2x200 (280) R	5/R ST	1	NO	NO	G	1 1
	Cabbage Gum	Comments:																	

Tree/ Stand No.	Genus & Species Common Name	Age Y = Young M = Mature O = Overmature	Vigour GV = Good Vigour LV = Low Vigour	Condition G = Good F = Fair P = Poor D = Dead	1. SRIV Age, Vigour, Condition / Index Rating www.iaca.org.au / 2. Estimated Life Expectancy 1. Long 2. Medium 3. Short	Crown Form D = Dominant C = Co-dominant I = Intermediate S = Suppressed F = Forest E = Emergent	Ht. Approx. metres	Crown Spread approx. metres / Orientation N= north S= South E= East W=West				Crown Cover % / Crown Density % / D = dormant	DBH in mm @ 1.4m, or other, as indicated / Trunk Orientation other than R = radial, e.g. N/S g = ground	Trunk Lean 1 = Upright-Slight 2 = Moderate 3 = Severe 4 = Critical. 5 = Acaulescent / Orientation / ST = Static P = Progressive Sc = Self- correcting	Roots Evident at Root Crown 1. = None 2. = Adventitious 3. = Basal Flare 4. = Buttresses 5. = First Order Roots (FOR), No. & distribution e.g. R = radial, or one each to N, S, E and W	Pests, Diseases & Damage No or Yes If Yes see comments	Branch Bark Included No or Yes or N/A	Form G = Good Form F = Fair Form P = Poor Form	Significance scale 1=High 2=Medium 3=Low / Retention Value 1=High 2=Medium 3=Low 4=Remove
21	<i>Eucalyptus amplifolia</i>	M	GV	G	MGVG - 10 1	D	25	10 N	10 S	10 E	10 W	100 100	900 R	1/R ST	1	NO	NO	G	1 1
	Cabbage Gum	Comments:																	
22	<i>Eucalyptus amplifolia</i>	M	LV	F	MLVF - 4 1	C	20	3 N	3 S	3 E	3 W	50 50	800 R	1/R ST	1	NO	NO	F	2 2
	Cabbage Gum	Comments:																	
23	<i>Eucalyptus amplifolia</i>	M	GV	G	MGVG - 10 1	C	20	4 N	4 S	4 E	4 W	70 70	300 R	1/R ST	1	NO	NO	G	1 1
	Cabbage Gum	Comments:																	
24	<i>Eucalyptus amplifolia</i>	M	GV	G	MGVG - 10 1	C	23	10 N	3 S	10 E	12 W	80 80	600 R	1/R ST	1	NO	NO	G	1 1
	Cabbage Gum	Comments:																	
25	<i>Eucalyptus amplifolia</i>	M	GV	G	MGVG - 10 1	D	12	10 N	3 S	3 E	5 W	80 80	900 R	5/R ST	1	NO	NO	F	2 2
	Cabbage Gum	Comments: Deadwood greater than 5%																	
26	<i>Eucalyptus amplifolia</i>	M	GV	G	MGVG - 10 1	C	20	5 N	5 S	5 E	5 W	100 100	800 R	1/R ST	1	NO	NO	G	1 1
	Cabbage Gum	Comments:																	
27	<i>Eucalyptus amplifolia</i>	M	GV	G	MGVG - 10 1	C	20	5 N	3 S	2 E	4 W	80 80	600 R	1/R ST	1	NO	NO	G	1 1
	Cabbage Gum	Comments:																	
28	<i>Eucalyptus amplifolia</i>	M	GV	G	MGVG - 10 1	C	25	10 N	10 S	10 E	10 W	100 100	900 R	1/R ST	1	NO	NO	G	1 1
	Cabbage Gum	Comments:																	
29	<i>Eucalyptus amplifolia</i>	Y	LV	F	YLVF - 3 2	C	10	1 N	1 S	1 E	1 W	10 10	100 R	1/R ST	1	YES	NO	P	3 4
	Cabbage Gum	Comments: Dieback.																	
30	<i>Eucalyptus amplifolia</i>	M	GV	G	MGVG - 10 1	C	20	2 N	2 S	2 E	5 W	70 70	900 R	5/R ST	1	NO	NO	G	1 1
	Cabbage Gum	Comments:																	

Tree/ Stand No.	Genus & Species Common Name	Age Y = Young M = Mature O = Overmature	Vigour GV = Good Vigour LV = Low Vigour	Condition G = Good F = Fair P = Poor D = Dead	1. SRIV Age, Vigour, Condition / Index Rating www.iaca.org.au / 2. Estimated Life Expectancy 1. Long 2. Medium 3. Short	Crown Form D = Dominant C = Co-dominant I = Intermediate S = Suppressed F = Forest E = Emergent	Ht. Approx. metres	Crown Spread approx. metres / Orientation N= north S= South E= East W=West				Crown Cover % / Crown Density % / D = dormant	DBH in mm @ 1.4m, or other, as indicated / Trunk Orientation other than R = radial, e.g. N/S g = ground	Trunk Lean 1 = Upright-Slight 2 = Moderate 3 = Severe 4 = Critical. 5 = Acaulescent / Orientation / ST = Static P = Progressive Sc = Self- correcting	Roots Evident at Root Crown 1. = None 2. = Adventitious 3. = Basal Flare 4. = Buttresses 5. = First Order Roots (FOR), No. & distribution e.g. R = radial, or one each to N, S, E and W	Pests, Diseases & Damage No or Yes If Yes see comments	Branch Bark Included No or Yes or N/A	Form G = Good Form F = Fair Form P = Poor Form	Significance scale 1=High 2=Medium 3=Low / Retention Value 1=High 2=Medium 3=Low 4=Remove
31	<i>Eucalyptus amplifolia</i>	Y	GV	G	YGVG - 9 1	C	9	1 N	1 S	1 E	1 W	10 10	100 R	1/R ST	1	NO	NO	G	3 3
	Cabbage Gum	Comments:																	
32	<i>Eucalyptus amplifolia</i>	M	GV	G	MGVG - 10 1	D	23	12 N	10 S	10 E	10 W	100 100	1500 R	5/R ST	3	NO	NO	G	1 1
	Cabbage Gum	Comments: Deadwood less than 10%																	
33	<i>Eucalyptus amplifolia</i>	M	GV	G	MGVG - 10 1	D	15	4 N	4 S	4 E	4 W	100 100	400 R	1/R ST	1	NO	NO	G	1 1
	Cabbage Gum	Comments:																	
34	<i>Eucalyptus amplifolia</i>	Y	GV	G	YGVG - 9 1	S	6	2 N	2 S	2 E	2 W	100 100	100 R	1/R ST	1	NO	NO	G	3 3
	Cabbage Gum	Comments:																	
35	<i>Eucalyptus amplifolia</i>	M	GV	G	MGVG - 10 1	D	10	4 N	4 S	4 E	4 W	100 100	500 R	1/R ST	1	NO	NO	G	1 1
	Cabbage Gum	Comments:																	
36	<i>Eucalyptus amplifolia</i>	M	GV	G	MGVG - 10 1	D	15	4 N	4 S	4 E	4 W	100 100	250 R	1/R ST	1	NO	NO	G	1 1
	Cabbage Gum	Comments:																	
37	<i>Eucalyptus amplifolia</i>	Y	LV	P	YLVP - 1 1	D	5	2 N	2 S	2 E	2 W	5 5	100 R	1/R ST	1	YES	NO	P	3 4
	Cabbage Gum	Comments: 90% Dead.																	
38	<i>Eucalyptus amplifolia</i>	M	GV	G	MGVG - 10 1	D	15	5 N	5 S	5 E	5 W	100 100	350 R	1/R ST	1	NO	NO	G	1 1
	Cabbage Gum	Comments:																	
39	<i>Eucalyptus amplifolia</i>	M	GV	G	MGVG - 1010 1	D	15	4 N	4 S	4 E	4 W	100 100	300 R	1/R ST	1	NO	NO	G	1 1
	Cabbage Gum	Comments:																	
40/ 2	<i>Ficus macrocarpa</i> x26	Y	GV	G	YGVG - 9 1	D	#4	3 N	3 S	3 E	3 W	100 100	#200 R	5/R ST	1	NO	NO	G	3 3
	Morton Bay Fig	Comments: 19 trees are neighbouring along Avenue.																	

Tree / Stand No.	Genus & Species Common Name	Age Y = Young M = Mature O = Overmature	Vigour GV = Good Vigour LV = Low Vigour	Condition G = Good F = Fair P = Poor D = Dead	1. SRIV Age, Vigour, Condition / Index Rating www.iaca.org.au / 2. Estimated Life Expectancy 1. Long 2. Medium 3. Short	Crown Form D = Dominant C = Co-dominant I = Intermediate S = Suppressed F = Forest E = Emergent	Ht. Approx. metres	Crown Spread approx. metres				Crown Cover % / Crown Density % / D = dormant	DBH in mm @ 1.4m, or other, as indicated / Trunk Orientation other than R = radial, e.g. N/S g = ground	Trunk Lean 1 = Upright-Slight 2 = Moderate 3 = Severe 4 = Critical. 5 = Acaulescent / Orientation / ST = Static P = Progressive Sc = Self-correcting	Roots Evident at Root Crown 1. = None 2. = Adventitious 3. = Basal Flare 4. = Buttresses 5. = First Order Roots (FOR), No. & distribution e.g. R = radial, or one each to N, S, E and W	Pests, Diseases & Damage No or Yes If Yes see comments	Branch Bark Included No or Yes or N/A	Form G = Good Form F = Fair Form P = Poor Form	Significance scale 1=High 2=Medium 3=Low / Retention Value 1=High 2=Medium 3=Low 4=Remove
								N	S	E	W								
41	<i>Corymbia citriodora</i>	M	GV	G	MGVG - 10 1	D	15	4	4	4	4	100	700	1/R	1	NO	NO	G	1
	Lemon Scented Gum	Comments: - Neighbouring property specimen																	
42	<i>Ficus benjamina</i>	M	GV	G	MGVG - 10 1	D	10	7	7	7	7	100	1000	5/R	3	NO	NO	G	1
	Weeping Fig	Comments: - Neighbouring property specimen																	
43	<i>Jacaranda mimosifolia</i>	M	GV	G	MGVG - 10 1	D	10	5	5	5	5	100	900	5/R	4	NO	NO	G	1
	Jacaranda	Comments: - Neighbouring property specimen																	
44/ 3	<i>Eucalyptus sp. x88</i>	Y	GV	G	YGVG - 9 1	D	#4	2	2	2	2	100	70	1/R	1	NO	NO	G	3
	Eucalypt	Comments:																	
45/ 4	<i>Eucalyptus sp. x9</i>	Y	GV	G	YGVG - 9 1	D	5	2	2	2	2	100	100	1/R	1	NO	NO	G	1
	Eucalypt	Comments: - Road reserve specimen																	
46	<i>Melaleuca linariifolia</i>	Y	GV	G	YGVG - 9 1	C	3.5	1	1	1	1	100	60	1/R	1	NO	NO	G	2
	Snow in Summer	Comments: Trunk to 300mm, crown deliquescent, orientation radial, symmetrical.																	
47	<i>Eucalyptus sp.</i>	Y	GV	G	YGVG - 9 1	C	7	1.5	1.5	1.5	1	90	60	1/R	1	YES	NO	P	2
	Eucalypt	Comments: Trunk to 3 metres with snapped apical stem with multiple leaders, orientation N/S, asymmetrical.																	
48	<i>Eucalyptus sp.</i>	Y	GV	G	YGVG - 9 1	C	7	1	1	1	2	90	60	1/R	1	YES	NO	P	2
	Eucalypt	Comments: Trunk to 3 metres with snapped apical stem with multiple leaders, orientation E/W, asymmetrical bias to the west.																	
49/ 5	<i>Pyrus ussuriensis x3</i>	Y	GV	G	YGVG - 9 1	D	6	0.5	0.5	0.5	0.5	N/A	70	1/R	1	YES	NO	G	2
	Manchurian Pear	Comments: Trunk to 1.5 metres, crown deliquescent, orientation radial, symmetrical.																	
50/ 6	Group 3 (Eike Haege 2017 AIA)	Y/M	GV	G	Y/MGVG - 9.5 1	F	9-12	#3	#3	#3	#3	90	#180 / R	1/R	1			G	1
	Ironbark, Smooth bark & Stringybark	Comments: Height, canopy & trunk measurements are average. Semi-mature specimens are predominantly Cumberland Palin Woodland species with open forest form. New plantings are present as part of adjacent development landscape works.																	

OBSERVATIONS

7.2 The site has a stand of young, mature or senescent, remnant and planted endemic Cumberland Shale Plains Woodland & Cumberland Red Gum River flat Forest ([Trees Near Me NSW Vegetation](#)) and non-locally indigenous or exotic evergreen and deciduous taxa within the current proposal. The proposed design requires the retention and protection of fifty-seven (57) specimens within the site and neighbouring property as they are considered significant for their contribution as landscape elements to the property. The retention of these trees allows them as components of the current curtilage to be transferred to the new proposal, maintaining elements of a continuous landscape, providing a more harmonious integration and transition of the use of the land.

Tree Significance

7.3 Significant Trees as established by the Rating System for Tree Significance – IACA Stars (2010), Appendix A.

Significance Scale

- 1 – High
- 2 – Medium
- 3 – Low

Significance Scale	1	2	3
Redgum Tree No.	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 15, 16, 18, 19, 20, 21, 23, 24, 26, 27, 28, 30, 32, 33, 35, 36, 38, 39, 41, 42, 43, 45 ⁹ , 50 (group)	17, 22, 25, 46, 47, 48, 49	14, 29, 31, 34, 37, 40 ⁹ , 44 ⁸⁸

Tree Retention Value

7.4 See Appendix A for Retention Value Matrix.

Retention Value

- High** – Priority for Retention
 - Medium** – Consider for Retention
 - Low** – Consider for Removal
 - Remove** - Priority for Removal
- * Trees located within the neighbouring property and should be retained and protected. Consent required from owner if removal required.

Retention Value	High Priority for Retention	Medium Consider for Retention	Low Consider for Removal	Remove Priority for Removal
Redgum Tree No.	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 15, 16, 18, 19, 20, 21, 23, 24, 26, 27, 28, 30, 32, 33, 35, 36, 38, 39, 41, 43, 45 ⁹ , 50 (group)	17, 22, 25, 44 ⁸⁸ , 46, 49	14, 31, 34, 40 ⁹ , 42, 47, 48	29, 37

7.5 AS4970 (2009) section 3, 3.3.3 requires the Project Arborist to demonstrate that where a retained tree is subject to a major encroachment (>10% of area of TPZ) it can be protected to remain viable.

7.6 Tree 1 *Eucalyptus amplifolia* – Cabbage Gum, this specimen was found in good condition & vigour at time of assessment.

- **Development Impacts:** AS4970 (2009) section 3 requires a Tree Protection Zone (TPZ) setback of 9.6 metres (m) radial from centre of trunk (COT), the setback for the proposed terracing wall adjacent to this specimen is estimated at 4.5m from COT, which is an encroachment into the TPZ by the proposed terracing walls.

7.7 Trees 4, 5 & 7 *Populus deltoides* - Eastern Cottonwood, these mature, exotic, deciduous specimens were found in good condition & vigour at the time of assessment.

- **Development Impacts:** AS4970 (2009) section 3 requires a TPZ setback of 9.6m for T4 & 5 & 10.8m for T7 radial from COT, the setback for the proposed basement adjacent to these specimens is estimated at 9.1m, .7m & 7.7m respectively from COT, which is an estimated 0.1%, 1.7% & 8.8% encroachment into the TPZ by the proposed development.

7.8 Tree 6 *Eucalyptus amplifolia* – Cabbage Gum, this mature, exotic, deciduous specimens were found in good condition & vigour at time of assessment.

- **Development Impacts:** AS4970 (2009) section 3 requires a TPZ setback of 9.6m radial from COT, the setback for the proposed deck / elevated boardwalk adjacent to this specimen is estimated at 2.4m from COT, which is not an encroachment into the TPZ by the proposed basement and an encroachment into the SRZ by the timber decking.

- 7.9 Trees 11, 12, 13, 15, 17, 18, 19, 24, 26, 28 & 32 *Eucalyptus amplifolia* - Cabbage Gum, these mature, endemic specimens were found in good condition & vigour at the time of assessment.
- *Development Impacts:* AS4970 (2009) section 3 requires a TPZ setback of 8.4m for T11 & T18, 8.5m for T12, 6.4m for T13, 12.0m for T5, 3.6m for T17, 6.0m for T19, 7.2m for T24, 9.6m for T26, 10.8m for T28 & 15.0m for T32 radial from COT, the setback for the indicated gabion wall adjacent to these specimens is estimated at 2.6m, 0.6m, 1.7m, 3.3m, 1.8m, 2.4m, 2.3m, 2.5m, 2.0m, 1.7m & 1.6m numerically from COT, which is an acceptable encroachment into the structural root zone by the proposed landscape works within the threatened ecological community.
- 7.10 Trees 14, 16, 21, 25, 27, 30, 33 & 35 *Eucalyptus amplifolia* - Cabbage Gum, these mature, endemic specimens were found in good condition & vigour at the time of assessment.
- *Development Impacts:* AS4970 (2009) section 3 requires a TPZ setback of 7.2m for T14 & T27, 3.6m for T16, 10.8m for T21, T25 & T30, 4.8m for T33 & 6.0m for T35 radial from COT, the setback for the indicated gabion wall adjacent to these specimens is estimated at 5.2m, 2.7m, 5.0m, 5.5m, 3.5m, 4.0m, 3.6m & 3.7m numerically from COT, which is an acceptable encroachment into the TPZ by the proposed landscape works within the threatened ecological community, providing the existing natural ground levels are maintained with no cut or fill.
- 7.11 Tree 20 *Eucalyptus amplifolia* - Cabbage Gum, this young, endemic specimen was found in good condition & vigour at the time of assessment.
- *Development Impacts:* AS4970 (2009) section 3 requires a TPZ setback of 3.4 m radial from COT, the setback for the proposed gabion wall adjacent to this specimen is estimated at 2.3m from COT, which is an estimated 10.74% encroachment into the TPZ by the proposed gabion wall.
- 7.12 Tree 22 *Eucalyptus amplifolia* - Cabbage Gum, this mature specimen was found in fair condition & low vigour at time of assessment.
- *Development Impacts:* AS4970 (2009) section 3 requires a TPZ setback of 9.6m radial from COT, the setback for the proposed development adjacent to this specimen is estimated at 2.5m from COT, which is an acceptable encroachment into the structural root zone by the proposed landscape works within the threatened ecological community.
- 7.13 Trees 23, 36, 38 & 39 *Eucalyptus amplifolia* - Cabbage Gum, these mature, endemic specimens were found in good condition & vigour at the time of assessment.
- *Development Impacts:* AS4970 (2009) section 3 requires a TPZ setback of 3.6m for T23 & T39, 3.0m for T36 & 4.2m for T38 radial from COT, the setback for the indicated gabion wall adjacent to these specimens is estimated at 7.0m, 4.6m, 5.1m & 4.1m numerically from COT, which is not an encroachment into the TPZ by the proposed landscape works within the threatened ecological community. These specimens are sufficiently setback from the proposed landscape works providing the existing natural ground levels are maintained with no cut or fill within the TPZ of these specimens.
- 7.14 Tree 29 *Eucalyptus amplifolia* - Cabbage Gum, this young specimen was found in fair condition with low vigour at the time of assessment.
- *Development Impacts:* AS4970 (2009) section 3 requires a TPZ setback of 2.0m radial from COT, the setback for the proposed development adjacent to this specimen is estimated at 1.0m from COT, which is an acceptable encroachment into the structural root zone by the proposed landscape works within the threatened ecological community.
- 7.15 Trees 31 & 34 *Eucalyptus amplifolia* - Cabbage Gum, these young, endemic specimens were found in good condition & vigour at the time of assessment.
- *Development Impacts:* AS4970 (2009) section 3 requires a TPZ setback of 2.0m radial from COT, the setback for the indicated gabion wall adjacent to these specimens is estimated at 4.0m & 3.6m numerically from COT, which is not an encroachment into the TPZ by the proposed landscape works within the threatened ecological community. These specimens are sufficiently setback from the proposed landscape works providing the existing natural ground levels are maintained with no cut or fill within the TPZ of these specimens.

- 7.16 Tree 37 *Eucalyptus amplifolia* - Cabbage Gum, this young, endemic specimen was found in fair condition with low vigour at the time of assessment.
- Development Impacts: AS4970 (2009) section 3 requires a TPZ setback of 2.0m radial from COT, the setback for the indicated retaining wall adjacent to these specimens is estimated at 3.7m from COT, which is not an encroachment into the TPZ by the proposed landscape works within the threatened ecological community This specimen is sufficiently setback from the proposed landscape works providing the existing natural ground levels are maintained with no cut or fill within the TPZ of the specimen.
- 7.17 Trees 40^{x19} *Ficus macrocarpa* – Morton Bay Fig, these young neighbouring specimens are avenue plantings and were found in good condition & vigour at time of assessment.
- Development Impacts: AS4970 (2009) section 3 requires a TPZ setback of 2.4m radial from COT, these specimens are estimated a minimum of 4.0m from COT to the property boundary, and are sufficiently setback from the development works to not be affected.
- 7.18 Tree 41 *Corymbia citriodora*– Lemon Scented Gum, this mature neighbouring non-locally indigenous specimen was found in good condition & vigour at time of assessment.
- Development Impacts: AS4970 (2009) section 3 requires a TPZ setback of 8.4m radial from COT, the setback to the property boundary adjacent to this specimen is estimated at 15.0m from COT, which is not an encroachment into the TPZ by the proposed development. The specimen is sufficiently setback from the development to not be affected.
- 7.19 Tree 42 *Ficus benjamina* – Weeping Fig, this mature neighbouring, exotic evergreen specimen was found in good condition & vigour at time of assessment.
- Development Impacts: AS4970 (2009) section 3 requires a TPZ setback of 12.0m radial from COT, the setback to the property boundary adjacent to this specimen is estimated at 11.5m from COT, with indicated changes to RL's within the site an estimated 0.5% encroachment into the TPZ by the proposed development.
- 7.20 Tree 43 *Jacaranda mimosifolia* – Jacaranda, this mature neighbouring exotic, deciduous specimen was found in good condition & vigour at time of assessment.
- Development Impacts: AS4970 (2009) section 3 requires a TPZ setback of 10.8m radial from COT, the setback to the property boundary adjacent to this specimen is more than 20.0m from COT, which is not an encroachment into the TPZ by the proposed development. The specimen is sufficiently setback from the development to not be affected.
- 7.21 Tree 50 (group) Cumberland Shale Plains Woodland & Cumberland Red Gum River flat Forest, these semimature specimens were found in good condition & vigour at time of assessment.
- Development Impacts: AS4970 (2009) section 3 requires a TPZ setback of 2.1m to 4.0m radial from COT, the setback for the proposed development adjacent to the specimens is estimated at 5.0m at the closest point from COT, which is not an encroachment into the TPZ by the proposed development. The alignment of the proposed development works are sufficiently setback to not impact these specimens.

Demolition and Tree Removal/s

- 7.22 Trees 2, 3, 8, 9, 10, 40^{x7}, 44^{x88}, 45^{x9}, 46, 47, 48 & 49^{x3} are recommended for removal, subject to approval from the consent authority as they are located within the site in a position where they cannot be retained due to the proposed building footprints and associated infrastructure such as excavation of the basement where encroachment will have an adverse impact on its roots and crown for viability and stability.
- Trees 2 & 3: *Eucalyptus tereticornis* - Forest Red Gum & *Populus deltoides* - Eastern Cottonwood; these specimens are located within the south of the property and positioned within the proposed building envelope. If this current proposed design is approved, then these specimens cannot be retained and are recommended to be replaced as part of the proposed landscape works.
 - Trees 8, 9 & 10: *Populus deltoides* - Eastern Cottonwood; these planted exotic deciduous specimens are located within the north of the property and positioned within the proposed roadway and associated infrastructure. If this current proposed design is approved, then these specimens cannot be retained and are recommended to be replaced as part of the proposed landscape works.

- Trees 40^{x7}: *Ficus macrocarpa* – Morton Bay Fig, these planted specimens are part of avenue planting and located to the east of the site and positioned within the proposed roadway and associated infrastructure. If this current proposed design is approved, then these specimens cannot be retained and are recommended to be replaced as part of the proposed landscape works.
- Trees 44^{x88} & 45^{x9}: *Eucalyptus sp.* - Eucalypt; these planted specimens are located within the existing carpark and positioned within the basement footprint. If this current proposed design is approved, then these specimens cannot be retained and are recommended to be replaced as part of the proposed landscape works.
- Trees 46, 47, 48 & 49^{x3}: *Melaleuca linariifolia* - Snow in Summer, *Eucalyptus sp* – Eucalypt & *Pyrus ussuriensis* - Manchurian Pear; these planted specimens are located within the western end of the property and positioned within the proposed retail building envelope. If this current proposed design is approved, then these specimens cannot be retained and are recommended to be replaced as part of the proposed landscape works.

7.23 Removal of a tree within 6 m of a tree to be retained should be undertaken only by cutting down such a tree without damaging the trees to be retained, and by grinding out its stump. Where possible the structural roots of 20 mm diameter or greater of the tree to be cut down should not be removed, to minimise soil disturbance and to reduce the impact on the roots of any tree to be retained nearby. Where structural roots are to be removed, this should be undertaken manually by the use of non-motorised hand tools after the stump has been ground out when such roots are often easier to locate from the site of the stump from which they have been severed.

Specific - Tree works – Post Construction

7.24 Trees to be removed are to be replaced with advanced specimens being mindful of the space limitations of the new use of the site. The advanced trees should be situated in areas along the boundaries of the site. The planting in these locations will provide the maximum benefit to the surrounding properties by screening views to and from the site and the plantings included in the proposed landscape plan. The replacement trees will be situated in positions where they may grow to maturity unhindered and will not conflict with built structures or utility services and in greater numbers than the trees removed should provide a net increase in the local amenity.

8.0 CONCLUSION

One hundred and fifteen (115) trees are nominated for removal and replacement with species in accordance with the associated Landscape documentation for the development. The fifty-seven (57) trees to be preserved will be retained and protected through the implementation of adequate measures for their integration into the development by the application of appropriate technology as detailed in this report. Where appropriate, the Landscape Plan will include planting with new trees including street tree/s.

The recommendations made in this report are subject to approval by the consent authority.

9.0 RECOMMENDATIONS

- 9.1 Trees 1, 4 to 7, 11 to 39 (threatened EEC), 40^{x19}, 41, 42, 43 & 50 (group) are to be retained in situ within the site and neighbouring properties with retained trees to be protected as detailed in 7.5 – 7.21 and Section 14 of part B of this report. Tree protection fences, or works, to be situated in accordance with *Site Plan B - Trees to be Retained and Tree Protection Zones* (Appendix F). See Tree Protection Plan for additional protection measures for the management of retained specimens.
- 9.2 Trees 2, 3, 8, 9, 10, 40^{x7}, 44^{x88}, 45^{x9}, 46, 47, 48 & 49^{x3} are recommended for removal, subject to approval from the consent authority, with tree work to be undertaken in accordance with 7.22 - 7.23 and Section 13 of Part B of this report.
- 9.3 Each of the replacement are to be a vigorous specimen with a straight trunk, gradually tapering and continuous, crown excurrent, symmetrical, with roots established but not pot bound in a volume container or approved similar and be maintained by an appropriately qualified and experienced landscape contractor for up to one (1) year after planting, or as appropriate.



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DISCLAIMER

The author and Redgum Horticultural take no responsibility for actions taken and their consequences, contrary to those expert and professional instructions given as recommendations pertaining to safety by way of exercising our responsibility to our client and the public as our duty of care commitment, to mitigate or prevent hazards from arising, from a failure moment in full or part, from a structurally deficient or unsound tree or a tree likely to be rendered thus by its retention and subsequent modification/s to its growing environment either above or below ground contrary to our advice.

REFERENCES

1. Draper BD and Richards PA 2009, *Dictionary for Managing Trees in Urban Environments*, Institute of Australian Consulting Arboriculturists (IACA), CSIRO Publishing, Collingwood, Victoria, Australia.
2. IACA 2005, Sustainable Retention Index Value, *Institute of Australian Consulting Arboriculturists*, Australia, www.iaca.org.au.
3. Standards Australia 2007, *Australian Standard 4373 Pruning of amenity trees*, Standards Australia, Sydney, Australia.
4. Standards Australia 2009, *Australian Standard 4970 Protection of trees on development sites*, Standards Australia, Sydney, Australia.
5. Safe Work Australia, *Guide to Managing Risk from Tree Trimming and Removal Works*.

Appendix A

IACA Significance of a Tree, Assessment Rating System (STARS) © (IACA 2010) ©

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 2001.

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.

Tree Significance - Assessment Criteria



1. 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.

2. 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*.

3. 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 monocultural stand in its entirety e.g. hedge.

Table 1.0 Tree Retention Value - Priority Matrix.

		Significance				
		1. High	2. Medium	3. Low		
		Significance in Landscape	Significance in Landscape	Significance in Landscape	Environmental Pest / Noxious Weed Species	Hazardous / Irreversible Decline
Estimated Life Expectancy	1. Long >40 years					
	2. Medium 15-40 Years					
	3. Short <1-15 Years					
	Dead					



Legend for Matrix Assessment

	Priority for Retention (High) - These trees are considered important for retention and should be retained and protected. Design modification or re-location of building/s should be considered to accommodate the setbacks as prescribed by the Australian Standard AS4970 <i>Protection of trees on development sites</i> . Tree sensitive construction measures must be implemented e.g. pier and beam etc if works are to proceed within the Tree Protection Zone.
	Consider for Retention (Medium) - These trees may be retained and protected. These are considered less critical; however their retention should remain priority with removal considered only if adversely affecting the proposed building/works and all other alternatives have been considered and exhausted.
	Consider for Removal (Low) - These trees are not considered important for retention, nor require special works or design modification to be implemented for their retention.
	Priority for Removal - These trees are considered hazardous, or in irreversible decline, or weeds and should be removed irrespective of development.

REFERENCES

Australia ICOMOS Inc. 1999, *The Burra Charter – The Australian ICOMOS Charter for Places of Cultural Significance*, International Council of Monuments and Sites, www.icomos.org/australia

Draper BD and Richards PA 2009, *Dictionary for Managing Trees in Urban Environments*, Institute of Australian Consulting Arboriculturists (IACA), CSIRO Publishing, Collingwood, Victoria, Australia.

Footprint Green Pty Ltd 2001, *Footprint Green Tree Significance & Retention Value Matrix*, Avalon, NSW Australia, www.footprintgreen.com.au

Appendix B

Matrix - Sustainable Retention Index Value (S.R.I.V.) ©

Version 4, 2010

Developed by IACA – Institute of Australian Consulting Arboriculturists www.iaca.org.au

The matrix is to be used with the value classes defined in the Glossary for Age / Vigour / Condition.

An index value is given to each category where ten (10) is the highest value.

Age Class	Vigour Class and Condition Class					
	Good Vigour & Good Condition (GVG)	Good Vigour & Fair Condition (GVF)	Good Vigour & Poor Condition (GVP)	Low Vigour & Good Condition (LVG)	Low Vigour & Fair Condition (LVF)	Low Vigour & Poor Condition (LVP)
	Able to be retained if sufficient space available above and below ground for future growth. No remedial work or improvement to growing environment required. May be subject to high vigour. Retention potential - Medium – Long Term.	Able to be retained if sufficient space available above and below ground for future growth. Remedial work may be required or improvement to growing environment may assist. Retention potential - Medium Term. Potential for longer with remediation or favourable environmental conditions.	Able to be retained if sufficient space available above and below ground for future growth. Remedial work unlikely to assist condition, improvement to growing environment may assist. Retention potential - Short Term. Potential for longer with remediation or favourable environmental conditions.	May be able to be retained if sufficient space available above and below ground for future growth. No remedial work required, but improvement to growing environment may assist vigour. Retention potential - Short Term. Potential for longer with remediation or favourable environmental conditions.	May be able to be retained if sufficient space available above and below ground for future growth. Remedial work or improvement to growing environment may assist condition and vigour. Retention potential - Short Term. Potential for longer with remediation or favourable environmental conditions.	Unlikely to be able to be retained if sufficient space available above and below ground for future growth. Remedial work or improvement to growing environment unlikely to assist condition or vigour. Retention potential - Likely to be removed immediately or retained for Short Term. Potential for longer with remediation or favourable environmental conditions.
Young (Y)	YGVG - 9 Index Value 9 Retention potential - Long Term. Likely to provide minimal contribution to local amenity if height <5 m. High potential for future growth and adaptability. Retain, move or replace.	YGVF - 8 Index Value 8 Retention potential - Short – Medium Term. Potential for longer with improved growing conditions. Likely to provide minimal contribution to local amenity if height <5 m. Medium-high potential for future growth and adaptability. Retain, move or replace.	YGVP - 5 Index Value 5 Retention potential - Short Term. Potential for longer with improved growing conditions. Likely to provide minimal contribution to local amenity if height <5 m. Low-medium potential for future growth and adaptability. Retain, move or replace.	YLVG - 4 Index Value 4 Retention potential - Short Term. Potential for longer with improved growing conditions. Likely to provide minimal contribution to local amenity if height <5 m. Medium potential for future growth and adaptability. Retain, move or replace.	YLVF - 3 Index Value 3 Retention potential - Short Term. Potential for longer with improved growing conditions. Likely to provide minimal contribution to local amenity if height <5 m. Low-medium potential for future growth and adaptability. Retain, move or replace.	YLVP - 1 Index Value 1 Retention potential - Likely to be removed immediately or retained for Short Term. Likely to provide minimal contribution to local amenity if height <5 m. Low potential for future growth and adaptability.
Mature (M)	MGVG - 10 Index Value 10 Retention potential - Medium - Long Term.	MGVF - 9 Index Value 9 Retention potential - Medium Term. Potential for longer with improved growing conditions.	MGVP - 6 Index Value 6 Retention potential - Short Term. Potential for longer with improved growing conditions.	MLVG - 5 Index Value 5 Retention potential - Short Term. Potential for longer with improved growing conditions.	MLVF - 4 Index Value 4 Retention potential - Short Term. Potential for longer with improved growing conditions.	MLVP - 2 Index Value 2 Retention potential - Likely to be removed immediately or retained for Short Term.
Over-mature (O)	OGVG - 6 Index Value 6 Retention potential - Medium - Long Term.	OGVF - 5 Index Value 5 Retention potential - Medium Term.	OGVP - 4 Index Value 4 Retention potential - Short Term.	OLVG - 3 Index Value 3 Retention potential - Short Term. Potential for longer with improved growing conditions.	OLVF - 2 Index Value 2 Retention potential - Short Term.	OLVP - 0 Index Value 0 Retention potential - Likely to be removed immediately or retained for Short Term.



Appendix C

Survey of Subject Tree/s

Trees the subject of this report are marked on the plans in the following appendices and are numbered as listed below.

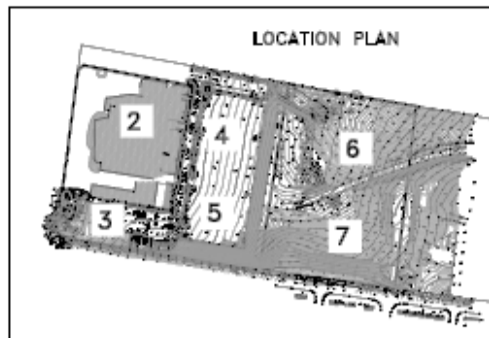
Redgum Tree No. / Stand No.	Genus and species	Common name	Recommendation
1	<i>Eucalyptus amplifolia</i>	Cabbage Gum	Retain and protect
2	<i>Eucalyptus tereticornis</i>	Forest Red Gum	Remove and replace
3	<i>Populus deltoides</i>	Eastern Cottonwood	Remove and replace
4	<i>Populus deltoides</i>	Eastern Cottonwood	Retain and protect
5	<i>Populus deltoides</i>	Eastern Cottonwood	Retain and protect
6	<i>Eucalyptus amplifolia</i>	Cabbage Gum	Retain and protect
7	<i>Populus deltoides</i>	Eastern Cottonwood	Retain and protect
8	<i>Populus deltoides</i>	Eastern Cottonwood	Remove and replace
9	<i>Populus deltoides</i>	Eastern Cottonwood	Remove and replace
10	<i>Populus deltoides</i>	Eastern Cottonwood	Remove and replace
11	<i>Eucalyptus amplifolia</i>	Cabbage Gum	Retain and protect
12	<i>Eucalyptus amplifolia</i>	Cabbage Gum	Retain and protect
13	<i>Eucalyptus amplifolia</i>	Cabbage Gum	Retain and protect
14	<i>Eucalyptus amplifolia</i>	Cabbage Gum	Retain and protect
15	<i>Eucalyptus amplifolia</i>	Cabbage Gum	Retain and protect
16	<i>Eucalyptus amplifolia</i>	Cabbage Gum	Retain and protect
17	<i>Eucalyptus amplifolia</i>	Cabbage Gum	Retain and protect
18	<i>Eucalyptus amplifolia</i>	Cabbage Gum	Retain and protect
19	<i>Eucalyptus amplifolia</i>	Cabbage Gum	Retain and protect
20	<i>Eucalyptus amplifolia</i>	Cabbage Gum	Retain and protect
21	<i>Eucalyptus amplifolia</i>	Cabbage Gum	Retain and protect
22	<i>Eucalyptus amplifolia</i>	Cabbage Gum	Retain and protect
23	<i>Eucalyptus amplifolia</i>	Cabbage Gum	Retain and protect
24	<i>Eucalyptus amplifolia</i>	Cabbage Gum	Retain and protect
25	<i>Eucalyptus amplifolia</i>	Cabbage Gum	Retain and protect
26	<i>Eucalyptus amplifolia</i>	Cabbage Gum	Retain and protect
27	<i>Eucalyptus amplifolia</i>	Cabbage Gum	Retain and protect
28	<i>Eucalyptus amplifolia</i>	Cabbage Gum	Retain and protect
29	<i>Eucalyptus amplifolia</i>	Cabbage Gum	Retain and protect
30	<i>Eucalyptus amplifolia</i>	Cabbage Gum	Retain and protect
31	<i>Eucalyptus amplifolia</i>	Cabbage Gum	Retain and protect
32	<i>Eucalyptus amplifolia</i>	Cabbage Gum	Retain and protect
33	<i>Eucalyptus amplifolia</i>	Cabbage Gum	Retain and protect
34	<i>Eucalyptus amplifolia</i>	Cabbage Gum	Retain and protect
35	<i>Eucalyptus amplifolia</i>	Cabbage Gum	Retain and protect
36	<i>Eucalyptus amplifolia</i>	Cabbage Gum	Retain and protect
37	<i>Eucalyptus amplifolia</i>	Cabbage Gum	Retain and protect
38	<i>Eucalyptus amplifolia</i>	Cabbage Gum	Retain and protect
39	<i>Eucalyptus amplifolia</i>	Cabbage Gum	Retain and protect
40 / 2	<i>Ficus macrocarpa</i> x19	Morton Bay Fig	Retain and protect – <i>Neighbouring trees</i>
40 / 2	<i>Ficus macrocarpa</i> x7	Morton Bay Fig	Remove and replace
41	<i>Corymbia citriodora</i>	Lemon Scented Gum	Retain and protect – <i>Neighbouring tree</i>
42	<i>Ficus benjamina</i>	Weeping Fig	Retain and protect – <i>Neighbouring tree</i>
43	<i>Jacaranda mimosifolia</i>	Jacaranda	Retain and protect – <i>Neighbouring tree</i>
44 / 3	<i>Eucalyptus</i> sp. x88	Eucalypt	Remove and replace
45 / 4	<i>Eucalyptus</i> sp. x9	Eucalypt	Remove and replace
46	<i>Melaleuca linariifolia</i>	Snow in Summer	Remove and replace
47	<i>Eucalyptus</i> sp.	Eucalypt	Remove and replace
48	<i>Eucalyptus</i> sp.	Eucalypt	Remove and replace
49 / 5	<i>Pyrus ussuriensis</i> x3	Manchurian Pear	Remove and replace
50 / 6	Group 3 (<i>Elke Haege 2017 AIA</i>)	Ironbark, Smooth bark & Stringybark	Retain and protect

Appendix C

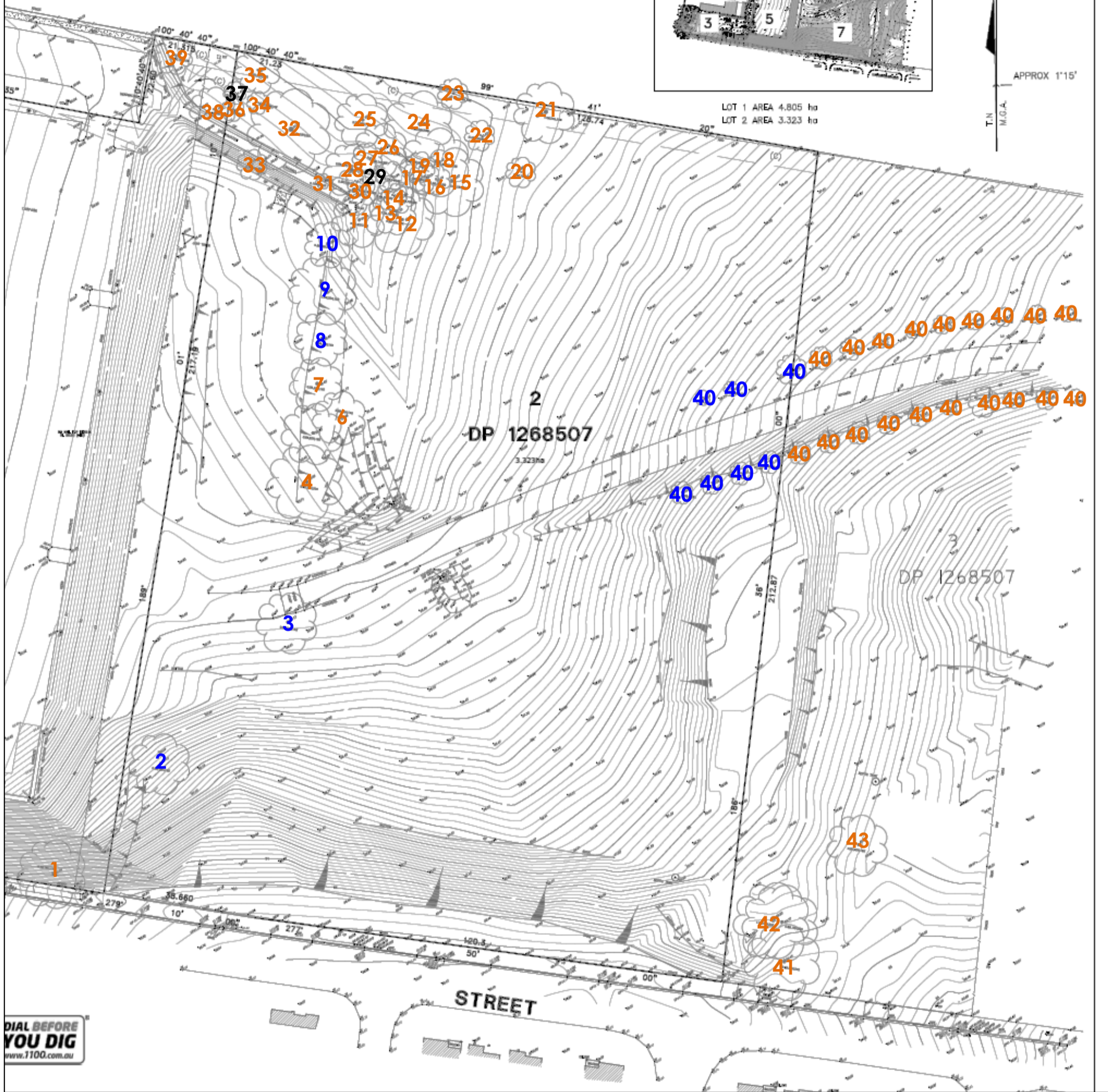
Site Plan A - Survey of Subject Trees

This report has relied upon the following plan/s and documents which are not to original scale.

Snip from Sheet 1 of 7.
Not to original scale



LOT 1 AREA 4.805 ha
LOT 2 AREA 3.323 ha



Redgum Legend

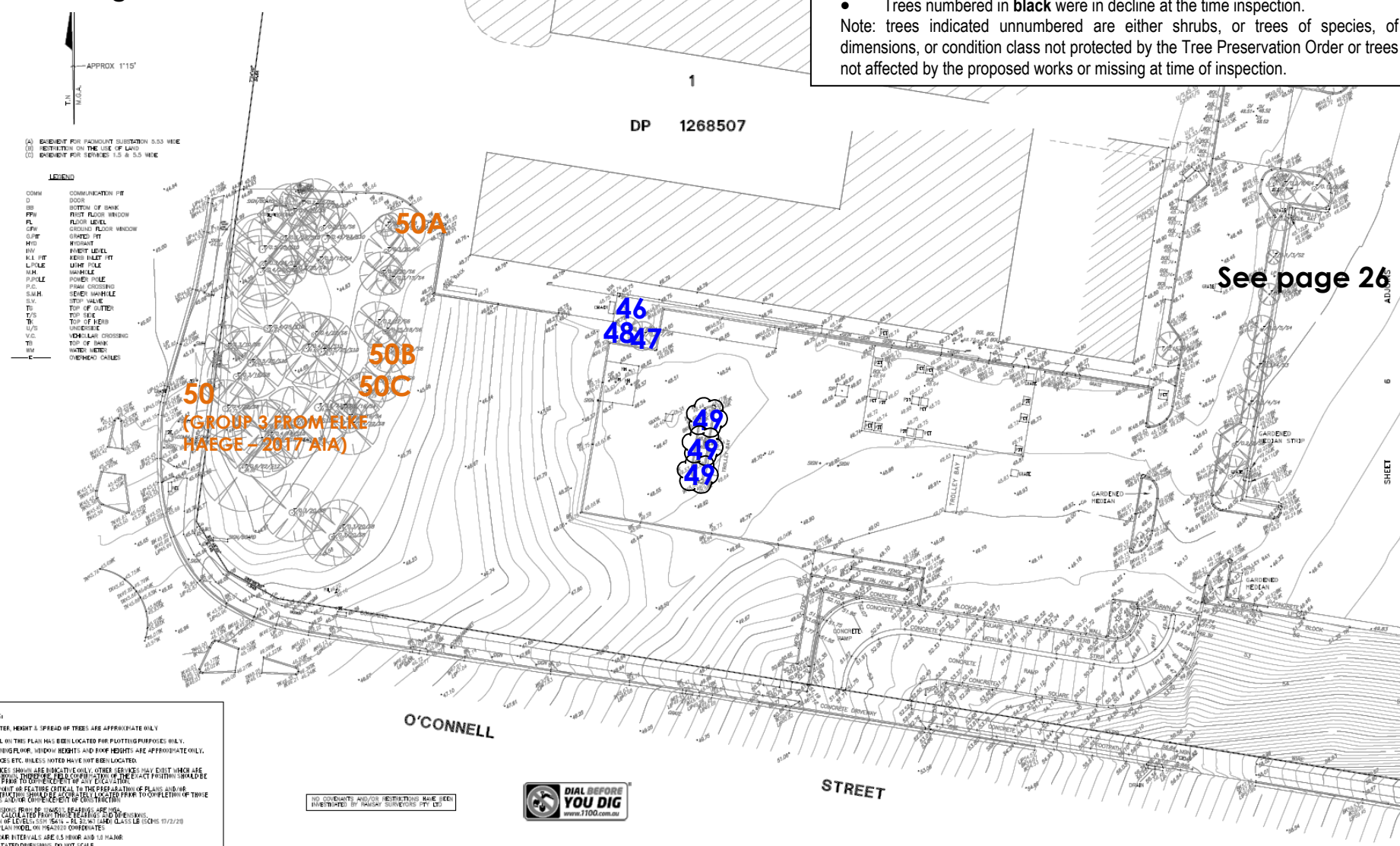
- Trees numbered in **orange** are recommended for **retention**.
 - Trees numbered in **blue** are recommended for **removal**.
 - Trees numbered in **black** were in decline at the time inspection.
- Note: trees indicated unnumbered are either shrubs, or trees of species, of dimensions, or condition class not protected by the Tree Preservation Order or trees not affected by the proposed works or missing at time of inspection.

AMENDMENTS		L.G.A.	INSTRUCTED BY:		PLAN SHOWING DETAIL AND LEVELS OVER PART LOT 1 & LOT 2 IN DP 1268507 O'CONNELL STREET, CADDENS	SCALE	N.T.S.
DATE	DESCRIPTION	PENRITH	SUJITH KAVALI			DATE	BY
31/03/21	INFORMATION ADDED AROUND RAMP	CADDENS	HOLDMARK PTY LTD	Ramsay Surveyors Pty Limited ACN 607 389 748 'CARLINGFORD CENTRAL' SUITE 15, 241-245 PENNANT HILLS RD, CARLINGFORD NSW 2118 P.O. BOX 2244 CARLINGFORD NSW 2118 PH: (02) 9635 5840 EMAIL: surveyor@ramsay.com.au www.ramsay.com.au	OVER PART LOT 1 & LOT 2 IN DP 1268507 O'CONNELL STREET, CADDENS	DATE	25/2/21
15/10/21	BOUNDARIES UPDATED					BY	MB
05/08/22	NOTE ADDED REGARDING MGA 2020					DRAWN	CSM
19/03/25	TREES AND BUILDINGS REMOVED IN					DATE	25/2/21
10/04/25	INFORMATION ADDED					OUR REF	8966
						SHEET 1 OF 7 SHEETS	

Snip from Sheet 5 of 7.
Not to original scale

Redgum Legend

- Trees numbered in **orange** are recommended for **retention**.
 - Trees numbered in **blue** are recommended for **removal**.
 - Trees numbered in **black** were in decline at the time inspection.
- Note: trees indicated unnumbered are either shrubs, or trees of species, of dimensions, or condition class not protected by the Tree Preservation Order or trees not affected by the proposed works or missing at time of inspection.



See page 26

NOTES:
DIAMETER, HEIGHT & SPREAD OF TREES ARE APPROXIMATE ONLY.
DETAIL ON THE PLAN HAS BEEN LOCATED FOR PLOTTING PURPOSES ONLY.
ADJACENT PLUM, WINDOW HEIGHTS AND ROOM HEIGHTS ARE APPROXIMATE ONLY.
SERVICES ETC. HOLE'S NOTES HAVE NOT BEEN LOCATED.
SERVICES SHOWN ARE INDICATIVE ONLY. OTHER SERVICES MAY EXIST WHICH ARE NOT SHOWN. THEREFORE FIELD CONFIRMATION OF THE EXACT POSITION SHOULD BE MADE PRIOR TO COMMENCEMENT OF ANY CONSTRUCTION.
ANY FAULT OR FRACTURE CRITICAL TO THE PREPARATION OF PLANS AND/OR CONSTRUCTION SHOULD BE CORRECTED PRIOR TO COMPLETION OF THESE PLANS AND/OR COMMENCEMENT OF CONSTRUCTION.
DIMENSIONS FROM THE CORNER OF THE SITE TO THE CENTER OF THE TREE ARE CALCULATED FROM THE TREE'S CENTER POINT DIMENSIONS.
ORIGIN OF LEVELS IS 1985 SEA LEVEL AS SHOWN ON CLASS LB (SCHEM 17/2/20)
CAD PLAN MODEL ON HEAVENLY COORDINATES
OUTLINE INTERVALS ARE 0.5 METER AND 1.0 METER
USE STATED OPENINGS, DO NOT SCALE.

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AMENDMENTS		L.G.A.	INSTRUCTED BY:
DATE	DESCRIPTION	PENRITH	SMITH KAVALI
31/03/21	INFORMATION ADDED AROUND RAMP		
15/10/21	BOUNDARIES UPDATED		
05/08/22	NOTE ADDED REGARDING MGA 2020	LOCALITY:	RE:
10/04/25	INFORMATION ADDED	CADDENS	HOLDMARK PTY LTD

H RAMSAY & CO
SURVEYORS EST. 1962
Ramsay Surveyors Pty Limited ACN 607 389 748
"CARUNFORD CENTRAL" SUITE 13, 241-245 PENRITH HILLS RD, CARUNFORD NSW 2118
P.O. BOX 2244 CARUNFORD NSW 2118 PH (02) 9635 5840
EMAIL: surveyor@ramsays.com.au www.ramsays.com.au

SCALE: 1:300 MAX
DATUM: AHD
SUBSTRAT: SHE
LEGEND: CSW
DATE: 05/02/21
DRAWN BY: 0160
SHEET 6 OF 7 SHEETS

PLAN SHOWING DETAIL AND LEVELS
OVER PART LOT 1 & LOT 2 IN DP 1268507
O'CONNELL STREET, CADDENS



Redgum Legend

- Trees numbered in **orange** are recommended for **retention**.
 - Trees numbered in **blue** are recommended for **removal**.
 - Trees numbered in **black** were in decline at the time inspection.
- Note: trees indicated unnumbered are either shrubs, or trees of species, of dimensions, or condition class not protected by the Tree Preservation Order or trees not affected by the proposed works or missing at time of inspection.



Part B:
TREE PROTECTION PLAN
(Trees to be retained and protected)

for

**68-80 O'Connell Street,
Caddens NSW**

Prepared 23 July 2025 / Our Ref: 25222
Revised 08 August 2025 / Our Ref: 25222.1

10.0 PREFACE

Retention of Significant Tree/s within the continual landscape of a development is recommended to minimise the impact of the built landscape within the overall local amenity. This section of the report highlights the required specifications within the Tree Protection Plan (Tree Management Plan) and is to be read in conjunction with Part A: Arboricultural Impact Assessment of this report.

11.0 INTRODUCTION

- 11.1 This section of the report provides the specification/s for all tree/s to be retained (on subject site) as detailed in Part A – Arboricultural Impact Assessment.
- 11.2 The trees to be retained are indicated on the Site Plan - Survey of Subject Trees to be retained & Tree Protection Zones. The minimum setback for protective fencing from development works per tree to be retained is summarised in Table 1.0. Tree Protection Specifications including - Site maintenance, Site Arboricultural service, Periodic inspections, Mulching, Irrigation, Weed control / suppression, Provision of services.
- 11.3 Tree maintenance works including pruning, removal or transplantation are detailed in section 2.0. Works for Tree Protection on Construction Sites are detailed in section 3.0 and Tree Protection Zones a Standard Procedure as detailed in section 13.0 to be applied, or further detailed, or additional or alternative works added where appropriate.

12.0 METHODOLOGY

This Methodology where utilised is applied to both Part A – Arboricultural Impact Assessment and B – Tree Protection Plan.

- 12.1 The method of assessment of tree/s applied is adapted from the principles of visual tree assessment undertaken from the ground, which consider:
- Tree health and subsequent stability, both long and short term
 - Sustainable Retention Index Value (SRIV) Version 4 (IACA 2010) ©
 - Hazard potential to people and property
 - Amenity values
 - Habitat values
 - Significance
- 12.2 This assessment is undertaken using standard tree assessment criteria for each tree based on the values above and is implemented as a result of at least one comprehensive and detailed site inspection to undertake a visual tree assessment from the ground of each individual tree, or stand of trees, or a representative population sample. Any dimensions recorded as averages, or by approximation, are noted accordingly.

13.0 PRUNING STANDARDS

- 13.1 Any pruning recommended in this report is to be to the Australian Standard® AS4373 *Pruning of amenity trees* and conducted in accordance with the NSW Work Cover Authority Code of Practice, Tree Work, 2007.
- 13.2 All pruning or removal works are to be in accordance with the appropriate Tree Management Policy where applicable, or Tree Management Order (TMO), or Tree Preservation Order (TPO).
- 13.3 Tree maintenance work is specialised and in order to be undertaken safely to ensure the works carried out are not detrimental to the survival of a tree being retained, and to assist in the safe removal of any tree, should be undertaken by a qualified arboriculturist with appropriate competencies recognised within the Australian Qualification Framework, with a minimum of 5 years of continual experience within the industry of operational amenity arboriculture, and covered by appropriate and current types of insurance to undertake such works.

14.0 SUMMARY: TREE MANAGEMENT PLAN

This Tree Protection Plan recommends; Trees 1, 4 to 7, 11 to 39 (threatened EEC), 40^{x19}, 41, 42, 43 & 50 (group) are located within the site and neighbouring properties and are to be retained and protected for the duration of development consent. For Tree 1, the alignment of the terracing walls is on the compressions side of the specimen and an acceptable major encroachment into the TPZ of this specimen. The section of terracing walls within the TPZ of the specimen have been designed to provide stable level change down to the common open space and are not intended to be walls with significant associated structure or footings. They are to be constructed using tree sensitive excavation (for posts) and construction techniques to comply with AS4970 2009 *Protection of Trees on Development Sites* to engineers' specifications with works to be supervised by a qualified Arborist. Trees 4, 5 & 7, the alignment of the basement will be a minor encroachment to these specimens. The section of the basement within the TPZ of the specimens is to be constructed using tree sensitive excavation and construction techniques such as a vertical cut with shotcrete and contiguous pilings to reduce any impact on their stability. Minor crown raising of these specimens may be required to clear access over the proposed boardwalk, with work to be undertaken by a qualified Arborist. Tree 6, the alignment of the basement is sufficiently setback to not impact this Cumberland Shale Plains Woodland / Cumberland Red Gum River flat Forest specimen with the Rain Garden and deck / elevated boardwalk are within the structural root zone of this specimen. Trees 4, 5, 6 & 7: Rain Garden - the design intent for the retained trees in the Forest Green is for existing ground levels to be retained, including the distinct swale below the trees, and to retain the water runoff regime. Catchment of natural water flow across the area is to be with a stormwater culvert below the area of the TPZ area of the retained trees. Raingarden type planting would be groundcovers and low strappy planting consistent with native species of the local area, intended to have similar impacts to the existing grass with limited additional planting in the structural root zones of the retained trees, so that they are suitably retained in good health. **Timber Decking** - the timber decking proposed to provide access below the trees is shown indicatively. A non-destructive **root mapping investigation** is recommended to be undertaken for the location of the supporting posts and their footings. The structures are to be flexible in outcome and complement the elevated deck structures and can accommodate design adjustment to suit tree protection requirements with a minimum clearance of 300mm from any structural roots of 200mm or more. This investigation could be undertaken prior to commencement of works to minimise disturbance to the root zone of these specimens with all works to be supervised by the project Arborist. Trees 11, 12, 13, 15, 17, 18, 19, 22, 24, 26, 28, 29 & 32, the alignment of the proposed gabion walls within the threatened ecological community is an acceptable major encroachment into the tree protection zones of these specimens providing the existing natural ground levels are to be retained, with no cut or fill to maintain the growing environment for these specimens. Trees 14, 16, 20, 21, 25, 27, 30, 33 & 35, the alignment of the proposed gabion walls is an acceptable encroachment into the tree protection zones of these specimens providing the existing natural ground levels are to be retained, with no cut, fill with the existing ground levels maintained within the growing environment for these specimens. Trees 23, 31, 34, 36, 37, 38 & 39, these specimens are sufficiently setback from the proposed landscape works providing the existing natural ground levels are maintained with no cut or fill within the TPZ of these specimens. Trees 40^{x19}, these neighbouring specimens are an avenue planting and are sufficiently setback from the development works to not be affected. Tree 41, 43 & 50 (group), the alignment of the development is sufficiently setback to not affect these specimens. Tree 42, the alignment of the proposed development works is a minor encroachment to this specimen but are sufficiently setback to not impact to specimen.

DISCUSSION

- 14.1 AS4970 (2009) section 3, 3.3.3 requires the Project Arborist to demonstrate that where a retained tree is subject to a major encroachment (>10% of area of TPZ) it can be protected to remain viable.
- 14.2 Tree 1 Eucalyptus amplifolia – Cabbage Gum, this specimen was found in good condition & vigour at time of assessment.
- Trees viability to development; this specimen is impacted by the proposed development. The project arborist is to certify the installation of protection measures as per D/A conditions prior to commencement of works and to be monitored throughout the project at approx. 3 mthly intervals depending on the length of the development. The specimen should remain viable beyond completion of development provided recommended installation & protection measures are adhered to.
 - Development Impacts: AS4970 (2009) section 3 requires a Tree Protection Zone (TPZ) setback of 9.6 metres (m) radial from centre of trunk (COT), the setback for the proposed terracing wall adjacent to this specimen is estimated at 4.5m from COT, which is an encroachment into the TPZ by the proposed terracing walls.

The alignment of the terracing walls is on the compressions side of the specimen and an acceptable major encroachment into the TPZ of this specimen. The section of terracing walls within the TPZ of the specimen have been designed to provide stable level change down to the common open space and are not intended to be walls with significant associated structure or footings. They are to be constructed using tree sensitive excavation (for posts) and construction techniques to comply with AS4970 2009 Protection of Trees on Development Sites to engineers' specifications with works to be supervised by a qualified Arborist.

14.3 Trees 4, 5 & 7 Populus deltoides - Eastern Cottonwood, these mature, exotic, deciduous specimens were found in good condition & vigour at the time of assessment.

- Trees viability to development: these specimens are impacted by the proposed development. The project arborist is to certify the installation of protection measures as per D/A conditions prior to commencement of works and to be monitored throughout the project at approx. 3 mthly intervals depending on the length of the development. The specimens may remain viable beyond completion of development provided recommended installation & protection measures are adhered to.

- Development Impacts: AS4970 (2009) section 3 requires a TPZ setback of 9.6m for T4 & 5 & 10.8m for T7 radial from COT, the setback for the proposed basement adjacent to these specimens is estimated at 9.1m, .7m & 7.7m respectively from COT, which is an estimated 0.1%, 1.7% & 8.8% encroachment into the TPZ by the proposed development.

The alignment of the basement will be a minor encroachment to these specimens. The section of the basement within the TPZ of the specimens is to be constructed using tree sensitive excavation and construction techniques such as a vertical cut with shotcrete and contiguous pilings to reduce any impact on their stability. Minor crown raising of these specimens may be required to clear access over the proposed boardwalk, with work to be undertaken by a qualified Arborist.

14.4 Tree 6 Eucalyptus amplifolia – Cabbage Gum, this mature, exotic, deciduous specimens were found in good condition & vigour at time of assessment.

- Trees viability to development: these specimens are impacted by the proposed development. The project arborist is to certify the installation of protection measures as per D/A conditions prior to commencement of works and to be monitored throughout the project at approx. 3 mthly intervals depending on the length of the development. The specimens may remain viable beyond completion of development provided recommended installation & protection measures are adhered to.

- Development Impacts: AS4970 (2009) section 3 requires a TPZ setback of 9.6m radial from COT, the setback for the proposed deck / elevated boardwalk adjacent to this specimen is estimated at 2.4m from COT, which is not an encroachment into the TPZ by the proposed basement and an encroachment into the SRZ by the timber decking.

The alignment of the basement is sufficiently setback to not impact this Cumberland Shale Plains Woodland / Cumberland Red Gum River flat Forest specimen with the Rain Garden and deck / elevated boardwalk are within the structural root zone of this specimen.

Trees 4, 5, 6 & 7: Rain Garden - the design intent for the retained trees in the Forest Green is for existing ground levels to be retained, including the distinct swale below the trees, and to retain the water runoff regime. Catchment of natural water flow across the area is to be with a stormwater culvert **below** the area of the TPZ area of the retained trees.

Raingarden type planting would be groundcovers and low strappy planting consistent with native species of the local area, intended to have similar impacts to the existing grass with limited additional planting in the structural root zones of the retained trees, so that they are suitably retained in good health.

Timber Decking - the timber decking proposed to provide access below the trees is shown indicatively.

A non-destructive root mapping investigation is recommended to be undertaken for the location of the supporting posts and their footings. The structures are to be flexible in outcome and complement the elevated deck structures and can accommodate design adjustment to suit tree protection requirements with a minimum clearance of 300mm from any structural roots of 200mm or more. This investigation could be undertaken prior to commencement of works to minimise disturbance to the root zone of these specimens with all works to be supervised by the project Arborist.

- 14.5 Trees 11, 12, 13, 15, 17, 18, 19, 24, 26, 28 & 32 Eucalyptus amplifolia - Cabbage Gum, these mature, endemic specimens were found in good condition & vigour at the time of assessment.
- Trees viability to development: these specimens are impacted by the proposed development. The project arborist is to certify the installation of protection measures as per D/A conditions prior to commencement of works and to be monitored throughout the project at approx. 3 mthly intervals depending on the length of the development. The specimens should remain viable beyond completion of development provided recommended installation & protection measures are adhered to.
 - Development Impacts: AS4970 (2009) section 3 requires a TPZ setback of 8.4m for T11 & T18, 8.5m for T12, 6.4m for T13, 12.0m for T5, 3.6m for T17, 6.0m for T19, 7.2m for T24, 9.6m for T26, 10.8m for T28 & 15.0m for T32 radial from COT, the setback for the indicated gabion wall adjacent to these specimens is estimated at 2.6m, 0.6m, 1.7m, 3.3m, 1.8m, 2.4m, 2.3m, 2.5m, 2.0m, 1.7m & 1.6m numerically from COT, which is an acceptable encroachment into the structural root zone by the proposed landscape works within the threatened ecological community.
- The alignment of the proposed gabion walls within the threatened ecological community is an acceptable major encroachment into the tree protection zones of these specimens providing the existing natural ground levels are retained, with no cut or fill to maintain the growing environment for these specimens.
- 14.6 Trees 14, 16, 21, 25, 27, 30, 33 & 35 Eucalyptus amplifolia - Cabbage Gum, these mature, endemic specimens were found in good condition & vigour at the time of assessment.
- Trees viability to development: these specimens are impacted by the proposed development. The project arborist is to certify the installation of protection measures as per D/A conditions prior to commencement of works and to be monitored throughout the project at approx. 3 mthly intervals depending on the length of the development. The specimens should remain viable beyond completion of development provided recommended installation & protection measures are adhered to.
 - Development Impacts: AS4970 (2009) section 3 requires a TPZ setback of 7.2m for T14 & T27, 3.6m for T16, 10.8m for T21, T25 & T30, 4.8m for T33 & 6.0m for T35 radial from COT, the setback for the indicated gabion wall adjacent to these specimens is estimated at 5.2m, 2.7m, 5.0m, 5.5m, 3.5m, 4.0m, 3.6m & 3.7m numerically from COT, which is an acceptable encroachment into the TPZ by the proposed landscape works within the threatened ecological community, providing the existing natural ground levels are maintained with no cut or fill.
- The alignment of the proposed gabion walls is an acceptable minor encroachment into the tree protection zones of these specimens providing the existing natural ground levels are to be retained, with no cut, fill with the existing ground levels maintained within the growing environment for these specimens.
- 14.7 Tree 20 Eucalyptus amplifolia - Cabbage Gum, this young, endemic specimen was found in good condition & vigour at the time of assessment.
- Trees viability to development: this specimen is impacted by the proposed development. The project arborist is to certify the installation of protection measures as per D/A conditions prior to commencement of works and to be monitored throughout the project at approx. 3 mthly intervals depending on the length of the development. The specimen should remain viable beyond completion of development provided recommended installation & protection measures are adhered to.
 - Development Impacts: AS4970 (2009) section 3 requires a TPZ setback of 3.4 m radial from COT, the setback for the proposed gabion wall adjacent to this specimen is estimated at 2.3m from COT, which is an estimated 10.74% encroachment into the TPZ by the proposed gabion wall.
- The alignment of the proposed gabion walls is an acceptable major encroachment into the tree protection zone of this specimen providing the existing natural ground levels are to be retained, with no cut, fill with the existing ground levels maintained within the growing environment for these specimens.
- 14.8 Tree 22 Eucalyptus amplifolia - Cabbage Gum, this mature specimen was found in fair condition & low vigour at time of assessment.
- Trees viability to development: this specimen is impacted by the proposed development. The project arborist is to certify the installation of protection measures as per D/A conditions prior to commencement of works and to be monitored throughout the project at approx. 3 mthly intervals depending on the length of the development. The specimen should remain viable beyond completion of development provided recommended installation & protection measures are adhered to.

- Development Impacts: AS4970 (2009) section 3 requires a TPZ setback of 9.6m radial from COT, the setback for the proposed development adjacent to this specimen is estimated at 2.5m from COT, which is an acceptable encroachment into the structural root zone by the proposed landscape works within the threatened ecological community.

The alignment of the proposed gabion walls within the threatened ecological community is an acceptable major encroachment into the tree protection zones of this specimen. If this specimen is to remain viable, the existing natural ground levels are to be retained, with no cut or fill to maintain the growing environment for this specimen.

- 14.9 Trees 23, 36, 38 & 39 Eucalyptus amplifolia - Cabbage Gum, these mature, endemic specimens were found in good condition & vigour at the time of assessment.

- Trees viability to development: providing the existing ground levels remain undisturbed, these specimens are not impacted by the proposed development. The project arborist is to certify the installation of protection measures as per D/A conditions prior to commencement of works and to be monitored throughout the project at approx. 3 mthly intervals depending on the length of the development. The specimens should remain viable beyond completion of development provided recommended installation & protection measures are adhered to.

- Development Impacts: AS4970 (2009) section 3 requires a TPZ setback of 3.6m for T23 & T39, 3.0m for T36 & 4.2m for T38 radial from COT, the setback for the indicated gabion wall adjacent to these specimens is estimated at 7.0m, 4.6m, 5.1m & 4.1m numerically from COT, which is not an encroachment into the TPZ by the proposed landscape works within the threatened ecological community These specimens are sufficiently setback from the proposed landscape works providing the existing natural ground levels are maintained with no cut or fill within the TPZ of these specimens.

- 14.10 Tree 29 Eucalyptus amplifolia - Cabbage Gum, this young specimen was found in fair condition with low vigour at the time of assessment.

- Trees viability to development: this specimen is impacted by the proposed development. The project arborist is to certify the installation of protection measures as per D/A conditions prior to commencement of works and to be monitored throughout the project at approx. 3 mthly intervals depending on the length of the development. The specimen should remain viable beyond completion of development provided recommended installation & protection measures are adhered to.

- Development Impacts: AS4970 (2009) section 3 requires a TPZ setback of 2.0m radial from COT, the setback for the proposed development adjacent to this specimen is estimated at 1.0m from COT, which is an acceptable encroachment into the structural root zone by the proposed landscape works within the threatened ecological community.

The alignment of the proposed gabion walls within the threatened ecological community is an acceptable major encroachment into the tree protection zones of this specimen providing the existing natural ground levels are to be retained, with no cut or fill to maintain the growing environment for this specimen.

- 14.11 Trees 31 & 34 Eucalyptus amplifolia - Cabbage Gum, these young, endemic specimens were found in good condition & vigour at the time of assessment.

- Trees viability to development: providing the existing ground levels remain undisturbed, these specimens are not impacted by the proposed development. The project arborist is to certify the installation of protection measures as per D/A conditions prior to commencement of works and to be monitored throughout the project at approx. 3 mthly intervals depending on the length of the development. The specimens should remain viable beyond completion of development provided recommended installation & protection measures are adhered to.

- Development Impacts: AS4970 (2009) section 3 requires a TPZ setback of 2.0m radial from COT, the setback for the indicated gabion wall adjacent to these specimens is estimated at 4.0m & 3.6m numerically from COT, which is not an encroachment into the TPZ by the proposed landscape works within the threatened ecological community These specimens are sufficiently setback from the proposed landscape works providing the existing natural ground levels are maintained with no cut or fill within the TPZ of these specimens.

- 14.12 Tree 37 *Eucalyptus amplifolia* - Cabbage Gum, this young, endemic specimen was found in fair condition with low vigour at the time of assessment.
- Trees viability to development: providing the existing ground levels remain undisturbed, this specimen is not impacted by the proposed development. The project arborist is to certify the installation of protection measures as per D/A conditions prior to commencement of works and to be monitored throughout the project at approx. 3 mthly intervals depending on the length of the development. The specimen should remain viable beyond completion of development provided recommended installation & protection measures are adhered to.
 - Development Impacts: AS4970 (2009) section 3 requires a TPZ setback of 2.0m radial from COT, the setback for the indicated gabion wall adjacent to these specimens is estimated at 3.7m from COT, which is not an encroachment into the TPZ by the proposed landscape works within the threatened ecological community. These specimens are sufficiently setback from the proposed landscape works providing the existing natural ground levels are maintained with no cut or fill within the TPZ of these specimens.
- 14.13 Trees 40^{x19} *Ficus macrocarpa* – Morton Bay Fig, these young neighbouring specimens are avenue plantings and were found in good condition & vigour at time of assessment.
- Trees viability to development: these specimens are not impacted by the proposed development. The project arborist is to certify the installation of protection measures as per D/A conditions prior to commencement of works and to be monitored throughout the project at approx. 3 mthly intervals depending on the length of the development. The specimens should remain viable beyond completion of development provided recommended installation & protection measures are adhered to.
 - Development Impacts: AS4970 (2009) section 3 requires a TPZ setback of 2.4m radial from COT, these specimens are estimated a minimum of 4.0m from COT to the property boundary and are sufficiently setback from the development works to not be affected.
- 14.14 Tree 41 *Corymbia citriodora*– Lemon Scented Gum, this mature neighbouring non-locally indigenous specimen was found in good condition & vigour at time of assessment.
- Trees viability to development: this specimen is not impacted by the proposed development. The project arborist is to certify the installation of protection measures as per D/A conditions prior to commencement of works and to be monitored throughout the project at approx. 3 mthly intervals depending on the length of the development. The specimen should remain viable beyond completion of development provided recommended installation & protection measures are adhered to.
 - Development Impacts: AS4970 (2009) section 3 requires a TPZ setback of 8.4m radial from COT, the setback to the property boundary adjacent to this specimen is estimated at 15.0m from COT, which is not an encroachment into the TPZ by the proposed development. The specimen is sufficiently setback from the development to not be affected.
- 14.15 Tree 42 *Ficus benjamina* – Weeping Fig, this mature neighbouring, exotic evergreen specimen was found in good condition & vigour at time of assessment.
- Trees viability to development: this specimen is impacted by the proposed development. The project arborist is to certify the installation of protection measures as per D/A conditions prior to commencement of works and to be monitored throughout the project at approx. 3 mthly intervals depending on the length of the development. The specimen should remain viable beyond completion of development provided recommended installation & protection measures are adhered to.
 - Development Impacts: AS4970 (2009) section 3 requires a TPZ setback of 12.0m radial from COT, the setback to the property boundary adjacent to this specimen is estimated at 11.5m from COT, with indicated changes to RL's within the site an estimated 0.5% encroachment into the TPZ by the proposed development.
- The alignment of the proposed development works is a minor encroachment to this specimen but are sufficiently setback to not impact to specimen.*

- 14.16 Tree 43 *Jacaranda mimosifolia* – Jacaranda, this mature neighbouring exotic, deciduous specimen was found in good condition & vigour at time of assessment.
- Trees viability to development: this specimen is not impacted by the proposed development. The project arborist is to certify the installation of protection measures as per D/A conditions prior to commencement of works and to be monitored throughout the project at approx. 3 mthly intervals depending on the length of the development. The specimen should remain viable beyond completion of development provided recommended installation & protection measures are adhered to.
 - Development Impacts: AS4970 (2009) section 3 requires a TPZ setback of 10.8m radial from COT, the setback to the property boundary adjacent to this specimen is more than 20.0m from COT, which is not an encroachment into the TPZ by the proposed development. The specimen is sufficiently setback from the development to not be affected.
- 14.17 Tree 50 (group) Cumberland Shale Plains Woodland & Cumberland Red Gum River flat Forest, these semimature specimens were found in good condition & vigour at time of assessment.
- Trees viability to development: it would appear that only three of these specimens may be impacted by the proposed development. The project arborist is to certify the installation of protection measures as per D/A conditions prior to commencement of works and to be monitored throughout the project at approx. 3 mthly intervals depending on the length of the development. It is unclear in the plans provided whether three specimens may be impacted by the proposed works with the remainder of the specimens appear to be sufficiently setback and should remain viable beyond completion of development provided recommended installation & protection measures are adhered to.
 - Development Impacts: AS4970 (2009) section 3 requires a TPZ setback of 2.1m to 4.0m radial from COT, the setback for the proposed development adjacent to the specimens is estimated at 5.0m at the closest point from COT, which is not an encroachment into the TPZ by the proposed development. The alignment of the proposed development works is sufficiently setback to not impact these specimens.

If boundary fences are to be installed within the tree protection zone of retained specimens, they are to be constructed using tree sensitive excavation and construction techniques such as post and rail construction with suspended panels to reduce any impact on the stability of retained trees, with posts to be dug by hand using non-motorised equipment to further assist in the protection of the trees.

If associated infrastructure (pipe works) is to be installed within the Tree Protection Zone of any retained specimen, they are to be installed by hand with non-motorised equipment. If structural roots are found within the trench, they are to be left intact and dug around retaining this specimen's structural integrity with works to be undertaken in consultation with the project arborist.

Proposed Development Impacts: There will be no impact to Trees 23, 31, 34, 36, 37, 38, 39, 40^{x19}, 41, 43 & 50 (group) with a minor encroachment for Trees 14, 16, 33 & 42 while Trees 1, 4, 5, 6, 7, 21, 25, 27, 30 & 35 will be subject to major encroachment into the TPZ while Trees 11, 12, 13, 15, 17, 18, 19, 22, 24, 26, 28, 29 & 32 are subject to an acceptable encroachment into the structural root zone by proposed landscape works. Retained specimens are to be protected as per AS 4970 (2009) Section 3, 3.3.3 Major Encroachments from development works within >10% of the area of the Tree Protection Zone and as per discussion points in section 14 in part B of this report. **Demolition Impacts:** There is an existing major encroachment within the threatened ecological community by the existing stormwater channel which is believed to be stable and expected to be retained, and at most would be a task of clearing out rubbish, debris and weeds which should improve the growing conditions for these specimens. Any demolition, excavations or construction work carried out within the TPZ of retained specimens must be supervised and certified by the Project Arborist in accordance with AS4970 (2009).

General – Tree Protection works – Prior to Demolition

- 14.18 Hold Point – Prior to demolition works, a site arborist shall be appointed to supervise all tree protection procedures detailed in this specification. The Site Arborist shall have a minimum level 5 AQF qualification in Arboriculture. Hold Points are to be adhered to throughout the duration of this development and all relevant documentation is to be submitted to the local authority.
- 14.19 The Tree Protection Zone for each tree/s is to be incorporated into the construction works for the site and the protection fencing or works to be situated as indicated on the Appendix F – Tree Protection Plan. The setbacks from building works on the side closest to each tree are to be carried out as indicated in Table 2.0, and Tree Protection measures installed as described here and detailed in Appendix D. The trees will be sustained within the constraints of the modifications to the site by the proposed development works.

- 14.20 Trees 1, 4 to 7, 11 to 39 (threatened EEC), 40^{x19}, 41, 42, 43 & 50 (group) are to be retained and protected and incorporated into the landscape works for the site, and Tree Protection Zone fencing to be marked accordingly on the Landscape Plan, where appropriate and installed prior to any demolition or construction.
- 14.21 Ground protection - If temporary access for machinery is required within the TPZ ground protection measures will be required. The purpose of ground protection is to prevent root damage and soil compaction within the TPZ. Measures may include a permeable membrane such as geotextile fabric beneath a layer of mulch or crushed rock below rumble boards. These measures may be applied to root zones beyond the TPZ.
- 14.22 Where applicable, any excavation for the establishment of a batter slope or benching for reasons of safety and to comply with Work Cover Authority safety regulations should be restricted as far as is safely possible near to trees to be retained to prevent root damage. If the excavations cannot be undertaken near to vertical the stability of these trees and their long-term viability may be compromised and their retention in a safe and healthy condition jeopardized and they may need to be revised and possibly removed.

Specific - Tree Protection Works - Prior to Demolition and Tree Removal

- 14.23 All other trees/shrubs; prior to demolition and tree removal works these tree/s are to be placed within a Tree Protection Zone with protective fencing and maintained and retained until the completion of all building works. Protective fencing is to be installed as shown in Appendix F - Tree Protection Plan.
- *The Protective fencing where required may delineate the **Tree Protection Zone (TPZ)** and should be situated as determined by the project arborist in accordance with AS4970 Protection of trees on development sites, Section 4, 4.3. "Fencing should be erected before any machinery or materials are brought onto the site and before the commencement of works including demolition. Once erected, protective fencing must not be removed or altered without approval by the project arborist. The TPZ must be secured to restrict access. AS4687 Temporary fencing and hoardings specifies applicable fencing requirements. Shade cloth or similar should be attached to reduce the transport of dust, other particulate matter and liquids into the protected area. Fence posts and supports should have a diameter greater than 20 mm and be located clear of roots. Existing perimeter fencing and other structures may be suitable as part of the protective fencing" or similar.*
 - *Tree Protection signage is to be attached to each **TPZ** and displayed from within the development site in accordance with AS4970 2009 Protection of trees on development sites*
 - *The area of the Tree Protection Zone to be mulched to a depth of 100 mm with organic material being 75% leaf litter and 25% wood, and this being composted material preferably from the same genus and species of tree as that to where the mulch is to be applied, i.e. species-specific mulch where possible. The depth of mulch and type as indicated, to be maintained for the duration of the project. Where deep excavation will expose the soil profile to drying out the root plate is to be protected by pegging jute matting across the ground surface 2 m back from the edge of the profile and 2 m down the face of the profile and is to be in one continuous sheet or layers up to 5 mm thick and overlapped 300 mm and pegged. Pegs are to be a minimum length of 200 mm and spaced at 500 mm increments in a grid pattern. Once installed mulch is to be placed on top of the jute matting previously described.*
- 14.24 There is to be no storage of materials, rubbish, soil, equipment, structures or goods of any type to be kept or placed within 5 metres from the trunk or within the dripline of any tree for the duration of the development. This will ensure protection of the tree/s to be retained on or adjacent to site.
- 14.25 Hold Point - Project/Site arborist is to inspect/assess all retained specimens prior to demolition to inspect tree protection measures to monitor that they have been carried out as per the approved D/A conditions for the site. Documentation is to be submitted to the consenting authority after each inspection

Demolition and Tree Removal/s

- 14.26 Removal of a tree within 6 m of a tree to be retained should be undertaken only by cutting down such a tree without damaging the trees to be retained, and by grinding out its stump. Where possible the structural roots of 20 mm diameter or greater of the tree to be cut down should not be removed, to minimise soil disturbance and to reduce the impact on the roots of any tree to be retained nearby. Where structural roots are to be removed this should be undertaken manually by the use of non-motorised hand tools after the stump has been ground out when such roots are often easier to locate from the site of the stump from which they have been severed.
- 14.27 Ground protection in accordance with AS4970 section 4, 4.5.3 may require steel plates to protect the ground surface from compaction to protect roots between the stages of demolition and construction.

Specific - Tree Protection works – During Demolition

- 14.28 Demolition of Existing Buildings should be undertaken with access restricted to the driveway and the building platform for each of the existing buildings, or to areas of the land where no trees are growing within 6m of any tree to be retained. Where access or space for a safe working environment is restricted, or where the area of the 6m set back must be compromised, a 100 mm layer of wood mulch must be laid over the area of encroachment. Where vehicular access is required across the mulch layer further root protection should be provided by laying a temporary pathway over the mulch. The temporary pathway should be constructed of a grated steel material capable of supporting the vehicles used during demolition e.g., like ramps used to load vehicles onto the backs of trucks. Trunks of trees may require protection from vehicular damage.
- 14.29 Demolition of landscape structures: the demolition of walls, driveways retaining walls, paths, and pools etc. within 6 m of a tree to be retained should be undertaken manually using hand tools. Where a driveway is to be demolished being of concrete strip or slab type construction, it should be undertaken by working from the end of the driveway closest to the building back towards the street by utilising the driveway as a stable platform to prevent soil compaction. Where a concrete slab driveway passes less than 1 m from the base of a tree and the area beneath the driveway is to be undisturbed and incorporated into the landscape works for the site, the volume of space previously occupied by the driveway must be replaced with local top soil from the site or otherwise a loamy sand, to replace the mass of the concrete on the root plate which may be critical to the ballast and centre of mass for the stability of the tree. If the tree becomes unstable immediately contact the project arborist.

Specific - Tree Protection works – Post Demolition and Prior to Construction

- 14.30 Hold Point - Project/Site arborist is to inspect/assess all retained specimens prior to construction in relation to tree protection measures to monitor that they have been carried out as per the approved D/A conditions for the site. Documentation is to be submitted to the consenting authority after each inspection.
- 14.31 Location of underground utilities within a Tree Protection Zone of a retained specimen.
Any utility services to be situated underground within the TPZ are to be undertaken utilising excavation techniques that prevent or minimise damage to structural roots (roots greater than >20 mm diameter). To prevent soil compaction and root damage these works should be conducted with non-motorised hand tools, air knife or directional drilling.
- 14.32 Re-grading of site near retained trees; Grading &/or re-grading of sites/slopes within Tree Protection Zones or near retained specimens is to be undertaken **only** if at all, after consultation with the Project Arborist. This is to protect all structural roots systems from damage or compaction from machinery.
- 14.33 Placement of relocatable buildings; consideration should be given to tree sensitivity such as the buildings being placed on pier and beam or skids construction as they are to be positioned on their driplines within the Tree Protection Zone (TPZ). The area of the Tree Protection Zone under the buildings is to be mulched to a depth of 200 mm (*if installed on skids*) with organic material to further reduce compaction. The mulch is to be composted material, i.e. species-specific mulch. Alternatively, if installed on a pier & beam construction, piers are to be undertaken manually by using non-motorised hand tools to determine the location of first order and lower order structural roots with a diameter of 20 mm (*structural woody roots*) or greater, without damaging them.

Specific - Tree Protection works – During Construction

- 14.341 Hold Point - Project/Site arborist is to inspect/assess all retained specimens during construction in relation to tree protection measures to monitor that they have been carried out as per the approved D/A conditions for the site. Documentation is to be submitted to the consenting authority after each inspection.

- 14.35 Where any structural roots (roots with a diameter of greater than >20 mm) encountered by excavation are to be pruned and it is to be undertaken with clean sharp pruning tools, with a final cut to undamaged wood to prevent infestation by pathogens and assist continued root growth and undertaken in consultation with the Consulting Arboriculturist. Tree Protection Zone fences are to be maintained during these works. Ground protection in accordance with AS4970 section 4, 4.5.3 may require steel plates to protect the ground surface from compaction to protect roots between the stages of demolition and construction.
- 14.36 All Tree Protection Zones of retained trees are to be monitored for the duration of the construction phase of the development. The three main areas requiring monitoring are; mulching - mulch must be maintained to a depth of 50–100 mm using material that complies with AS 4454. Where the existing landscape within the TPZ is to remain unaltered (e.g. garden beds or turf) mulch may not be required, watering - soil moisture levels should be regularly monitored by the project arborist. Temporary irrigation or watering may be required within the TPZ. An above-ground irrigation system could be installed and maintained by a competent individual and weeding - weeds should be removed by hand without disturbing soil or should be controlled with weedicide.
- 14.37 Trees to be removed are to be replaced with advanced specimens being mindful of the space limitations of the new use of the site. The advanced trees should be situated in areas along the boundaries of the site. The planting in these locations will provide the maximum benefit to the surrounding properties by screening views to and from the site and the plantings included in the proposed landscape plan. The replacement trees will be situated in positions where they may grow to maturity unhindered and will not conflict with built structures or utility services and in greater numbers than the trees removed should provide a net increase in the local amenity.

Specific - Tree Protection works – Post Construction

- 14.38 Hold Point - At completion of construction work the Site/Project Arborist should carry out an assessment of all trees retained &/or affected by works. This assessment is to document any required on-going remedial care needed to ensure viable retention of trees affected. Documentation is to be submitted to the consenting authority.

15.0 CONCLUSION

One hundred and fifteen (115) trees are nominated for removal and replacement with species in accordance with the associated Landscape documentation for the development. The fifty-seven (57) trees to be preserved will be retained and protected through the implementation of adequate measures for their integration into the development by the application of appropriate technology as detailed in this report. Where appropriate, the Landscape Plan will include planting with new trees including street tree/s.

It is often a consequence of redevelopment, and subject to the nature of the proposed land use that some or all the trees present on the site prior to that redevelopment may be required to be removed and replaced with new tree plantings in different locations. This may be dependent upon the type of development and its design constraints and the requirements of the local planning instruments and any Landscape Design Codes if existing. Where tree removal is required for this development, it is considered that those trees identified within this report are not sustainable within the context of the proposed development. Where tree retention has been considered, those trees are expected to survive the redevelopment process and remain stable and viable. The retention and protection of existing trees on site is a significant aspect of the development process, allowing those trees as components of the current curtilage to be transferred to the new development for incorporation into the landscaping works for the site. The retention of some or all the existing trees contributes to: the preservation of local amenity, screening of views to and from the site, and a balance to the scale and bulk of buildings, while maintaining elements of a continuous landscape, providing a more harmonious integration and transition of the use of the land.

If all the recommendations and procedures detailed herein are adhered to, some or all the trees the subject of this report will continue or will be replaced with more appropriate plantings in suitable locations or enhanced by additional new plantings, and will grow to develop as important landscape components providing elements of long term amenity for the property and its owners or occupants, and the local community.

The recommendations made in this report are subject to approval by the consent authority.

As a renewable and dynamic natural resource, the urban tree and the growing environment essential for its survival must be understood and carefully managed to balance its needs with those of people. It is crucial that as required: this resource be planned for, planted, nurtured, protected, maintained and replaced, to ensure appropriateness and suitability of new plantings and trees retained, for safety and viability, so that it remains vital, and is sustainable in continuity.

16.0 RECOMMENDATIONS – Retention.

- 16.1 Trees 1, 4 to 7, 11 to 39 (threatened EEC), 40^{x19}, 41, 42, 43 & 50 (group) are to be retained in situ within the site and neighbouring property with retained specimens to be protected as detailed in 14.2 - 14.38 of Part B of this report. Tree protection fences or works, to be located in accordance with *Site Plan B – Trees to be Retained and Tree Protection Zones* (Appendix F).
- 16.2 Where Tree Protection Zone fences are to be moved or relocated this must be undertaken in consultation with the Consultant Arboriculturist for the project to ensure that tree protection is maintained. If the fences are relocated areas are to be mulched in accordance with 14.23 of this report to reduce compaction to the root system of the retained specimens.
- 16.3 To minimise damage to retained crowns, all Tree Protection Zones are to be adhered to. This must be undertaken in consultation with the Consultant Arboriculturist for the project to ensure that tree protection is maintained. Minor pruning may be required if damage occurs, work to be undertaken in accordance with section 4 of this report.
- 16.4 Hold Points - Project/Site arborist is to inspect/assess all retained specimens prior to Demolition and Tree Removal, Post Demolition, Prior to Construction during Construction and on completion in relation to trees protected and the protection measures have been carried out as per the approved D/A conditions for the site. Documentation is to be submitted to the consenting authority after each inspection.
- 16.5 Any work to be undertaken within Tree Protection Zones is to be undertaken in accordance with 16.2 of this report.
- 16.6 Tree removal near retained specimens is to be undertaken in accordance with 14.26 of this report.
- 16.7 There is to be no storage of materials, rubbish, soil, equipment, structures or goods of any type to be kept or placed within 5 metres from the trunk or within the dripline of any tree for the duration of the development. This will ensure protection of the tree/s to be retained on or adjacent to site.
- 16.8 Each of the replacement are to be a vigorous specimen with a straight trunk, gradually tapering and continuous, crown excurrent, symmetrical, with roots established but not pot bound in a volume container or approved similar and be maintained by an appropriately qualified and experienced landscape contractor for up to one (1) year after planting or as appropriate.



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DISCLAIMER

The author and Redgum Horticultural take no responsibility for actions taken and their consequences, contrary to those expert and professional instructions given as recommendations pertaining to safety by way of exercising our responsibility to our client and the public as our duty of care commitment, to mitigate or prevent hazards from arising, from a failure moment in full or part, from a structurally deficient or unsound tree or a tree likely to be rendered thus by its retention and subsequent modification/s to its growing environment either above or below ground contrary to our advice.

Appendix D

Extract from Australian Standard AS4970 2009 Protection of trees on development sites

Section 3, Determining the tree protection zones of the selected trees

3.1 Tree protection zone (TPZ)

“The tree protection zone (TPZ) is the principal 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 TPZ incorporates the structural root zone (SRZ) (refer to Clause 3.3.5).”

3.2 Determining the TPZ

The radius of the TPZ is calculated for each tree by multiplying its DBH x 12.

$$\text{TPZ} = \text{DBH} \times 12$$

where

DBH = trunk diameter measured at 1.4 m above ground

Radius is measured from the centre of the stem at ground level.

3.3.5 Structural root zone (SRZ)

“The SRZ is the area required for street stability. A larger area is required to maintain a viable tree. The SRZ only needs to be calculated when a major encroachment into a TPZ is proposed. Root investigation may provide more information on the extent of these roots.”

Determining the SRZ

The radius of the TPZ is calculated for each tree by multiplying its DBH x 12.

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

where

D = trunk diameter, in metres, measured above the root buttress.

Note: The SRZ for trees with trunk diameters less than 0.15 m will be 1.5 m.

Appendix E

Glossary

From

*Dictionary for Managing Trees in Urban Environments by Draper BD and Richards PA 2009,
Institute of Australian Consulting Arboriculturists (IACA), CSIRO Publishing, Collingwood, Victoria, Australia.*

Age of Trees

Age Most trees have a stable biomass for the major proportion of their life. The estimation of the age of a tree is based on the knowledge of the expected lifespan of the taxa *in situ* divided into three distinct stages of measurable biomass, when the exact age of the tree from its date of cultivation or planting is unknown and can be categorized as *Young*, *Mature* and *Over-mature* (British Standards 1991, p. 13, Harris *et al*, 2004, p. 262).

Young Tree aged less than <20% of life expectancy, *in situ*.

Mature Tree aged 20-80% of life expectancy, *in situ*.

Over-mature Tree aged greater than >80% of life expectancy, *in situ*, or *senescent* with or without reduced *vigour*, and declining gradually or rapidly but irreversibly to death.

Condition of Trees

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 second (2nd) order branches), including structural defects such as wounds, cavities or hollows, *crooked* trunk or weak trunk/branch junctions and the effects of predation by pests and diseases. These may not be directly connected with *vigour* and it is possible for a tree to be of *normal vigour* but in *poor condition*. Condition can be categorized as *Good Condition*, *Fair Condition*, *Poor Condition* and *Dead*.

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*.

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*.

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*.

Senescent / Moribund Advanced state of decline, dying or nearly dead.

Dead Tree is no longer capable of performing any of the following processes or is exhibiting any of the following symptoms;

Processes

Photosynthesis via its foliage crown (as indicated by the presence of moist, green or other coloured leaves);

Osmosis (the ability of the root 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*);

Symptoms

Permanent leaf loss;

Permanent 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 sapwood).

Removed No longer present, or tree not able to be located or having been cut down and retained on a site, or having been taken away from a site prior to site inspection.

Branch

Branch An elongated woody structure arising initially from the trunk to support leaves, flowers, fruit and the development of other branches. A branch may itself fork and continue to divide many times as successive *orders of branches* with the length and taper decreasing incrementally to the *outer extremity* of the *crown*. These may develop initially as a gradually tapering continuation of the *trunk* with minimal division as in a *young tree* or a tree of *excurrent habit*, or in a *sapling*, or may arise where the trunk terminates at or some distance from the *root crown*, dividing into *first order branches* to form and support the *foliage crown*. In an *acaulescent tree*, branches arise at or near the *root crown*. Similarly branches may arise from a *sprout mass* from damaged *roots, branches or trunk*.

Orders of branches The marked divisions between successively smaller branches (James 2003, p. 168) commencing at the initial division where the trunk terminates on a *deliquescent tree* or from *lateral branches* on an *excurrent tree*. Successive branching is generally characterised by a gradual reduction in branch diameters at each division, and each gradation from the trunk can be categorised numerically, e.g. first order, second order, third order etc. (See Figure 21.)

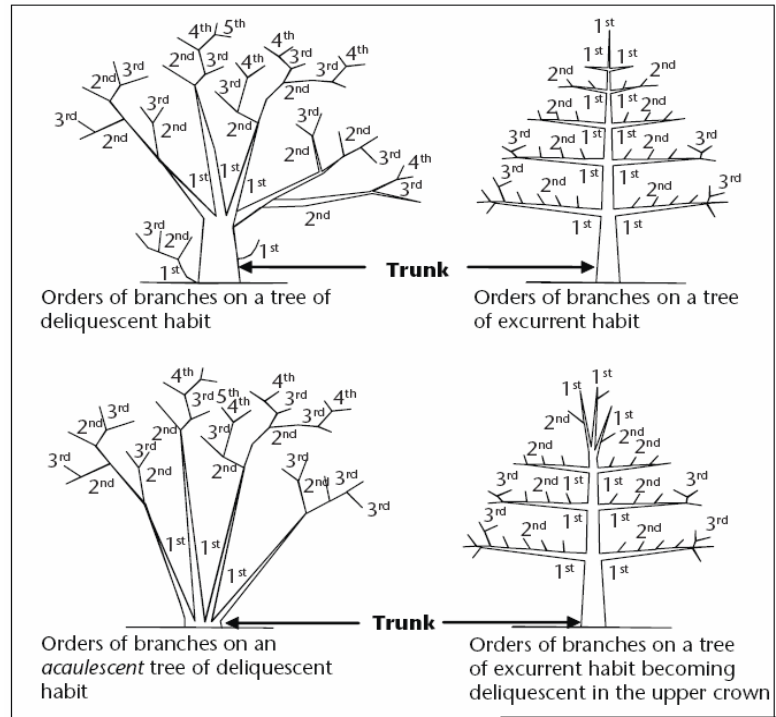


Figure 21 Orders of branches

Crown

Canopy 1. Of multiple trees, the convergence, or merging in full or part, of the crowns of two or more trees due to their proximity, or where competition for light and space available in a forest environment is limited as each tree develops forming a continuous layer of foliage. 2. Used as a plural for crown. 3. Sometimes synonymously used for crown (USA).

Crown Of an individual tree all the parts 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 the branches. The crown of any tree can be divided vertically into three sections and can be categorised as *lower crown*, *mid crown* and *upper crown* (Figure 8). For a *leaning tree* these can be divided evenly into crown sections of one-third from the *base to apex*. The volume of a crown can be categorised as the *inner crown*, *outer crown* and *outer extremity of crown*.

Lower crown The *proximal* or lowest section of a crown when divided vertically into one-third ($\frac{1}{3}$) increments. See also *Crown*, *Mid crown* and *Upper crown*.

Mid crown The middle section of a crown when divided vertically into one-third ($\frac{1}{3}$) increments. See also *Crown*, *Lower crown* and *Upper crown*.

Upper crown The *distal* or highest section of a crown when divided vertically into one-third ($\frac{1}{3}$) increments. See also *Crown*, *Mid crown* and *Lower crown*.

Crown Projection (CP) Area within the *dripline* or beneath the lateral extent of the *crown* (Geiger 2004, p. 2). See also *Crown spread* and *Dripline*.

Dripline A line formed around the edge of a tree by the lateral extent of the *crown*. Such a line may be evident on the ground with some trees when exposed soil is displaced by rain shed from the crown. See also *Crown Projection*.

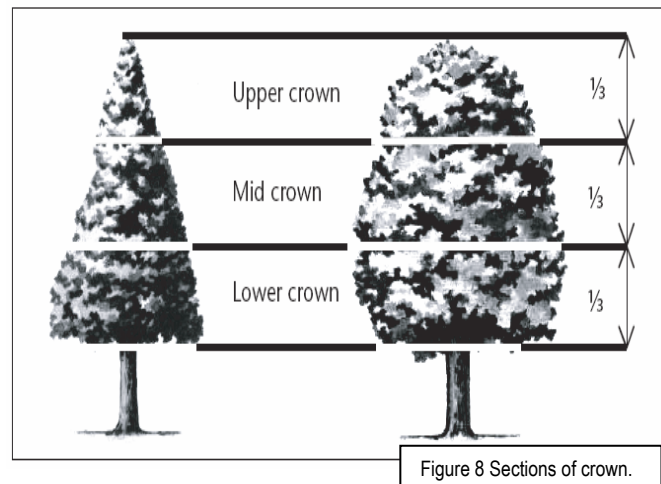


Figure 8 Sections of crown.

Crown Form of Trees

Crown Form The shape of the crown of a tree as influenced by the availability or restriction of space and light, or other contributing factors within its growing environment. Crown Form may be determined for tree shape and habit generally as *Dominant*, *Codominant*, *Intermediate*, *Emergent*, *Forest* and *Suppressed*. The habit and shape of a *crown* may also be considered qualitatively and can be categorized as *Good Form* or *Poor Form*.

Good Form Tree of *typical* crown shape and habit with proportions representative of the taxa considering constraints such as origin e.g. indigenous or exotic, but does not appear to have been adversely influenced in its development by environmental factors in situ such as *soil water* availability, prevailing wind, or cultural practices such as lopping and competition for space and light.

Poor Form Tree of *atypical* crown shape and habit with proportions not representative of the species considering constraints and appears to have been adversely influenced in its development by environmental factors in situ such as *soil water* availability, prevailing wind, cultural practices such as lopping and competition for space and light; causing it to be *misshapen* or disfigured by disease or vandalism.

Crown Form Codominant Crowns of trees restricted for space and light on one or more sides and receiving light primarily from above e.g. constrained by another tree/s or a building.

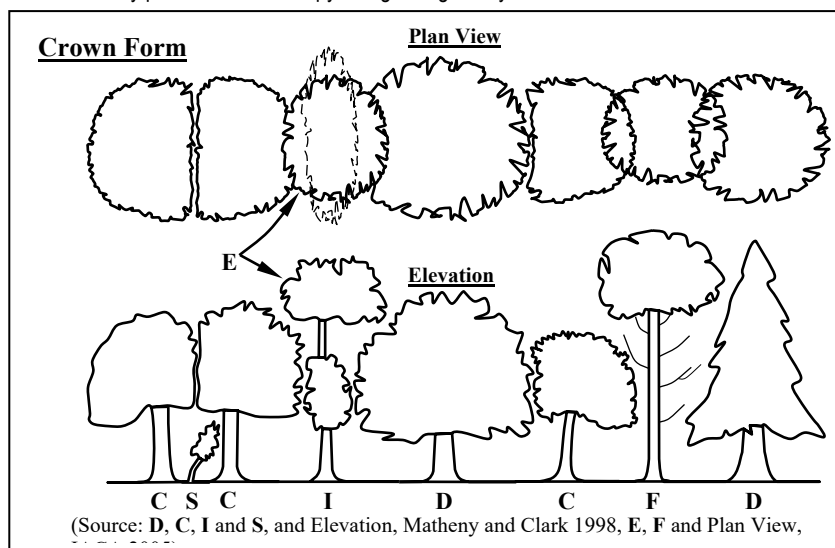
Crown Form Dominant Crowns of trees generally not restricted for space and light receiving light from above and all sides.

Crown Form Emergent Crowns of trees restricted for space on most sides receiving most light from above until the *upper crown* grows to protrude above the canopy in a stand or forest environment. Such trees may be *crown form dominant* or transitional from *crown form intermediate* to *crown form forest* asserting both *apical dominance* and *axillary dominance* once free of constraints for space and light.

Crown Form Forest Crowns of trees restricted for space and light except from above forming tall trees with narrow spreading crowns with foliage restricted generally to the top of the tree. The trunk is usually erect, straight and continuous, tapering gradually, crown often excurrent, with first order branches becoming structural, supporting the live crown concentrated towards the top of the tree, and below this point other first order branches arising radially with each *inferior* and usually temporary, divergent and ranging from horizontal to ascending, often with internodes exaggerated due to competition for space and light in the *lower crown*.

Crown Form Intermediate Crowns of trees restricted for space on most sides with light primarily from above and on some sides only.

Crown Form Suppressed Crowns of trees generally not restricted for space but restricted for light by being *overtopped* by other trees and occupying an understorey position in the canopy and growing slowly.



Deadwood

Deadwood Dead branches within a tree's crown and considered quantitatively as separate to *crown cover* and can be categorised as *Small Deadwood* and *Large Deadwood* according to diameter, length and subsequent *risk* potential. The amount of dead branches on a tree can be categorized as *Low Volume Deadwood*, *Medium Volume Deadwood* and *High Volume Deadwood*. See also *Dieback*.

Deadwooding Removing of dead branches by *pruning*. Such pruning may assist in the prevention of the spread of *decay* from *dieback* or for reasons of safety near an identifiable target.

Small Deadwood A dead branch up to 10mm diameter and usually <2 metres long, generally considered of low *risk* potential.

Large Deadwood A dead branch >10mm diameter and usually >2 metres long, generally considered of high *risk* potential.

High Volume Deadwood Where >10 dead branches occur that may require *removal*.

Medium Volume Deadwood Where 5-10 dead branches occur that may require *removal*.

Low Volume Deadwood Where <5 dead branches occur that may require *removal*.

Dieback

Dieback The death of some areas of the *crown*. Symptoms are leaf drop, bare twigs, dead branches and tree death, respectively. This can be caused by root damage, root disease, bacterial or fungal canker, severe bark damage, intensive grazing by insects, *abrupt changes* in growth conditions, drought, water-logging or over-maturity. Dieback often implies reduced *resistance*, *stress* or *decline* which may be temporary. Dieback can be categorized as *Low Volume Dieback*, *Medium Volume Dieback* and *High Volume Dieback*.

High Volume Dieback Where >50% of the *crown cover* has died.

Medium Volume Dieback Where 10-50% of the *crown cover* has died.

Low Volume Dieback Where <10% of the *crown cover* has died. See also *Dieback*, *High Volume Dieback* and *Medium Volume Dieback*.

Epicormic shoots

Epicormic Shoots Juvenile shoots produced at branches or trunk from *epicormic strands* in some Eucalypts (Burrows 2002, pp. 111-131) or sprouts produced from dormant or latent buds concealed beneath the bark in some trees. Production can be triggered by fire, pruning, wounding, or root damage but may also be as a result of *stress* or *decline*. Epicormic shoots can be categorized as *Low Volume Epicormic Shoots*, *Medium Volume Epicormic Shoots* and *High Volume Epicormic Shoots*.

High Volume Epicormic Shoots Where >50% of the *crown cover* is comprised of live *epicormic shoots*.

Medium Volume Epicormic Shoots Where 10-50% of the *crown cover* is comprised of live *epicormic shoots*.

Low Volume Epicormic Shoots Where <10% of the *crown cover* is comprised of live *epicormic shoots*.

General Terms

Cavity A usually shallow void often localized initiated by a *wound* and subsequent *decay* within the trunk, branches or roots, or beneath bark, and may be enclosed or have one or more opening.

Decay Process of degradation of wood by microorganisms (Australian Standard 2007, p. 6) and fungus.

Hazard The threat of danger to people or property from a tree or tree part resulting from changes in the physical condition, growing environment, or existing physical attributes of the tree, e.g. included bark, soil erosion, or thorns or poisonous parts, respectively.

Included bark 1. The bark on the inner side of the *branch union*, or is within a concave *crotch* that is unable to be lost from the tree and accumulates or is trapped by *acutely divergent* branches forming a *compression fork*. 2. Growth of bark at the interface of two or more branches on the inner side of a branch union or in the crotch where each branch forms a branch collar and the collars roll past one another without forming a graft where no one collar is able to subsume the other. Risk of failure is worsened in some taxa where branching is *acutely divergent* or *acutely convergent* and ascending or erect.

Hollow A large void initiated by a *wound* forming a *cavity* in the trunk, branches or roots and usually increased over time by *decay* or other contributing factors, e.g. fire, or fauna such as birds or insects e.g. ants or termites. A hollow can be categorized as an *Ascending Hollow* or a *Descending Hollow*.

Risk The random or potentially foreseeable possibility of an episode causing harm or damage.

Significant Important, weighty or more than ordinary.

Significant Tree A tree considered important, weighty or more than ordinary. Example: due to prominence of location, or *in situ*, or contribution as a component of the overall landscape for *amenity* or aesthetic qualities, or *curtilage* to structures, or importance due to uniqueness of taxa for species, subspecies, variety, *crown form*, or as an historical or cultural planting, or for age, or substantial dimensions, or habit, or as *remnant vegetation*, or habitat potential, or a rare or threatened species, or uncommon in cultivation, or of aboriginal cultural importance, or is a commemorative planting.

Substantial A tree with large dimensions or proportions in relation to its place in the landscape.

Sustainable Retention Index Value (SRIV) A visual tree assessment method to determine a qualitative and numerical rating for the viability of urban trees for development sites and management purposes, based on general tree and landscape assessment criteria using classes of *age*, *condition* and *vigour*. SRIV is for the professional manager of urban trees to consider the tree *in situ* with an assumed knowledge of the *taxon* and its growing environment. It is based on the physical attributes of the tree and its response to its environment considering its position in a matrix for age class, vigour class, condition class and its sustainable retention with regard to the safety of people or damage to property. This also factors the ability to retain the tree with remedial work or beneficial modifications to its growing environment or removal and replacement. SRIV is supplementary to the decision made by a tree management professional as to whether a tree is retained or removed (IACA - Institute of Australian Consulting Arboriculturists 2005).

Visual Tree Assessment (VTA) A visual inspection of a tree from the ground based on the principle that, when a tree exhibits apparently superfluous material in its shape, this represents repair structures to rectify *defects* or to reinforce weak areas in accordance with the *Axiom of Uniform Stress* (Mattheck & Breloer 1994, pp. 12-13, 145). Such assessments should only be undertaken by suitably competent practitioners.

Leaning Trees

Leaning A tree where the *trunk* grows or moves away from upright. A lean may occur anywhere along the *trunk* influenced by a number of contributing factors e.g. genetically predetermined characteristics, competition for space or light, prevailing winds, aspect, slope, or other factors. A *leaning* tree may maintain a *static lean* or display an increasingly *progressive lean* over time and may be hazardous and prone to *failure* and *collapse*. The degrees of leaning can be categorized as *Slightly Leaning*, *Moderately Leaning*, *Severely Leaning* and *Critically Leaning*.

Slightly Leaning A leaning tree where the trunk is growing at an angle within 0°-15° from upright.

Moderately Leaning A leaning tree where the trunk is growing at an angle within 15°-30° from upright.

Severely Leaning A leaning tree where the trunk is growing at an angle within 30°-45° from upright.

Critically Leaning A leaning tree where the trunk is growing at an angle greater than >45° from upright.

Progressively Leaning A tree where the degree of *leaning* appears to be increasing over time.

Static Leaning A leaning tree whose lean appears to have stabilized over time.

Periods of Time

Periods of Time The life span of a tree in the urban environment may often be reduced by the influences of encroachment and the dynamics of the environment and can be categorized as *Immediate*, *Short Term*, *Medium Term* and *Long Term*.

Immediate An *episode* or occurrence, likely to happen within a twenty-four (24) hour period, e.g. tree failure or collapse in full or part posing an imminent danger.

Short Term A period of time less than <1 – 15 years.

Medium Term A period of time 15 – 40 years.

Long Term A period of time greater than >40 years.

Roots

First Order Roots (FOR) Initial woody roots arising from the *root crown* at the base of the *trunk*, or as an *adventitious root mass* for structural support and *stability*. Woody roots may be buttressed and divided as a marked gradation, gradually tapering and continuous or tapering rapidly at a short distance from the root crown. Depending on soil type these roots may descend initially and not be evident at the root crown, or become buried by changes in soil levels. Trees may develop 4-11 (Perry 1982, pp. 197-221), or more first order roots which may radiate from the trunk with a relatively even distribution, or be prominent on a particular aspect, dependent upon physical characteristics e.g. leaning trunk, *asymmetrical* crown; and constraints within the growing *environment* from topography e.g. slope, soil depth, rocky outcrops, exposure to predominant wind, soil moisture, depth of *water table* etc.

Orders of Roots The marked divisions between woody roots, commencing at the initial division from the base of the trunk, at the *root crown* where successive branching is generally characterised by a gradual reduction in root diameters and each gradation from the trunk and can be categorized numerically, e.g. *first order roots*, second order roots, third order roots etc. Roots may not always be evident at the *root crown* and this may be dependent on species, age class and the growing environment. Palms at maturity may form an *adventitious root mass*.

Root Plate The entire root system of a tree generally occupying the top 300-600mm of soil including roots at or above ground and may extend laterally for distances exceeding twice the height of the tree (Perry 1982, pp. 197-221). Development and extent is dependent on water availability, soil type, *soil depth* and the physical characteristics of the surrounding landscape.

Root Crown Roots arising at the base of a trunk.

Zone of Rapid Taper The area in the *root plate* where the diameter of *structural roots* reduces substantially over a short distance from the *trunk*. Considered to be the minimum radial distance to provide structural support and *root plate* stability. See also *Structural Root Zone (SRZ)*.

Structural Roots Roots supporting the infrastructure of the *root plate* providing strength and *stability* to the tree. Such roots may taper rapidly at short distances from the *root crown* or become large and woody as with gymnosperms and dicotyledonous angiosperms and are usually 1st and 2nd order roots, or form an *adventitious root mass* in monocotyledonous angiosperms (palms). Such roots may be crossed and grafted and are usually contained within the area of *crown projection* or extend just beyond the *dripline*.

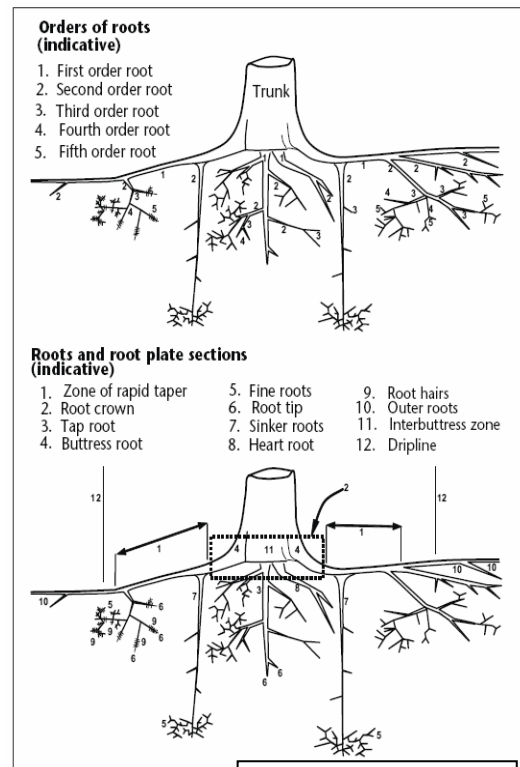


Figure 22 Orders of Roots.

Symmetry

Symmetry Balance within a *crown*, or *root plate*, above or below the *axis* of the trunk of branch and foliage, and root distribution respectively and can be categorized as *Asymmetrical* and *Symmetrical*.

Asymmetrical Imbalance within a crown, where there is an uneven distribution of branches and the foliage *crown* or *root plate* around the vertical *axis* of the trunk. This may be due to *Crown Form Codominant* or *Crown Form Suppressed* as a result of natural restrictions e.g. from buildings, or from competition for space and light with other trees, or from exposure to wind, or artificially caused by pruning for clearance of roads, buildings or power lines. An example of an expression of this may be, crown asymmetrical, bias to west.

Symmetrical Balance within a crown, where there is an even distribution of branches and the *foliage crown* around the vertical *axis* of the trunk. This usually applies to trees of *Crown Form Dominant* or *Crown Form Forest*. An example of an expression of this may be crown symmetrical.

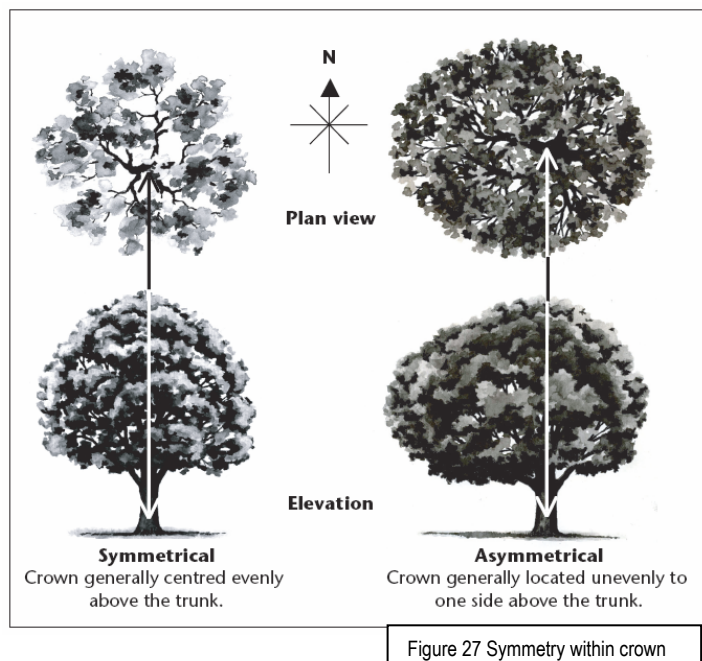


Figure 27 Symmetry within crown

Trunk

Trunk A single stem extending from the *root crown* to support or elevate the *crown*, terminating where it divides into separate *stems* forming *first order branches*. A trunk may be evident at or near ground or be absent in *acaulescent* trees of *deliquescent* habit, or may be continuous in trees of *excurrent* habit. The trunk of any *caulescent* tree can be divided vertically into three (3) sections and can be categorized as *Lower Trunk*, *Mid Trunk* and *Upper Trunk*. For a *leaning* tree these may be divided evenly into sections of one third along the trunk.

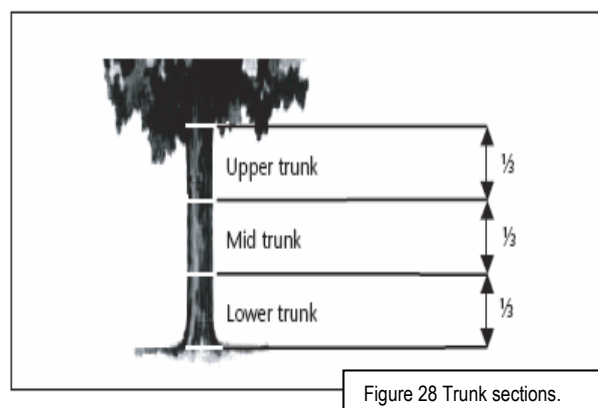
Acaulescent A *trunkless* tree or tree growth forming a very short *trunk*. See also *Caulescent*. (See Fig. 21)

Caulescent Tree grows to form a *trunk*. See also *Acaulescent*. (See Fig. 21)

Lower trunk Lowest, or *proximal* section of a trunk when divided into one-third ($\frac{1}{3}$) increments along its *axis*. See also *Trunk*, *Mid trunk* and *Upper trunk*.

Mid trunk A middle section of a trunk when divided into one-third ($\frac{1}{3}$) increments along its *axis*. See also *Trunk*, *Lower trunk* and *Upper trunk*.

Upper trunk Highest, or *distal* section of a trunk when divided into one-third ($\frac{1}{3}$) increments along its *axis*. See also *Trunk*, *Lower trunk* and *Mid trunk*.



Diameter at Breast Height (DBH) Measurement of trunk width calculated at a given distance above ground from the base of the tree often measured at 1.4 m. The trunk of a tree is usually not a circle when viewed in cross section, due to the presence of *reaction wood* or *adaptive wood*, therefore an average diameter is determined with a *diameter tape* or by recording the trunk along its narrowest and widest axes, adding the two dimensions together and dividing them by 2 to record an average and allowing the orientation of the longest axis of the trunk to also be recorded. Where a tree is growing on a lean the distance along the top of the trunk is measured to 1.4m and the diameter then recorded from that point perpendicular to the edge of the trunk. Where a *leaning* trunk is *crooked* a vertical distance of 1.4m is measured from the ground. Where a tree branches from a trunk that is less than 1.4m above ground, the trunk diameter is recorded perpendicular to the length of the *trunk* from the point immediately below the base of the flange of the *branch collar* extending the furthest down the trunk, and the distance of this point above ground recorded as *trunk length*. Where a tree is located on sloping ground the DBH should be measured at half way along the side of the tree to average out the angle of slope. Where a tree is *acaulescent* or *trunkless* branching at or near ground an average diameter is determined by recording the radial extent of the trunk at or near ground and noting where the measurement was recorded e.g. at ground.

Vigour

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 *Normal Vigour*, *High Vigour*, *Low Vigour* and *Dormant Tree Vigour*.

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 a stringent watering and fertilising program; or some trees may achieve an extended lifespan from continuous *pollarding* practices over the life of the tree.

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.

Appendix F

Survey of Subject Tree/s

Trees the subject of this report are marked on the plans in the following appendices and are numbered as listed below.

Redgum Tree No. / Stand No.	Genus and species	Common name	Recommendation
1	<i>Eucalyptus amplifolia</i>	Cabbage Gum	Retain and protect
2	<i>Eucalyptus tereticornis</i>	Forest Red Gum	Remove and replace
3	<i>Populus deltoides</i>	<i>Eastern Cottonwood</i>	Remove and replace
4	<i>Populus deltoides</i>	<i>Eastern Cottonwood</i>	Retain and protect
5	<i>Populus deltoides</i>	<i>Eastern Cottonwood</i>	Retain and protect
6	<i>Eucalyptus amplifolia</i>	Cabbage Gum	Retain and protect
7	<i>Populus deltoides</i>	Eastern Cottonwood	Retain and protect
8	<i>Populus deltoides</i>	Eastern Cottonwood	Remove and replace
9	<i>Populus deltoides</i>	Eastern Cottonwood	Remove and replace
10	<i>Populus deltoides</i>	Eastern Cottonwood	Remove and replace
11	<i>Eucalyptus amplifolia</i>	Cabbage Gum	Retain and protect
12	<i>Eucalyptus amplifolia</i>	Cabbage Gum	Retain and protect
13	<i>Eucalyptus amplifolia</i>	Cabbage Gum	Retain and protect
14	<i>Eucalyptus amplifolia</i>	Cabbage Gum	Retain and protect
15	<i>Eucalyptus amplifolia</i>	Cabbage Gum	Retain and protect
16	<i>Eucalyptus amplifolia</i>	Cabbage Gum	Retain and protect
17	<i>Eucalyptus amplifolia</i>	Cabbage Gum	Retain and protect
18	<i>Eucalyptus amplifolia</i>	Cabbage Gum	Retain and protect
19	<i>Eucalyptus amplifolia</i>	Cabbage Gum	Retain and protect
20	<i>Eucalyptus amplifolia</i>	Cabbage Gum	Retain and protect
21	<i>Eucalyptus amplifolia</i>	Cabbage Gum	Retain and protect
22	<i>Eucalyptus amplifolia</i>	Cabbage Gum	Retain and protect
23	<i>Eucalyptus amplifolia</i>	Cabbage Gum	Retain and protect
24	<i>Eucalyptus amplifolia</i>	Cabbage Gum	Retain and protect
25	<i>Eucalyptus amplifolia</i>	Cabbage Gum	Retain and protect
26	<i>Eucalyptus amplifolia</i>	Cabbage Gum	Retain and protect
27	<i>Eucalyptus amplifolia</i>	Cabbage Gum	Retain and protect
28	<i>Eucalyptus amplifolia</i>	Cabbage Gum	Retain and protect
29	<i>Eucalyptus amplifolia</i>	Cabbage Gum	Retain and protect
30	<i>Eucalyptus amplifolia</i>	Cabbage Gum	Retain and protect
31	<i>Eucalyptus amplifolia</i>	Cabbage Gum	Retain and protect
32	<i>Eucalyptus amplifolia</i>	Cabbage Gum	Retain and protect
33	<i>Eucalyptus amplifolia</i>	Cabbage Gum	Retain and protect
34	<i>Eucalyptus amplifolia</i>	Cabbage Gum	Retain and protect
35	<i>Eucalyptus amplifolia</i>	Cabbage Gum	Retain and protect
36	<i>Eucalyptus amplifolia</i>	Cabbage Gum	Retain and protect
37	<i>Eucalyptus amplifolia</i>	Cabbage Gum	Retain and protect
38	<i>Eucalyptus amplifolia</i>	Cabbage Gum	Retain and protect
39	<i>Eucalyptus amplifolia</i>	Cabbage Gum	Retain and protect
40 / 2	<i>Ficus macrocarpa</i> x19	Morton Bay Fig	Retain and protect – <i>Neighbouring trees</i>
40 / 2	<i>Ficus macrocarpa</i> x7	Morton Bay Fig	Remove and replace
41	<i>Corymbia citriodora</i>	Lemon Scented Gum	Retain and protect – <i>Neighbouring tree</i>
42	<i>Ficus benjamina</i>	Weeping Fig	Retain and protect – <i>Neighbouring tree</i>
43	<i>Jacaranda mimosifolia</i>	Jacaranda	Retain and protect – <i>Neighbouring tree</i>
44 / 3	<i>Eucalyptus</i> sp. x88	Eucalypt	Remove and replace
45 / 4	<i>Eucalyptus</i> sp. x9	Eucalypt	Remove and replace
46	<i>Melaleuca linariifolia</i>	Snow in Summer	Remove and replace
47	<i>Eucalyptus</i> sp.	Eucalypt	Remove and replace
48	<i>Eucalyptus</i> sp.	Eucalypt	Remove and replace
49 / 5	<i>Pyrus ussuriensis</i> x3	Manchurian Pear	Remove and replace
50 / 6	Group 3 (Elke Haege 2017 AIA)	Ironbark, Smoothbark & Stringybark	Retain and protect

Table 2.0 This table only applies to trees being retained. Tree Protection Zone fencing locations as measured from the centre of each tree and the recommended distances for the side closest to the building construction works e.g. excavation (see explanatory notes below). Tree Protection Zone fences and setbacks where applicable are indicated in Appendix F.

1. Redgum Tree No. / Redgum Stand No.	2. Structural Root Zone SRZ (DARB) From centre of trunk (COT) Diameter Above Root Buttress AS4970 2009 Section 3, 3.3.5 (see Appendix D) where applicable (Minimum 1.5 metres)	3. Trunk Diameter at Breast Height DBH 1.4m above ground, AS4970 2009, or mm or m above ground where indicated. # = average. g = ground	4. Tree Protection Zone (TPZ) = 12 x DBH From centre of trunk (COT) in metres AS4970 2009 Section 3 (see Appendix D) (Minimum 2.0 metres)	5. Proposed distance of tree protection fence/works on the side closest to building construction ² , in metres by Redgum Horticultural.
1	3.0	800	9.6	4.5 (retaining wall-compression side)
4	3.0	800	9.6	9.1 (0.1% basement)
5	3.0	800	9.6	8.7 (1.7% basement)
6	3.0	800	9.6	9.6
7	3.2	900	10.8	7.7 (8.8% basement)
11	2.8	700	8.4	2.6 gabion wall
12	2.9	710 (2x500)	8.5	0.6 gabion wall
13	2.5	#530 (400x350)	6.4	1.7 gabion wall
14	2.7	600	7.2	5.2 gabion wall
15	3.3	1000	12.0	3.3 gabion wall
16	2.0	300	3.6	2.7 gabion wall
17	2.0	300	3.6	1.8 gabion wall
18	2.8	700	8.4	2.4 gabion wall
19	2.5	500	6.0	2.3 gabion wall
20	1.9	280 (2x200)	3.4	2.3 gabion wall
21	3.2	900	10.8	5.0 gabion wall
22	3.0	800	9.6	2.5 gabion wall
23	2.0	300	3.6	7.0 gabion wall
24	2.7	600	7.2	2.5 gabion wall
25	3.2	900	10.8	5.5 gabion wall
26	3.0	800	9.6	2.0 gabion wall
27	2.7	600	7.2	3.5 gabion wall
28	3.2	900	10.8	1.7 gabion wall
29	1.5 #25	100	2.0#22	1.0 gabion wall
30	3.2	900	10.8	4.0 gabion wall
31	1.5 #25	100	2.0#22	4.0 gabion wall
32	3.9	1500	15.0 #23	1.6 gabion wall
33	2.3	400	4.8	3.6 gabion wall
34	1.5 #25	100	2.0#22	3.6 gabion wall
35	2.5	500	6.0	3.7 gabion wall
36	1.8	250	3.0	4.6 gabion wall
37	1.5 #25	100	2.0#22	3.7 gabion wall
38	2.1	350	4.2	5.1 gabion wall
39	2.0	300	3.6	4.1 gabion wall
40/2	1.7	#200	2.4	2.4
41	2.8	700	8.4	8.4
42	3.3	1000	12.0	11.5 (0.5% boundary)
43	3.2	900	10.8	10.8
50/6	1.6 to 2.3	180 to 400	2.1 to 4.0	5.0

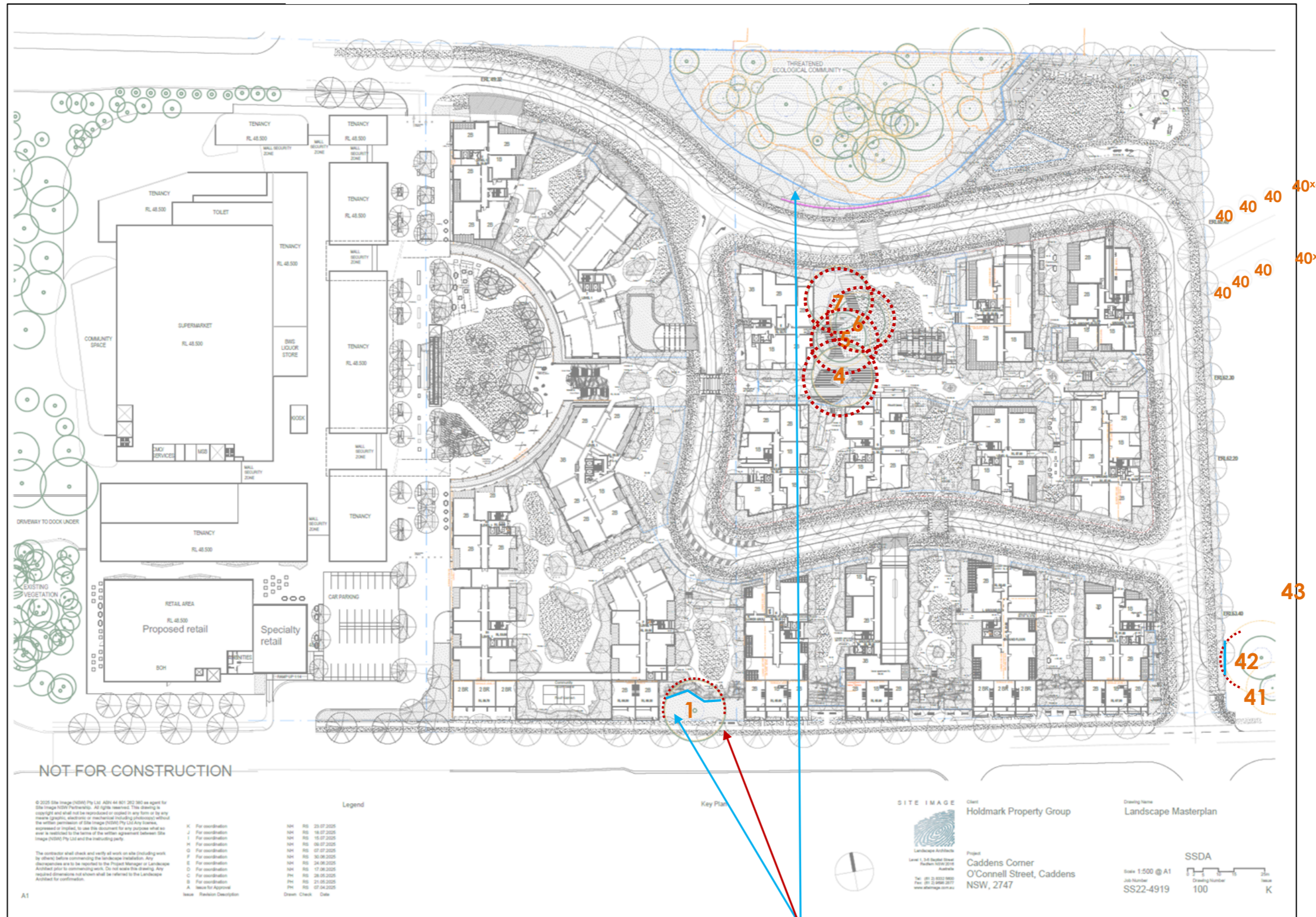
<p>Descriptors for modified setbacks as per above table.</p> <ol style="list-style-type: none"> 1 Special conditions apply to protect the roots of trees generally. 2 Additional protective fencing information is detailed in attached plans. 3 Acceptable due to the good relative tolerance of the species to development impacts. 4 Range of setbacks for the trees at each end of a linear stand are to be calculated if required. 5 Acceptable as fence located at a substantial distance beyond dripline or may also include the location of a smaller tree in proximity to a larger tree to be retained and the smaller tree being protected well within the protective fencing for that larger tree. 6 Acceptable due to additional special protection works, see Section 5.0 for this tree. 7 Acceptable as pre-existing site conditions were conducive to having restricted the development of root growth in this direction. 8 Street tree with protective fencing of minimal width to allow for pedestrian access along road reserve. 9 Acceptable as tree transplanted reducing the area of the root zone. 10 Acceptable as not effected by development works. 11 Young tree not expected to have established a substantially expansive root system and able to re-establish or modify growth to be sustainable due to age and good vigour. 12 Set back prescribed by the consent authority. 	<ol style="list-style-type: none"> 13 Acceptable as tree growing on a lean and encroachment on compression wood side where root growth is of reduced structural importance. 14 Acceptable as root mapping has indicated extent of structural woody roots with a diameter of 20 mm or more. 15 Acceptable as a specimen of palm taxa tolerant of encroachment. 16 Acceptable as excavation on down slope or across slope side of tree. 17 Acceptable as encroachment into growing area below ground minor, with one corner of building or excavation works extending to within the radius of the dripline. 18 Acceptable as encroachment by pier, including screw piles, with minimal disturbance. 19 Acceptable as encroachment above grade without excavation or sub-base compaction. 20 Acceptable as located within 0.5 m from edge of dripline. 21 Acceptable as encroachment with gap graded fill that can accommodate gaseous exchange between roots/soil and the atmosphere and ongoing root growth. 22 Minimum setback 2 m, AS4970 (2009) section 3, 3.2. 23 Maximum setback 15 m, AS4970 (2009) section 3, 3.2. 24 Tree is a palm, other monocot, cycad or tree fern TPZ is to be 1 m outside crown projection AS4970 (2009) section 3, 3.2. 25 Minimum Structural Root Zone (SRZ) for trees less than 0.15 m diameter is 1.5 m, AS4970 (2009) section 3, 3.5.
<p>Explanatory notes for Table 4.0.</p> <p>This table is based upon Australian Standard AS4970 2009 <i>Protection of trees on development sites</i>, Section 3 Determining the protection zone of the selected trees (see Appendix D), where the approved building works should be no closer, including excavation, than the dimensions stated above.</p> <p>“3.3 Variations to the TPZ</p> <p>3.3.2 Minor Encroachment - <i>If the proposed encroachment is less than 10% of the area of the TPZ and is outside the SRZ, detailed root investigations should not be required. The area lost to this encroachment should be compensated for elsewhere and contiguous with the TPZ.</i></p>	<p>3.3.3 Major Encroachment</p> <p><i>If the proposed encroachment is greater than 10% of the area of the TPZ or inside the SRZ the project arborist must demonstrate that the tree(s) would remain viable. The area lost to this encroachment should be compensated for elsewhere and contiguous with the TPZ.”</i></p>

Appendix F

Site Plan B - Survey of Trees to be Retained and Tree Protection Plan

Plan reproduced by email and further reduced by electronic scanning and no longer to original scale. For other tree protection measures see sections 5.0 and 7.0.

All Tree Protection Zones are to be measured on site.



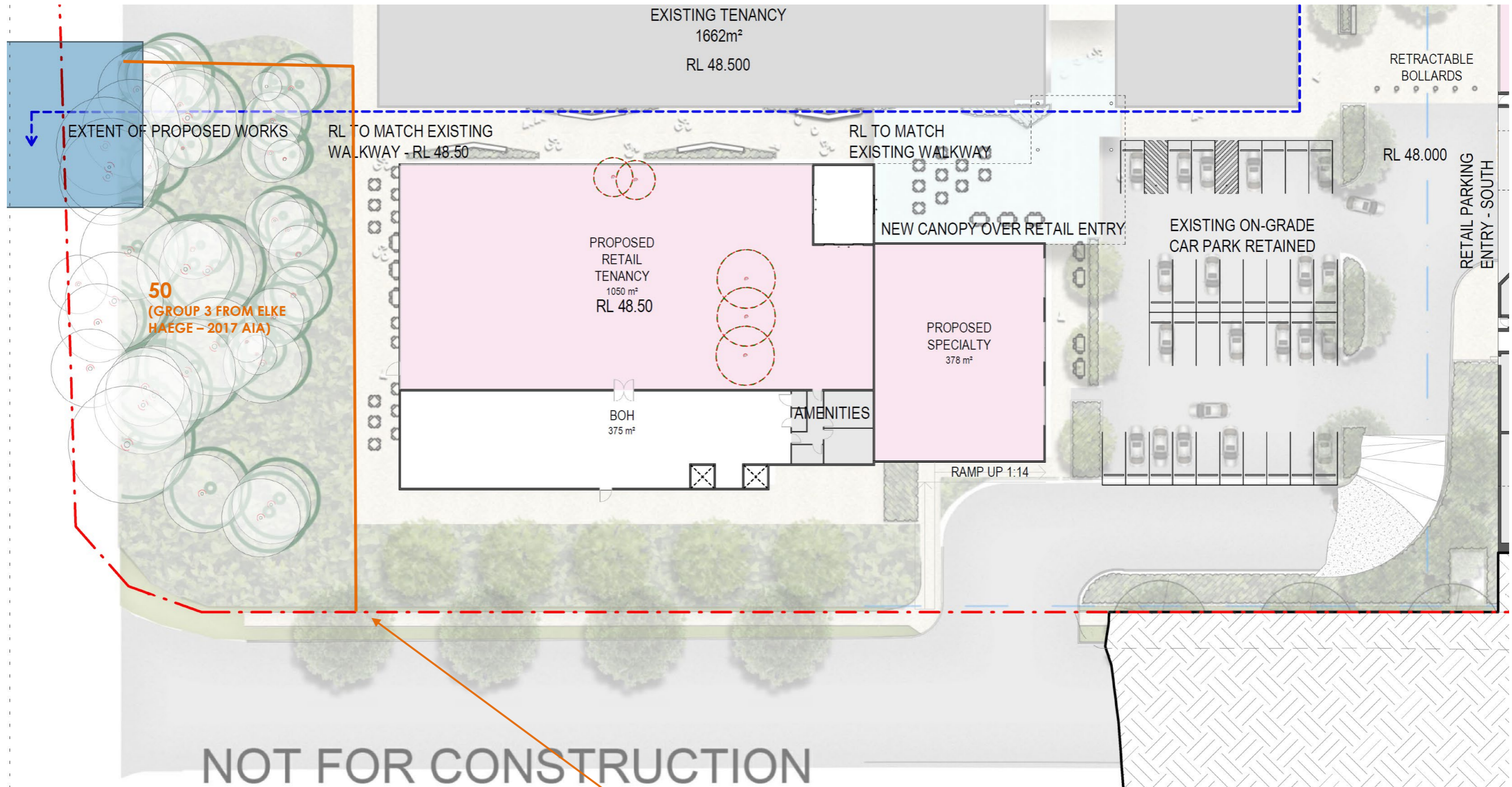
Redgum Legend

- **Tree Protection Zone (TPZ)**, fencing with setbacks as indicated, or other protection measures or works as indicated.
- - - - - **Tree Protection Zone**, area of special protection measures or works outside of fenced area.
- Relocated **Tree Protection Zone**, area of special protection measures or works outside of fenced area once construction commences.
- XX** Tree numbers – trees to be retained only.
Subject trees represented by the approximate location of the trunk.

Indicative location of Tree Protection fencing which is to be measured on site and positioned along the Tree Protection Zone, excavation zone or proposed building footprint and to remain installed for the duration of the development. Installation of boundary fences within rootzone to be of pier and beam construction. Red dotted Tree Protection around trees relates to relocation of fencing when construction is to be undertaken within these areas. All works to be carried out within the blue Tree Protection area after works commences is to be undertaken in consultation with site arboriculturist.

Appendix F

Site Plan B - Survey of Trees to be Retained and Tree Protection Plan
 Detail Survey by H. Ramsay & Co. Sheet 5 of 7, Job Ref: 8966, Dated 10/04/2025
 Overlaid with snip from Site Plan by Group GSA Pty Ltd Issue P1, Dated 04/07/2025
 To show impact to trees in Southwest of site by proposed works



Redgum Legend	
	Tree Protection Zone (TPZ) , fencing with setbacks as indicated, or other protection measures or works as indicated.
	Tree Protection Zone , area of special protection measures or works outside of fenced area.
	Relocated Tree Protection Zone , area of special protection measures or works outside of fenced area once construction commences.
	Tree numbers – trees to be retained only. Subject trees represented by the approximate location of the trunk.
	Indicative location of Tree Protection fencing which is to be measured on site and positioned along the Tree Protection Zone, excavation zone or proposed building footprint and to remain installed for the duration of the development. Installation of boundary fences within rootzone to be of pier and beam construction. Red dotted Tree Protection around trees relates to relocation of fencing when construction is to be undertaken within these areas. All works to be carried out within the blue Tree Protection area after works commences is to be undertaken in consultation with site arboriculturist.