

Arboricultural Impact Assessment

For

Formus Miranda P/L

Location

23 Kiora Road & 2 – 6 Willock Ave, Miranda,
NSW

Prepared by:

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PI/ PL Insurance (2023 – 5M/20M)

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This firm is not financially affiliated nor does it have a business relationship with any tree removal/pruning company

Prepared on – 28/8/23



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Abbreviations & Terms

AQF5	Australian Qualification Framework, Level 5
AS4970 -2009	Australian Standards 4970 - 2009, Protection of trees on development sites
DBH	Diameter at Breast Height – measured at 1.4m from ground level
Direct Impacts	Impacts such as the footprint, strip footings, services, cut/ fill, concrete slabs, trenches etc that directly impact the tree canopy above and or below ground
Indirect Impacts	Impacts where the tree/s may be subjected to/by deliveries, stockpiling, preparation of building products, site sheds/ toilets etc.
LGA	Local Government Authority
SRZ	Structural Root Zone
TPZ	Tree Protection Zone

Version	date	by
1	28/8/23	CK

Disclaimer

The trees referred to in this report were living entities and are therefore subject to natural processes. They will be also be subject to changes to their environment caused by human activities, and to ever changing weather conditions.

Sydney Landscape Consultants inspection for this report was ground based and hidden defects which are not readily visible may not be detected and therefore we cannot wholly guarantee the condition and safety of the trees inspected. We recommend regular inspections by minimum qualified AQF level 5 Arborist.

Plans and material referenced within this assessment have been utilised only as provided to our firm in aiding the assessment for the subject site. Our firm cannot be held liable for any superseded or amended plans or reports, that our firm were not provided with.

Our firm provides unbiased Arboricultural Reports based on industry best practice, accreditation, research, site specific facts and the condition of trees, whilst being independent in decision making relating to the retention and or removal of trees. Our assessments are grounded in ensuring the safety of human life, wellbeing of structures, property and environment in accordance with local, State and Federal Governmental policies.

This report does not constitute a report unless all page numbers are sequenced and read in conjunction as a sequenced report for the subject site, assessed.

1. Summary

This report has been compiled on behalf of the Formus Miranda P/L, relating to an Arboricultural Impact Assessment for the subject site, being 23 Kiora Rd, Miranda, NSW.

This Arborist report refers to Eighteen (18) trees, being located wholly within the site, adjacent sites and those trees upon Councils Street verge. This report will analyse the trees' location, condition, Tree Protection Zone, Structural Root Zone, retention values and any encroachment/s that any proposed footprint/s and associated structures may have on all trees assessed within this report.

A Root Mapping Assessment was conducted, to understand what impacts the basement may have on the rooting environment, fronting tree 8, Councils Street tree.

The author (Craig Kenworthy) of this report recommends:

- Trees 1, 2, 3, 4, 5, 8, 13 and 15 to be retained and protected (8) trees.
- Trees 6, 7, 9, 10, 11, 12, 14, 16, 17 and 18 are recommended to be removed (10) and replaced within the site to offset those lost, and the ability to provide a better landscape outcome within the site, that currently exists.
- Tree 11 has been proposed to be removed as its location conflicts with the proposed driveway and is a total loss under this proposal. The opportunity to retain this tree and discussions with the stakeholders, decided that for the entire project to work, this location was the best option. Furthermore, the existing brick wall fronting tree 11, is severally, structurally compromised and dangerous and can be assumed that tree roots have caused this, with changing levels inside the site compared to Councils Street verge levels.
An opportunity exists in the location of the existing driveway fronting Willock Ave asphalted carpark, to plant a new *Lophostemon confertus* tree at minimum 100 litre pot/bag, to offset the loss of tree 11.
- Minor pruning to trees 5 and 8, outer Southern canopy that may conflict with scaffolding and possible building footprint. Attendance prior and during pruning by an AQF 5 Arborist to supervise.
- Attendance and guidance by the engaged AQF 5 Arborist, for all excavations within the TPZs of all trees proposed to be retained.
- No stormwater or service plans have been provided. It is recommended all piping be outside trees TPZ. If this cannot be achieved, all stormwater and service piping proposed within any trees TPZ, must be either hand dug or non-destructive methods of excavation such as Hydro vac, Air spade or underground boring, used. No machinery excavator trenching buckets or chain trenchers are permitted within any trees TPZ.
- Tree Protection measures, monitoring and Certification all in accordance with AS4970 – 2009, Section 4 and Section 5, that have been signed off by the Consulting AQF 5 Arborist.

2. Introduction

Sydney Landscape Consultants have been engaged to assess the trees that may be impacted by the proposed works upon the site, adjacent sites and Councils Street trees. The information within this report, allows Sutherland Council to understand the trees that may be impacted by the proposal, with recommendations as to best mitigate impacts to those trees assessed.

3. Methodology

For the purposes of this report, a Visual Tree Assessment (VTA) method of evaluating structural defects and stability in trees (Mattheck and Breloer, 1994) was undertaken. All inspections were completed from the ground only. No level 3 diagnostic devices were used on the subject trees. Works forming part of this visual assessment include;

- Entering the subject site, 17/3/23 to walk around and measure trees DBH, with close inspections of trunk, root, branching and canopy conditions.
- Plotting all the trees assessed, upon the plans provided and included several that were not addressed within several plans.
- Address all trees as per Sutherland Councils Tree Management Policy, NATURAL RESOURCE MANAGEMENT DCP 2015 CHAPTER 39.
- All trees assessed appear upon the Tree Location and Protection Plan provided within this report (A4) and separately upon an A3 scaled drawing.
- TPZs are calculated and correlated against the proposed structures upon the site, shown upon plans.
- A root mapping assessment, 18/8/23, being a level 3 Assessment, was used to understand the impacts to tree 8, located on Willock Avenue.

Tree diameter, Diameter at Breast Height (DBH) measured at 1.4m above ground level and recorded in metres, using Australian Standard, *Protection of trees on development sites – AS4970 – 2009*, Appendix A.

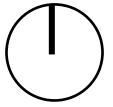
Any recommended work relating to pruning and or recommendation / mitigation shall be in accordance with Australian Standard, *Pruning of Amenity trees – AS4373 – 2007*.

Heights of trees taken using a Nikon Forestry 500 Clinometer and measured in Metres, whilst views were obstructed, estimation of several trees had to occur due to limited viewing and aspect of several tree heights.

All trees have been identified from the site visit conducted and with the aid of the Basement plan (01, Arborist Consultation Coordination – Dwg No – PP - 130-001) and Ground Level plan, Arborist Consultation Coordination - Dwg No - PP-130-000)

Survey Plan by Lawrence Group, Dwg – DETL – 001/A, dated 17/06/16

All photographs that appear within this report were taken on the day of the 17th, March and 18th August, 2023.



4. Site Locality



23 Kiora Rd, Miranda (sixmaps.com.au)

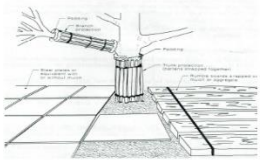
Boundaries illustrative only

5. Tree Location & Protection Plan

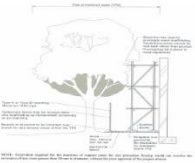
Do not scale from A4 page. Only print and scale from the A3 Tree Location & Protection Plan provided, additional to this report. The A3 plan must be kept on site for all to understand and adhere to.



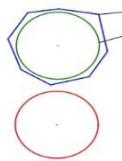
Tree protection fencing for trees; 2, 3, 4, 5, 8



Tree protection padding for trees 1 and 8



Scaffolding requirements as per AS4970 - 2009, Section 4.5.6



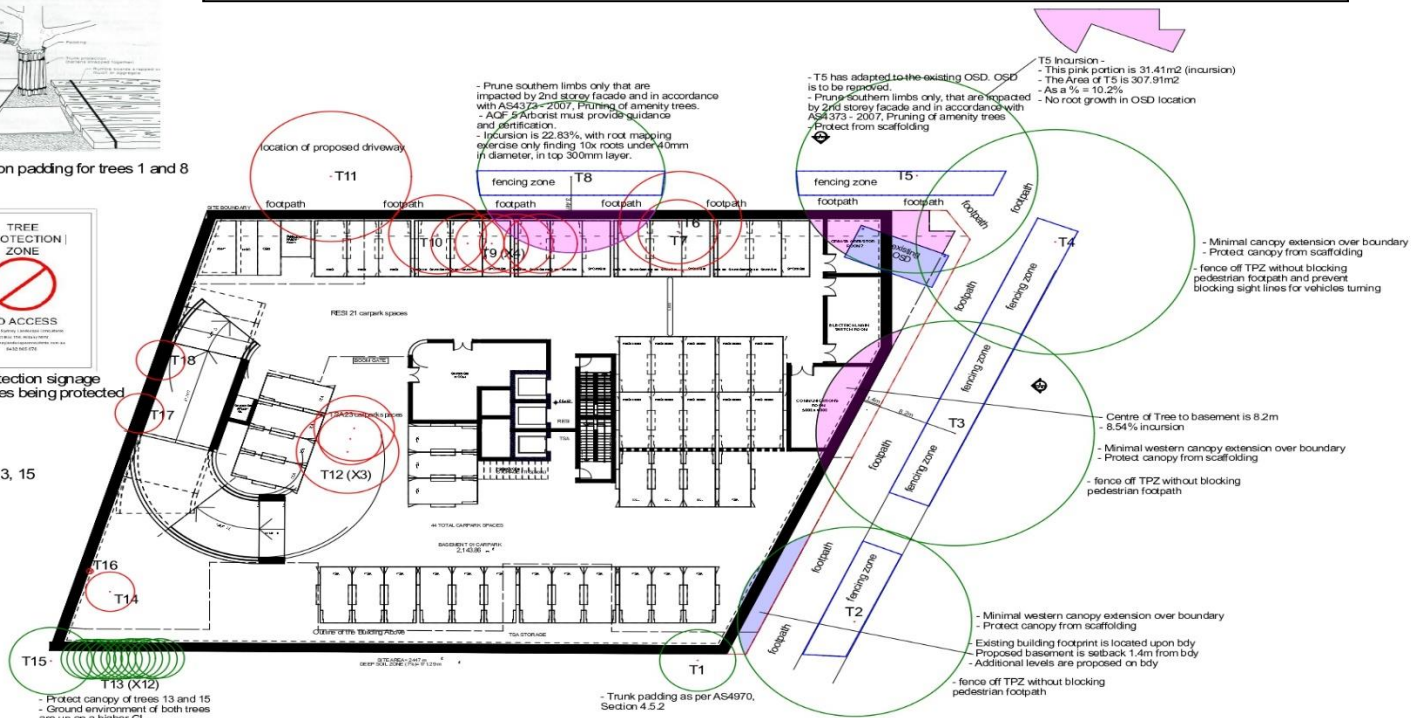
- Trees protection fencing
- Tree Protection Zone
- Trees proposed for retention - 1, 2, 3, 4, 5, 8, 13, 15
- Trees proposed for removal - 6, 7, 9, 10, 11, 12, 14, 16, 17, 18

Tree schedule -

- T1 - *Syagrus romanzoffiana* - TPZ = 3.12m - retain
- T2 - *Cinnamomum camphora* - TPZ = 9.6m - retain
- T3 - *Lophostemon confertus* - TPZ = 11.4m - retain
- T4 - *Cinnamomum camphora* - TPZ = 11.4m - retain
- T5 - *Lophostemon confertus* - TPZ = 9.9m - retain
- T6 - *Phoenix canariensis* - TPZ = 5m - remove
- T7 - *Cedrus deodora* - TPZ = 3.24m - remove
- T8 - *Lophostemon confertus* - TPZ = 7.7m - retain
- T9 (x4) - *Murraya paniculata* - TPZ = 3m - remove
- T10 - *Syagrus romanzoffiana* - TPZ = 4m - remove
- T11 - *Lophostemon confertus* - TPZ = 6.6m - remove
- T12 (x3) - *Syzygium australe* - TPZ = 3.3, 2.6, 4.2 - remove
- T13 (X12) - *Callistemon viminalis* - TPZ = 2m - retain
- T14 - *Schefflera actinophylla* - TPZ = NA - Exempt
- T15 - *Syzygium australe* - TPZ = 3.4m - retain
- T16 - Dead - remove
- T17 - *Camellia japonica* - TPZ = 2m - remove
- T18 - *Camellia japonica* - TPZ = 2m - remove



Tree Protection signage for all trees being protected



Hold points prior, during and after all works have been completed are recommended to be implemented.

SYDNEYLANDSCAPECONSULTANTS
 AQF 5 Consulting Arborists & Horticulturists
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 0432 965 678



Drawing Title: **Tree Location and Protection Plan**

CLIENT: **Formus Property Pty Ltd**
Formus Property

Project Title: **Kiara Road, Miranda**
23 Kiara Road Miranda NSW 2228 Australia

Scale : 1:400 @A3
Dwg: CK
Date: 8/9/23



the Basement 01 Plan by Turner Architects was used for this Tree Location and Protection

6. Findings

The subject site currently has several aged buildings, an asphalt and gravelled car park, with several sheds and structures scattered around the site.

All existing structures upon the site are aged and single storey. The buildings surrounding and upon adjacent sites are multi-storey relatively new buildings, with hard structures abutting their boundaries.

The Basement plan denotes basement walling and excavations to 4x boundaries of the site.

The proposed driveway into the site is proposed along Willock Avenue, North West corner.

Trees 2, 3 and 4 fronting the site upon Kiora Road, are understood to be of Heritage value and noted within this report and snippet below;

Street trees, alternate planting of <i>Lophostemon confertus</i> (Brush Box) and <i>Cinnamomum camphora</i> (Camphor Laurel)	Kiora Road	MGA Zone 56, 324920°E, 6232620°N	Local	3102
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Tree 2, *Cinnamomum camphora*, has been assessed from the initial site visit as displaying of low vigour and thinning canopy. From the second site visit (18/8/23) whilst undertaking the root mapping assessment, it was observed, that this tree has declined further with an increase in thinning canopy and an increase in evidence, of possum chewing new leaf and possum faeces on the ground, under the canopy.

Tree 5, *Lophostemon confertus*, growing upon Willock Avenue is approx. 3m from the boundary of this site. Within the site and close to the boundary corner, is an existing underground OSD tank. This tank is approx. 7.8m wide, longitudinally, several metres deep and approx. 6m from this tree and therefore can be assumed that no roots from tree 5 exist past this tank, into the site. Tree 5 has adapted to this OSD tank being built within its TPZ.

Tree 8, *Lophostemon confertus* has an approx. incursion of 24% into its TPZ of 7.7m and therefore a root mapping assessment was conducted on the 18/8/23. A total of 10x roots have been exposed in depths of 300mm, that constituted impregnable soil and hard pan clay. (See Appendix 10.5)

This report will address the Eighteen (18) trees' condition, significance, retention values and assess the impact on all trees that may be impacted either directly or indirectly by the proposed works

6.1 Vegetation assessed

The subject trees relating to this report are as follows and locations are shown upon the Tree Location and Protection Plan:

Tree 1) ***Syagrus romanizoffiana* – Cocos Palm** – Located within adjacent site, No 25- 27 Kiora Rd.

Tree 2) ***Cinnamomum camphora*** – **Camphora Laurel** - Located upon Councils Street verge, fronting Kiora Road.

Tree 3) ***Lophostemon confertus*** – **Qld Brushbox** - Located upon Councils Street verge, fronting Kiora Road.

Tree 4) ***Cinnamomum camphora*** – **Camphora Laurel** - Located upon Councils Street verge, fronting Kiora Road.

Tree 5) ***Lophostemon confertus*** – **Qld Brushbox** - Located upon Councils Street verge, fronting Willock Road.

Tree 6) ***Phoenix canariensis*** – **Canary Island Date Palm** – Located within site, close to front boundary of Willock Road.

Tree 7) ***Cedrus deodora*** – **Deodar Cedar** – Located within site, close to front boundary of Willock Road. Very close to tree 6.

Tree 8) ***Lophostemon confertus*** – **Qld Brushbox** - Located upon Councils Street verge, fronting Willock Ave.

Tree 9) ***Murraya paniculata*** – **Orange Jessamine** – Located within site, close to Willock Ave, midway across the site.

Tree 10) ***Syagrus romanizoffiana*** – **Cocos Palm** - Located within site, fronting Willock Ave.

Tree 11) ***Lophostemon confertus*** – **Qld Brushbox** - Located upon Councils Street verge, fronting Willock Ave.

Tree 12) ***Syzygium australe*** – **Brush Cherry** – Located within site, middle of site.

Tree 13 (x12) ***Callistemon viminalis*** - **Bottlebrush** - Located within adjacent site, No 25 - 27 Kiora, above basement.

Tree 14) ***Schefflera actinophylla*** – **Umbrella Tree** - Located within site, rear South West Corner.

Tree 15)– ***Syzygium australe*** – **Brush Cherry** - Located within adjacent site corner, No 25 - 27 Kiora, above basement.

Tree 16) - **Dead** - Located within site, rear South West Corner.

Tree 17) – ***Camellia japonica*** – **Japanese Camellia** - Located within site, West boundary.

Tree 18) - ***Camellia japonica*** – **Japanese Camellia** - Located within site, west boundary.

6.2 Tree Assessment

Tree no	Species	Height (M)	Crown Spread (M) N S E W	DBH (M)	Live Crown Ratio %	Vigour/structure	Age Class	TPZ M	SRZ M DAB	SULE	RET VALUE	STARS	Recommendations
1	<i>Syagrus romanizoffiana</i>	8	2, 2, 2, 2	.260	90%	Good/fair	mature	3.12	2	2d	low	low	Retain tree, neighbours palm, growing up upon podium levels.
Mature tree, palm with crown form dominant, radial crown habit and form. Growing between an OSD tank and retaining wall, next door, GLs are a min .800mm higher than subject site.													
Tree no	Species	Height (M)	Crown Spread (M) N S E W	DBH (M)	Live Crown Ratio %	Vigour/Structure	Age Class	TPZ M	SRZ M DAB	SULE	RET VALUE	STARS	Recommendations
2	<i>Cinnamomum camphora</i>	10	9, 6.5, 8, 7.5	.800	50%	Low/low	Mature	9.6	3.44	3d	Med	Med	Retain tree, although concerns to its health and vigour are questionable. Heritage tree
Mature tree, crown form dominant, with very high volumes of deadwood. Tree's leaf to canopy ratio is poor with a lack of vigour present. High volume of chewed young new fresh leaf, suspected Possum attack, with possum faeces evident on ground surrounding tree. Raised GLs surrounding, surface roots exposed, past pruning evidenced. Tree is highly constrained by structures to the East and south. Several other trees upwards of street are in same condition.													
Tree no	Species	Height (M)	Crown Spread (M) N S E W	DBH (M)	Live Crown Ratio %	Vigour/structure	Age Class	TPZ M	SRZ M DAB	SULE	RET VALUE	STARS	Recommendations
3	<i>Lophostemon confertus</i>	10	6.5, 7, 6, 6.5	.950	80%	Fair/good	Mature	11.4	3.57	2a	high	high	Retain tree and protect. Heritage tree
Mature tree, crown form dominant, single trunk to 1.6m then a minimum of 8x first order stems forming canopy of tree. Raised GLs surrounding, surface roots exposed, Medium volumes of deadwood, dieback in canopy present, epicormic shoots noticed.													
Tree no	Species	Height (M)	Crown Spread (M) N S E W	DBH (M)	Live Crown Ratio %	Vigour/structure	Age Class	TPZ M	SRZ M DAB	SULE	RET VALUE	STARS	Recommendations
4	<i>Cinnamomum camphora</i>	9	8, 7, 3, 7.5	.950	50%	Low/fair	mature	11.4	3.2	3d	low	med	Retain tree, although concerns to its health and vigour are questionable. Heritage tree
Mature tree, crown form dominant, with constrained growing environment close to corner of main roads. Raised GLs surrounding predominantly East and North, several large surface roots exposed, Canopy East conflicts with overhead powerlines and clearance distances. Tree in decline with several epicormic shots having died.													
Tree no	Species	Height (M)	Crown Spread (M) N S E W	DBH (M)	Live Crown Ratio %	Vigour/structure	Age Class	TPZ M	SRZ M DAB	SULE	RET VALUE	STARS	Recommendations
5	<i>Lophostemon confertus</i>	10	5, 5, 6, 5.5	.830 (2x cdmt)	90%	Good/fair	Mature	9.9	3.24	2d	high	high	Retain tree and protect
Mature tree, crown form dominant with single trunk to 900mm, then codominant trunks forming canopy of tree. Growing within a constrained ground environment close to drainage infrastructure, surface roots exposed East, dieback of canopy and medium volumes of deadwood spread evenly throughout canopy.													

Tree no	Species	Height (M)	Crown Spread (M) N S E W	DBH (M)	Live Crown Ratio %	Vigour/structure	Age Class	TPZ M	SRZ M DAB	SULE	RET VAL	STARS	Recommendations
6	<i>Phoenix canariensis</i>	8	4, 4, 4, 4	.750	90%	poor/fair	Semi Mature	9*	3.31*	3d	low	low	Remove palm
Large semi mature palm, crown form suppressed slightly, canopy raised as over driveway, growing within a dilapidated raised timber garden bed, with masonry walling East side. * Palm - monocot with not a typical TPZ/SRZ.													
Tree no	Species	Height (M)	Crown Spread (M) N S E W	DBH (M)	Live Crown Ratio %	Vigour/structure	Age Class	TPZ M	SRZ M DAB	SULE	RET VALUE	STARS	Recommendations
7	<i>Cedrus deodora</i>	10	2, 1.5, 1.5, 2	.270	30%	low/poor	young	3.24	2.1	3d	low	low	Remove suppressed, etiolated tree.
Young tree crown form suppressed / emergent, growing very close to tree 6 within a raised garden bed. Very little lower and mid canopy, majority upper, high volumes of deadwood, trunk lean west at base and arching up through tree 6 and correcting itself.													
Tree no	Species	Height (M)	Crown Spread (M) N S E W	DBH (M)	Live Crown Ratio %	Vigour/structure	Age Class	TPZ M	SRZ M DAB	SULE	RET VALUE	STARS	Recommendations
8	<i>Lophostemon confertus</i>	11	4, 4.5, 4, 5.5	.644 4x dmt	90%	Fair/fair	Mature	7.7	3.1	2d	med	med	Retain tree and protect
Mature tree, crown form dominant, Councils Street tree, growing close to kerbing. Medium volumes of deadwood evenly throughout canopy, epicormics shoots present internally with several small girdled roots at base, East side. Approx 10x roots found at 3.1m South of trunk and on Basement alignment with no roots over 40mm.													
Tree no	Species	Height (M)	Crown Spread (M) N S E W	DBH (M)	Live Crown Ratio %	Vigour/structure	Age Class	TPZ M	SRZ M DAB	SULE	RET VALUE	STARS	Recommendations
9	<i>Murraya paniculata (x4)</i>	4	2, 2.5, 1, 1	Multi trunked	95%	Fair/fair	Mature	3*	2*	3c	low	low	Remove 4x planted small trees
Mature planted 4x small trees as a previous privacy screen. Multistemmed hedge row, growing atop of embankment. *Estimated													
Tree no	Species	Height (M)	Crown Spread (M) N S E W	DBH (M)	Live Crown Ratio %	Vigour/structure	Age Class	TPZ M	SRZ M DAB	SULE	RET VALUE	STARS	Recommendations
10	<i>Syagrus romanizoffiana</i>	8	2.5, 2.5, 2.5, 2.5	.300	100%	Good/good	mature	4	2m	4e	low	low	Remove palm, exempt Spp
Exempt Spp													
Tree no	Species	Height (M)	Crown Spread (M) N S E W	DBH (M)	Live Crown Ratio %	Vigour/Structure	Age Class	TPZ M	SRZ M DAB	SULE	RET VALUE	STARS	Recommendations
11	<i>Lophostemon confertus</i>	10	5, 5, 3.5, 4	.550	80%	fair/fair	Mature	6.6	2.76	2d	med	med	Remove tree, conflicts with driveway location.
Mature tree, crown form dominant, Single trunk to 1.7m, then 3x 1 st order stems forming canopy of tree, surface roots exposed, dieback in canopy, canopy westward is conflicting with overhead wires.													

Tree no	Species	Height (M)	Crown Spread (M) N S E W	DBH (M)	Live Crown Ratio %	Vigour/structure	Age Class	TPZ M	SRZ M DAB	SULE	RET VALUE	STARS	Recommendations
12	<i>Syzygium australe</i> (x3)	8.5	6 x 4	.273, .220, .350	100%	Good/fair	Mature	3.3, 2.6, 4.2	2.2 avg	3d	Low	low	Remove 3x planted trees.
3x Mature trees, crown form dominant trees, albeit conflicting with each other.													
Tree no	Species	Height (M)	Crown Spread (M) N S E W	DBH (M)	Live Crown Ratio %	Vigour/structure	Age Class	TPZ M	SRZ M DAB	SULE	RET VALUE	STARS	Recommendations
13	<i>Callistemon viminalis</i> (x12)	4/5	2.5, 2.5, 2.5, 2.5	.100 avg	40%	Low/poor	Mature	2	1.5	3d	low	low	Retain and protect tree canopies
12x mature planted trees on adjacent site, above on podium garden beds. Foliage overhanging into site. Trees previously planted as a privacy screen.													
Tree no	Species	Height (M)	Crown Spread (M) N S E W	DBH (M)	Live Crown Ratio %	Vigour/structure	Age Class	TPZ M	SRZ M DAB	SULE	RET VALUE	STARS	Recommendations
14	<i>Schefflera actinophylla</i>	8	na	na	na	na	na	na	na	4e	low	low	Remove exempt Spp
Remove exempt Spp.													
Tree no	Species	Height (M)	Crown Spread (M) N S E W	DBH (M)	Live Crown Ratio %	Vigour/structure	Age Class	TPZ M	SRZ M DAB	SULE	RET VAL	STARS	Recommendations
15	<i>Syzygium australe</i>	8	3, 4, 2, 3	.282 3x cdmnt	90%	Fair/fair	Semi Mature	3.4	2.1	3d	low	low	Retain and protect canopy, north
Semi mature planted tree on adjacent site n far South West corner, a top of basement walling, in on podium garden bed.													
Tree no	Species	Height (M)	Crown Spread (M) N S E W	DBH (M)	Live Crown Ratio %	Vigour/structure	Age Class	TPZ M	SRZ M DAB	SULE	RET VALUE	STARS	Recommendations
16	<i>Dead</i>	na	na	.350	0%	Na	mature	4.2	na	4a	Low	low	Remove tree
Dead tree with no fauna habitat present.													
Tree No	Species	Height (M)	Crown Spread (M) N S E W	DBH (M)	Live Crown Ratio %	Vigour/structure	Age Class	TPZ M	SRZ M DAB	SULE	RET VAL	STARS	Recommendations
17	<i>Camellia japonica</i>	4.5	2.5, 2, 1, 0	multi	95%	Fair/fair	Mature	2	1.5	4a	low	low	Remove small planted ornamental tree.
Semi Mature ornamental tree growing at .500mm to western boundary wall, typical of spp													
Tree No	Species	Height (M)	Crown Spread (M) N S E W	DBH (M)	Live Crown Ratio %	Vigour/structure	Age Class	TPZ M	SRZ M DAB	SULE	RET VALUE	STARS	Recommendations
18	<i>Camellia japonica</i>	4	2.5, 2.5, 1.5, 0	multi	75%	Fair/fair	mature	2	1.5	4a	Low	low	Remove small planted ornamental tree.

Semi Mature ornamental tree growing at .500mm to western boundary wall, typical of spp

6.3 Encroachment

Encroachment refers to the likelihood of interference within the SRZ and or TPZ of each tree, and is calculated in a percentage form.

TPZ – Tree Protection Zone = DBH X 12 METRES - DBH = Diameter at Breast Height (1.4 metres)

SRZ – Structural Root Zone = $(D \times 50)^{.42} \times .64$ - D = trunk diameter measured above the root buttress

Tree 1) ***Syagrus romanizoffiana*** – No ground impacts envisaged as this palm is growing upon a higher level upon adjacent site in an, on podium garden bed.

Tree 2) ***Cinnamomum camphora*** – Councils Street tree and Heritage value. This tree has a TPZ of 9.6m radially out from its trunk. The existing building within the site is located upon the boundary and is an aged building. This tree can be assumed to have adapted to this building's footprint being upon the boundary, for its lifetime.

The proposed works, see the basement being located 1.4m back from the boundary, with the Ground Level plan, demonstrating, being located upon the boundary, the same as what is existing. Arboricultural Hold Points and Certifications are recommended.

Tree 3) ***Lophostemon confertus*** – This tree being upon Councils Street verge, has a TPZ of 11.4m radially out from its trunk. The basement plan demonstrates that the basement is setback from the boundary of 1.4m, whilst the Ground Level Plan demonstrates the building façade at the same 1.4m out from the boundary and located directly above the 1.4m setback of the basement.

The incursion calculated of the basement to this trees' growing environment is 8.54% and is a minor incursion. Coupled with the existing driveway that is located to the South of this tree, is proposed to be removed and returned back to grass and an improvement, to this trees' growing environment.

Arboricultural Hold Points and Certifications are recommended.

Tree 4) ***Cinnamomum camphora*** – This tree being upon Councils Street verge fronting Kiora Rd, but located close to the corner of Kiora and Willock, has a calculated TPZ of 11.4m radially out from its trunk. This tree has adapted over its lifetime with the existing OSD being located within its most Western TPZ. With this OSD being removed, the corner of the proposed building will replace this OSD incursion and constitutes a Minor encroachment. Arboricultural Hold Points and Certifications are recommended.

Tree 5) ***Lophostemon confertus*** – This tree is located on Councils Street verge and very close to the edge of street kerbing. This tree has adapted over its lifetime with an OSD, carpark and associated kerbing structures, located within its Southern TPZ.

As shown upon the Tree Location and Protection Plan and in pink, this incursion has been calculated at 10.2% and it can be assumed, due to the depths of existing OSD, no roots have traversed past this OSD and into the site. The infrastructure that exists within this trees TPZ and what is proposed,

can be assumed to be similar, with Arboricultural Hold Points and Certifications being recommended.

Tree 6) ***Phoenix canariensis*** – Proposed to be removed, it does not warrant extraordinary efforts to retain

Tree 7) ***Cedrus deodora*** – Proposed to be removed, it does not warrant extraordinary efforts to retain

Tree 8) ***Lophostemon confertus*** – On plan, the incursion from the basement upon the boundary is approx. 24% and this constitutes a major incursion. Root mapping was undertaken on the 18/8/23, upon the boundary and approx. 10x roots have been found at depths of 300mm at no larger diameters of 40mm. As mentioned in this report, the Air spade utilised, had difficulties in penetrating further than 300mm, subsequently and not at the expense of destroying and delaminating existing roots, deeper excavations proved futile.

Pruning will be required to this trees Southern canopy to cater for scaffolding and Arboricultural Hold Points and Certifications are recommended.

Tree 9) ***Murraya paniculata*** – Proposed for removal

Tree 10) ***Syagrus romanizoffiana*** – Exempt Spp on site.

Tree 11) ***Lophostemon confertus*** – This trees location conflicts with the proposed driveway and is a total loss under this proposal. The opportunity to retain this tree and discussions with the stakeholders, decided that for the entire project to work, this location was the best option. Furthermore, the existing brick wall fronting tree 11, is severally, structurally compromised and dangerous and can be assumed that tree roots have caused this, with changing levels inside the site compared to Councils Street verge levels.

Tree 12) ***Syzygium australe*** – Proposed for removal, total loss, inside the site

Tree 13 (x12) ***Callistemon viminalis*** – Retain and protect overhanging canopy. The furthest extent of canopy overhang has been calculated at 3.5m. Protect from scaffolding in accordance with AS4970 - 2009, Section 4.5.6 / Figure 5.

Tree 14) ***Schefflera actinophylla*** – Exempt Spp, remove

Tree 15)– ***Syzygium australe*** – Retain and protect overhanging canopy. The furthest extent of canopy overhang has been calculated at 3m

Tree 16) - ***Dead*** - Remove

Tree 17) – ***Camellia japonica*** – Remove

Tree 18) - ***Camellia japonica*** – Remove

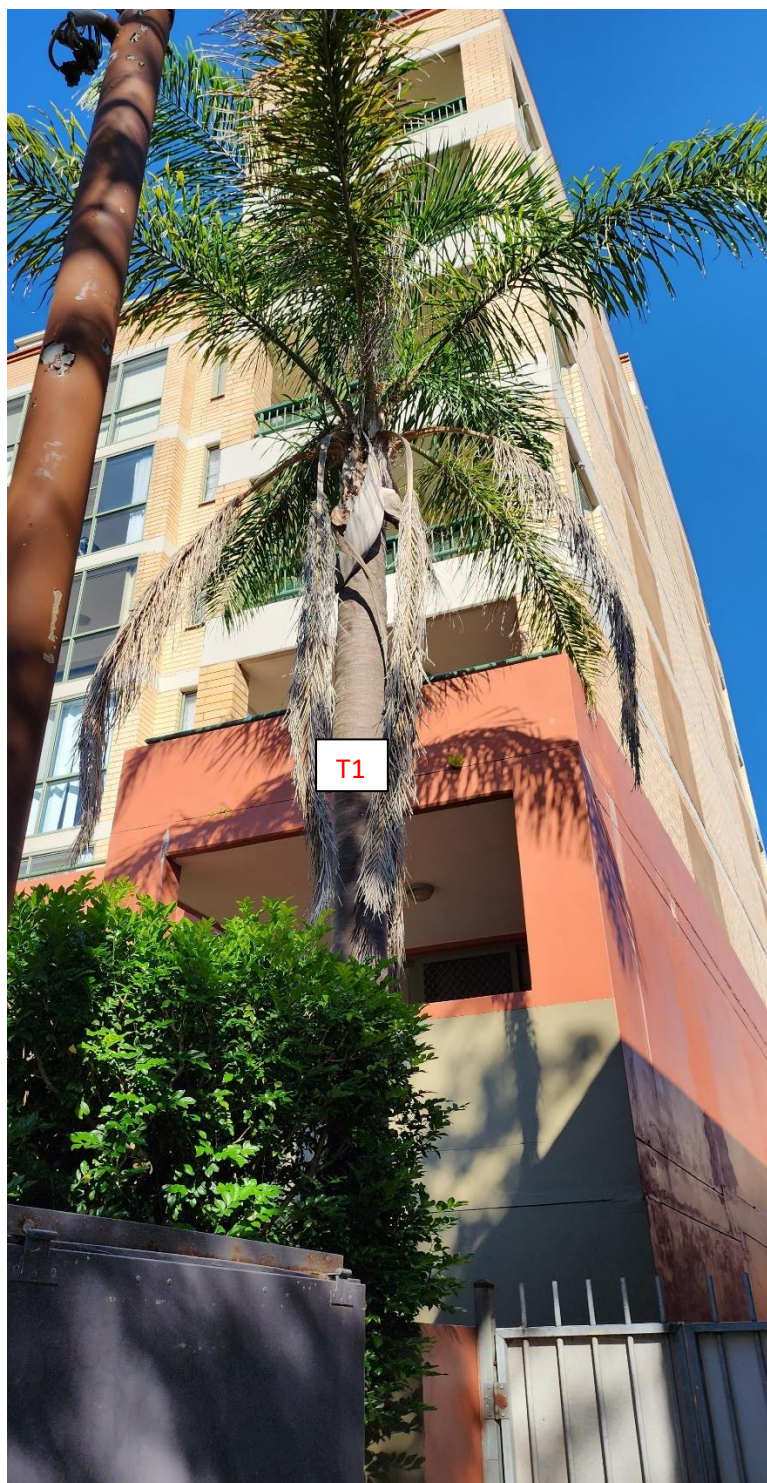
Construction impacts to trees often include some degree of root injury, soil compaction, removal of leaf area through pruning, loss of rooting space and changes in soil moisture and microbiology. These impacts do not occur all at once. Rather, a series of changes occur to which the tree must respond and adapt. First, roots are injured and the site micro climate altered by clearing. Then further changes occur during grading and installation of improvements. Construction of adjacent structures causes another series of damages. Finally, finish grading and landscaping further encroach into root area and alter the trees microsite. Trees may respond to these impacts in a variety of ways, from slower growth and poor foliage colour to dieback and death¹.

7. Photographs of trees



Photograph 1, above looking South East to trees 1, 2 and 3.

¹ Arboriculture, Fourth Edition, Integrated Management of Landscape Trees, Shrubs, and Vines/ Richard W. Harris, James R. Clark, Nelda P. Matheny/ 2004/ Prentice Hall/ Chapter 11, Preserving Existing Trees, Pg. 263
Sydney Landscape Consultants, 23 Kiora Rd, Miranda, Arboricultural Impact Assessment, 28/8/23



Photograph 2, above looking at Palm, No 1.



Photograph 3, above looking East to trees 4 and 5.



Photograph 4, above looking West to trees 5, 6, 7, 8 and 11.



Photograph 5, looking North West to trees 8, 9 and 10.



Photograph 6, looking West along South Boundary and canopy of trees on podium, adjacent site.



Photograph 7, looking West along South and West Boundary, trees 13, 14, 15 and 16.



Photograph 8, looking South to tree 2, thinning canopy and lacking in vigour



Photograph 9, looking North East to tree 4, in poor condition



Photograph 10, looking West at boundary wall, fronting tree 11. Structurally dangerous with soil levels within site, much higher than Council verge.

8. Mitigation / Recommendations

The author (Craig Kenworthy) of this report recommends:

- Trees 1, 2, 3, 4, 5, 8, 13 and 15 to be retained and protected (8) trees.
- Trees 6, 7, 9, 10, 11, 12, 14, 16, 17 and 18 are recommended to be removed (10) and replaced within the site to offset those lost, and the ability to provide a better landscape outcome within the site, that currently exists.
- The A3 Tree Location and Protection plan that accompanies this report, be laminated and displayed within site sheds.
- Trunk padding to tree/palm 1, neighbours palm and in accordance with AS4970, Section 4.5.2.
- Council to monitor tree 2 and tree 4, Heritage trees, being assessed as having low vigour due to Possum attack.
- Minor pruning to trees 5 and 8, outer Southern canopy that may conflict with scaffolding and possible building footprint. Attendance prior and during pruning by an AQF 5 Arborist to supervise.
- Tree 11 being a Council Street tree. Council is the determining authority as to whether this tree is to be removed and or retained. The proposals driveway location conflicts with this tree and would be required to be removed and or a redesign of the proposal. An opportunity exists in the location of the existing driveway fronting Willock Ave asphalted carpark, to plant a new *Lophostemon confertus* tree at minimum 100 litre pot/bag, to offset the loss of tree 11.
- Attendance and guidance by the engaged AQF 5 Arborist, for all excavations within the TPZs of all trees proposed to be retained.
- The driveway that currently exists on Kiara Rd, be removed and new soils and lawn, remediate this area, for the ongoing viability and health improvements to trees 2 and 3. This driveway be discontinued prior to any works for the protection of these trees, with all project works being directed from Willock Ave.
- No stormwater or service plans have been provided. All stormwater and service piping that is proposed within any trees TPZ must be either hand dug or non-destructive methods of excavation such as Hydro vac, Air spade or underground boring. No machinery excavator trenching buckets or chain trenchers are permitted within any trees TPZ.
- Tree Protection measures, monitoring and Certification all in accordance with AS4970 – 2009, Section 4 and Section 5, that have been signed off by the Consulting AQF 5 Arborist.

- Compensatory planting of species endemic to the region for those lost to their heights, exempt status and conflicts with proposed footprint. Replacement planting, where possible, shall be in accordance with Councils Chapter 39, Section 4.15, *Industrial and commercial development*.

8.1 Hold Points & Certification

TIMING / SITE VISITS	PROCEDURE	AUTHORITY	CERTIFICATION	SIGNATURES
Hold Point 1 – Letter of Engagement	To provide the applicant and PCA with a Letter of Engagement for Arboricultural Services	Project Arborist to provide PCA	Letter of Engagement	AQF 5 Arborist: date Project Manager:
Hold Point 2a - Before ANY works and prior to a Construction Certificate	Retain and protect trees 1, 2, 3, 4, 5, 8, 13 and 15 Spray paint with an X, trees to be removed – trees 6, 7, 9, 10, 11, 12, 14, 16, 17 and 18 within the site. Prune trees - 5 & 8 South canopy	Project Arborist to attend to view Tree Protection Fencing, mulch and signage has been installed and to sign off if compliant.	Certificate of Compliance for Certifier	AQF 5 Arborist: date Project Manager:
Hold Point 3 – Excavations	To monitor all excavations, within TPZ of trees, 2, 3, 4, 5, 8 where the basement is dug upon the boundary and any TPZ.	Project Arborist to attend	Certificate of findings if Compliance has been met or not, for Certifier	AQF 5 Arborist: date Project Manager:
Hold Point 4 – Periodically (Monthly)	Monitor maintenance to protection measures. TPZ/SRZ mulched and watered.	Project Arborist	Certificate of Compliance for Certifier if compliant or not.	AQF 5 Arborist: date Project Manager:
Hold Point 5 – Prior Occupation Certificate	To view condition of TPZ and condition of protected trees before OC.	Project Arborist	Certificate of Compliance for Certifier	AQF 5 Arborist: date Project Manager:

9. Conclusion

This report has focused on the subject site at 23 Kiara Road, Miranda, NSW, for a proposed new development of the site. The assessment has focused on Councils Street trees, trees within the site and those on adjacent sites, as to the impacts that this proposal may have on them.

Trees needing to be removed are not of high landscape significance and can be easily replaced within the landscape scheme.

This report has focused on all trees that may be impacted by the proposal with findings and recommendations to enable a better outcome for the site.

10. Appendices

10.1 Tree protection zones (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. This is an area that is prohibited from any construction work. TPZs have been calculated for each tree (3) within this report. The TPZ for each tree has been formulated using calculations based on the Australian Standard, *Protection of trees on development sites, AS 4970 – 2009*

10.2 Structural Root Zone (SRZ)

The SRZ is a specified distance measured from the trunk that is set aside for the protection of the tree's structural roots. This zone is paramount for protection measures as is necessary for the stability of a tree. The SRZ is a radial measurement from the trunk. Roots within the SRZ are not to be touched. The SRZ have been calculated using the Australian Standard, *Protection of trees on development sites, AS 4970 – 2009*

10.3 SULE (Safe Useful Life Expectancy)

SULE categories (after Barrell, 2001)¹

SULE Category	Description
Long	Trees that appeared to be retainable at the time of assessment for more than 40 years with an acceptable level of risk.
1a	Structurally sound trees located in positions that can accommodate for future growth
1b	Trees that could be made suitable for retention in the long term by remedial tree care.
1c	Trees of special significance that would warrant extraordinary efforts to secure their long term retention.
Medium	Trees that appeared to be retainable at the time of assessment for 15-40 years with an acceptable level of risk.
2a	Trees that may only live for 15-40 years
2b	Trees that could live for more than 40 years but may be removed for safety or nuisance reasons
2c	Trees that could live for more than 40 years but may be removed to prevent interference with more suitable individuals or to provide for new planting.
2d	Trees that could be made suitable for retention in the medium term by remedial tree care.
Short	Trees that appeared to be retainable at the time of assessment for 5-15 years with an acceptable level of risk.
3a	Trees that may only live for another 5-15 years
3b	Trees that could live for more than 15 years but may be removed for safety or nuisance reasons.
3c	Trees that could live for more than 15 years but may be removed to prevent interference with more suitable individuals or to provide for a new planting.
3d	Trees that require substantial remedial tree care and are only suitable for retention in the short term.
Remove	Trees that should be removed within the next five years.
4a	Dead, dying, suppressed or declining trees.
4b	Dangerous trees because of instability or loss of adjacent trees
4c	Dangerous trees because of structural defects
4d	Damaged trees not safe to retain.
4e	Trees that could live for more than 5 years but may be removed to prevent interference with more suitable individuals or to provide for a new planting.
4f	Trees that are damaging or may cause damage to existing structures within 5 years.
Small	Small, or young trees that can be reliably moved or replaced.
5a	Small trees less than 5m in height.
5b	Young trees less than 15 years old but over 5m in height.

¹ (Barrell,J. (2001) "SULE: Its use and status into the new millennium" in *Management of mature trees*, Proceedings of the 4th NAAA Tree Management Seminar, NAAA, Sydney.

10.4 IACA Significance of a Tree Assessment Rating System (STARS)

Criteria for Assessment of Landscape Significance

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.

		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



	<p>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.</p>
	<p>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.</p>
	<p>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.</p>
	<p>Priority for Removal - These trees are considered hazardous, or in irreversible decline, or weeds and should be removed irrespective of development.</p>

10.5 Root Mapping Assessment

The proposed basement is located upon the boundary of Willock Avenue. Calculations by the Author of this report has calculated a TPZ for tree 8 as 7.7m radially out from its trunk. Therefore, an incursion from the basement on the boundary, constitutes as a 24% encroachment into tree 8s TPZ.

Tree 8 is a *Lophostemon confertus*, that appears to have been planted forming part of an Avenue planting. Street level to the North is considerably lower, whilst the concrete pedestrian footpath to the South is within a metre of this trees' trunk.

The TPZ can tolerate encroachment as stated in AS4970 - 2009, however, a limitation of encroachment exists before impacts start to occur. As the TPZ radius is based on an arbitrary formula, further evidence such as root mapping is required to determine the actual root presence in the location of the boundary.

Results of root mapping assessment

Root No	Distance from Point A	Depth below surface	Root Diameter	Comments
1	3.26m	200mm	18mm	Located 3.95m from COT
2	3.98m	120mm	30mm	
3	4.18m	250mm	40mm	Roots 3 and 4, fused together
4	4.26m	100mm	40mm	
5	4.30m	250mm	40mm	
6	5.05m	140mm	35mm	
7	5.59m	230mm	25mm	
8	5.88m	130mm	15mm	
9	5.96m	220mm	20mm	
10	6.11m	130mm	25mm	Located 3.6m from COT

Refer to Photograph 2.

Assessment

Tree 8, being a Mature tree, crown form dominant, Councils Street tree, growing close to kerbing. Medium volumes of deadwood evenly throughout canopy, epicormics shoots present internally with several small girdled roots at base, East side.

Height of 10m, DBH of .644m (4x dominants), with fair vigour and structure. TPZ of 7.7m and an SRZ of 3.1m. This tree has a medium landscape significance and Medium Retention value.

The soils found in the location of trenching, demonstrated as hard, compacted, relatively moist and somewhat undisturbed. The Air spade encountered difficulties in obtaining depths greater than 300mm. This was a concern, due to the impenetrable soils and impacts to existing roots and possible delamination of such roots.

Mattocks were used to manually break up the soil where possible, where the Air spade could not. This presented as a limitation and one that the Contractor explained as never experiencing such hard compacted virgin ground before.

It was the intention to focus on the location, immediately opposite the trunk and 3.4 metres in calculation out from the tree, that constituted the SRZ of 3.1m, for this tree.

No roots over 40mm were found within the trenching performed.

Many fine fibrous roots were uncovered and these displayed as *Murraya paniculata* roots, from the hedge located immediately to the South of tree 8. The odour was noticeable as *Murraya* roots.

Many fibrous roots were found close to the starting point A, and these were identified as being from the *Phoenix canariensis*, several metres to the East and seen within photographs.

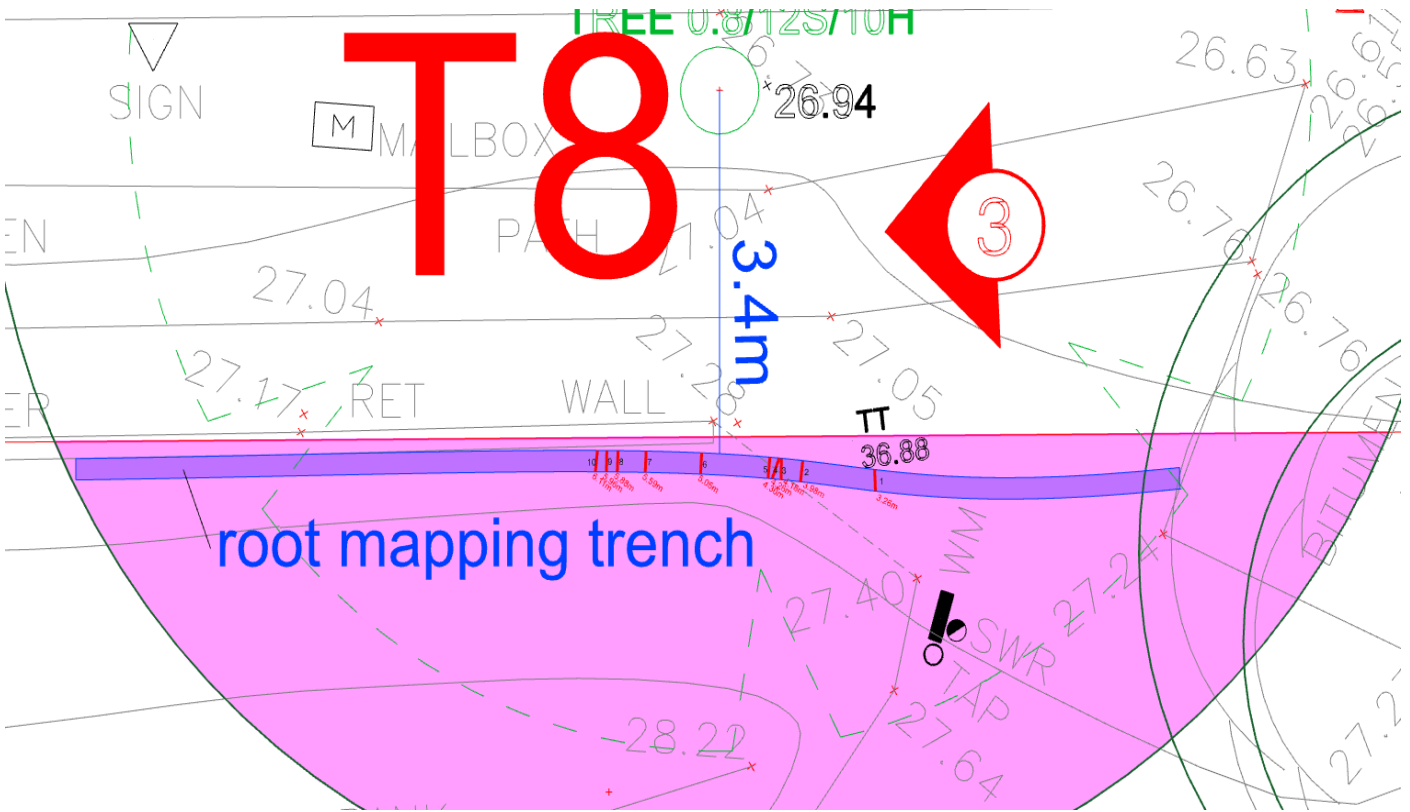
In general, *Lophostemon confertus* is a fast-growing hardy species often used for street planting, vigorous root system³ and is drought tolerant once established and can also tolerate pollution and some compaction. Published literature and anecdotal evidence exist that indicate root pruning can occur, with no perceivable change or limited change to tree health and stability.

Hamilton (1989), notes that in his opinion adhering to the recommendations of not pruning closer than midway between the drip line and the trunk, is in many situations, more conservative than necessary and is frequently violated without serious consequences⁴

Tree species plays a significant role in tolerance to root loss. Hamilton, suggests that the severity of impact varies because some species are more tolerant than others⁴. Anecdotally, arborists can usually nominate species that are considered tolerant such as *Platanus x hybrida*, *Cinnamomum camphora* or *Lophostemon confertus*⁵

Generally, resilience to root loss requires the ability to generate new roots to re-establish root-shoot ratio which in turn requires energy either directly from photosynthesis or from stored carbohydrates in the stem and root system.

Tree 8 is considered to have fair vigour and structure based on its crown density, habit, form and tenacity and on that basis, Tree 8 would be considered more resilient to root severance, coupled with the lack of large structural roots and findings within the root mapping assessment conducted.



Root Mapping alignment above, fronting T8



Photograph 1 above looking East to the open trench



Photographs 2, left, above looking East to the open trench. Many fibrous *Murraya* roots in the foreground.

Conclusion

This Root Mapping Assessment and Report was commissioned by Formus Pty Ltd, to address the impacts proposed by the basement being located upon the boundary, fronting tree 8. Root mapping was undertaken using an Airspade to explore the nature of roots that may be affected by the proposed basement within the TPZ of Tree 8 - *Lophostemon confertus*.

A total of ten (10) roots have been uncovered at depths of 300mm in impenetrable ground, by way of Air spade and PSI at the upper limits, of capable machinery. It is understood, that this tree species is tolerant of root severance, loss, and being a tenacious species, the nature of roots found and constraints observed, this tree will cope with the basement being located upon the boundary.

The Author of this report recommends that any roots pruned are to be done prior to any construction activities. Hand tools will be necessary to expose the roots found within this root mapping exercise. The roots are to be pruned by an Arborist using a sharp sterilised saw behind the cut face, perpendicular to root travel, prior to being backfilled with clean site soil.

The soil and surrounds are to be immediately irrigated. The cut face is to be covered with woven geofabric material and pegged into place to prevent contamination. Irrigate the area surrounding the tree at least twice per week (if required). Apply *Seasol* at the rate prescribed on the label for a 'stressed' tree. *Seasol* is a seaweed concentrate tonic, that is found to stimulate root growth and give better resistance to fungal attack.

11. Bibliography

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A Richards/ 2009/ CSIRO Publishing.

http://www.treetec.net.au/TPZ_SRZ_DBH_calculator.php

Sutherland Councils Tree Management Policy, NATURAL RESOURCE MANAGEMENT DCP
2015 CHAPTER 39.

Regards



Craig Kenworthy

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AQF Level 5 - Arboriculture

AQF Level 5 – Landscape Design

AQF Level 5 – Horticulture

AQF Level 4 – Workplace Training and Assessment

AQF Level 3 – Landscape Construction, NSW

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