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ARBORICULTURAL IMPACT ASSESSMENT AND TREE MANAGEMENT PLAN

PROPOSED CHILDCARE CENTRE DEVELOPMENT APPLICATION

14 WINDERMERE AVENUE NORTHMEAD, NSW

Report prepared for:

Janssen Designs Pty Ltd
PO Box 41
Kenthurst NSW 2156

Report prepared by:

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21st November 2022 – Version 2

Arboriculture Australia™
Member #2590

DISCLAIMER

This report has been prepared in accordance with the scope of services described in agreement between Horticultural Management Services and the client.

This report relies upon data, surveys and site inspections results taken at or under the particular time and or conditions specified herein.

Any representation, statement, opinion or advice, expressed or implied in this publication is made in good faith but on the basis that Horticultural Management Services, its agents and employees are not liable (whether by reason of negligence, lack of care or otherwise) to any person for any damage or loss whatsoever which has occurred or may occur in relation to that person taking or not taking (as the case may be) action in respect of any representation, statement, or advice referred to above.

Every effort has been made in this report to include, assess, and address all defects, structural weaknesses, and instabilities of the subject trees. All inspections were made from ground level using only visual means and no intrusive or destructive means of inspection were used. For many structural defects such as decay and inclusions, internal inspection is required by means of resistograph or similar. No such investigation has been made in this case. Trees are living organisms and are subject to failure through a variety of causes not able to be identified by means of this inspection and assessment.

Information contained in this report covers only the subject tree that was assessed and reflects the condition of the subject tree at the time of inspection. Any finding, conclusion or recommendations only apply to the aforementioned and no greater reliance should be assumed or drawn by the Client.

There is no warranty or guarantee, expressed or implied that problems or deficiencies regarding the subject trees or the subject site may not arise in the future.

Furthermore, this report has been prepared solely for the use by the Client. The Client acknowledges that this assessment, and any opinions, advice or recommendations expressed or given in it, are based on the information supplied by the Client, and based on the data observations, measurements and analysis carried out or obtained by Horticultural Management Services and referred to in the assessment.

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TABLE OF CONTENTS

APPENDICIES

1.0 INTRODUCTION

Horticultural Management Services were engaged to conduct an Arboriculture Assessment Report for 14 Windermere Avenue, Northmead. It is understood that this report is to form part of a Development Application for a proposed Childcare Centre application, which includes the demolition of the existing dwelling and structures, approved tree and minor shrub removal and tree protection and management for site and adjoining trees, construction of dwellings, new driveways, and associated landscaping as per APPENDIX A Proposed Development Layout.

The purpose of this report is to identify the trees within and or adjoining the site, provide information on their individual current health and condition, determine their remaining life expectancy and significance in the landscape, and assess their suitability for retention/preservation or removal. The scope of this report includes the allocation of SULE ratings (Safe Useful Life Expectancy), and identification of arboricultural work required.

The potential impact of the proposed development has also been assessed, together with recommendations for amendments to the design or construction to ensure the retention of tress considered worthy of preservation.

A site investigation was undertaken on Thursday 17th November 2022 to assess the trees onsite and those adjoining which may be affected by the proposed design. Information contained in this report covers only the subject trees that were assessed and reflects the condition of the subject trees on site at the time of inspection.

Assessment has been conducted with consideration of the Biodiversity Conservation Act 2016, Biosecurity Act 2015, and Parramatta City Council Tree Preservation Order (TPO), Part 5.4 (Preservation of Trees and Vegetation) of Parramatta Council's Development Control Plan (DCP) 2011.

2.0 AIMS

To detail the condition of the trees and consider the location and condition of such in relation to their surrounds.

To complete the following:

- Inspect the subject trees within and adjacent to the site/s and site conditions,
- Assess the condition of the subject tree(s),
- Observe and describe the trees and other vegetation on the subject site,
- Discuss the trees within their current landscape,
- Determine the subject trees' Landscape Significance including cultural, environmental, and aesthetic values,
- Consider the benefits of retention or removal of the trees for the medium to long-term benefit of the trees and on-going public safety,
- Provide recommendations for Tree Management, if or as required, within the context of a development application, and
- Prepare site specific tree protection specifications for trees recommended for retention.

3.0 SITE DESCRIPTION AND OBSERVATIONS

The site is identified as 14 Windermere Avenue, Northmead NSW.

Relevant site plans and/or documents reviewed prior to undertaking the Arborist Assessment include:

- *Janssen Architecture, Cover Page, Drawing Number A000, Issus A, date 15th June 2022,*
- *Janssen Architecture, Demolition Plan, Drawing Number A000, Issus A, date 15th June 2022,*
- *Janssen Architecture, Site Analysis Plan, Drawing Number A000, Issus A, date 15th June 2022,*
- *Janssen Architecture, Lower Ground Floor Plan, Drawing Number A000, Issus A, date 15th June 2022,*
- *Janssen Architecture, Ground Floor Plan, Drawing Number A000, Issus A, date 15th June 2022,*
- *Janssen Architecture, First Floor Plan, Drawing Number A000, Issus A, date 15th June 2022,*
- *Parramatta City Council Tree Preservation Order (TPO), Part 5.4 (Preservation of Trees and Vegetation) of Parramatta Council's Development Control Plan (DCP) 2011.*

Included within this report is a site plan showing the locations of the site trees based on the proposed development layout.

Site observations noted a mixture of introduced (planted) exotic and native/remnant vegetation. The herbaceous or grass vegetation consists of a mixture of introduced pastoral grasses/weed species due to the site's location within a residential precinct.

3.1 HERITAGE SIGNIFICANCE

There are no trees within the site that have been identified as Heritage Items under Council Planning Instrument or identified within a Significant Tree Register.

3.2 TREES ON ADJOINING LAND

In accordance with Council's requirements, trees adjoining the development have been assessed as part of this report.

There are no trees on adjoining properties that will be affected by this development.

3.3 SITE LOCATION

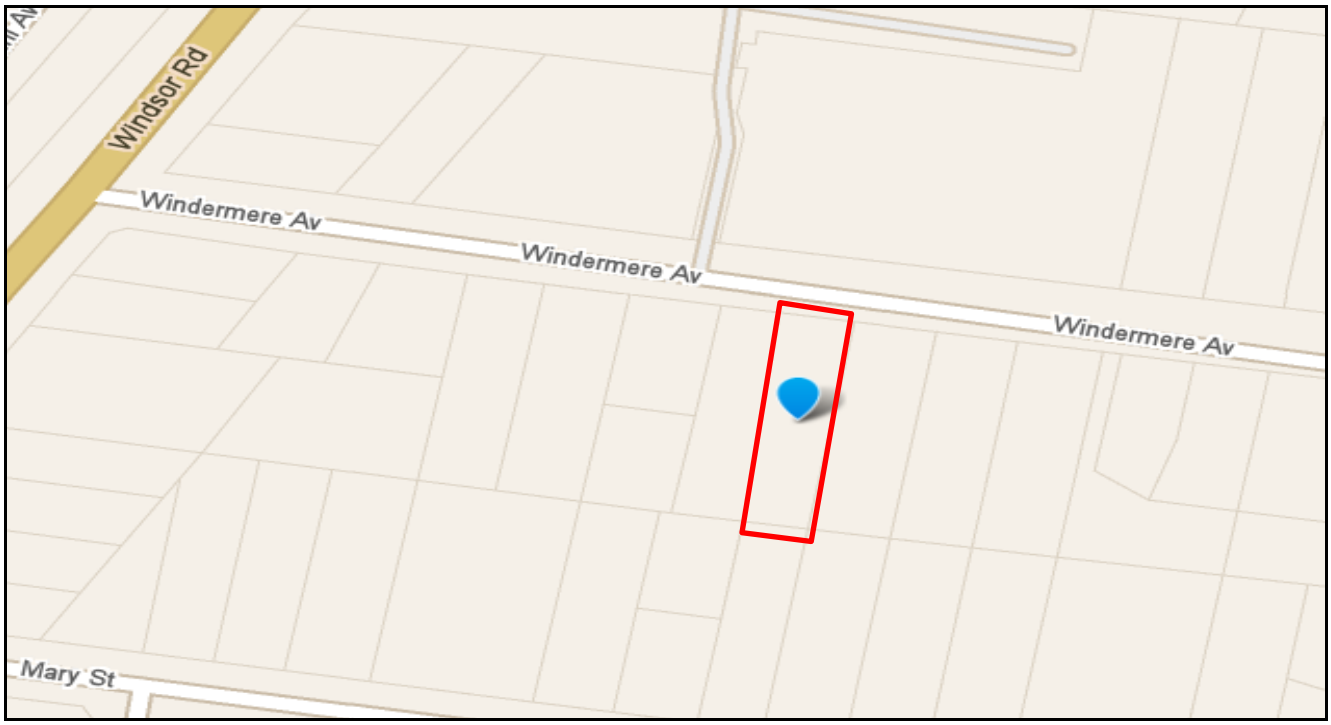

Figure 1 Shows the location of the site. Source *whereis.com.au*

3.4 AERIAL SITE LOCATION

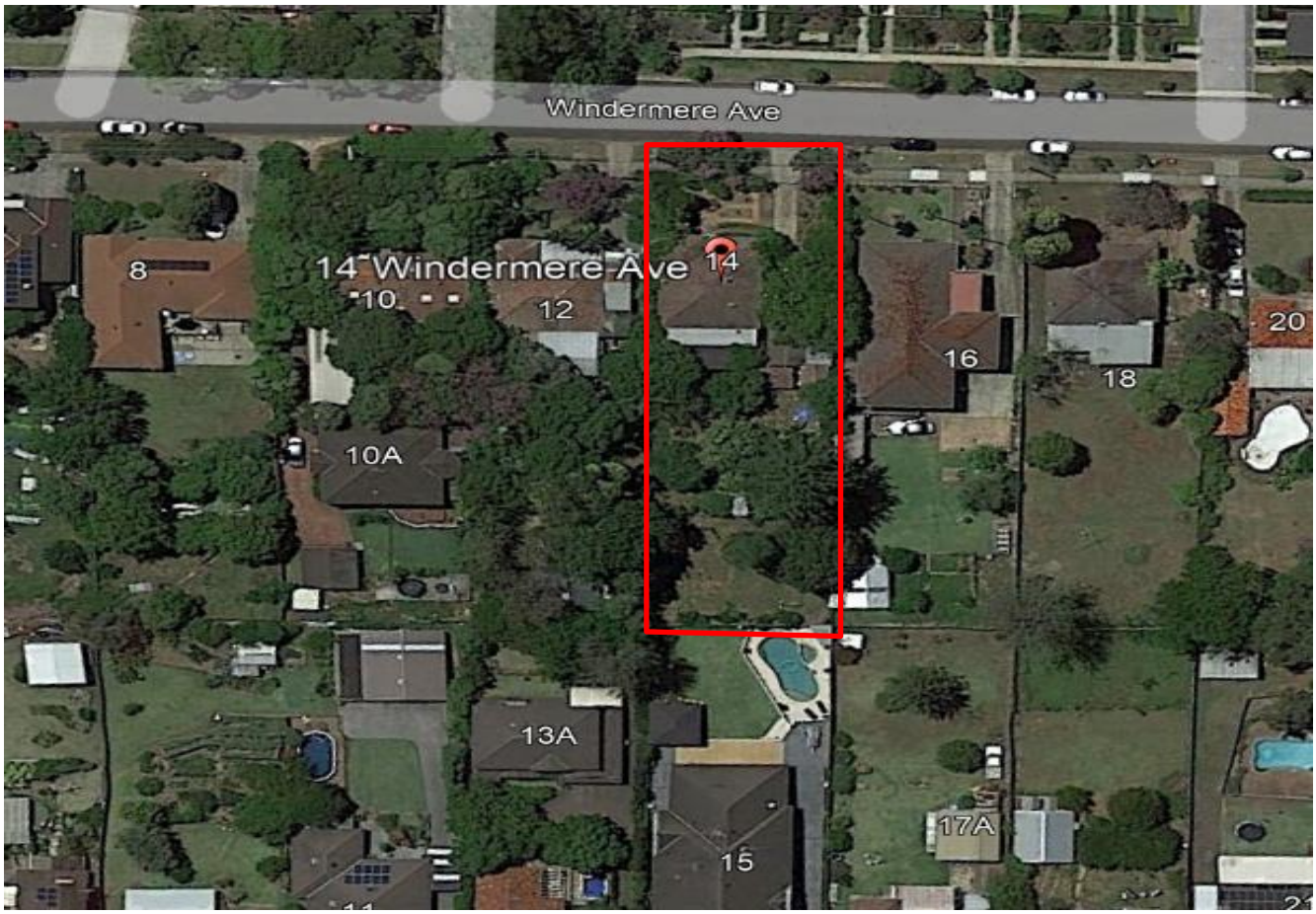

Figure 2 Shows an aerial location of the site. Source Googleearth.com

4.0 METHODOLOGY

This report is the result of a comprehensive site inspection undertaken on Thursday 17th November 2022 by Horticultural Management Services (HMS).

The following tree assessment was undertaken using criteria based on the Tree Risk Assessment Guidelines by the International Society of Arboriculture. A Level 2 Visual Tree Assessment (VTA) was used as described in 'The Body language of trees – A handbook for Failure Analysis'. This involves inspection from ground height and includes only the external features of the trees. Trees on adjoining sites were assessed from within the site boundaries only and only within 5m of the site boundaries.

For reference throughout the report, each tree has been allocated an identification number listed in the Tree Assessment Summary table and identified on the tree location site plan.

Assessment of individual trees includes the following:

- Species identification (botanical and common),
- Height and form,
- Observations made including an evaluation of the tree's health and vigour using Crown spread and cover, foliage size, colour, extension growth, presence of disease or pest infestation, canopy density, presence of deadwood, dieback and epicormic growth as indicators,
- Condition, using visible evidence of structural defects, instability, evidence of previous pruning and physical damage as indicators,
- Suitability of the tree to the site and its existing location; in consideration of damage or potential damage to services or structures, available space for future development and nuisance issues,
- Likely future amenity based on a visual assessment,
- The trees tolerance to development impacts based on surface observations,
- Significance -specific heritage, cultural or intrinsic importance,
- Amenity value -as shade, windbreak etc or subjective, aesthetic values,
- Habitat value -both as an individual tree and as part of an ecological community,
- Observations of soil conditions and likely root spread,
- Overall condition assessment and suitability,
- Hazard/failure potential of tree to damage property or result in death,
- Safe Useful Life Expectancy (SULE) after Barrell (1995),

Retention Value was based on the subject tree's Remaining Life Expectancy Range and Landscape Significance. The Retention Value was modified where necessary to take in consideration the subject tree's health, structure, and site suitability.

Landscape Significance was determined by assessing the combination of the cultural, environmental, and aesthetic values of the subject trees. A subjective rating of high, moderate, low, or nil has been allocated to the trees. This provides a relative value of the trees' Landscape Significance which may aid in determining their Retention Value. A more detailed explanation is outlined Appendix B.7.

Tree height and canopy spread, were estimated only. Diameter at Breast Height (DBH) was determined by measuring the main stem at 1.4m above ground. Photos were taken of the subject trees and subject site for the inclusion in this tabled report.

The components of **tree risk assessment** include the trees failure potential or in the case of the proposed, an environment conductive to tree failure.

5.0 IMPACT ASSESSMENT

A summary of each tree identified within the site is outlined in section 6.0 TREE ASSESSMENT SUMMARY.

The assessment in each case has considered the following:

- Structural Root Zones (SRZ),
- Building works or footprint within TPZ or SRZ,
- Optimum Tree Protection Zones (TPZ) and Structural Root Zones (SRZ),
- SULE Rating for value of the tree assessed,
- Assessment of the likely impact of the proposed works,
- Recommendations for retention, management, or removal.

The components of tree risk assessment include the trees failure potential or in the case of land clearing/management, an environment conductive to tree failure.

Other factors are also considered related to the site, such as potential development or land use, soil condition and prevailing winds must be considered in conjunction when assessing the potential of failure for any tree.

6.0 TREE ASSESSMENT SUMMARY

Risk Matrix	Catastrophic	Major	Moderate	Low	Tree approved to be removed by Council.
	Urgent- Tree requires immediate removal due to WH&S concerns.	Tree requires removal as part of development application.	TPO Exempt due to species, height requirements and or approved to be removed by Council.	Tree to be retained, protected, and monitored	

Tree Number	Tree Species Common Name Botanical name	Height (m)	DBH @ 1.4m	DAB (mm)	SRZ Required (m)	TPZ Required (m)	Tree Age * Young * Semi Mature * Mature * Over Mature	Tree Health * Good * Fair * Poor * Dead	Tree Structure * Good * Fair * Poor	SULE Rating	Ecological Significance * High * Medium * Low * Nil	Landscape Visual Significance * High * Moderate * Low * Nil	Retention Value * H 40yrs + * M 15 - 40yrs * L 5 to 15ys * Nil Less 5ys * Dead	To Be Retained
1	Jacaranda *Jacaranda mimosifolia* ***Council Street Tree***	7	290	310	2.1	3.5	Mature	Good	Fair	3	Nil	Moderate to High	Medium	**Yes**
	Comments: This Council street tree whilst in good health, has been continually incorrectly pruned/lopped resulting in its poor aesthetic form with epicormic extension regrowth forming its canopy. Based on AS4970-2009 Protection of Trees on Development Sites, this mature Council Street tree is sufficiently distanced to be safely retained and protected, with all considered building and scope of works outside of its TPZ/SRZ. Erection of timber battens around its trunk is also recommended. This tree will be monitored an AQF L5 Project Arborist.													
2	Jacaranda *Jacaranda mimosifolia* ***Council Street Tree***	9	390	400	N/A	N/A	Mature	Good	Fair	3	Nil	Moderate to High	Medium	**No**
	Comments: This Council street tree whilst in good health, has been continually incorrectly pruned/lopped resulting in its poor aesthetic form with epicormic extension regrowth forming its canopy. Based on its location within the proposed childcare driveway ramp to the basement and considered scope of works, this tree is required to be removed. All considerations, options regarding its retention were considered to incorporate the childcare design, access requirements, construction methodologies, however, its removal for the driveway location is supported.													

Tree Number	Tree Species Common Name Botanical name	Height (m)	DBH @ 1.4m	DAB (mm)	SRZ Required (m)	TPZ Required (m)	Tree Age * Young * Semi Mature * Mature * Over Mature	Tree Health * Good * Fair * Poor * Dead	Tree Structure * Good * Fair * Poor	SULE Rating	Ecological Significance * High * Medium * Low * Nil	Landscape Visual Significance * High * Moderate * Low * Nil	Retention Value * H 40yrs + * M 15 - 40yrs * L 5 to 15ys * Nil Less 5ys * Dead	To Be Retained
3	Jacaranda *Jacaranda mimosifolia* ***Council Street Tree***	6	300	330	2.1	3.6	Mature	Good	Fair	3	Nil	Moderate to High	Medium	**Yes**
	Comments: This Council street tree whilst in good health, has a noted large open wound from a torn scaffold limb from possible passing vehicles has been continually incorrectly pruned/lopped resulting in its poor aesthetic form with epicormic extension regrowth forming its canopy Based on AS4970-2009 Protection of Trees on Development Sites, this mature Council Street tree is sufficiently distanced to be safely retained and protected, with all considered building and scope of works outside of its TPZ/SRZ. Erection of timber battens around its trunk is also recommended. This tree will be monitored an AQF L5 Project Arborist.													
4	Mock Orange *Murraya paniculata*	3	M/T	250	N/A	N/A	Mature	Good	Good	5	Nil	Low	Low	**No**
	Comments: As per Councils Tree Management Policy, Exemptions Section 5.4.3 Exempt Works, this planted ornamental shrub is TPO Exempt, due to height requirements being less than 5m in height; therefore, a tree removal permit is not required, and it may be removed without further consideration.													
5	Camellia *Camellia japonica*	3	220	250	N/A	N/A	Mature	Good	Good	5	Nil	Low	Low	**No**
	Comments: As per Councils Tree Management Policy, Exemptions Section 5.4.3 Exempt Works, this planted ornamental shrub/tree is TPO Exempt, due to height requirements being less than 5m in height; therefore, a tree removal permit is not required, and it may be removed without further consideration.													
6	Camellia *Camellia japonica*	3.5	220	250	N/A	N/A	Mature	Good	Good	5	Nil	Low	Low	**No**
	Comments: As per Councils Tree Management Policy, Exemptions Section 5.4.3 Exempt Works, this planted ornamental shrub/tree is TPO Exempt, due to height requirements being less than 5m in height; therefore, a tree removal permit is not required, and it may be removed without further consideration.													

Tree Number	Tree Species Common Name Botanical name	Height (m)	DBH @ 1.4m	DAB (mm)	SRZ Required (m)	TPZ Required (m)	Tree Age * Young * Semi Mature * Mature * Over Mature	Tree Health * Good * Fair * Poor * Dead	Tree Structure * Good * Fair * Poor	SULE Rating	Ecological Significance * High * Medium * Low * Nil	Landscape Visual Significance * High * Moderate * Low * Nil	Retention Value * H 40yrs + * M 15 - 40yrs * L 5 to 15ys * Nil Less 5ys * Dead	To Be Retained
7	Bangalow Palm *Archontophoenix cunninghamiana*	8	250	280	N/A	N/A	Mature	Good	Good	3	Nil	Low	Low	**No**
	Comments: Based on the site inspection, this planted palm tree is required to be removed due to its location within the proposed childcare basement excavations, scope of works and site modifications that support is removal. It is recommended to be replaced in the landscape master plan upon completion.													
8	Camellia *Camellia japonica*	3	220	250	N/A	N/A	Mature	Good	Good	5	Nil	Low	Low	**No**
	Comments: As per Councils Tree Management Policy, Exemptions Section 5.4.3 Exempt Works, this planted ornamental shrub/tree is TPO Exempt, due to height requirements being less than 5m in height; therefore, a tree removal permit is not required, and it may be removed without further consideration.													
9	Camellia *Camellia japonica*	3	220	250	N/A	N/A	Mature	Good	Good	5	Nil	Low	Low	**No**
	Comments: As per Councils Tree Management Policy, Exemptions Section 5.4.3 Exempt Works, this planted ornamental shrub/tree is TPO Exempt, due to height requirements being less than 5m in height; therefore, a tree removal permit is not required, and it may be removed without further consideration.													
10	Camellia *Camellia japonica*	3	220	250	N/A	N/A	Mature	Good	Good	5	Nil	Low	Low	**No**
	Comments: As per Councils Tree Management Policy, Exemptions Section 5.4.3 Exempt Works, this planted ornamental shrub/tree is TPO Exempt, due to height requirements being less than 5m in height; therefore, a tree removal permit is not required, and it may be removed without further consideration.													
11	Bull Bay Magnolia *Magnolia grandiflora*	10	370 780	1000	N/A	N/A	Mature	Good	Good	3	Nil	Low to Moderate	Medium	**No**
	Comments: Based on the site inspection, this planted ornamental tree is required to be removed due to its location within the proposed childcare basement excavations, scope of works and site modifications that support is removal. It is recommended to be replaced in the landscape master plan upon completion.													

Tree Number	Tree Species Common Name Botanical name	Height (m)	DBH @ 1.4m	DAB (mm)	SRZ Required (m)	TPZ Required (m)	Tree Age * Young * Semi Mature * Mature * Over Mature	Tree Health * Good * Fair * Poor * Dead	Tree Structure * Good * Fair * Poor	SULE Rating	Ecological Significance * High * Medium * Low * Nil	Landscape Visual Significance * High * Moderate * Low * Nil	Retention Value * H 40yrs + * M 15 - 40yrs * L 5 to 15ys * Nil Less 5ys * Dead	To Be Retained
12	Strawberry Tree *Arbutus unedo*	9	690	750	N/A	N/A	Mature	Good	Good	3	Nil	Low to Moderate	Medium	**No**
	Comments: Based on the site inspection, this planted ornamental tree is required to be removed due to its location within the proposed childcare basement excavations, scope of works and site modifications that support is removal. It is recommended to be replaced in the landscape master plan upon completion.													
13	Broad Leaved Privet *Ligustrum lucidum*	4	M/T	220	N/A	N/A	Mature	Good	Good	5	Nil	Nil	Nil	**No**
	Comments: This tree is a self-seeded nuisance weed species tree, that is listed as TPO Exempt, as it is a Noxious weed species and may be removed without further consideration and or approval.													
14	Camellia *Camellia japonica*	3	220	250	N/A	N/A	Mature	Good	Good	5	Nil	Low	Low	**No**
	Comments: As per Councils Tree Management Policy, Exemptions Section 5.4.3 Exempt Works, this planted ornamental shrub/tree is TPO Exempt, due to height requirements being less than 5m in height; therefore, a tree removal permit is not required, and it may be removed without further consideration.													
15	Crepe Myrtle *Lagerstroemia indica*	6	M/T	350	N/A	N/A	Mature	Good	Good	5	Nil	Low	Low	**No**
	Comments: Based on the site inspection, this planted ornamental tree is required to be removed due to its location within the proposed childcare basement development and site modifications that support is removal. It is recommended to be replaced in the landscape master plan upon completion.													

Tree Number	Tree Species Common Name Botanical name	Height (m)	DBH @ 1.4m	DAB (mm)	SRZ Required (m)	TPZ Required (m)	Tree Age * Young * Semi Mature * Mature * Over Mature	Tree Health * Good * Fair * Poor * Dead	Tree Structure * Good * Fair * Poor	SULE Rating	Ecological Significance * High * Medium * Low * Nil	Landscape Visual Significance * High * Moderate * Low * Nil	Retention Value * H 40yrs + * M 15 - 40yrs * L 5 to 15ys * Nil Less 5ys * Dead	To Be Retained
16	Norfolk Island Pine *Araucaria heterophylla*	20	1000	1000	N/A	N/A	Mature	Good	Good	3	Low to Medium	Moderate to High	Medium	**No**
	Comments: This significant tree appears to be in good health and structural condition, however, based on its location within the proposed childcare basement excavations and building envelope and considered scope of works, this tree is required to be removed. All considerations, options regarding its retention were considered to incorporate the childcare design, access requirements, construction methodologies, however major incursions from site modifications would result in the long-term declining and loss of structural stability to this tree. Therefore, its removal and replacement is supported.													
17	White Bird of Paradise *Strelitzia nicolai*	5	M/T	300	N/A	N/A	Mature	Good	Good	5	Nil	Low	Low	**No**
	Comments: Based on the site inspection, this planted clumping palm tree is required to be removed due to its location within the proposed childcare development and site modifications that support is removal. It is recommended to be replaced in the landscape master plan upon completion.													
18	Lilly Pilly *Syzygium luehmannii*	12	M/T	610	2.7	7.2	Mature	Good	Good	3	Low to Medium	Moderate	Medium	**Yes**
	Comments: Based on AS4970-2009 Protection of Trees on Development Sites, this site tree is sufficiently distanced to be safely retained and protected, with all considered building and scope of works outside of its SRZ. Erection of timber battens around its trunk is also recommended. This tree will be monitored an AQF L5 Project Arborist.													
19	Native frangipani *Hymenosporum flavum*	14	450	500	2.5	5.4	Mature	Good	Good	3	Low to Medium	Moderate to High	Medium	**Yes**
	Comments: Based on AS4970-2009 Protection of Trees on Development Sites, this site tree is sufficiently distanced to be safely retained and protected, with all considered building and scope of works outside of its SRZ. Erection of timber battens around its trunk is also recommended. This tree will be monitored an AQF L5 Project Arborist.													

Tree Number	Tree Species Common Name Botanical name	Height (m)	DBH @ 1.4m	DAB (mm)	SRZ Required (m)	TPZ Required (m)	Tree Age * Young * Semi Mature * Mature * Over Mature	Tree Health * Good * Fair * Poor * Dead	Tree Structure * Good * Fair * Poor	SULE Rating	Ecological Significance * High * Medium * Low * Nil	Landscape Visual Significance * High * Moderate * Low * Nil	Retention Value * H 40yrs + * M 15 - 40yrs * L 5 to 15ys * Nil Less 5ys * Dead	To Be Retained
20	Native frangipani *Hymenosporum flavum*	12	280	310	N/A	N/A	Mature	Good	Good	3	Low to Medium	Moderate to High	Medium	**No**
	Comments: Based on the site inspection, this planted ornamental tree is required to be removed due to its location within the proposed childcare development, site modifications and stormwater management that support is removal. It is recommended to be replaced in the landscape master plan upon completion.													
21	Camphor Tree *Cinnamomum camphora*	5	220	230	N/A	N/A	Mature	Good	Good	5	Nil	Low	Low	**No**
	Comments: This tree is a self-seeded nuisance weed species tree, that is listed as TPO Exempt, as it is a Noxious weed species and may be removed without further consideration and or approval.													
22	Oleander *Nerium oleander*	2.5	M/T	280	N/A	N/A	Mature	Good	Good	5	Nil	Low	Low	**No**
	Comments: As per Councils Tree Management Policy, Exemptions Section 5.4.3 Exempt Works, this planted ornamental shrub is TPO Exempt, due to height requirements being less than 5m in height; therefore, a tree removal permit is not required, and it may be removed without further consideration.													
23	Oleander *Nerium oleander*	2.5	M/T	280	N/A	N/A	Mature	Good	Good	5	Nil	Low	Low	**No**
	Comments: As per Councils Tree Management Policy, Exemptions Section 5.4.3 Exempt Works, this planted ornamental shrub is TPO Exempt, due to height requirements being less than 5m in height; therefore, a tree removal permit is not required, and it may be removed without further consideration.													

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24	Oleander *Nerium oleander*	2.5	M/T	280	N/A	N/A	Mature	Good	Good	5	Nil	Low	Low	**No**
	Comments: As per Councils Tree Management Policy, Exemptions Section 5.4.3 Exempt Works, this planted ornamental shrub is TPO Exempt, due to height requirements being less than 5m in height; therefore, a tree removal permit is not required, and it may be removed without further consideration.													

Key. Multi trunk (M/T)

Table 1: Shows a list of trees observed and assessed in relation to this development application by a Qualified Horticulturist and AQF Level 5 Arborist (Dip Arb).

7.0 TREE IDENTIFICATION BASED ON PROPOSED DEVELOPMENT

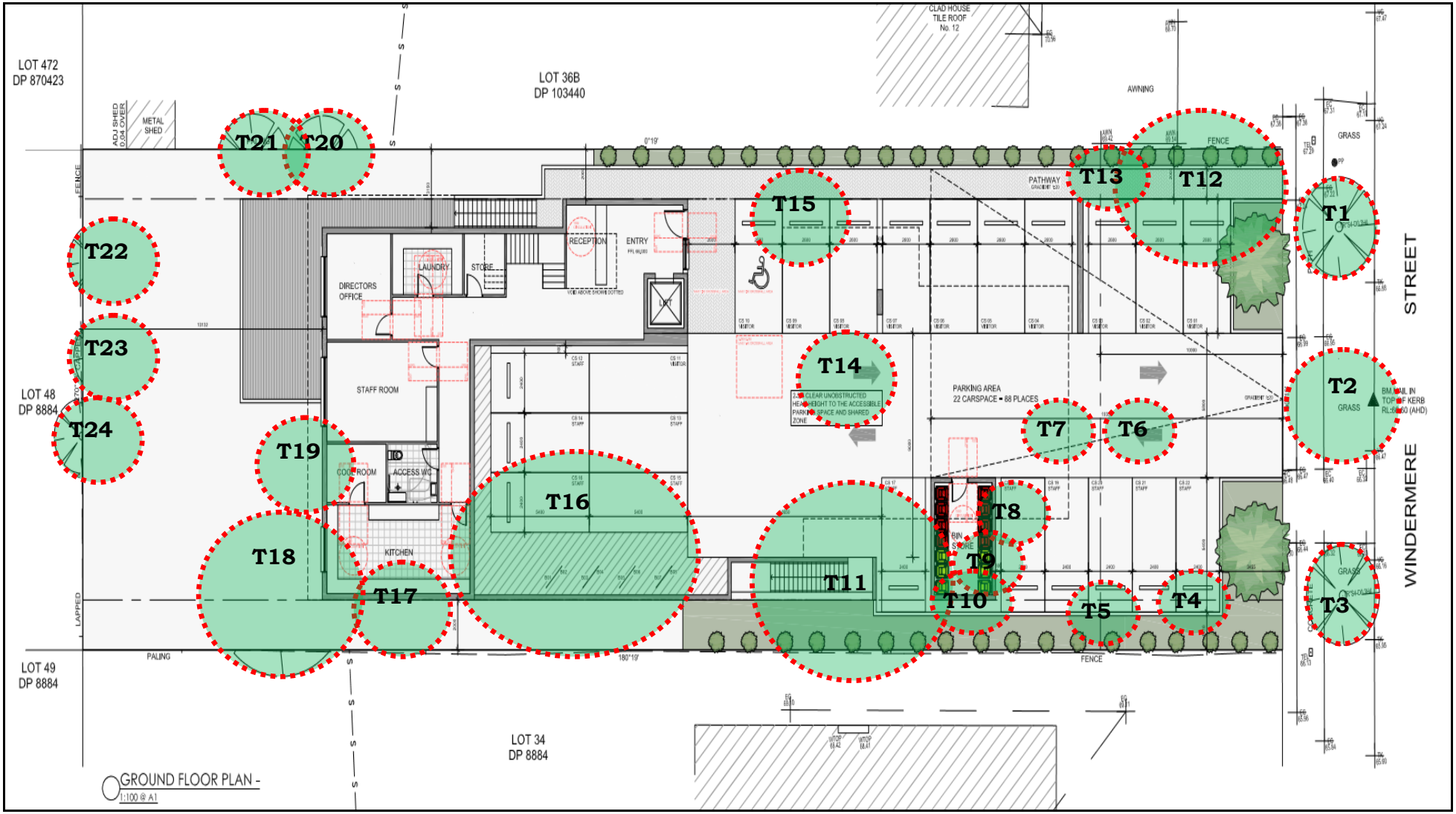


Figure 3 Shows the site trees location based on the proposed development layout.

8.0 TREES APPROVED TO BE REMOVED BASED ON DEVELOPMENT LOCATION

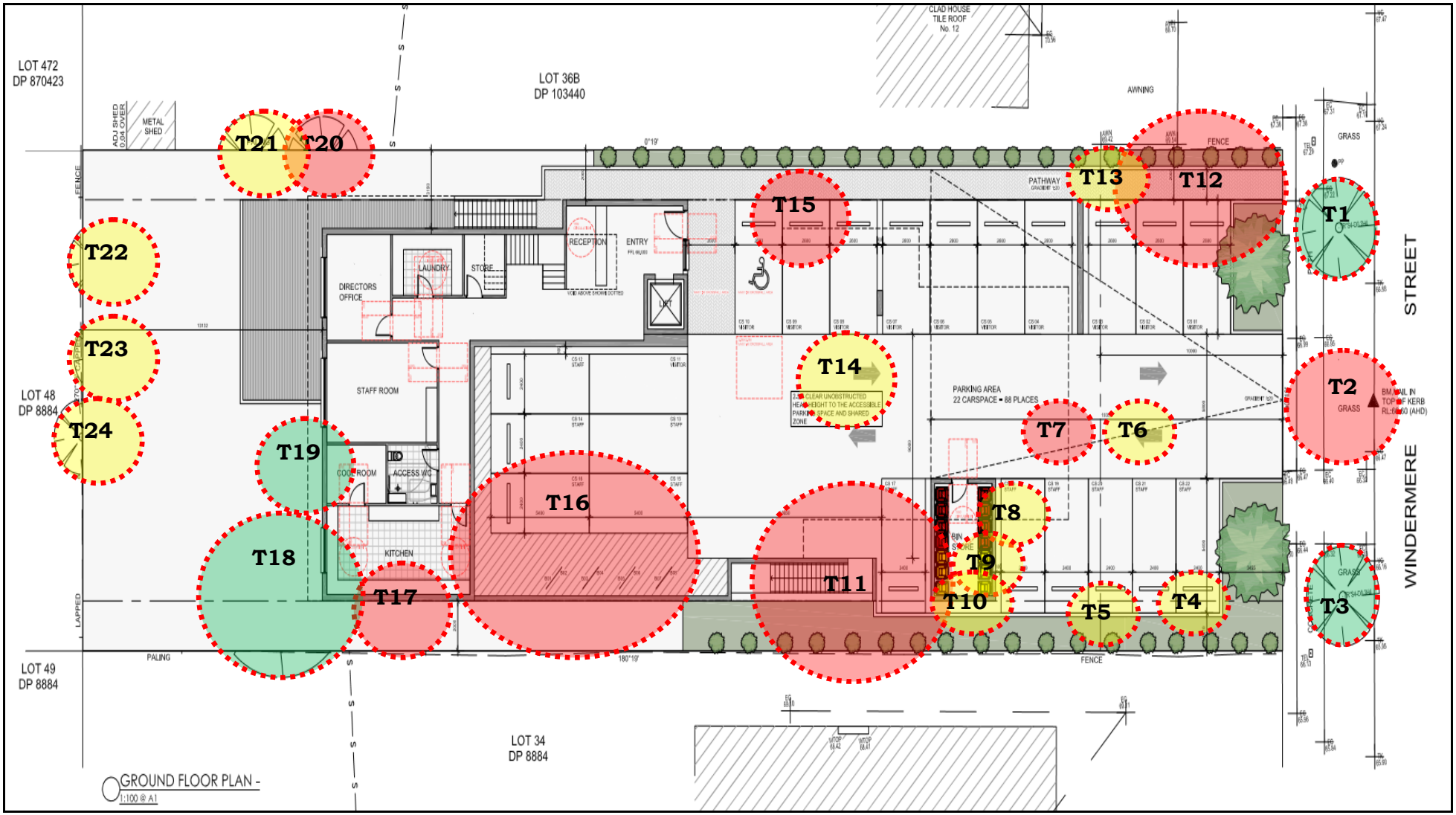


Figure 4 Shows Trees in Red required to be removed and TPO Exempt in YELLOW based on the plans provided.

9.0 TREE MANAGEMENT PLAN (TMP)

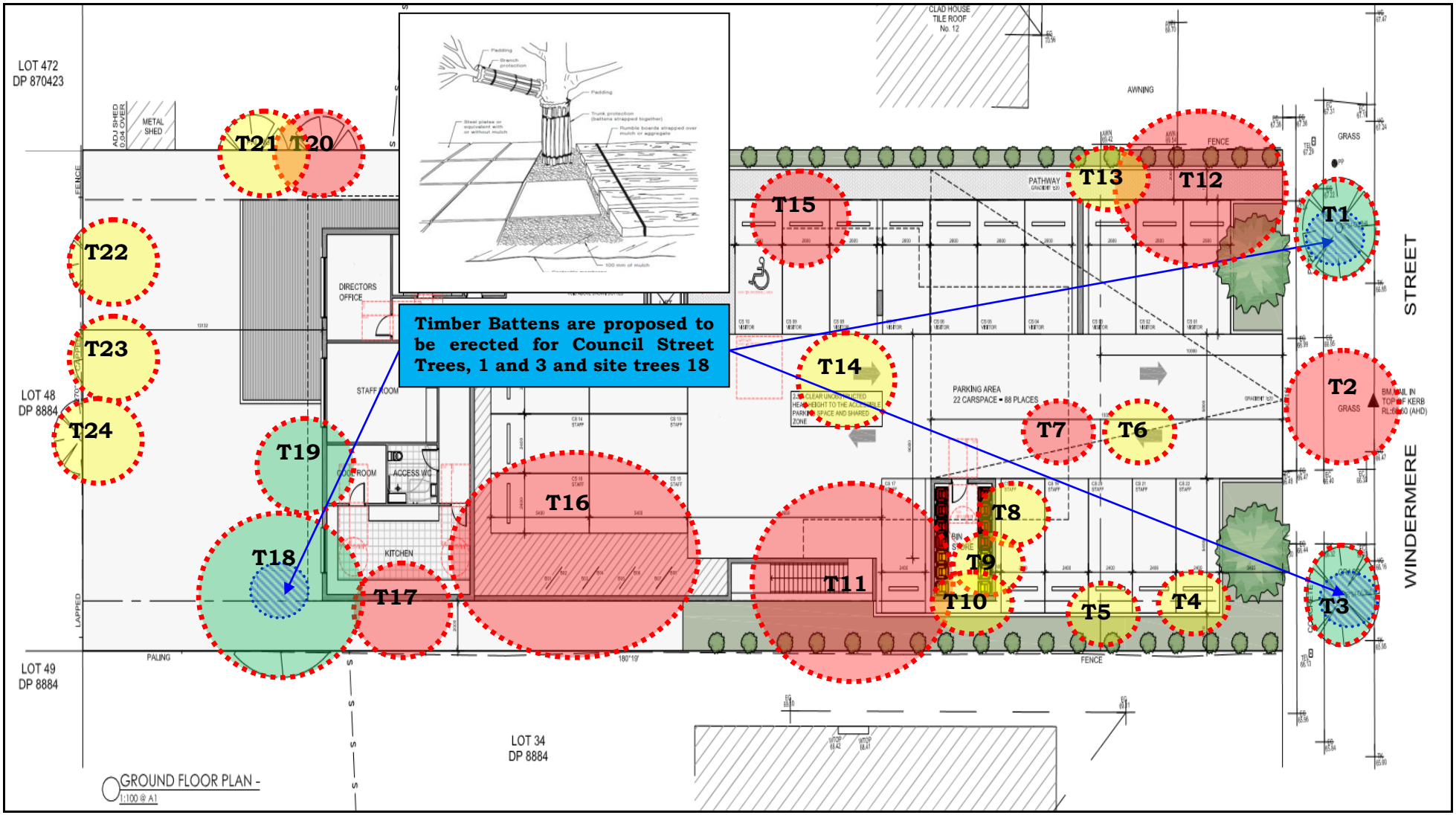


Figure 5 Shows the Site and Street trees to be retained, protected, and managed.

10.0 SITE PHOTOGRAPHS

Figure 6 Shows looking at the site with Trees 2 and 3 from a distance.

Figure 7 Shows Tree 3 with large open wound from a torn scaffold limb.

Figure 8 Shows minor shrubs to be removed.

Figure 9 Shows Tree 12 from a distance required to be removed along the boundary.

Figure 10 Shows minor shrubs and Camellias Numbered 8, 9 and 10 to be removed.

Figure 11 Shows Tree 11, that is required to be removed due to basement excavations.

Figure 12 Shows Trees 15 being a Crepe Myrtle to be removed.

Figure 13 Shows Tree 16 from a distance required to be removed for basement excavations.

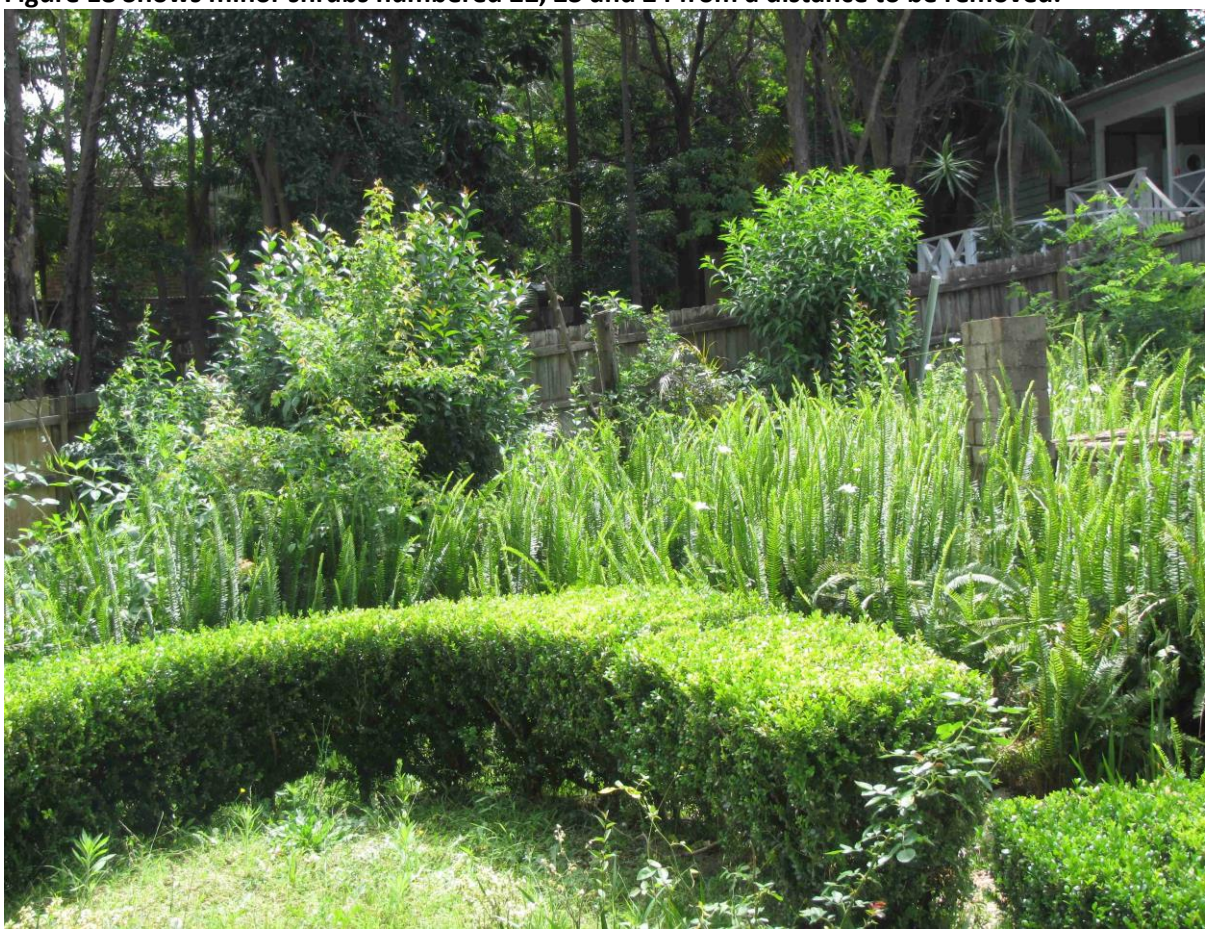
Figure 14 Shows Tree 17 being a minor Bird of Paradise to be removed.

Figure 15 Shows Tree 19 from a distance located towards the rear of the site.

Figure 16 Shows Trees 20 and 21 located along the side boundary to be removed.

Figure 17 Shows Trees 18 and 19 from a distance to be retained and protected.

Figure 18 Shows minor shrubs numbered 22, 23 and 24 from a distance to be removed.



19 Shows minor planted ornamental shrubs required to be removed.

11.0 CONCLUSION

The trees which are subject of this report are protected under Parramatta City Council Tree Preservation Order (TPO), Part 5.4 (Preservation of Trees and Vegetation) of Parramatta Council's Development Control Plan (DCP) 2011.

Consideration of retaining mature significant vegetation to the area was paramount. After close visual and physical investigation of the various trees condition the results from field investigations are as follows;

Adjoining and Site Trees Numbered 1, 3, 18 and 19 are sufficiently distanced to be safely retained and protected and managed in conjunction with hand digging methodology for the new Childcare Centre construction to ensure no impacts to these Trees TPZ/SRZ. They will be monitored by an engaged AQF L5 project arborist.

Subject to Council process, approval is recommended for the removal of Twenty-(20) shrubs, palm trees and trees numbered 2, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 20, 21, 22, 23 and 24 including minor TPO Exempt shrubs, based on their location within the tabled basement excavations, childcare building envelope, construction requirements, tabled driveway location, landscaping and considered scope of works within the development.

Trees Numbered 4, 5, 6, 8, 9, 10, 13, 14, 21, 22, 23 and 24 are TPO Exempt as per Councils Tree Management Policy, Exemptions Section 5.4.3 Exempt Works, due to height requirements being less than 5m in height; or tabled as nuisance weed species, therefore, a tree removal permit is not required, and they may be removed without further consideration.

Whilst these trees tabled to be removed are in good health and structural condition, they are required to be removed, based on their location within the proposed basement/building envelope, excavation works, and scope of works support their removal. All considerations, options regarding there retention were considered, however, based on the plans, site modifications will result in long-term modifications to the tree's natural environment (TPZ/SRZ) through but not limited to; surface root and soil compaction, loss of anchorage roots, natural water table redirection through the required cut and fill levels, stormwater service line installations that would result in the decline of the tree's health and overall stability.

No roosting or habitat hollows were observed in any of the trees proposed to be removed.

It is anticipated these trees will be replaced within proposed landscape plan upon completion.

As stated, this tabled report is a snapshot of the existing trees structural condition, health, and condition at that particular point in time on site and should be used as a guide when assessing this Development Application.

12.0 RECOMMENDATIONS

After close visual and physical investigation of the trees condition (VTA), results from the field investigations indicated the following:

Subject to Council process, approval is recommended for the removal of Twenty-(20) shrubs, palm trees and trees numbered 2, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 20, 21, 22, 23 and 24 including minor TPO Exempt shrubs, based on their location within the tabled basement excavations, childcare building envelope, construction requirements, tabled driveway location, landscaping and considered scope of works within the development.

Trees Numbered 4, 5, 6, 8, 9, 10, 13, 14, 21, 22, 23 and 24 are TPO Exempt as per Councils Tree Management Policy, Exemptions Section 5.4.3 Exempt Works, due to height requirements being less than 5m in height; or tabled as nuisance weed species, therefore, a tree removal permit is not required, and they may be removed without further consideration.

Whilst these trees tabled to be removed are in good health and structural condition, they are required to be removed, based on their location within the proposed basement/building envelope, excavation works, and scope of works support their removal. All considerations, options regarding there retention were considered, however, based on the plans, site modifications will result in long-term modifications to the tree's natural environment (TPZ/SRZ) through but not limited to; surface root and soil compaction, loss of anchorage roots, natural water table redirection through the required cut and fill levels, stormwater service line installations that would result in the decline of the tree's health and overall stability.

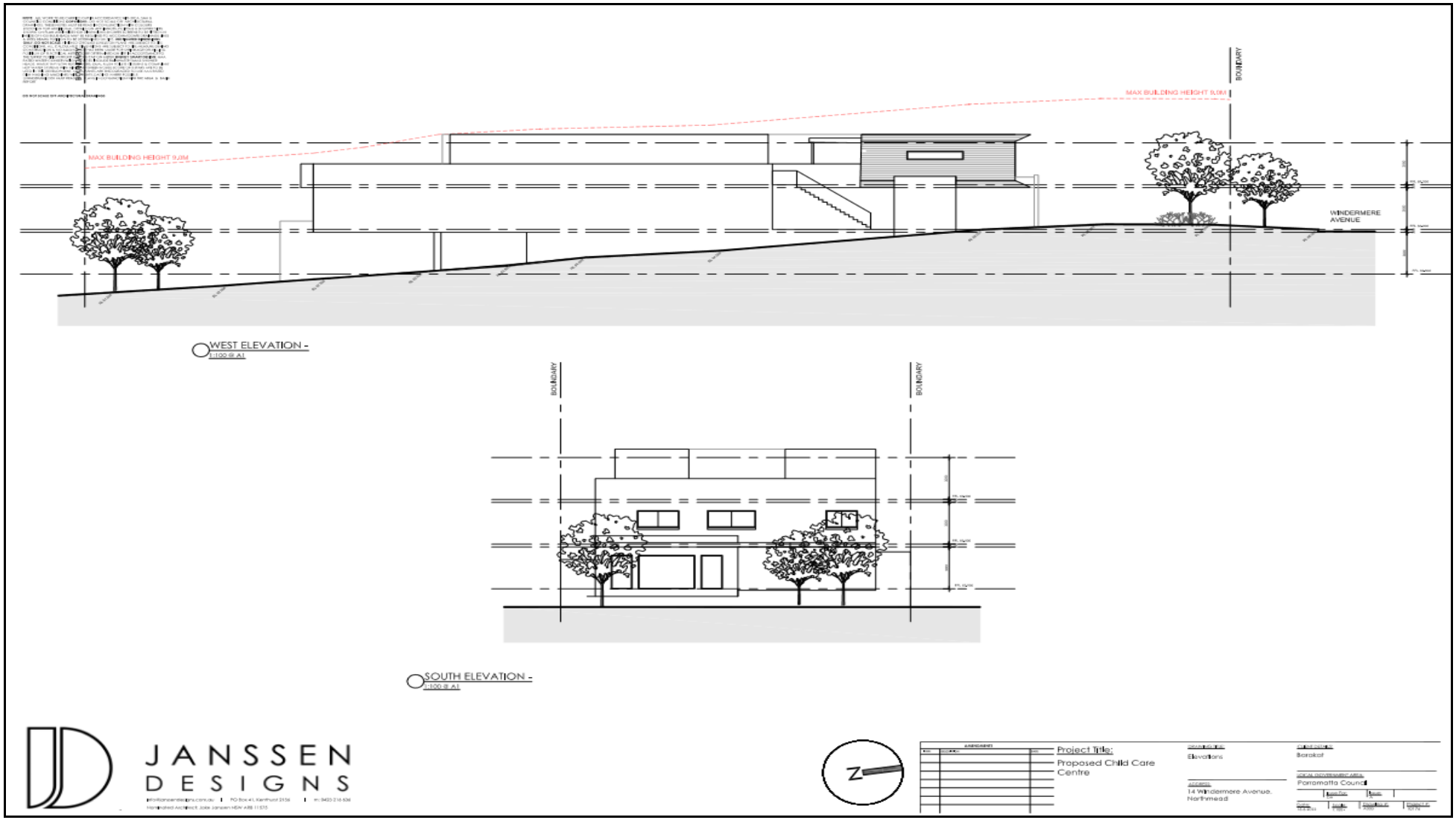
Adjoining and Site Trees Numbered 1, 3, 18 and 19 are sufficiently distanced to be safely retained and protected and managed in conjunction with hand digging methodology for the new Childcare Centre construction to ensure no impacts to these Trees TPZ/SRZ. They will be monitored by an engaged AQF L5 project arborist.

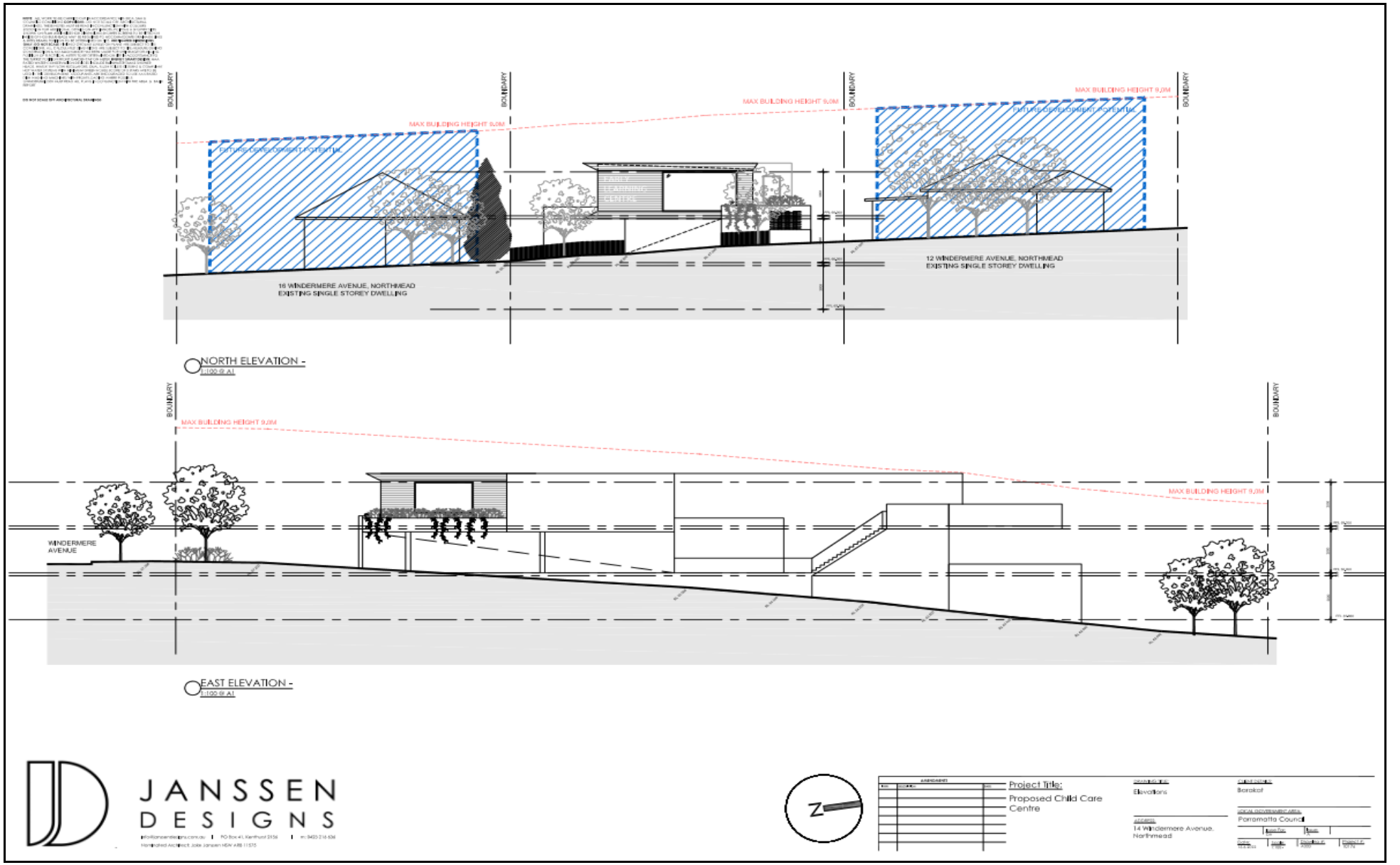
The following points may be considered for the proposed Childcare development and retention of trees under this application;

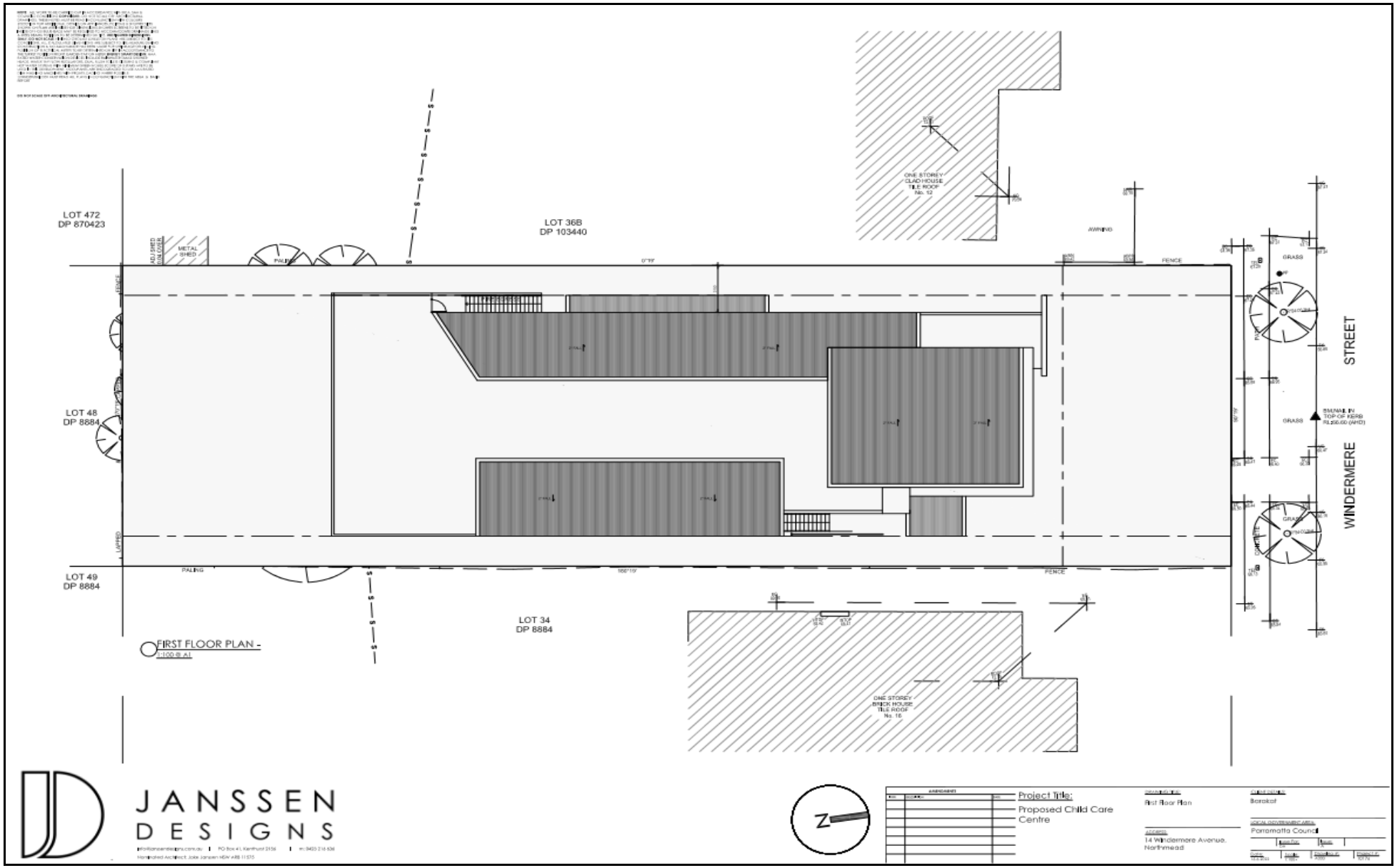
- Avoid large changes to the surface structure due to modification of the tree's moisture / surface feeding roots,
- A Qualified Arborist/Horticulturalist undertakes all Arboricultural works,
- **ANY** excavation that is required within the trees TPZ will be hand dug to ensure minimal disturbance to support and or surface feeding roots,
- Any tree roots discovered are cut cleanly with root pruning devices,
- No tree roots over 40mm in diameter will be cut without project arborist and Council approval,
- Any proposed work located near the trunk or outer canopy of the trees drip line, where services are known to be in the vicinity, any excavation for services should be hand dug to ensure minimal impact to the trees surface feeding and support roots,
- No building waste is to be disposed of/or stored near the tree trunk or drip zone,
- Regular watering is to be undertaken in hot dry periods to alleviate any short-term stress or loss of available water,
- Erection of timber battens be installed to ensure the protection of street trees as per APPENDIX E 9,
- A qualified Arborist should monitor these trees over a twelve (12) month period to evaluate the trees recovery and provide technical information to Council as required.

APPENDICIES

APPENDIX A: APPROVED DEVELOPMENT LAYOUT




BOUNDARY
BOUNDARY
BOUNDARY
BOUNDARY
MAX BUILDING HEIGHT 9.0M
MAX BUILDING HEIGHT 9.0M
MAX BUILDING HEIGHT 9.0M
EXISTING DEVELOPMENT POTENTIAL
FUTURE DEVELOPMENT POTENTIAL
16 WINDERMERE AVENUE, NORTHMEAD
EXISTING SINGLE STOREY DWELLING
12 WINDERMERE AVENUE, NORTHMEAD
EXISTING SINGLE STOREY DWELLING
NORTH ELEVATION -
1:100 @ A1
BOUNDARY
BOUNDARY
MAX BUILDING HEIGHT 9.0M
MAX BUILDING HEIGHT 9.0M
WINDERMERE AVENUE
EAST ELEVATION -
1:100 @ A1
JANSSEN DESIGNS
Project Title:
Proposed Child Care Centre
Elevations
14 Windermere Avenue, Northmead
Parramatta Council


LOT 472
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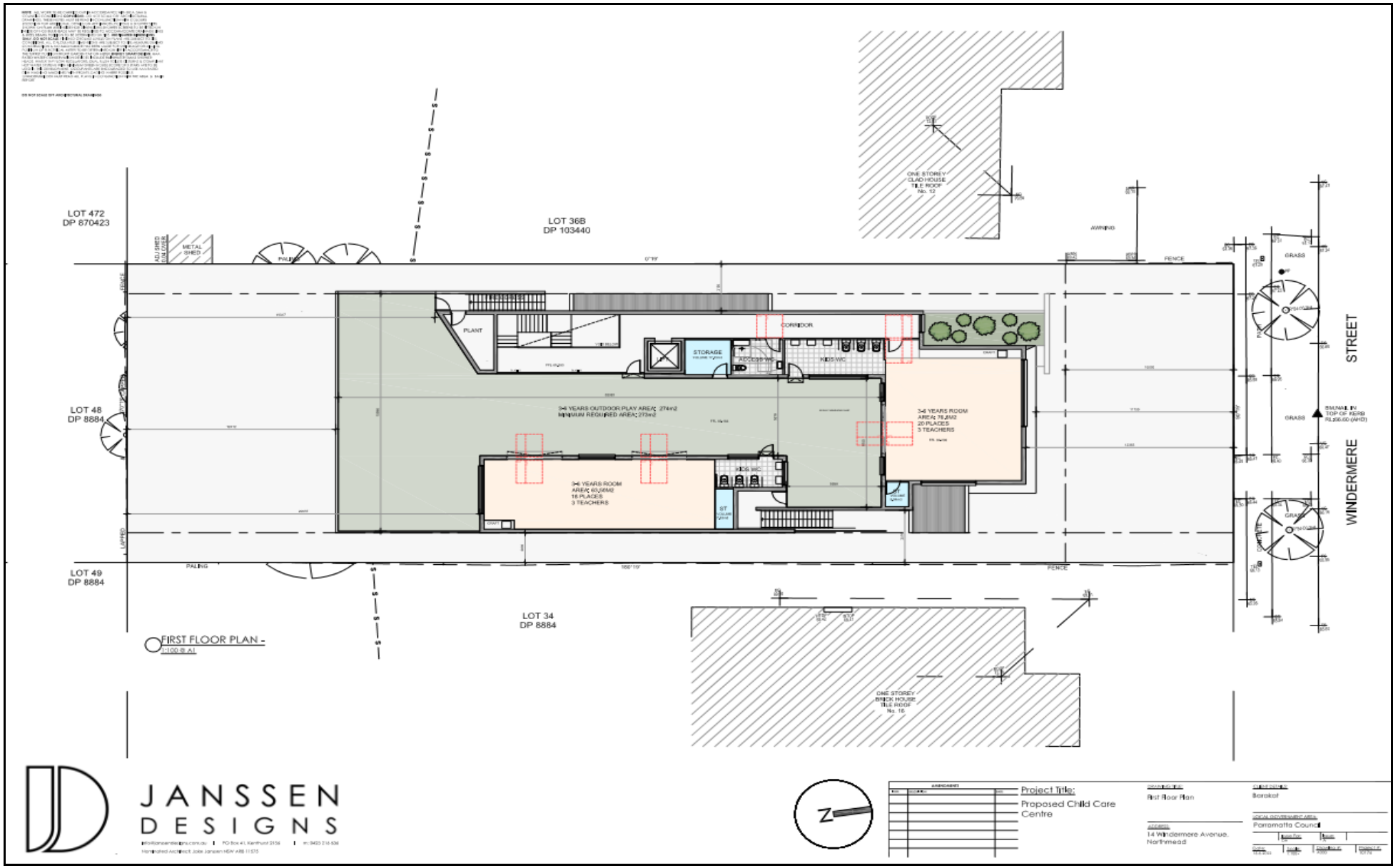
LOT 36B
DP 103440
LOT 48
DP 8884
LOT 49
DP 8884
LOT 34
DP 8884
ONE STOREY
CLAD HOUSE
TILE ROOF
No. 12
ONE STOREY
BRICK HOUSE
TILE ROOF
No. 16
METAL SHED
ADJ SHED
PALING
FENCE
AWNING
GRASS
STREET
WINDERMERE
FIRST FLOOR PLAN -
1:100 @ A1
JANSSEN
DESIGNS
Project Title:
Proposed Child Care
Centre
First Floor Plan
14 Windermere Avenue,
Northmead
Baraket
Parramatta Council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LOT 36B
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LOT 48
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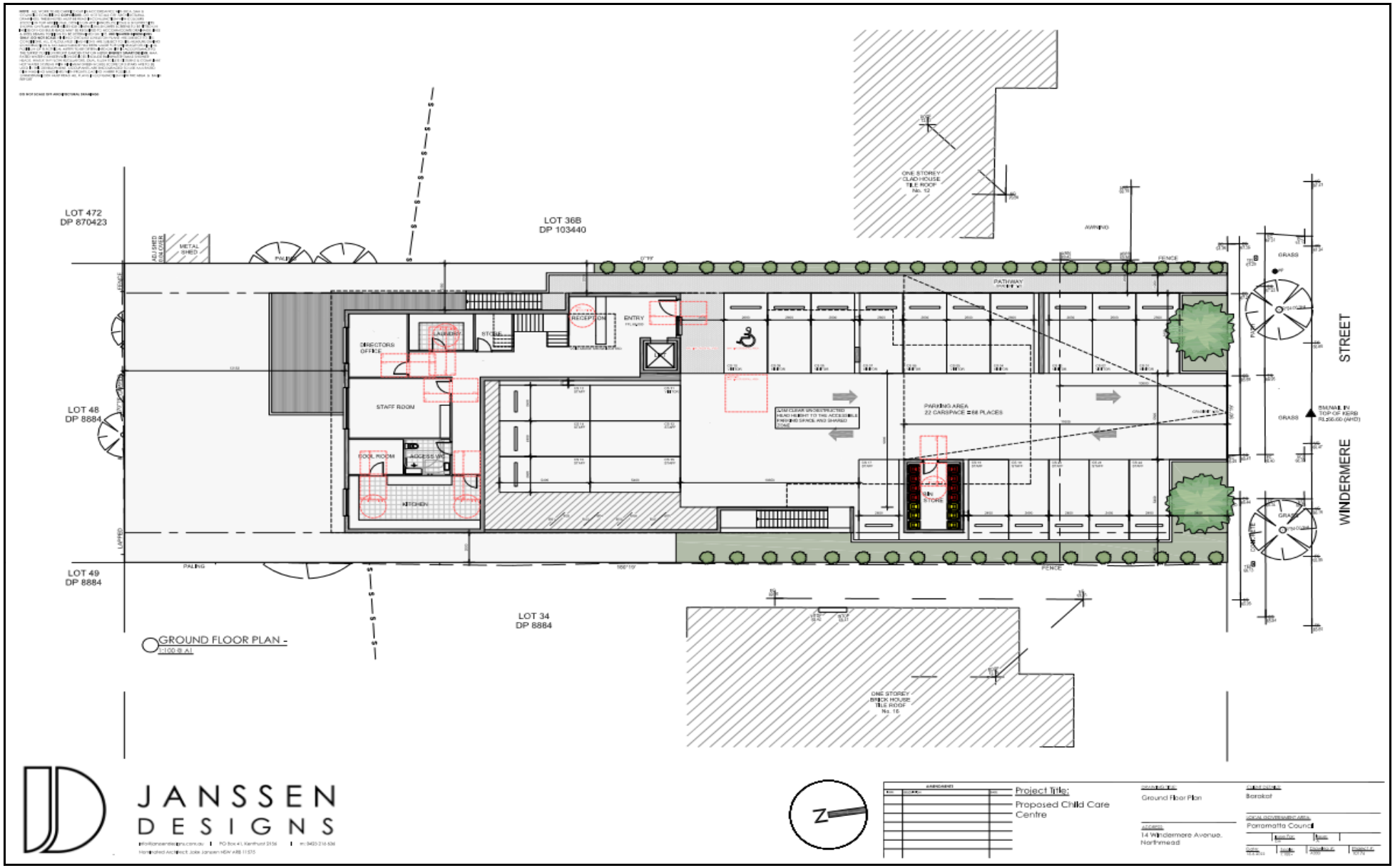
LOT 49
DP 8884
LOT 34
DP 8884
ONE STOREY
CLAD HOUSE
TILE ROOF
No. 12
ONE STOREY
BRICK HOUSE
TILE ROOF
No. 16
METAL SHED
PALING
FENCE
AWNING
PLANT
STORAGE
CORRIDOR
ACCESS WC
KIDS WC
3-4 YEARS OUTDOOR PLAY AREA: 274m2
MINIMUM REQUIRED AREA: 273m2
3-4 YEARS ROOM
AREA: 76.8M2
20 PLACES
3 TEACHERS
3-4 YEARS ROOM
AREA: 60.96M2
16 PLACES
3 TEACHERS
ST
GRASS
WINDERMERE
STREET
FIRST FLOOR PLAN -
1:100 @ A1
JANSSEN
DESIGNS
Project Title:
Proposed Child Care
Centre
First Floor Plan
14 Windermere Avenue,
Northmead
Parramatta Council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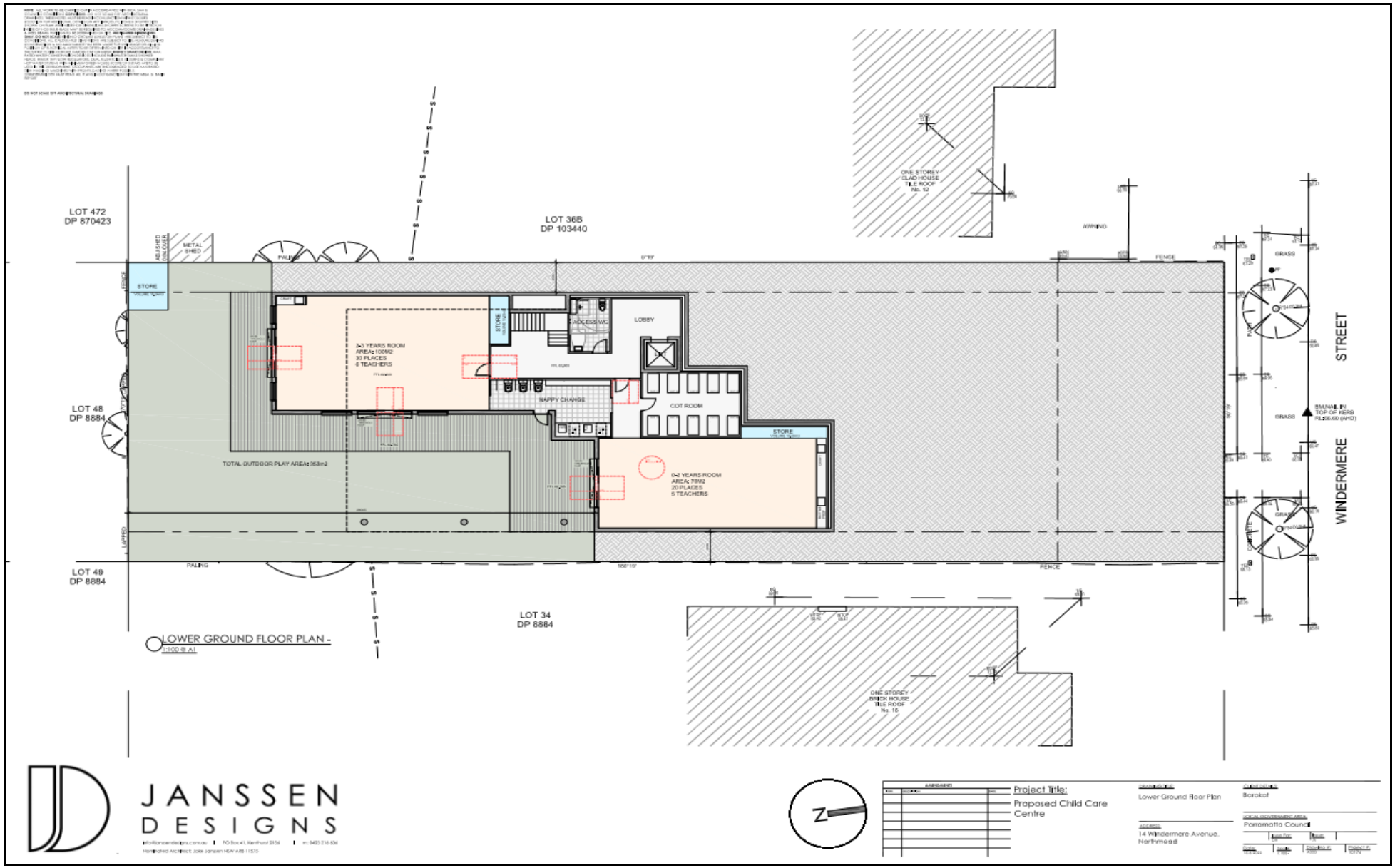
LOT 36B
DP 103440
LOT 48
DP 8884
LOT 49
DP 8884
LOT 34
DP 8884
METAL SHED
PALING
DIRECTORS OFFICE
LAUNDRY
STORE
RECEPTION
ENTRY
STAFF ROOM
COOL ROOM
ACCESS WC
KITCHEN
PARKING AREA
22 CARSPACE INCL PLACES
BIN STORE
PATHWAY
AWNING
FENCE
GRASS
WINDERMERE STREET
ONE STOREY CLAD HOUSE TILE ROOF No. 12
ONE STOREY BRICK HOUSE TILE ROOF No. 16
GROUND FLOOR PLAN -
1:100 @ A1
JANSSEN DESIGNS
Project Title:
Proposed Child Care Centre
Ground Floor Plan
14 Windermere Avenue, Northmead
Parramatta Council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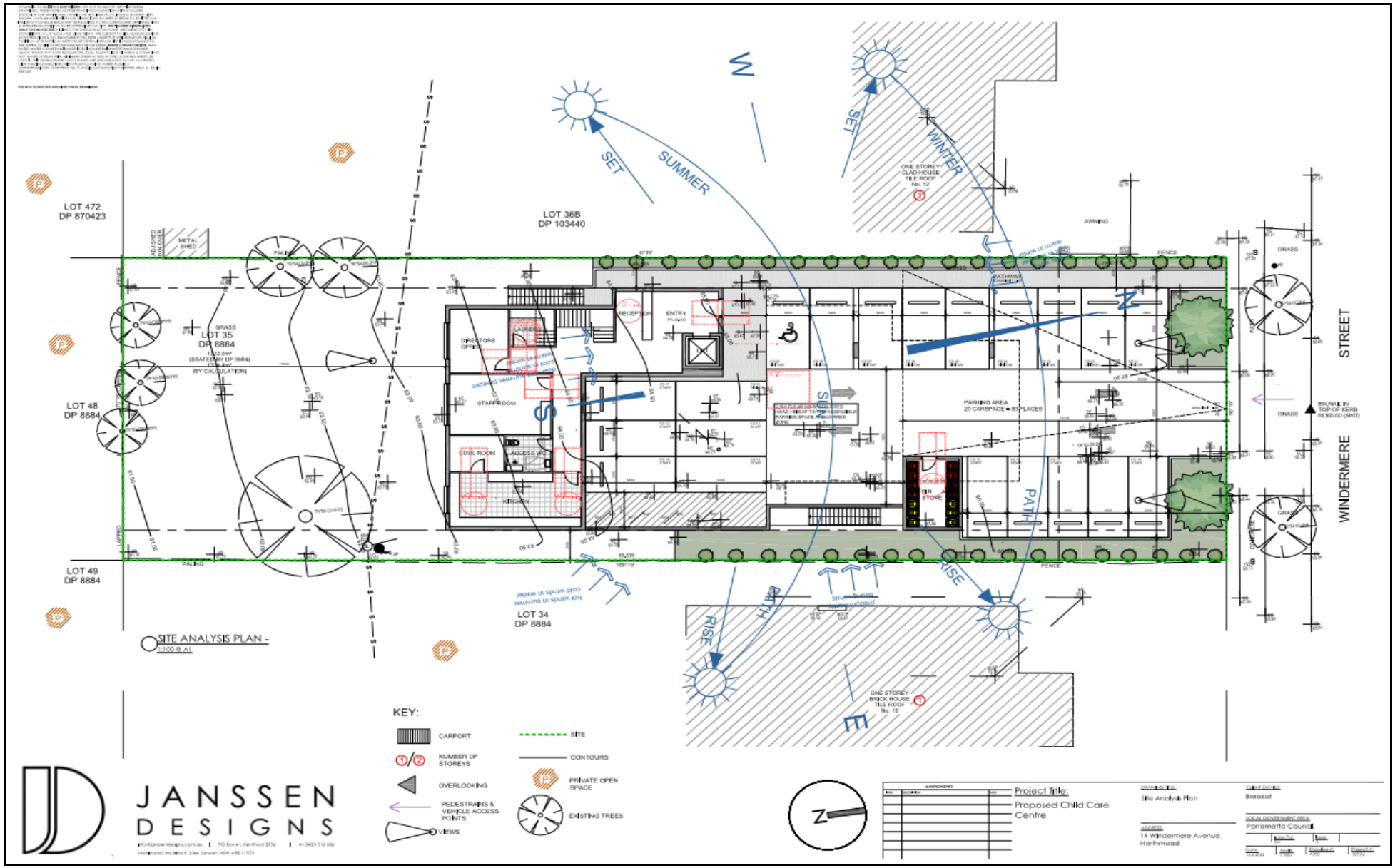
LOT 48
DP 8884
LOT 49
DP 8884
LOT 34
DP 8884
STREET
WINDERMERE
LOWER GROUND FLOOR PLAN -
JANSSEN
DESIGNS
Project Title:
Proposed Child Care
Centre
Lower Ground Floor Plan
14 Windermere Avenue,
Northmead
Baraka
Parramatta Council


LOT 472
DP 870423
LOT 36B
DP 103440
LOT 35
DP 8884
LOT 48
DP 8884
LOT 49
DP 8884
LOT 34
DP 8884
SUMMER
WINTER
SET
RISE
PATH
STREET
WINDERMERE
SITE ANALYSIS PLAN -
KEY:
CARPORT
NUMBER OF STOREYS
OVERLOOKING
PEDESTRIANS & VEHICLE ACCESS POINTS
VIEWS
SITE
CONTOURS
PRIVATE OPEN SPACE
EXISTING TREES
JANSSEN DESIGNS
Project Title:
Proposed Child Care Centre
Site Analysis Plan
14 Windermere Avenue, Northmead
Baraket
Parramatta Council

APPENDIX B: SUPPORTING INFORMATION FOR TREE ASSESSMENT TABLE

B.1 TREE PROTECTION ZONE CALCULATION

A Tree Protection Zone (TPZ) is a radial distance measured from the centre of the trunk of the tree. The intention of the TPZ is to minimise incursions to the root system and canopy to ensure the long-term health and stability of the tree. A commonly used delineation for the TPZ is the dripline (extent of the crown spread projected to the ground plane). However, this may not provide adequate protection for trees that have prominent leans or distorted imbalanced or narrow crowns. A more appropriate guideline is the trunk diameter.

The Tree trunk measurement is recorded and known as the Diameter at Breast Height (DBH) at 1.4 metres from ground level using a metric tape measure. The TPZ area is then calculated by DBH x 12.

The TPZ incorporates the Structural Root Zone (SRZ). The SRZ is the area required for tree stability and has a standard calculation formula. The SRZ calculation is only used when a major encroachment into a TPZ is proposed.

B.2 TREE AGE TERMINOLOGY

Rating	Description
Juvenile	Less than 20% of the life expectancy for the species
Semi-mature	Middle age trees, 20% to 50% of life expectancy
Mature	Greater than 50 – 80% of the life expectancy for the species
Over-mature	Greater than 80% of the life expectancy for the species, senescent tree, or those declining irreversibly to death

B.3 DEFINITION OF ASSESSED HEALTH AND CONDITION OF TREE

The condition of each tree has been rated in overall terms as one of the following:

Rating	Description
Good	The tree is generally healthy, vigorous, and free from the presence of major disease, obvious structural weaknesses, and fungal or insect infestation. It is expected to continue to live in the same condition as at the time of the inspection. Only small recommendations may be required to help continue the trees longevity.
Fair	The tree is generally vigorous but has some indication of decline possibly due to the early effects of disease, fungal or insect infestation, affected by physical (storm damage) or mechanical damage (Vandalism or involved in an accident by a vehicle), or is faltering due to the modification of the tree's environment essential for its survival. This tree group may recover with remedial work undertaken by a Qualified Arborist where appropriate or without intervention and may regain some vigour and stabilise over time. Medium recommendations are required to bring this tree up to a satisfactory standard.
Poor	The tree is exhibiting symptoms of advanced and irreversible decline due to possible factors such as fungal infestation, termite damage, ring barking of the tree's trunk due to borer infestation. Symptoms observed can include major die-back in branches, foliage thinning in the crown, and epicormic growth throughout the inner canopy. This tree group will normally decline further to death regardless of remedial works or modifications undertaken.
Dead	The tree is no longer alive and is in poor structural condition, that may cause damage to people or property and removal is strongly recommended.

B.4 ASSESSED STRUCTURAL CONDITION

This refers to the tree's form and growth habit, modified by its environment, including the state of the trunk and main structural branches. It considers the presence of defects such as decay, weak branch junctions and other visible abnormalities. Although some trees without defects fail in major storms, the presence of any defect will increase the chances of failure.

Rating	Description
Good	Trees with a single dominant trunk along which evenly spaced branches are spread. Branches have properly formed collars which provide strong attachment to the trunk and are about 25% of the trunk diameter. Minor structural defects may be present with low failure potentials.
Average	Trees with structural defects with low failure potential.
Fair	Trees with structural defects with medium failure potentials and require monitoring on an annual basis.
Poor	Trees with defects which have failed, or have a high risk of failing soon, and corrective action must be taken soon as possible.

B.5 SAFE USEFUL LIFE EXPECTANCY (SULE)

The remaining Safe Useful Life Expectancy of a tree is an estimate of the sustainability of the tree within the site/landscape, calculated based on an estimate of the average age of the species in an urban area, compared with its estimated current age. SULE ratings are estimated in line with the following table:

	1 LONG - 40+ yrs	2 MEDIUM - 15 to 40 yrs	3 SHORT- 5 to 15 yrs	4 REMOVAL - < 5 yrs	5 MOVED OR REPLACED
	Likely to be useful for over 40 years with acceptable risk and assuming reasonable maintenance	Likely to be useful for 15-40 years with acceptable risk and assuming reasonable maintenance	Trees that appeared to be retainable at the time of assessment for 5 to 15 years with acceptable level of risk.	Tree to be removed within the next 5 years	Tree which can be reliably moved or replaced.
A	Structurally sound trees growing in positions that can accommodate future growth	Trees which may only live 15-40 years	Trees that may only live between 5 and 15 more years.	Dead, dying, suppressed or declining trees through disease or inhospitable conditions.	Small tree less than 5m in height.
B	Trees which could be made suitable for long term retention by further care	Trees which may live for more than 40 years but which would be removed for safety or nuisance reasons	Trees which may live for more than 15 years but which would be removed for safety or nuisance reasons	Dangerous trees through instability or recent loss of adjacent trees.	Young trees less than 15 years old but over 5m in height.
C	Trees of special significance for history, commemorative or rarity reasons that warrant extraordinary efforts to secure their long-term future	Trees that may live for more than 40 years but would be removed to prevent interference with more suitable individuals or to provide space for new planting	Trees that may live for more than 15 years but should be removed to prevent interference with more suitable individuals or to provide space for new plantings	Dangerous trees through structural defects including cavities, decay included bark, wounds or poor form.	Trees that have been pruned to artificially control growth.
D		Trees which could be made suitable for medium term retention by remedial care	Trees which require substantial remediation tree care and are only suitable for retention in the short term.	Damaged trees that are clearly not safe to retain.	
E				Trees that may live for more than 5 years but should be removed to prevent interference with more suitable individuals or to provide space for new plantings	
F				Trees damaging Or which may cause damage to existing structures within the next 5 years	
G				Trees that will become dangerous after removal of other tress for reasons given in A) to F)	

SULE table adapted from Barrell (1995).

NOTE: No tree is "safe" i.e. entirely without hazard potential. The SULE rating given to any tree in this report assumes that reasonable maintenance will be provided by & qualified arborist using correct and acknowledged techniques. Retained trees are to have a reasonable setback and be protected from root damage. Incorrect practices can significantly accelerate tree decline and increase hazard potential.

B.6 ECOLOGICAL SIGNIFICANCE

These categories are based upon the criteria used in the Thyer Tree Valuation Method (1996) to evaluate a tree's ecological benefit.

Rating	Description
None	Weed species
Low	Restricts desirable plants or of little benefit to fauna.
Medium	Beneficial to flora & fauna provides food source and/or shelter.
High	Remnant /indigenous species of native vegetation.
Very High	Indigenous species being an integral part of a natural ecosystem.

B.7 LANDSCAPE SIGNIFICANCE

The site's **Landscape Significance** is a subjective value determined by assessing a combination of cultural, environmental, and aesthetic values of the subject trees. This may aid in determining their overall retention value. Generally, the Landscape Significance of the subject trees has been determined using the following criteria:

RATING	DESCRIPTION
HIGH	The subject tree is listed as a Heritage Item under the *Local Environmental Plan* with a local or state level of significance.
	The subject tree forms part of the curtilage of a heritage item.
	The subject tree creates a 'sense of place' or is considered 'landmark' tree.
	The subject tree is of local, cultural, or historical importance or is widely known.
	The subject tree is listed on Council's Significance Tree Register.
	The subject tree is scheduled as a Threatened Species or Threatened Plant Community under replaced by the Biodiversity Conservation Act (2016)
	The subject tree is a remnant tree.
	The subject tree is a locally indigenous species and is representative of the original vegetation of the area.
	The subject tree provides habitat to a threatened species.
	The subject tree is an excellent representative of the species in terms of aesthetic value.
MODERATE	The subject tree makes a positive contribution to the visual character or amenity of the area.
	The subject tree provides a specific function such as screening or minimising the scale of a building.
	The subject tree has a known habitat value.
	The subject tree is a good representative of the species in terms of aesthetic value.
LOW	The subject tree is an environmental pest species or is exempt under the provisions of the local Council's Tree Preservation Order.
	The subject tree makes little or no contribution to the amenity of the locality.
	The subject tree is a poor representative of the species in terms of aesthetic value.
NIL	The subject tree is declared a Noxious Weed under the Biosecurity Act (2015)

*NOTE: If the tree can be categorised into more than one value, the higher value should be allocated.

B.8 RETENTION VALUE WITHIN THE LANDSCAPE

The Retention Values of the trees have been determined based on the estimated longevity of the individual tree with consideration of its landscape significance rating. Together with recommendations contained within this report, the information should be used to determine the most appropriate action for trees considered for either retention or removal.

Retention Value Rating	**Landscape/Environmental Significance**						
Estimated Life Expectancy	**1- Very High**	**2- Very High to High**	**3- High to Moderate**	**4 - Moderate**	**5- Moderate to Low**	**6- Low**	**7- Nil**
HIGH – (H) Greater than 40 Years	**High Retention Value**						
MEDIUM- (M) 15 to 40 Years			**Moderate Retention Value**				
LOW – (L) 5 to 15 years				**Low Retention Value**			
Less than 5 Years							
Dead or Hazardous							

APPENDIX C: TREE PROTECTION ZONES

The Tree Protection Zone (TPZ) is the designated area around a tree where optimum protection and preservation efforts should be implemented.

Root systems have two major functions, which are to obtain water and minerals from the soil and to give anchorage support to the tree. Most of the root system is in the surface 600mm to 800mm deep, extending radially for distances which are frequently in excess of the tree height. Unless conditions are uniform around the tree, which would be highly unusual, the extent of the root-systems can be irregular and difficult to predict. As tree roots are very opportunistic, they will not generally show the symmetry seen in the aerial parts.

On average, the tree's roots will extend to the outer reaches of their canopies, depending on morphology and disposition of the individual tree roots, and known to be influenced by past or existing site conditions including but not limited to;

- The individual tree species,
- Soil type, structure, and location,
- Topography and existing drainage,
- Location of either manmade hard structures or environment
- Pruning requirements, if required,

No disturbance should occur within this area. It is calculated by using a formula that considers the tolerance level of the species to disturbance, its age class, and its condition and trunk diameter.

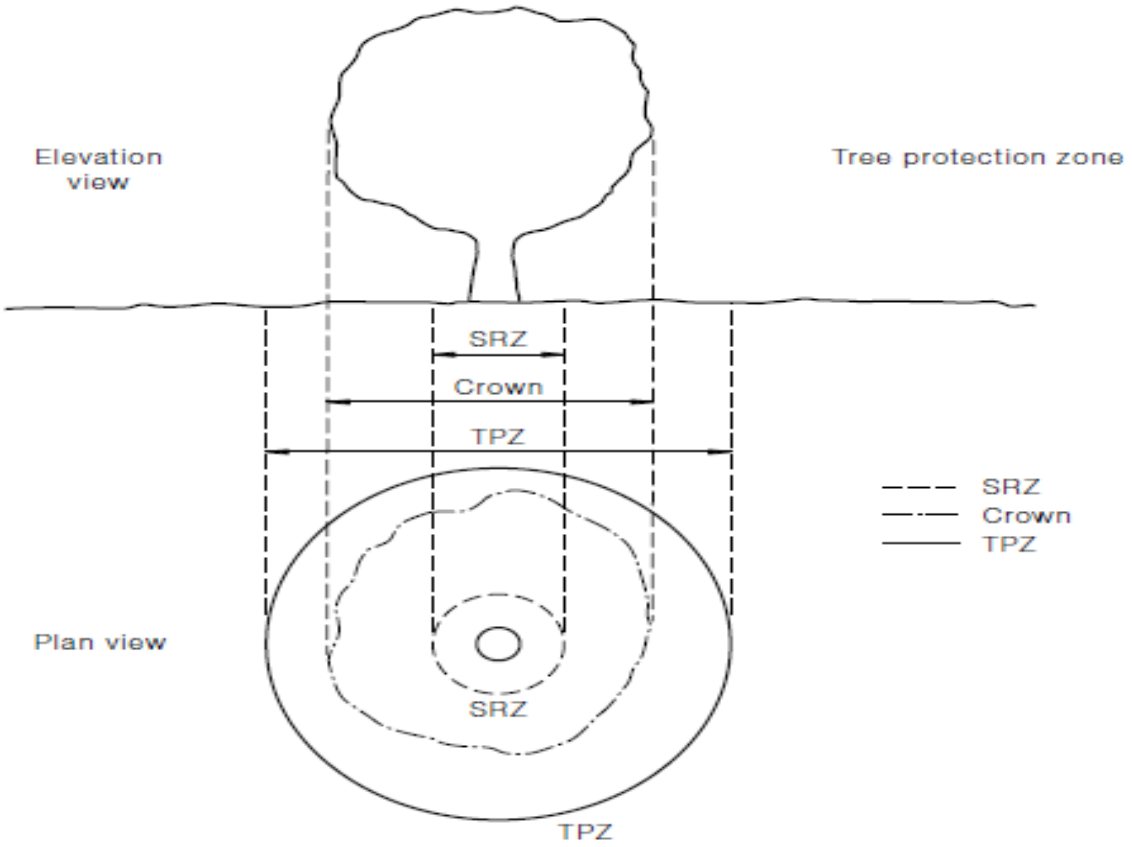
The main area for surface feeding roots to occur is from the tree trunk to the outer canopy known as the drip zone. These fibrous roots are less likely to occur under or near other buildings, as there is little surface moisture or soil air presence for root survival. These fibrous roots are those that take up water and nutrients.

While some tree roots will deeply penetrate the soil profile, in search of available water, most will occupy the first 60-80cm of the soil, as to obtain the needed sustenance. At times, it will not be possible to retain the optimum TPZ around each tree and any activities proposed within this area must be carefully analysed to minimise any effects on its health and/or stability.

The actual spread of the root system is largely dependent on the species involved, and their localised environment. Any work carried out within the TPZ should be reviewed and supervised by an appropriately qualified Arborist.

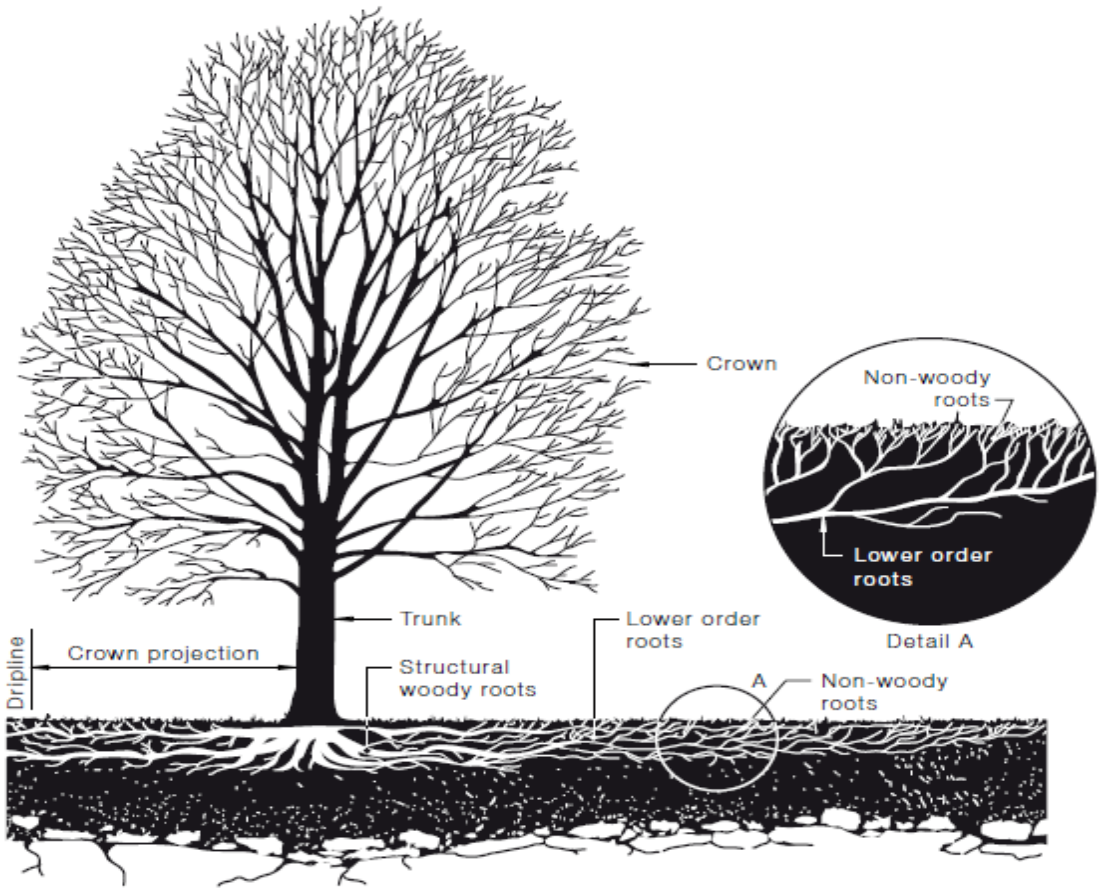
Construction works proposed to be undertaken around the trees if not correctly assessed may modify the natural water table and reduce the amount of soil air and moisture present/available to the trees and their longevity may be greatly diminished. Changing the drainage patterns around a tree by constructing a building, driveways, road, and paths etc will alter the amount of water the tree receives and may cause root death or damage. Trenches dug beside or adjoining large trees for water, sewer or services may also damage the roots and will make a tree unstable.

Older trees will tolerate far less stress than younger trees as with age they become less responsive and find it very strenuous to respond to changes in their environment.



C.1. Diagram of the TPZ and SRZ of a typical tree.

Source: Australian Standards - AS 4970-2009 Protection of trees on development sites.



C.2. Diagram of a typical tree root structure.

Source: Australian Standards - AS 4970-2009 Protection of trees on development sites.

C.3 PROHIBITED SITE WORKS WITHIN TREE PROTECTION ZONES

The trees identified to be retained shall be protected prior to and during the construction process from activities that may result in an adverse effect on its health, structure, or longevity.

Unless otherwise stated, and/or approved by Council/Consent Authority, the area within the Tree Protection Zone shall exclude the following activities:

- Modification of existing soil levels,
- Excavations and trenching,
- Cultivation of the soil,
- Mechanical removal of vegetation,
- Soil disturbance,
- Movement of natural rock,
- Storage of materials, plant, or equipment,
- Erection of site sheds,
- Affixing of signage or hoarding to the tree,
- Preparation of building materials,
- Disposal of waste materials and chemicals,
- Movement of pedestrian or vehicular traffic,
- Parking of vehicles or plant machines
- Temporary or permanent location of services i.e., water, electricity, sewer

C.4 WORKS WITHIN THE TREE PROTECTION ZONE

The Tree Protection Zone may need to be modified during the construction process to allow access between the tree to be retained and the construction works.

The Tree Protection Zone shall remain intact as specified and approved by Council until these works are to project completion. If access, encroachment, or incursion into the Tree Protection Zone is deemed essential, prior authorization is required by the Site Arborist.

Upon completion of the works within the Tree Protection Zone, the Tree Protection Fencing must remain erected until site machinery, sheds, storage facilities are removed.

The modification of the Tree Protection Zones may necessitate the dismantling of sections of the Tree Protection Fencing in the short term as part of the construction process. The Tree Protection Fence shall only be removed, altered, or relocated with the authorization of the Site Arborist in writing.

Where there is not sufficient space to place temporary site structures and they may be required to be placed within the specified TPZ, authorization is required by the Site Arborist prior to any works commencing.

APPENDIX D: RETENTION OF TREES GENERAL CONDITIONS.

The following points may be considered for the long-term retention of adjoining trees as listed in Section 6.0 Tree Identification Assessment Summary, not affected by this proposed development under this application.

- Avoid large changes to the surface structure due to modification of the tree's moisture / surface feeding roots,
- A Qualified Arborist/Horticulturalist undertakes all Arboricultural works,
- All trenching near the trees as required is to be hand dug to ensure minimal disturbance to additional surface feeding roots,
- Any tree roots discovered are cut cleanly with root pruning devices,
- Vertical deep watering points for stressed mature trees if or as required,
- Air-knife treatments, to alleviate soil compaction where trees are suffering stress, and to inspect tree root structures and growth patterns,
- Any proposed work located near the trunk or outer canopy of the trees drip line, where services are known to be in the vicinity, any excavation for services should be hand dug to ensure minimal impact to the trees surface feeding and support roots,
- Any tree roots that are exposed will be removed by approved Arboricultural techniques and have a root hormone i.e. Formula 20® or equivalent applied at the manufacture's specification,
- Any trenches undertaken near tree drip zones will be backfilled and compacted with an approved Australian Standard orchid mix 60/40 containing washed river sand and peat moss to a minimum depth of 700mm, the remaining soil profile is to be filled with an approved topsoil to meet the existing soil surface,
- No building waste is to be disposed of/or stored near the tree trunk or drip zone,
- To ameliorate impact of any development, advanced plants may be used in the Landscape Master Plan,
- Plantings should take into consideration the high priority of the streetscape and visual amenity,
- Any vegetation removed during the development is not mulched and used in landscaping due to the high levels of weed infestation on the site and the likelihood that seeds, and viable cuttings may be spread throughout the development,
- To ameliorate impact of any development, standard erosion and sediment controls are recommended,
- The trees drip line/zone is to be mulched to the Horticultural standard of 75mm,
- Regular watering is to be undertaken in hot dry periods to alleviate any short-term stress or loss of available water,
- Erection of a chain mesh safety fence be installed to ensure the protection of Trees Critical Root Zone as per APPENDIX E.5,
- A qualified Arborist should monitor these trees over a twelve (12) month period to evaluate the trees recovery and provide technical information to Council as required.

D.1 PRUNING/REMOVAL STANDARDS

Any pruning recommended in this report is to be to the Australian Standard® AS4373 'Pruning of Amenity Trees', Amenity Tree Industry "Code of Practise 1998 and conducted in accordance with the NSW Work Cover Authority Code of Practice for Tree Work 2007.

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) and applicable consent conditions.

Tree maintenance work is specialised and in order to be undertaken safely and to ensure the works carried out are not detrimental to the survival of the tree or surrounding vegetation, all works should be undertaken by a qualified Arborist with appropriate competencies recognised within the Australian Qualification frame work, 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.

Any pruning near electricity wires should be undertaken in accordance with relative Electrical Safety Rules and be performed by persons individually authorised by Energy Australia with a "Work Near Overhead Power Lines" Certificate to undertake this scope of works.

D.2 ROOT PRUNING AND EXCAVATION WORKS

Minor roots (less than 40mm in diameter) to be pruned shall be cleanly severed with sharp, sterilised pruning implements. Hessian material shall be placed over the face of the excavation. Exposed roots shall be kept in a moist condition during the construction phase.

The main area for surface feeding roots to occur is from the tree trunk to the outer canopy known as the drip zone. These fibrous roots are less likely to occur under or near other buildings, as there is little surface moisture or soil air presence for root survival. These fibrous roots are those that take up water and nutrients.

If under the course of construction, the tree roots are damaged or adversely affected, their demise will cause drought stress; poor uptake of water and nutrients, slower dispersal of gums and resins and could, in the long term, influence the movement of certain compounds which make up the structure of the tree. Where major roots (greater than 40mmø) are encountered during excavations, further advice from the Site Arborist shall be sought prior to any pruning. Certain instances may require hand digging to ensure the trees health and overall stability.

APPENDIX E: PRE-CONSTRUCTION TREE PROTECTION MEASURES

E.1 APPOINTMENT OF SITE ARBORIST

A Site Arborist shall be appointed prior the commencement of all works on-site.

The Site Arborist shall monitor the trees to be retained and supervise the tree protection measures. The Site Arborist shall have a minimum qualification equivalent (using the Australian Qualifications Framework) of NSW TAFE Certificate Level 5 or above in Arboriculture. An allowance of Five-(5) working days' notice to allow inspections to be undertaken at the following stages would be considered standard practice.

INSPECTION/HOLD POINT	INSPECTION PERSONNEL
Identification of retained trees and installation of tree protection zone including protection fencing, silt fencing and appropriate signage.	Site Arborist to undertake with Site Supervisor.
Modification of the Tree Protection Zone if or as required.	Site Arborist to undertake with Site Supervisor.
Works within the Tree Protection Zone if or as required.	Site Arborist to undertake with Site Supervisor.
Completion of the construction works (Post Construction) and final inspection/sign off.	Site Arborist to undertake with Site Supervisor.

E.2 EDUCATION

The project development applicant, contractors and site workers shall receive a copy of the final/Council approved Arborist Assessment and specifications with a minimum of 3 working days prior to commencing work on-site.

Contractors and site workers undertaking works within the Tree Protection Zones shall sign the site log confirming they have read and understand these specifications, prior to undertaking works on-site.

E.3 TREE PROTECTION FENCING

Tree Protection Fencing shall be installed at the perimeter of the Tree Protection Zone as specified.

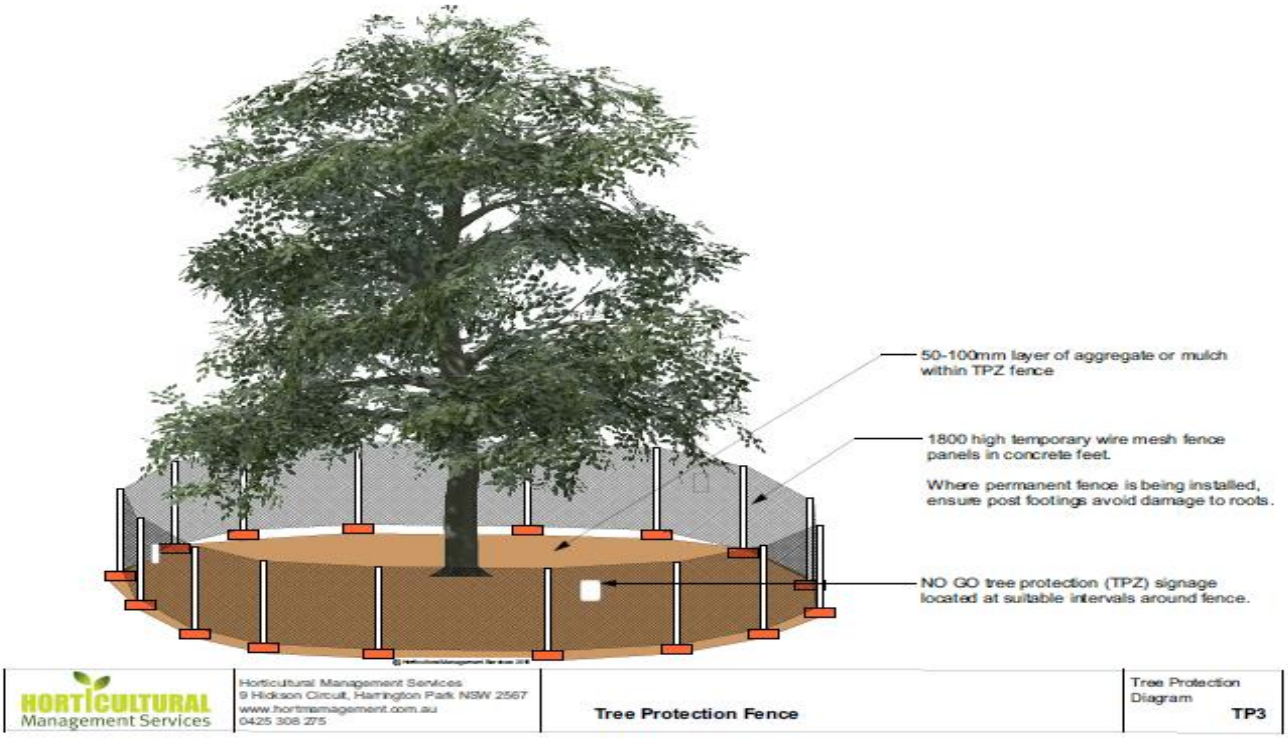
As a minimum, the Tree Protection Fence shall consist of 1.8m high temporary chain wire panels supported by steel poles/stakes. They shall be fastened together and supported to prevent sideways movement. The fence must have a lockable opening for access. The tree's woody roots shall not be damaged during the installation of the Tree Protection Fencing.

Shade cloth material shall be attached to the outer surface of the Tree Protection Fence. The shade cloth material shall be transparent to provide visibility into the Tree Protection Zone.

The Tree Protection Fence shall be erected prior to the commencement of works on-site and shall be maintained in good condition for the duration of the development period.

The Tree Protection Fence shall only be removed, altered, or relocated with the authorization from the Site Arborist in consultation with the Site Supervisor.

E.4 TREE PROTECTION FENCE



Source: AS 4970-2009 Protection of trees on development sites.

E.5 SIGNAGE

Tree Protection Signage shall be attached to the Tree Protection Zone and displayed in a prominent position on each tree protection fencing.

The signs shall be repeated at 10m intervals or closer where the fence changes direction. The signage shall be installed prior to the commencement of works on-site and shall be maintained in good condition for the duration of the development period.

The lettering for each sign shall be a minimum 72-point font size. The signs shall be a minimum size of 600 x 500mm. The lettering on the sign should comply with AS 1319. Each sign shall advise the following details;

- This fence has been installed to prevent damage to the tree and its natural environment. **Access is restricted.**
- If access, encroachment, or incursion into this Tree Protection Zone is required, prior authorisation is required by the Site Arborist.
- Name, address, and telephone number of the firm.

Source AS 4970-2009 Protection of trees on development sites

E.6 SILT FENCING, SEDIMENT CONTROL AND SOIL EROSION

To protect the sites habitat from soil erosion, an approved sedimentation control fence should be erected prior to the construction process.

The purpose of the silt fencing, and sediment control is to ensure that no soil material (erosion) enters or leaves the building site into Tree Protection Zones or any nearby dams or creeks etc. Silt fence shall be installed parallel to the contours in the area immediately above the Tree Protection Zone. The silt fence shall be installed by securing geo-fabric to secure post fencing.

The post pickets shall be placed at 200mm below existing soil surface. Any sedimentation barrier used is to remain in place for a minimum of 12 weeks after practical completion and can be removed after this time provided, plant growth, health, density, and condition have been noted by the Site Arborist.

A hay/straw bale shall be placed up slope from the silt fence and secured with timber stakes. The bottom of the geo-fabric shall be folded underneath the hay/straw bale.

To allow for the maintenance of both the Tree Protection Fence and the silt fence, the two- (2) fences shall be constructed separately and stand independently of each other. The silt fence shall be erected prior to the commencement of works on-site and shall be maintained in good condition for the duration of the development period.

It should be noted that the installation of silt fences as part of this Tree Protection Plan are not erosion and sediment control measures for the development.

The method and type of barrier is to be directed by Council and or as identified in EPA Guidelines, which covers the recently revised document **"Managing Urban Storm water: Soil and Construction Vol.1 (4th Edition)"** (also referred to as the **"Blue Book"**. The Blue Book covers a range of technical and management issues relating to erosion and sediment control in urban development (including standard drawings).

The Site should be left in a clean and tidy manner ensuring suitable mulch cover is applied within the trees drip zone prior to the sedimentation barrier removed.

E.7 SOIL PROTECTION WORKS

Where deemed necessary by the Site Arborist, the ground surface within the Tree Protection Zone shall be protected by laying geo-textile over the existing mulch cover.

Large diameter (up to 70mm) recycled railway ballast (basalt) shall be placed over the geo-textile material to a depth of 100mm.

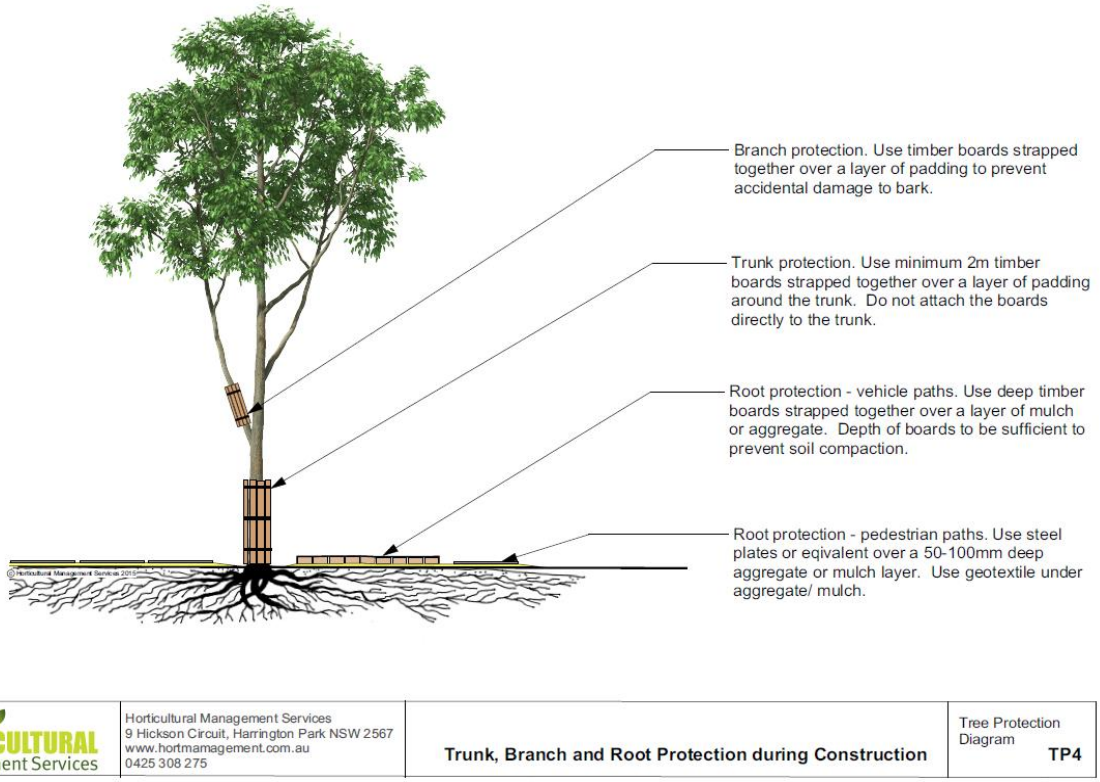
The soil layers shall not be inverted during the excavation works and topsoil shall be stockpiled on site for use in the landscape works. However, it is expected that stringent controls are imposed and implemented to minimise adverse impacts on the soil. These should be site specific and are beyond the scope of this report.

E.8 TREE TRUNK PROTECTION WORKS

Where deemed necessary by the Site Arborist, trunk protection shall be provided. Trunk protection may vary subject to the scope of works, trees age, height, and environmental conditions. For semi mature to mature trees shall be installed by wrapping around two-(2) layers of carpet underlay or similar around the trunk to a minimum height of 2m or where the lower scaffold branches allow.
The trunk shall further be protected with 2m lengths of timbers (75 x 50 x 200mm) spaced at 100mm centres, secured by wire rope. The wire rope shall not be fixed to the tree in any way. (See Diagram E.10)

E.9 TREE BRANCH PROTECTION WORKS

Where deemed necessary by the Site Arborist, branch protection shall be provided. Branch protection shall be installed by wrapping around two-(2) layers of carpet underlay or similar around the branch, secured by wire rope. The wire rope shall not be fixed to the tree in any way. (See Diagram E.10)



E.10. Diagram of Trunk, Branch and Root protection during Construction.
Source: Australian Standards - AS 4970-2009 Protection of trees on development sites

NOTE: In the event of the tree that is to be retained becoming damaged during the construction period, the Site Arborist shall be informed to inspect and provide advice on remedial action if or as required.

APPENDIX F: SITE MANAGEMENT FOR RETAINED TREES

F.1 MATERIALS STORAGE

No materials shall be stored or located within the specified Tree Protection Zone.

A silt fence shall be installed down slope of any storage points. Storage points (where applicable) shall be covered when not in use. An appropriate Environmental spill kit shall be on site at all times for any unlikely spillages.

F.2 WASTE STORAGE

Waste storage shall not be located within the specified Tree Protection Zone.

A silt fence box style collection point shall be installed down slope from any waste/rubbish collection point. All rubbish shall be stored to prevent material loss caused by wind and or water. Skip bins shall be covered when not in use.

All debris collected should be removed from the site and disposed of in an authorized waste management facility. Natural debris such as logs, and rocks may be left as wildlife habitat provided it does not present a safety hazard or become an obstruction. In such cases it should be appropriately re-arranged and or secured.

Site sheds shall not be located within the specified Tree Protection Zone for any reason.

F.3 TRENCHING

Trenching may cause damage, die-back, structural integrity issues, collapse of the structure or even death to a tree over a period of time due to long term modifications to the site and the trees natural topography and this tree is valuable to the visual landscape amenity.

F.4 TRENCHLESS TECHNIQUE (BORING)

Trenchless techniques provide an alternative option for the safe retention and protection of a valuable natural asset for required service infrastructure. Consideration of directional boring, pipe jacking, impact moling and boring will reduce the potential impact to a trees natural environment and retain the sites visual amenity.

These options mentioned are reliable and have been long used to ensure the retention of significant existing vegetation.

Areas of landscape or grass disturbed during these works will be reinstated with the same variety of plants or lawn removed to a condition that would meet Horticultural current best practices.

F.5 UNDERBORING FOR PIPELINE INSTALLATION

Where underboring will pass within a tree's root structure consideration of the trees Tree Protection Zone (TPZ) and Structural Root Zone (SRZ) is required. The minimum depth for boring is considered to be around 800mm which is the depth from the existing soil level that the majority of anchorage and feeder root will be encountered.

Where underboring or trenching is adjacent to or within a trees TPZ the site/project Arborist is to be contacted at least three-(3) days prior to any works commencing to arrange and undertake a site inspection with recommendations for tree retention and protection.

Underboring is considered the preferred option for installation of services within close proximity to signification trees. Manual hand digging, or the use of high-pressure water and vacuum truck may be required if works are within the SRZ to ensure the trees anchorage system and overall health is not compromised.

F.6 MONITORING

The Site Arborist is recommended to monitor the site fortnightly throughout the development period to ensure these specifications are maintained. The site manager is recommended to keep a log recording the details of the site inspections for review by the Principal Certifying Authority prior to the release of the Compliance/Occupation Certificate.

Any changes to the proposed design or unforeseen site changes will require additional arboricultural assessment.

The applicant/contractor shall complete all works tabled in this Arborist Assessment in accordance with this program as agreed with, any variations are to be formally submitted to the Site Arborist and or Certifying Authority for approval.

The work shall be deemed 'practically complete' when all works have been completed to the satisfaction of the Contractor and Certifying Authority.

F.7 PEST AND DISEASE MONITORING

All plants should be monitored for pest and disease every two weeks as part of the programmed site inspections. Insecticide is not recommended for native plant species unless the problem becomes severe. Most native plants will re-shoot after insect predation has passed.

APPENDIX G: SENSITIVE CONSTRUCTION APPROACH FOR ADJOINING TREES

Where works are unavoidable within the Tree Protection Zone (TPZ) and or Structural Root Zone (SRZ) of trees to be retained, the following should be considered, but not limited to;

- Minimise the direct and indirect impacts to tree roots and soil such as root severance or damage, soil excavation, compaction, and contamination,
- Allow for the free movement of water and oxygen within the soil of the TPZ,
- Allow for future rooting area adjacent to the TPZ,

Where the placement of footings within the SRZ cannot be avoided, root sensitive footing systems should be considered. Footing systems such as pier and beam, screw pile, waffle slab or cantilevered have the potential to reduce the impact on trees by retaining sections of soil and roots between the piers.

To achieve the most benefit from this type of construction, the following is recommended: -

- Discontinuous footings should be used within the SRZ of the subject tree. (standard footing design could be used outside this area),
- All beams should be above the natural soil grade/surface,
- The footing design should allow for the greatest achievable span between Piers (as per engineer's specifications/advice),
- Piers should not be placed within the Root Plate Radius of the subject tree,
- Foundations for the proposed piers should be initially hand dug to a depth of 500mm or to rock. If any roots are found that are greater than 40mmø, the pier position should be relocated, subject to engineer's advice,
- The proposed excavations should not result in the severance of roots greater than 40mmø,
- Care should be taken to avoid soil compaction between piers and any drilling machinery should remain outside the Tree Protection Zone. If access within the Tree Protection Zone by machinery cannot be avoided, appropriate compaction control methods should be used,
- Consider the type of equipment that will be used to drill holes for the piers and the clearance/tolerance requirement under the subject tree's canopy,
- These construction methods may require the implementation of post-construction maintenance such as irrigation and mulching. This would assist in minimising the potential impacts on tree health by providing favourable environment conditions for continued root growth and development.

Where achievable, pedestrian / vehicular access ways should be constructed of a semipermeable material (as listed above) and placed above grade to minimize the need for excavation. The strength of the pavement shall be selected to reduce the reliance on sub-base for strength.

Where appropriate, hand excavation and root pruning should be undertaken along the length of excavations adjacent to SRZs prior to any machine construction work. Major roots (greater than 40mmø) should not be severed or damaged. Minor roots (less than 40mmø) to be pruned should be cleanly severed.

APPENDIX H: POST CONSTRUCTION MAINTENANCE PROCESS

Upon the completion of construction works, a final assessment of the tree(s) shall be undertaken by the Site Arborist in consultation with the Site Supervisor. Items to be inspected and addressed shall include but not limited to;

- Tree Protection Zone measures, (*were they adequate?*)
- Any damage to the tree's root system, (*if applicable*)
- Any visible damage to the tree's trunk, branches, or canopy, (*if applicable*)
- Any changes in levels, soil structure, erosion, or loss of organic matter, (*if applicable*)
- Changes to wind loading in the crown through pruning requirement and effects of new structures, (*if applicable*)
- Pest and disease infestation, (*if observed*)
- Drought stress,
- Requirement for decompaction works, (*if applicable*)
- Requirement for further pruning works, (*if required*)
- Requirement for ongoing maintenance such as watering, mulching.

APPENDIX I: TERMINOLOGY

CO-DOMINANT STEMS: The term 'co-dominant' is used to describe two or more stems or leaders that are approximately the same diameter and emerge from the same location on the main trunk. The junction where the two stems meet is a common location of above ground tree failure (Harris, Clark & Matheny, 1999).

CONDITION: An evaluation of the structural status of the tree including defects that may affect the useful life of an otherwise healthy specimen. Influencing factors include cavities and decay, weak unions between scaffolds {major branches) or trunks and faults of form or habit.

DBH: Acronym for trunk diameter at breast height (1 4m from ground level).

DEADWOOD: Deadwood is a normal function for plant growth and development. The safety of the target, namely pedestrians, is considered the primary basis for deadwood removal. As deadwood has an ecological value, the removal of deadwood is usually only carried where it is a potential hazard to site users. Dead wooding a tree does not increase its life expectancy.

DIEBACK: Dieback is the progressive death of branches or shoots originating from the tips. Dieback and decline are parts of a disease complex that have similar causal agents. Crown dieback is a recognizable, visible symptom of the early stages of decline and potential tree death.

DOMINANT: Trees with crowns above the upper layer of the canopy and generally receiving light from above and the sides.

EDGE: Trees located on the edge of a more dominant canopy of trees, and frequently possessing asymmetrical crowns, (heavier on the open side) and trunks that may be distorted due to competing with others for valuable nutrients i.e. soil air, water, light.

EPICORMIC GROWTH: Epicormic growth comes from dormant buds held in the cambium. Under normal growth conditions, these buds are held in a dormant state by hormones produced in the canopy. These shoots are often produced by the tree in response to injury or environmental stress. Epicormic growth has implications for tree structure as the attachment of an epicormic shoot is much weaker than that of a 'naturally' developed branch.

FOREST: Trees that have grown in a forest setting and only have about 1/3 of their canopy located on tall straight trunks.

INCLUDED BRANCH JUNCTIONS: Included branch junctions often form when two branches or trunks grow together at sharply acute angles, producing a wedge of inward-rolling bark. Junctions with included bark form weak attachments, as there is little connective tissue between the two stems.

INTERMEDIATE: Trees that have been overtopped, and become part of the understorey canopy

MYCORRHIZAE: Mycorrhizae are fungi that grow in symbiotic association with tree roots (especially the fine root hairs) and are attributed with increasing the uptake of nutrients, particularly phosphorus, and reducing infection from soil borne pathogens. They greatly increase the surface area of a tree's root system. Mycorrhizae require aerobic soil conditions and are reduced in number by compaction, waterlogging and over-use of soil fertilisers. Forest litter or similar mulch provides ideal conditions for the proliferation of mycorrhizae.

NON-WOODY ROOTS: Extending from the woody root system, a mass of non-woody, fine feeder roots develop. These non-woody roots are active in water and nutrient uptake, are fine in structure, typically less than 0.5mm diameter, and include mycrorrhizal associations with some soil fungi.

PROJECT ARBORIST: The person responsible for carrying out the tree assessment, report preparation, consultation with designers, specifying tree protection measures, monitoring and certification. The project arborist will be suitably experienced and competent in arboriculture, having acquired through training, qualification (minimum Australian Qualification Framework (AQF) Level 5, Diploma of Horticulture (Arboriculture)) and/or equivalent experience, the knowledge and skills enabling that person to perform the tasks required by this Standard.

ROOT PLATE: This forms the main structural woody roots which provides overall anchorage for the tree. It is this central part of the root-system (large root mass with sub-soil normally attached) which may tilt over or rotates in storm events.

STRUCTURAL ROOT ZONE (SRZ): The area around the base of a tree required for the tree's stability in the ground. The woody root growth and soil cohesion in this area are necessary to hold the tree upright. The SRZ is nominally circular with the trunk at its centre and is expressed by its radius in metres. This zone considers a tree's structural stability only, not the root zone required for a tree's vigour and long-term viability, which will usually be a much larger area.

TREE HAZARD POTENTIAL: An assessment of the risks associated in retaining a tree in its existing or proposed surrounds. Factors to consider are the growth characteristics of the species, tree vitality, condition and the frequency and type of potential targets. The impact the proposed works may have on tree vitality can only be assumed.

TREE PROTECTION ZONE (TPZ): A specified area above and below ground, and at a given distance from the trunk, set aside for the protection of a tree's roots and crown to provide for the viability and stability of a tree to be retained.

TREE: Long lived woody perennial plant greater than (or usually greater than) 3 m in height with one or relatively few main stems or trunks (or as defined by the determining authority).

VIGOUR: Ability of a tree to sustain its life processes. The term 'vigour' in this document is synonymous with commonly used terms such as 'health' and 'vitality'.

VITALITY: Indicates the energy reserves of the tree and is determined by the observed crown colour and density, the percentage of dead / dying branches and epicormic growth. The vitality of the canopy and that of the root system is interdependent. Root damage or heavy pruning draws on a tree's energy reserves. The tree's ability to initiate internal defence systems (compartmentalisation of damage) is reduced and it can also become predisposed to attack by insects and pathogens.

WOODY ROOTS: Beyond the root plate the root system rapidly subdivides into smaller diameter woody roots (hydrotropic) which conduct water and nutrients from the non-woody roots.

WORK: Any physical activity in relation to land that is specified by the determining authority.

WOUNDING: Wounding may be the result of mechanical injury from construction equipment; branch failure, splitting or cracking during high wind events. The long-term effects of tree wounding are the potential development of decay and loss of wood strength.

APPENDIX J: REFERENCES

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Parramatta City Council Tree Preservation Order (TPO), Part 5.4 (Preservation of Trees and Vegetation) of Parramatta Council's Development Control Plan (DCP) 2011.

APPENDIX K: CERTIFICATION

I certify that the enclosed "Arboricultural Impact Assessment and Tree Management Plan" for the proposed development at 14 Windermere Avenue, Northmead has been prepared by Horticultural Management Services.

To the best of my knowledge and professional integrity, it is true in all material particulars and does not, by its presentation or omission of information, materially mislead.

Qualifications:

- *Diploma of Arboriculture (AQF L5)*
- *International Society of Arboriculture (ISA) Tree Risk Assessment TRAQ Certified*
- *Diploma of Horticulture*
- *Diploma of Conservation and Land Management*

Scott Freeman

Scott Freeman
Principal
Horticultural Management Services