ALLIED TREE
CONSULTANCY
Level 5 and 8 Arboriculturist

Arboricultural Impact Assessment Report

For the site address
Sutherland Hospital
CARINGBAH, NSW

Project
Sutherland Hospital Operating Theatre Upgrade Project

Prepared for
Health Infrastructure
Level 14, 77 Pacific Highway
NORTH SYDNEY, NSW

AUTHOR
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STATUS

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1.0 Introduction

1.1 *Allied Tree Consultancy* (ATC) has been commissioned by *Health Infrastructure* to prepare an Arboricultural Impact Assessment to form part of the State Significant Development Application proposal for a portion of the Sutherland Hospital. This proposal includes the development works for the operating theatre located on the western side of the Hospital. This report includes twenty trees located on, and adjacent to the lot, and discusses the viability of these trees based on the proposed works.

1.2 This report will address for these trees, the:

- species' identification, location, dimensions, and condition;
- SULE (Safe Useful Life Expectancy) and STARS (Significance of a Tree Assessment Rating System) rating;
- discussion and impact of the proposed works on each tree;
- tree protection zones and protection specifications for trees recommended for retention.

1.3 The subject site resides within Carringbah; for this reason, Sutherland Shire Council is the consenting authority for any tree works that relate to council-owned assets (being the street trees on Kareena Road) recommended in this report.

2.0 Standards

2.1 Allied Tree Consultancy provides an ethical and unbiased approach to all assignments, possessing no association with private utility arboriculture or organisations that may reflect a conflict of interest.

2.2 This report must be made available to all contractors during the tendering process so that any cost associated with the required works for the protection of trees can be accommodated.

2.3 It is the responsibility of the project manager to provide the requirements outlined in this report relative to the Protection Zones, Measures (Section 7.0) and Specifications (Section 8.0) to all contractors associated with the project before the initiation of work.

2.4 All tree-related work outlined in this report is to be conducted in accordance with the:

- Australian Standard – AS4373; Pruning of Amenity Trees.
- Guide to Managing Risks of Tree Trimming and Removal Work[1].

[1] Safe Work Australia; July 2016; Guide to Managing Risks of Tree Trimming and Removal Work, Australia

- All tree works must be carried out at a tertiary level (minimum Certificate-level 3) qualified and experienced (minimum five years) arboriculturist.
- For any works in the vicinity of electrical lines, the arboriculturist must possess the ISSC26 endorsement (Interim guide for operating cranes and plant in proximity to overhead powerlines).

2.5 As a minimum requirement, all trees recommended for retention in this report must have removed all dead, diseased, and crossing limbs and branch stubs to be pruned to the branch collar. This work must comply with the local government tree policy (Sutherland Shire Council) and Section 2.4.

2.6 Any tree stock subject to conditions for works carried out in this report must be supplied by a registered Nursery that adheres to the AS 2303; 2015[2].

- All tree stock must be of at least 'Advanced' size (minimum 75lt) unless otherwise requested.
- All tree stock requested must be planted with adequate protection. This may include tree guards (protect stem and crown) and if planted in a lawn area, a suitable barrier (planter ring) of an area, at least, $1m^2$ to prevent grass from growing within the area adjacent to the stem.

3.0 Disclosure Statement

Trees are living organisms and, for this reason, possess natural variability. This cannot be controlled. However, risks associated with trees can be managed. An arborist cannot guarantee that a tree will be safe under all circumstances, nor predict the time when a tree will fail. To live or work near a tree involves some degree of risk, and this evaluation does not preclude all the possibilities of failure.

4.0 Methodology

4.1 The following tree assessment was undertaken using criteria based on the guidelines laid down by the International Society of Arboriculture.

4.2 The format of the report is summarised below;

4.2.1 **Plan 1;** Tree Location Relative to Site: This is an unscaled plan reproduced from the Survey Plan as referenced in Section 4.4.1, depicting the area of assessment.

[2] Australian Standard; 2015, AS2303, Tree stock for landscape use, Australia

4.2.2 Table 1; This table compiles the tree species, dimensions**,** brief assessment (history, structure, pest, disease or any other variables subject to the tree), significance, allocation of the zones of protection (i.e., Tree Protection Zone[3] ;TPZ and Structural Root Zone; SRZ) for each tree illustrated in Plan 1, Section 5.0. All measurements are in metres.

4.2.3 Discussion relating to the site assessment and proposed works regarding the trees.

4.2.4 Protection Specification; Section 8.0 details the requirements for that area designated as the Tree Protection Zone (TPZ), for those trees recommended for retention.

4.3 The opinions expressed in this report, and the material, upon which they are based, were obtained from the following process and data supplied:

4.3.1 Site assessment on the 16th July 2020 using the method of the Visual Tree Assessment[4]. This has included a Level 2 risk assessment, being a *Basic Assessment*[5]. The assessment has been conducted by Geoff Beisler[6] on behalf of *Allied Tree Consultancy*.

4.3.2 Trees No. 20-22 have not been subject to an assessment and the data has been collected based on aerial and street view photography.

4.3.3 Trees included in this report are those that conform to the description of a prescribed tree by the local government policy.

4.3.4 All measurements, unless specified otherwise are taken from the tree centre.

4.3.5 Tagging of trees with scribed aluminium tags nailed to the trees at chest level, northern side, except the street trees, being No. 20-22.

4.3.6 Raw data from the preliminary assessment including the specimen's dimensions were compiled by the use of a diameter tape, height

[3] Australian Standard, 4970; 2009 – Protection of Trees on Development Sites, Australia
[4] Mattheck, C. Breloer, H.,1994, The Body Language of Trees – A handbook for failure analysis The Stationary Office, London
[5] Dunster J.A., 2013, Tree Risk Assessment Manual, International Society of Arboriculture, 2013, USA
[6] Consulting Arborist, Diploma of Arboriculture (level 5)

clinometer, angle finder, compass, steel probes, Teflon hammer, binoculars and recording instruments.

4.4 Documentation provided

The following documentation has been provided to Allied Tree Consultancy and utilised within the report.

4.4.1 Surveyor

Drawn by *Richard Abbott Registered Surveyor*
Date: 8 May 2020
Reference: 200599
Drawing No: Sheet 1 of 9
Note 1: See Section 4.5.1

4.4.2 Design

Drawn by *HDR P/L*
Date: 13 November 2020
Reference: 10192314
Drawing No: 18 sheets starting at HDR-AR-DG-010200, issue 2
Including the Architectural Design Statement; HDR-AR-RPT-DA01
Note 2: See Section 4.5.2

4.4.3 Design; Main Building Works

Drawn by *Acor Consultants*
Date: 14 July 2020
Reference: SY191015
Drawing No: CV-DG-3100, issue A

4.4.4 Document

The Sutherland Hospital Operating Theatre Upgrade Project-Master Plan Report
Author: *Health Infrastructure*
Date: 21 January 2020
Reference: Issue C

4.4.5 Document

Civil Engineering State Significant development Application
Author: *Acor Consultants*
Date: 13 November 2020
Reference: (Document No.) ACR-CV-RPT-003. Issue No. revision A
Reference: (Document No.) ACR-ST-SSD. Issue No. revision 1

4.5 Limitations of the assessment/discussion process

4.5.1 Trees No. 12, 14, 20, 21 and 22 have been omitted from the plans provided, however, are required for inclusion because they conform to the definition of a prescribed tree within the local government tree policy. The trees locations have been plotted onto the Plan 1 by *Allied Tree Consultancy*. The trees locations were established by measuring from known points and scaling onto the drawing. *Allied Tree Consultancy* is not a registered surveyor and, however, the accuracy of the survey is attempted; the true position of the trees may marginally deviate. Any such deviation provides the potential for changing the actual impact (encroachment) provided to a tree.

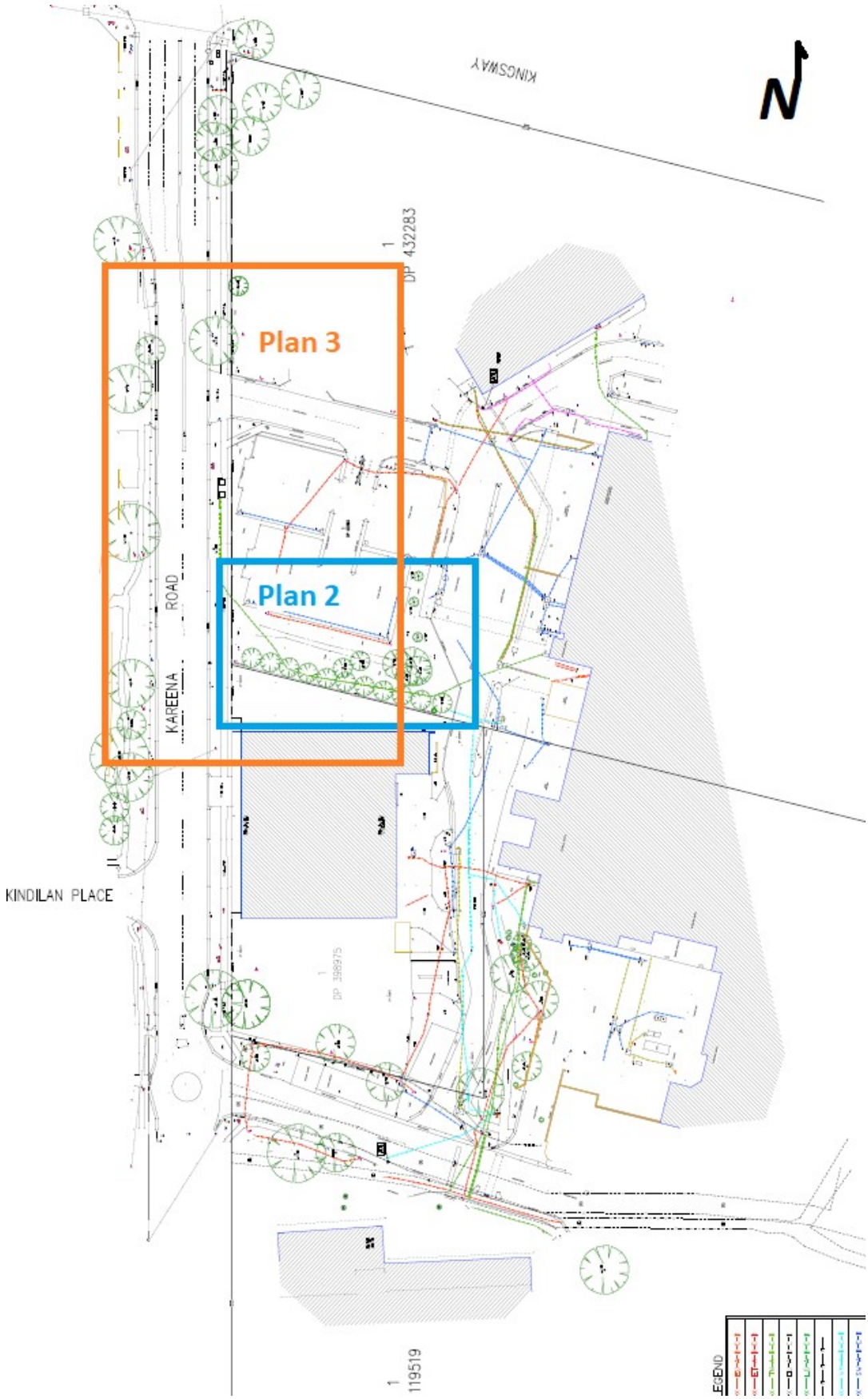
4.5.2 No. 12, 14 and 22 have not been included within this drawing, therefore have been transposed by Allied Tree Consultancy. The tree location was established by scaling from the survey drawing. Therefore discrepancies that can affect the actual impact on the trees can exist.

4.5.3 The assessment has considered only those target zones that are apparent to the author and the visually apparent tree conditions, during the time of assessment.

4.5.4 Any tree regardless of apparent defects would fail if the forces applied to exceed the strength of the tree or its parts, for example, extreme storm conditions.

4.5.5 The assessment has been limited to that part of the tree which is visible, existing from the ground level to the crown. Root decay can exist and in some circumstances provide no symptoms of the presence. This assessment responds to all the symptoms provided by a tree, however, cannot provide a conclusive recommendation regarding any tree that may have extensive root decay that leads to windthrow without the appropriate symptoms.

5.0 Plan 1; Area of assessment



Not to scale

Source: Adapted from *Richard Abbot Registered Surveyor,* see Section 4.4.1

5.1 Plan 2; Area of assessment illustrating tree location

Not to scale
Trees labelled A, are exempt. Tree labelled B was absent, see Section 7.0
Source: Adapted from *Richard Abbot Registered Surveyor,* see Section 4.4.1

5.2 Plan 3; Area of assessment illustrating tree location

Not to scale
Trees labelled A, are exempt. Tree labelled B was absent, see Section 7.0
Source: Adapted from *Richard Abbot Registered Surveyor,* see Section 4.4.1

6.0 Table 1 – Tree Species Data

Terminology/references provided in Appendix A.

Tree No.	Botanical Name Common Name	Height (m)	DBH (m)	Crown Spread (m)	Age	Crown Class	Crown Aspect	Vitality	SULE Rating	STARS Rating	TPZ	SRZ
1	*Backhousia myrtifolia* [A] Grey Myrtle	7	0.16 [B]	3 x 4	M	I	Sym.	A	**B1**	**MEDIUM**	**2.0**	**1.5**
Assessment This tree presents the habit typical of species. May experience minor conflict with surrounding trees. **Proposed works**; See Section 7.1.3												
2	*Leptospermum petersonii* Lemon Scented Tea Tree	8	0.28 0.28 0.30	4 x 6	M	D	S	B-C	**A3/D3**	**LOW**	**6.0**	**2.4**
Assessment This tree presents the habit typical of species, however, exhibits significant decline. Open wounds from lopping events are located on the lower stem. May experience minor conflict with surrounding trees. **Proposed works**; See Sections 7.1.2 and 7.1.3												
3	*Waterhousea floribunda* Weeping Lilly Pilly	7	0.17 [BC]	6 x 6	M	S	N	A	**B1**	**MEDIUM**	**2.0**	**1.5**
Assessment This tree presents the habit typical of species. May experience minor conflict with surrounding trees. A juvenile *Backhousia myrtifolia* (not located on the survey), is located within the SRZ, western side. **Proposed works**; See Section 7.1.3												
4	*Waterhousea floribunda* Weeping Lilly Pilly	7	0.16 0.12	5 x 6	M	S	N	A	**B1**	**MEDIUM**	**2.4**	**1.7**
Assessment This tree presents the habit typical of species. May experience minor conflict with surrounding trees. Juvenile *Backhousia myrtifolia* (not located on the survey), are located within the SRZ, eastern and western sides. **Proposed works**; See Section 7.1.3												
5	*Waterhousea floribunda* Weeping Lilly Pilly	7	0.17 [BC]	5 x 6	M	C	N	A	**B1**	**MEDIUM**	**2.0**	**1.5**
Assessment This tree presents the habit typical of species. May experience minor conflict with surrounding trees.												

Tree No.	Botanical Name Common Name	Height (m)	DBH (m)	Crown Spread (m)	Age	Crown Class	Crown Aspect	Vitality	SULE Rating	STARS Rating	TPZ	SRZ
Proposed works; See Section 7.1.3												
6	*Waterhousea floribunda* Weeping Lilly Pilly	7	0.20 [BC]	4 x 5	M	C	N	B	**A2**	**MEDIUM**	**2.4**	**1.7**
Assessment This tree presents the habit typical of species, however the upper crown exhibits some decline. May experience minor conflict with surrounding trees. **Proposed works**; See Section 7.1.1												
7	*Waterhousea floribunda* Weeping Lilly Pilly	7	0.16 0.10	4 x 4	M	C	N	A	**B1**	**MEDIUM**	**2.3**	**1.7**
Assessment This tree presents the habit typical of species. May experience minor conflict with surrounding trees. A juvenile *Backhousia myrtifolia* (not located on the survey), is located within the SRZ, eastern side. **Proposed works**; See Section 7.1.1												
8	*Waterhousea floribunda* Weeping Lilly Pilly	7	0.16	4 x 6	M	C	N	A	**B1**	**MEDIUM**	**2.0**	**1.5**
Assessment This tree presents the habit typical of species. May experience minor conflict with surrounding trees. Juvenile *Backhousia myrtifolia* (not located on the survey), are located within the SRZ, eastern and western sides. **Proposed works**; See Section 7.1.1												
9	*Waterhousea floribunda* Weeping Lilly Pilly	8	0.18 [BC]	6 x6	M	C	N	A	**B1**	**MEDIUM**	**2.1**	**1.6**
Assessment This tree presents the habit typical of species. May experience minor conflict with surrounding trees. A juvenile *Backhousia myrtifolia* (not located on the survey), is located within the SRZ, eastern side. **Proposed works**; See Section 7.1.1												
10	*Casuarina glauca* [A] Swamp Sheoak	11	0.20 0.20	4 x 6	M	D	N	A	**B1**	**HIGH**	**3.3**	**1.9**
Assessment Co-dominant at the base. May experience minor conflict with surrounding trees. **Proposed works**; See Section 7.1.3												

Tree No.	Botanical Name Common Name	Height (m)	DBH (m)	Crown Spread (m)	Age	Crown Class	Crown Aspect	Vitality	SULE Rating	STARS Rating	TPZ	SRZ
11	*Waterhousea floribunda* Weeping Lilly Pilly	8	0.26 [BC]	6 x 6	M	D	Sym.	A	**B1**	**MEDIUM**	**3.1**	**1.8**
Assessment Co-dominant at 0.5m. May experience minor conflict with surrounding trees. **Proposed works**; See Section 7.1.3												
12	*Waterhousea floribunda* Weeping Lilly Pilly	5	0.19 [B]	2 x 4	M	S	N	A	**B1**	**MEDIUM**	**2.3**	**1.7**
Assessment Co-dominant (3 stems) at 1m. Not located on the survey. May experience minor conflict with surrounding trees. Juvenile *Backhousia myrtifolia* (not located on the survey), are located within the SRZ, eastern and western sides. **Proposed works**; See Section 7.1.3												
13	*Waterhousea floribunda* Weeping Lilly Pilly	8	0.24 [B]	5 x 5	M	C	Sym.	A	**B1**	**MEDIUM**	**2.9**	**1.8**
Assessment This tree presents the habit typical of species. May experience minor conflict with surrounding trees. Juvenile *Backhousia myrtifolia* (not located on the survey), are located within the SRZ, eastern and western sides. **Proposed works**; See Section 7.1.3												
14	*Waterhousea floribunda* Weeping Lilly Pilly	8	0.22 0.23	4 x 5	M	C	N	A	**B1**	**MEDIUM**	**3.8**	**2.0**
Assessment Co-dominant at 1m. May experience minor conflict with surrounding trees. **Proposed works**; See Section 7.1.3												
15	*Grevillia robusta* Silky Oak	10	0.13 0.16	5 x 5	M	I	N	A	**A2/B1**	**MEDIUM**	**2.5**	**1.7**
Assessment Co-dominant at the base. May experience minor conflict with surrounding trees and the light pole to the north. **Proposed works**; See Section 7.1.3												
16	*Eucalyptus botryoides x saligna* Wollongong Woollybutt	17	0.35 0.39	11 x 14	M	D	N	A	**B1**	**HIGH**	**6.2**	**2.5**
Assessment This tree presents the habit typical of species. Co-dominant at 0.6m. A vertical wound between 1m-1.5m, eastern side of the southern stem, is almost occluded. May experience minor conflict with surrounding trees.												

Tree No.	Botanical Name Common Name	Height (m)	DBH (m)	Crown Spread (m)	Age	Crown Class	Crown Aspect	Vitality	SULE Rating	STARS Rating	TPZ	SRZ
Proposed works; See Section 7.1.3												
17	*Corymbia maculata* Spotted Gum	11	0.26	8 x 8	M	I	E	A	**B1**	**HIGH**	**3.1**	**1.9**
Assessment This tree presents the habit typical of species, however, has a significant easterly bias due to suppression. **Proposed works**; See Section 7.1.3												
18	*Corymbia maculata* Spotted Gum	16	0.27	7 x9	M	C	S	A	**B1**	**HIGH**	**3.2**	**1.9**
Assessment This tree presents the habit typical of species. May have minor conflicts wit trees No. 15-17. **Proposed works**; See Section 7.1.3												
19	*Corymbia maculata* Spotted Gum	7	0.10	2 x 2	Y	D	Sym.	A	**B1**	**MEDIUM**	**2.0**	**1.5**
Assessment This juvenile tree presents the habit typical of species. **Proposed works**; See Section 7.1.3												
20	*Eucalyptus microcorys* Tallowwood	14	0.32 0.32 [C]	11 x 11	M	D	Sym.	A-B	**A2**	**HIGH**	**5.4** [C]	**2.4** [C]
Assessment This council-owned street tree presents the habit typical of species, co-dominant at 1.2m. The upper crown appears to present partial density, which can reflect on a suppressed vitality. **Proposed works**; See Section 7.1.1												

A. Incomplete identification of species due to insufficiently available plant material
B. Diameter taken below 1.4m due to low stem bifurcation
C. Estimate due to the overgrown area and/or limited access
D. Deciduous species, void of foliage at the time of assessment
E. Level 3 assessment required to determine the accurate rating

7.0 Site Assessment

The area of assessment comprises the western side of the Sutherland Hospital, the strip of land situated between the NSW Ambulance building to the south, and the car park to the north (see Section 5.0, Plan 1), and a portion of Kareena road fronting this area. The modified area is level, however, an earthen embankment has been created in between the aforementioned areas, and immediately north of the subject trees. Trees No 1-9 and 11-14 are deliberately planted specimens in close proximity and form part of a landscape planting, likely for screening. The weed stock and colour bond fence located immediately south of these trees has limited the assessment of all trees within this grove. This grove also contains two trees not located on the survey and multiple specimens that do not fulfill local councils' definition of a tree. Infrastructure involving excavation has been installed at the western end of the site, however, appears to have been in situ before planting. Juvenile specimens that do not meet local councils' definition of a tree are located across the site (including trees located on the survey); however, these have not been included. An exempt species (located on the survey) is situated in the grove, as is several stumps indicating past tree removal- these appear to have been removed long ago and do not appear to be related to the survey supplied. One tree located on the survey was absent.

The trees labeled as A and B, that have been included on the survey drawing (Plan 1) however excluded from this report because of the failure to conform to the description of a prescribed tree based on the Sutherland Shire Councils Development Control Plan.

Tree A: trees that occur on the lot proposed for development and are exempt species, or less than 100mm at 0.5m.

Tree B: trees located on the survey, however, were absent.

7.1 Proposed development

The proposed development consists of the Sutherland Hospital Operating Theatre Upgrade Project, and specifically the construction of the building.

Works limited to the infrastructure upgrade works consisting of installation of subsurface infrastructure and widening of a portion of the Kareena Road have formed part of an initial Arboricultural Impact Assessment report by *Allied Tree Consultancy*, Referenced D4211, dated September 2020. This has allowed for the removal of trees No. 21 and 22 which have been illustrated in Plan 3, Section 5.2.

The calculations included in the following discussion has not considered;

- subsurface utilities that have not been included in the design,
- Work methods related to subsurface utilities, for example concrete encasing or replacement of existing lines
- or work methods related to construction (stockpiling, site sheds, scaffolding) unless otherwise specified.

These may also increase the encroachment and tree impact and, therefore, the opportunity for tree retention.

This report discusses the impact of the proposed design on the trees. Twenty (20) trees have been listed within this report based upon the vicinity of the proposed works. This has included street and neighbouring trees where any part of the zones of protection; Tree Protection Zone (TPZ), and Structural Root Zone (SRZ) to encroach into the lot. Recommendations based on the tree significance and condition, together with the impact on these trees regarding the development for this lot follow;

7.1.1 Trees and zones of protection (TPZ/SRZ) outside of the proposed design

Trees No. 6-9 and 20

None of the proposed works conflict with the location of these trees or respective zones of protection. These trees can be retained without impact by the proposed design.

7.1.2 Tree providing a limited useful life expectancy

Tree No. 2

This tree provides low significance based on the species, habit, and rating and could be removed due to the low amenity value and limited useful life expectancy irrespective of the design conflict.

7.1.3 Trees directly conflicting with the design

Tree No. 1-5 and 10-19

These trees are located in the footprint of the proposed design and will require removal based on this premise alone. The conflict is the footprint of the proposed new building.

7.2 Sub-surface utilities

No additional drawings have been provided for the proposed route of sub-surface utilities other than those contained in the drawing sets (Section 4.4). Any trenching, other than what has been allowed for should be avoided within the area of the TPZ. Any proposed route shall be re-routed outside of the TPZ. Under boring may be required if a limitation for the route of a service is restricted to an area that falls within the TPZ. Any excavation in the area of a TPZ must be authorised and conditioned by the project arborist.

7.3 Protection measures

The following protection measures are required to be implemented for the following trees before initiation of site works (including demolition/excavation) and retained until the landscaping works are required unless otherwise specified. The location of the protection measures are illustrated in Plan 2, Appendix B, and examples of the protection measures are contained in Appendix C.

7.3.1 Protective fence: Trees No. 6-9

A protective fence is required to be installed to protect the TPZ from all site-related work and are recommended to be located in accordance with the requirements of the AS 4970, listed in Appendix C. The fence is required to be secured to the ground with pegs to avoid movement during construction. This must be installed prior to the commencement of any demolition, excavation or construction works and shall be maintained throughout the entire construction phase of the development, and until landscaping works is required.

7.3.2 Conditions for compliance

The following conditions are required before any works proceed on site.

Site induction; All workers related to the construction process and before entering the site must be briefed about the requirements/conditions outlined in this report relative to the zone of protection, measures, and specifications before the initiation of work. This is required as part of the site induction process.

Project Arborist; A project arborist who conforms to the requirements of the AS 4970 is required to be nominated immediately after a *Notice of Determination* is issued, and they are to be provided with all related site documents.

7.4 Compliance Documentation

The following stages will require assessment and documentation (report, letter, certification) by the project arborist or person responsible for the specific work type, and the related documentation is to be issued to the principal certifying agent.

7.4.1 Table 2; Assessment/Certification stages

Hold Points	Work type	Document required
Pre-demolition	Installation of the protection measures, Section 7.3	Certificate*

During construction	Any <u>further works</u> required within the area of the TPZ, or decline related to the trees that have not been covered by this report.	Report Brief
During construction	Any crown modification including pruning or root disturbance.	Report Brief

Construction refers to the time between the initiation of demolition and until an occupation certificate is issued.

Project Arborist person nominated as responsible for the provision of the tree assessment, arborist report, consultation with stakeholders, and certification for the development project. This person will be adequately experienced and qualified with a minimum of a level 5 (AQF); Diploma in Horticulture (Arboriculture)[7].

8.0 Protection Specification

The retention and protection of these trees requires the remaining Tree Protection Zone (TPZ) not subject to encroachment to conform to the conditions outlined below. These conditions provide the limitations of work permitted within the area of the Tree Protection Zone (TPZ) and must be adhered to unless otherwise stated.

1. Crown pruning can be accommodated, however, must conform to the AS 4373; *Pruning of Amenity Trees*, and not misshape the crown nor remove in excess of 10-15% of the existing crown, pending on the species, and vitality. The opportunity for, type and proportion of pruning will be required to be nominated by the project arborist.

2. <u>Soil levels within the TPZ must remain the same</u>. Any excavation within the TPZ must have been previously specified and allowed for by the project arborist:

   a) So it does not alter the drainage to the tree.

   b) Under specified circumstances,

   - Added fill soil does not exceed 100mm in depth over the natural grade. Construction methodologies exist that can allow grade increases in excess of 100mm, via the use of an impervious cover, an approved permeable material or permanent aeration system or other approved methods.

[7] Based upon the definition of a 'consulting arborist' from the AS 4970; Protection of trees on development sites; 2009, Section 1.4.4, p 6.

- Excavation cannot exceed a depth of more than 50mm within the area of the TPZ, not including the SRZ. The grade within the SRZ cannot be reduced without the consent from a project arborist.

3. No form of material or structure, solid or liquid, is to be stored or disposed of within the TPZ.

4. No lighting of fires is permitted within the TPZ.

5. All drainage runoff, sediment, concrete, mortar slurry, paints, washings, toilet effluent, petroleum products, and any other toxic wastes must be prevented from entering the TPZ.

6. No activity that will cause excessive soil compaction is permitted within the TPZ. That is, machinery, excavators, etc. must refrain from entering the area of the TPZ unless measures have been taken, and with consultation with the project, arborist to protect the root zone.

7. No site sheds, amenities or similar site structures are permitted to be located or extend into the area of the TPZ unless the project arborist provides prior consent.

8. No form of construction work or related activity such as the mixing of concrete, cutting, grinding, generator storage or cleaning of tools is permitted within the TPZ.

9. No part of any tree may be used as an anchorage point, nor should any noticeboard, telephone cable, rope, guy, framework, etc. be attached to any part of a tree.

12. (a) All excavation work within the TPZ will utilise methods to preserve root systems intact and undamaged. Examples of methods permitted are by hand tools, hydraulic, or pneumatic air excavation technology.

(b) Any root unearthed which is less than 50mm in diameter must be cleanly cut and dusted with a fungicide, and not allowed to dry out, with minimum exposure to the air as possible.

(c) Any root unearthed which is greater than 50mm in diameter must be located regarding their directional spread and potential impact. A project arborist will be required to assess the situation and determine future action regarding retaining the tree in a healthy state.

9.0 Summary of tree impact by design

Based on the design supplied, the following summary provides the impacts imposed on the trees included in this report.

9.1 Trees No. 6-9 and 20

These trees are not adversely impacted by the design, that is, they conform to a minor encroachment or less and the nominated zones of protection (TPZ, SRZ) based on the requirements of the Protection Specification, Section 8.0. The proposed design does not adversely affect these trees.

9.2 Trees No. 1-5 and 10-19

The proposed design will impact adversely on these trees and are unable to be retained based on the design.

9.3 Sub-surface utilities

No drawings have been provided for the proposed route of sub-surface utilities other than those contained in the drawing sets (Section 4.4). Any trenching, other than what has been allowed for should be avoided within the area of the TPZ. Any proposed route shall be re-routed outside of the TPZ. Under boring may be required if a limitation for the route of a service is restricted to an area that falls within the TPZ. Any excavation in the area of a TPZ must be authorised and conditioned by the project arborist.

9.4 Protection measures

Protection measures (outlined in Section 7.3 and 7.4) are required to be implemented for the trees nominated for retention (referenced in Section 9.1) and installed before initiation of site works (including demolition/excavation) and retained until the landscaping works are required unless otherwise specified.

All workers related to the construction process and before entering the site must be briefed about the requirements/conditions outlined in this report relative to the zone of protection, measures, and specifications before the initiation of work.

A project arborist is required to be nominated, and the stages and related certification or similar documentation is to be issued to the principal certifying agent.

The opinions expressed in this report by the author have been provided within the capacity of a Consulting Arborist. Any further explanation or details can be provided by contacting the author.

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10.0 Appendix A- Terminology Defined

Height

Is a measure of the vertical distance from the average ground level around the root crown to the top surface of the crown, and on palms - to the apical growth point.

DBH

Diameter at Breast Height – being the stem diameter in meters, measured at 1.4m from ground level, including the thickness of the bark.; Mult. refers to multiple stems, that is in excess of 4 stems.

Crown Spread

A two-dimension linear measurement (in metres) of the crown plan. The first figure is the north-south span, the second being the east-west measurement.

Age

Is the estimate of the specimen's age based upon the expected lifespan of the species. This is divided into three stages.

Young (Y)	Trees less than 20% of life expectancy.
Mature (M)	Trees aged between 20% to 80% life expectancy.
Over-mature (O)	Trees aged over 80% of life expectancy with probable symptoms of senescence.

Crown Aspect

In relation to the root crown, this refers to the aspect the majority of the crown resides in. This will be either termed Symmetrical (Sym.) where the centre of the crown resides over the root crown or the cardinal direction the centre of the crown is biased towards, being either North (N), South (S), East (E) or West (W).

Vitality Rating

Is a rating of the health of the tree, irrespective and independent of the structural integrity, and defined by the 'ability for a tree to sustain its life processes' ((Draper, Richards, 2009). This is divided between three variables, and based on the assessment of symptoms including, but not limited to; leaf size, colour, crown density, woundwood development, adaptive growth formation, and epicormic growth.

A: Normal vitality, typical for the species

B: Below average vitality, possibly temporary loss of health, partial symptoms.

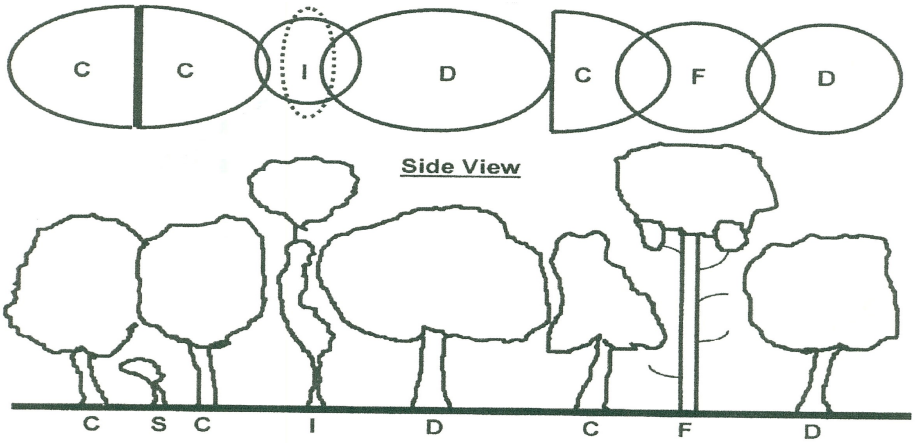
C: Poor vitality; obvious decline, potentially irreversible

Crown Class

Is the differing crown habits as influenced by the external variables within the surrounding environment. They are:

D	– *Dominant*	Crown is receiving uninterrupted light from above and sides, also known as emergent.
C	– *Codominant*	Crown is receiving light from above and one side of the crown.
I	– *Intermediate*	Crown is receiving light from above but not the sides of the crown.
S	– *Suppressed*	Crown has been shadowed by the surrounding elements and receives no light from above or sides.
F	– *Forest*	Characterised by an erect, straight stem (usually excurrent) with little stem taper and virtually no branching over the majority of the stem except for the top of the tree which has a small concentrated branch structure making up the crown.

Top View



D C, I & S, and side view, after (Matheny, N. & Clark, J. R. 1998, Trees Development, Published by International Society of Arboriculture, P.O. Box 3129, Champaign IL 61826-3129 USA, p.20, adapted from the Hazard Tree Assessment Program, Recreation and Park Department, City of San Francisco, California).

Levels of assessment

Level 1: Limited visual: a visual tree assessment to manage large populations of trees within a limited period and in order to identify obvious faults which would be considered imminent.

Level 2: Basic assessment: a standard performed assessment providing for a detailed visual assessment including all parts of the tree and surrounding environment and via the use of simple tools.

Level 3: Advanced assessment: specific type assessments conducted by either arborist who specialise with specific areas of assessment or via the use of specialised equipment. For example, aerial assessment by use of an EWP or rope/harness, or decay detection equipment.

TPZ; Tree Protection Zone

Is an area of protection required for maintaining the trees vitality and long-term viability. Measured in meters as a radius from the trees centre. The requirements of this zone are outlined within the Protection Specification, Section 8.0, and are to be adhered to unless otherwise stated.

The size of the Tree Protection Zone (TPZ) has been calculated from the *Australian Standard, 4970; 2009* – Protection of Trees on Development Sites

The TPZ does not provide the limit of root extension, however, offers an area of the root zone that requires predominate protection from development works. The allocated TPZ can be modified by some circumstances; however will require compensation equivalent to the area loss, elsewhere and adjacent to the TPZ.

SRZ; Structural Root Zone

Is the area around the tree containing the woody roots necessary for stability. Measured in meters as a radius from the trees centre. The requirements of this zone are outlined within the Protection Specification, Section 8.0, and are to be adhered to unless otherwise stated.

Protection Measures

These are required for the protection of trees during demolition/construction activities.
Protective barriers are required to be installed before the initiation of demolition and/or construction and are to be maintained up to the time of landscaping. Samples of the recommended protection measures are illustrated in Appendix B.

All other definitions are referenced from;

Draper D.B., Richards P.A., 2009, Dictionary for Managing Trees in Urban Environments
CSIRO Pub., Australia

Significance Rating, Significance of a Tree Assessment Rating System (S.T.A.R.S), IACA, 2010[8]

Tree Significance – Assessment Criteria

1. High Significance in landscape

- The tree is in good condition and good vitality;
- 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 vitality;
- 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 vitality;
- 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,

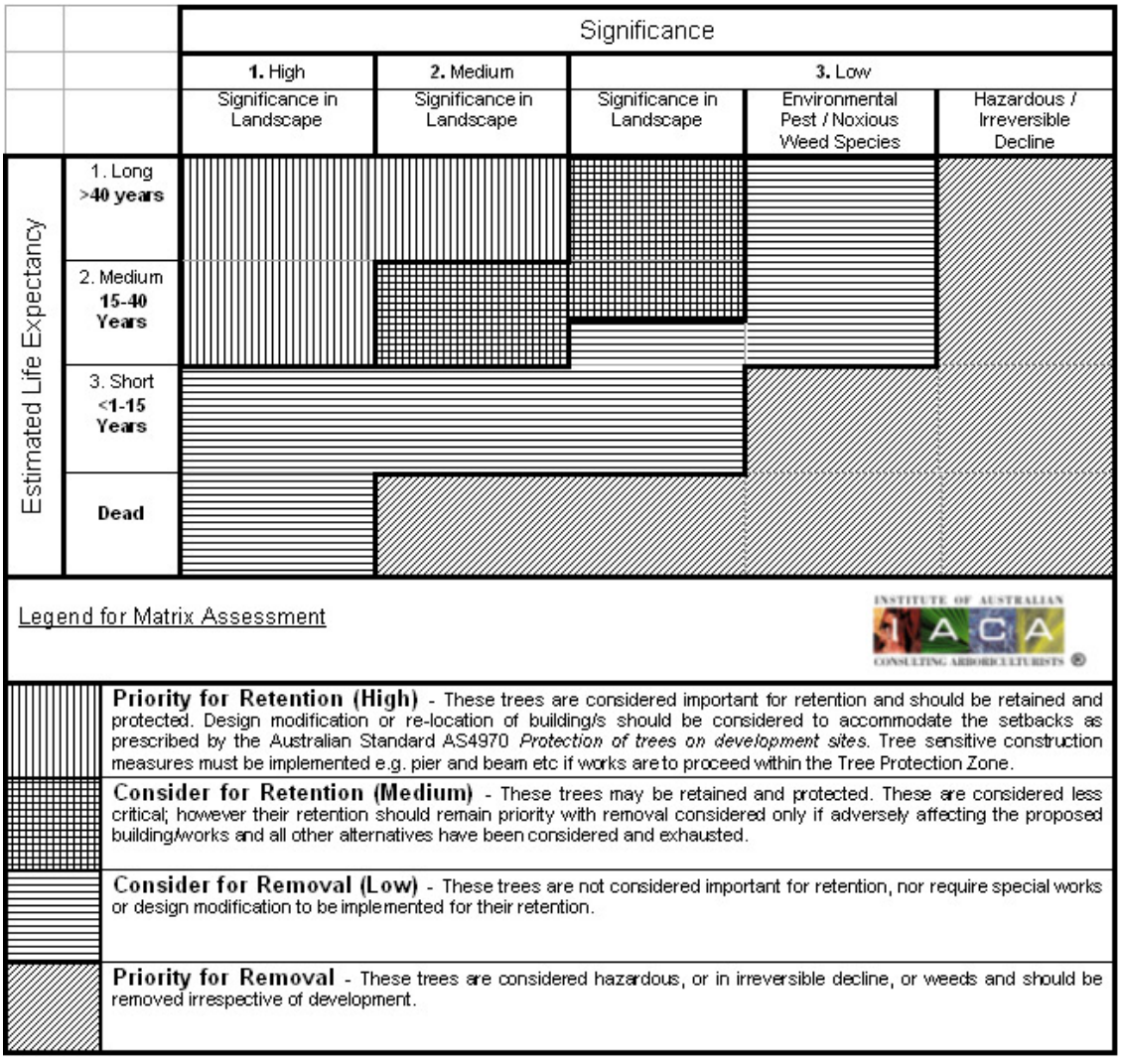
[8] IACA, 2010, IACA Significance of a Tree, Assessment Rating System (STARS), Institute of Australian Consulting Arboriculturists, Australia, www.iaca.org.au

unlikely to reach dimensions typical for the taxa in situ – tree is inappropriate to the site conditions,
- The tree is listed as exempt under the provisions of the local Council Tree Preservation Order or similar protection mechanisms,
- The tree has a wound or defect that has potential to become structurally unsound.
Environmental Pest / Noxious Weed Species
- The tree is an Environmental Pest Species due to its invasiveness or poisonous/ allergenic properties,
- The tree is a declared noxious weed by legislation.
Hazardous/Irreversible Decline
- The tree is structurally unsound and/or unstable and is considered potentially dangerous, - The tree is dead, or is in irreversible decline, or has the potential to fail or collapse in full or part in the immediate to short-term.

The tree is to have a minimum of three (3) criteria in a category to be classified in that group.

Note: The assessment criteria are for individual trees only, however, can be applied to a monocultural stand in its entirety e.g.

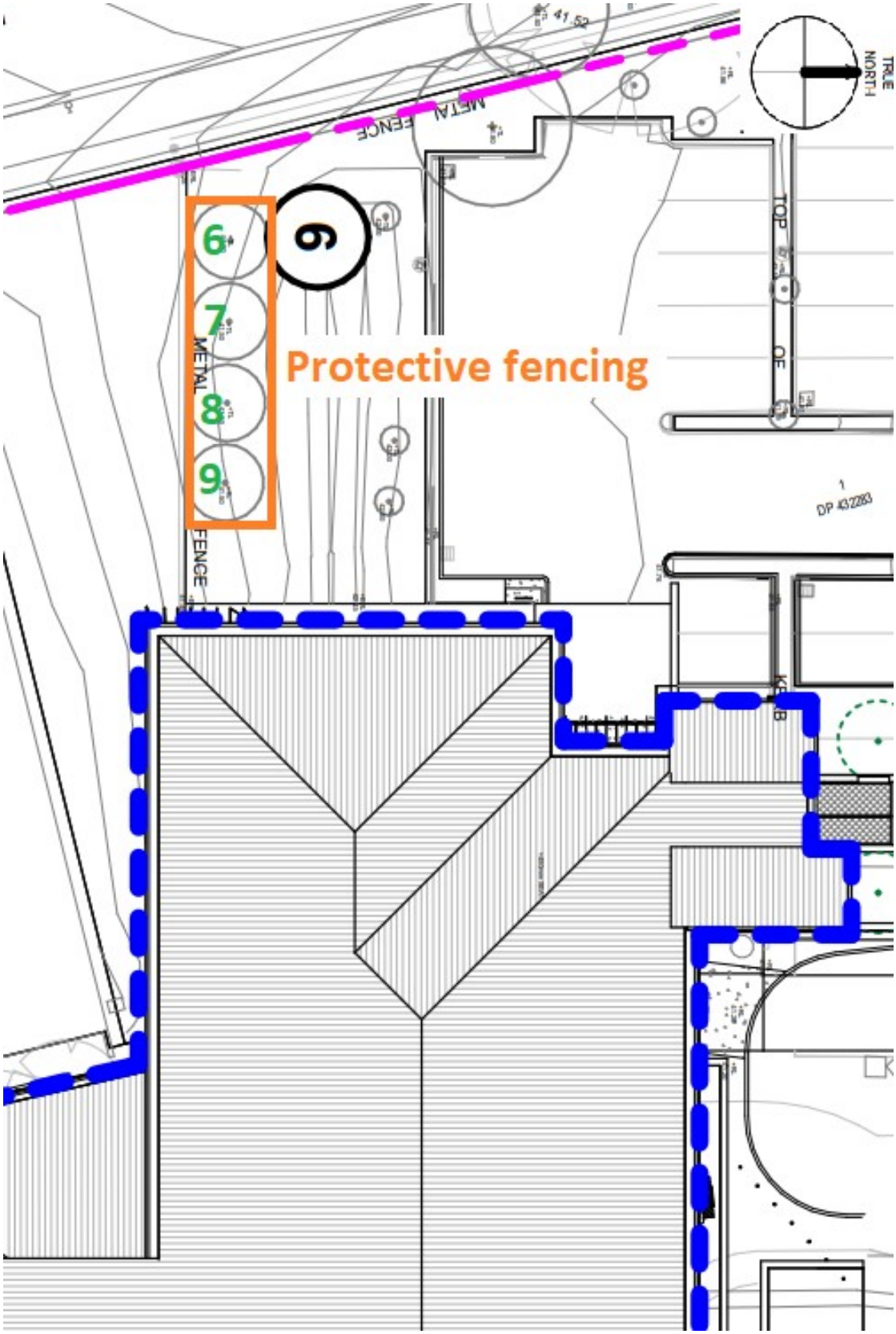
Table 3; Tree Retention Value – Priority Matrix.



Safe Useful Life Expectancy – S.U.L.E (Barell 1995)

	1. Long	2. Medium	3. Short	4. Removal	5. Moved or Replaced
	Trees that appeared to be retainable at the time of assessment for more than 40 years with an acceptable level of risk.	Trees that appeared to be retainable at the time of assessment for 15 – 40 years with an acceptable level of risk.	Trees that appeared to be retainable at the time of assessment for 5 – 15 years with an acceptable level of risk.	Trees that should be removed within the next 5 years.	Trees which can be reliably moved or replaced.
A	Structurally sound trees located in positions that can accommodate future growth.	Trees that may only live between 15 and 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 trees less than 5m in height.
B	Trees that could be made suitable for retention in the long term by remedial tree care.	Trees that may live for more than 40 years but would be removed for safety or nuisance reasons.	Trees that may live for more than 15 years but would be removed for safety or nuisance reasons.	Dangerous trees through instability on recent loss of adjacent trees.	Young trees less than 15 years old but over 5m in heights
C	Trees of special significance for historical, commemorative or rarity reasons that would warrant extraordinary efforts to secure their long term retention.	Trees that may live for more than 40 years but 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 planting.	Damaged trees through structural defects including cavities, decay, included bark, wounds or poor form.	Trees that have been pruned to artificially control growth.
D		Trees that could be made suitable for retention in the medium term by remedial tree care.	Trees that require substantial remedial 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 that are damaging or may cause damage to existing structures within 5 years.	
G				Trees that will become dangerous after removal of other trees for reasons given in (A) to (F).	

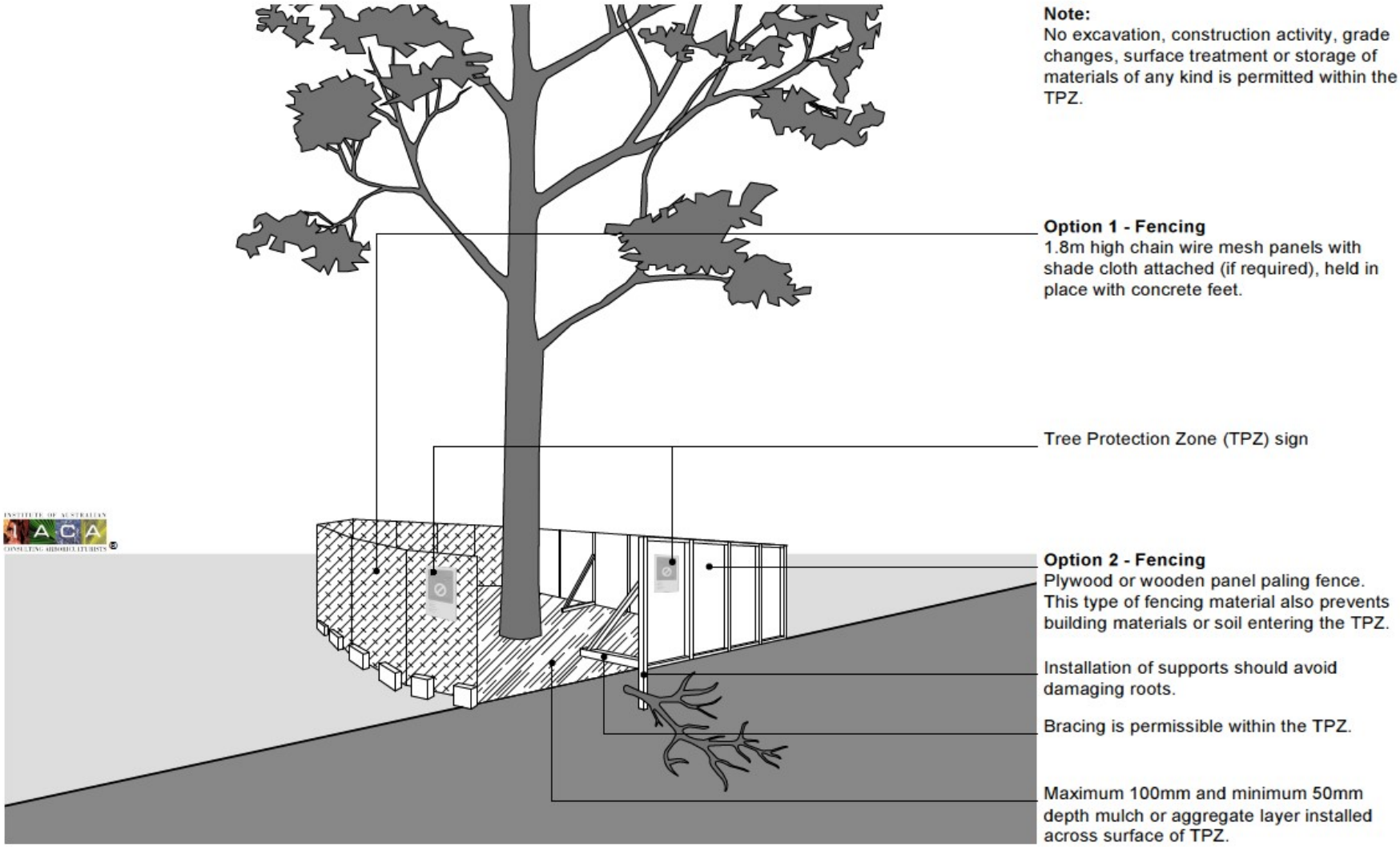
Appendix B- Plan 2; Measures of protection



Not to scale

Source: Adapted from *HDR P/L,* Drawing HDR-AR-DG-010300 (3), See Section 4.4.2

Appendix C- Protection measures;
Protective fence



Stem and Ground protection