Allied Tree Consultancy

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Arboricultural Impact Assessment

An assessment is addressing the potential viability of trees in relation to the proposed development.

Prepared for
The Site Foreman

For the proposed development located at
No. 3 Bilgola Ave,
BILGOLA BEACH, NSW

Prepared by
Warwick Varley
Consulting Arborist

Prepared: 6 May 2016
Reference No: D2758

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1.0 Introduction

1.1 The following Arborist report has been requested by *The Site Foreman*, for the trees located within and adjacent to the area proposed for development, being no. 3 Bilgola Avenue, Bilgola Beach. This report discusses the viability for tree retention and removal based on the proposed design. The proposal consists of an extension to the existing dwelling.

1.2 This report will address for these trees, the:

- species' identification, location, dimensions, and condition;
- SULE rating;
- discussion and impact of the proposed works on each tree;
- recommendations for the removal, retention and/or pruning;
- tree protection zones and protection specifications for trees recommended for retention.

1.3 The subject site resides within Bilgola Beach; for this reason, Pittwater Council is the consenting authority for any tree works 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”.
- NSW Work Cover Authority Code of Practice for the Amenity Tree Industry, August 1998; Catalogue No. 034.
- 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 guild 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 (Pittwater Council) and Section 2.4.

2.6 Any tree stock subject to conditions in relation to works carried out in this report must be supplied by a registered Nursery that adheres to the NATSPEC guidelines.

- 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.

4.2.2 Table 1; This table compiles the species, dimensions**,** condition and brief assessment (history, structure, pest, disease or any other variables subject to the tree) of the tree as referenced within Plan 1. Also contained in the assessment section is the calculated zones of protection (i.e. TPZ and SRZ) as well as the protection measures and any changes or additions required as part of the proposed works.

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

4.2.4 Protection Specification; This section details the requirements of the TPZ for trees recommended for retention.

4.3 The process involved in compiling the information for this assessment involves:

1. Site assessment on the 28th April 2016 using the method of the Visual Tree Assessment[1]. This has included a Level 2 risk assessment, being a *Basic Assessment*[2]. The assessment has been conducted by Warwick Varley[3] on behalf of Allied Tree Consultancy.

2. Trees included in this report are those that are 3m or greater in height.

3. Raw data from the preliminary assessment including the specimen's dimensions was compiled by the use of a diameter tape, height 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 Survey

Drawn by *PSN Land Surveyors P/L*
Date: Not dated
Drawing: P4339_Drafted, Sheet 1
Title: Plan showing features and structures……

Note 1: Trees no. 1 and 10 have been omitted from the plans provided, however are required for inclusion because they conform to the definition of a tree within the local government tree policy. The tree location has been plotted onto the Plan 1 and the drawing set by *Allied Tree Consultancy*. The tree location was 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.

4.4.2 Designer

Drawn by *The Site Foreman*
Date: March 2016
Project No: 2480
Drawing No: SK 00 A- SK 07 A

[1] Mattheck, C. Breloer, H.,1994, The Body Language of Trees – A handbook for failure analysis The Stationary Office, London
[2] Dunster J.A., 2013, Tree Risk Assessment Manual, International Society of Arboriculture, 2013, USA
[3] Consulting Arborist, Graduate Certificate and Diploma of Arboriculture (level 5 and 8)

4.5 Limitations of the assessment/discussion process

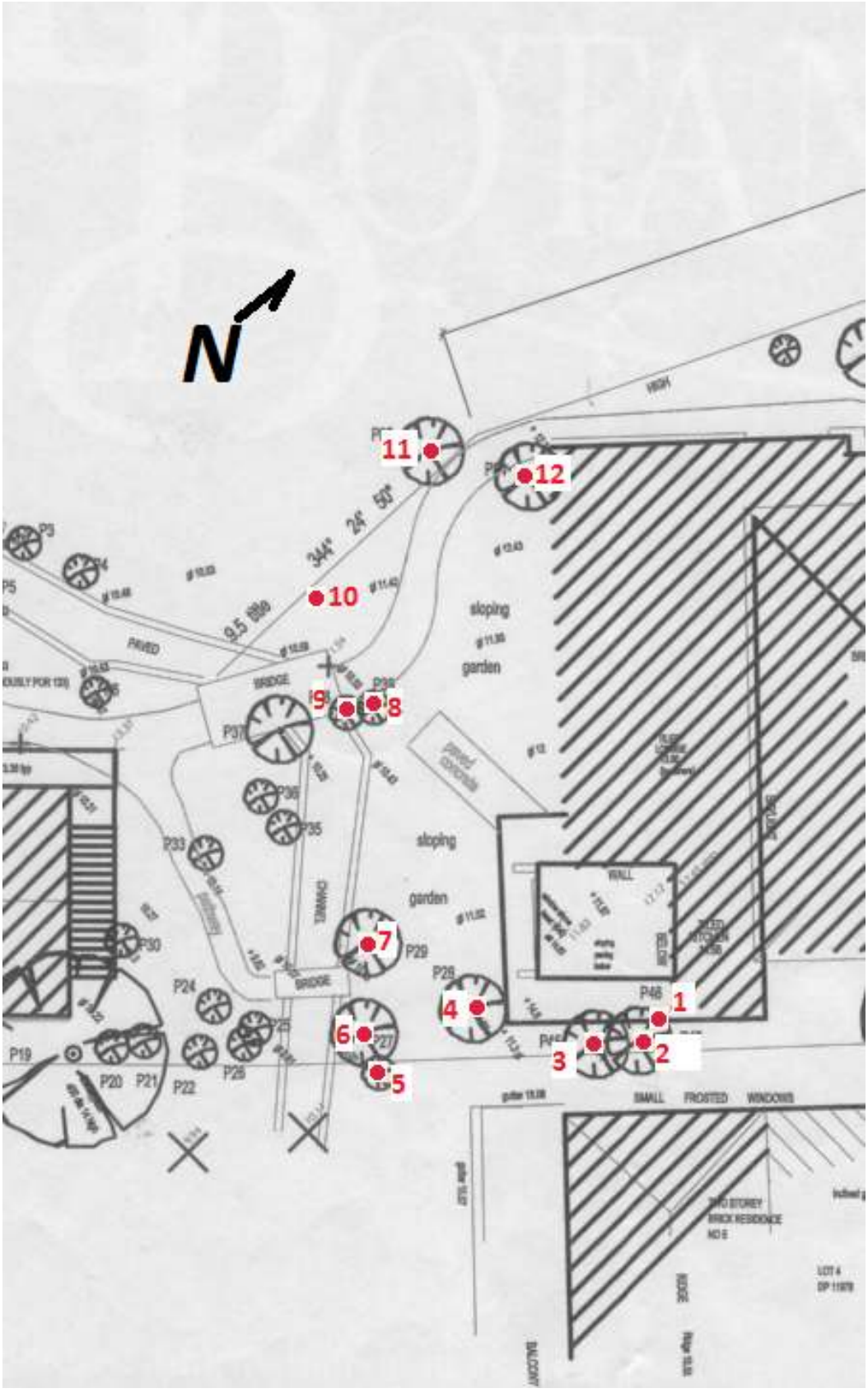
4.5.1 The location of trees no. 1 and 10 have been estimated by the arborist. Allied Tree Consultancy is not a registered surveyor and, however, the accuracy of the survey is attempted; the true position of these trees may marginally deviate. Any such deviation provides the potential for changing the actual impact (encroachment) provided to a tree.

4.5.2 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.

4.5.3 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.

4.5.4 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 wind throw without the appropriate symptoms.

5.0 Plan 1; Area of assessment illustrating tree location



Not to scale
Source: Adapted from *PSN Land Surveyors P/L, not* dated, Drawing: P4339_Drafted, Sheet 1

6.0 Table 1 – Tree Species Data

Terminology/references provided within Appendix A.

Tree No.	Botanical Name Common Name	Height (m)	DBH (m)	Crown Spread (m)	Age	Crown Class	Crown Aspect	Crown Ratio	SULE Rating	STARS Rating	TPZ	SRZ
1	*Livistona australis* Cabbage Palm	12	0.29	3 x 3	M	D	Sym.	F	**A1**	**High**	**-**	**-**
Assessment		This tree provides the habit typical for the species. Proposed works See section 7.1.1									**Remove**	
2	*Livistona australis* Cabbage Palm	7	0.42	3 x 3	M	I	Sym.	F	**A1**	**High**	**3.0**	**1.0**
Assessment		This tree provides the habit typical for the species. Proposed works See section 7.1.2									**Retain**	
3	*Howea belmoreana Curly Palm*	5	0.15	3 x 3	M	S	Sym.	F	**A2**	**Low**	**1.5**	**1.0**
Assessment		This tree provides the habit typical for the species. The crown is in contact with the neighbours dwelling. Proposed works See section 7.1.3									**Retain**	
4	*Archontophoenix cunninghamiana* Bangalay Palm	12	0.27	2 x 2	M	I	Sym.	F	**A3**	**Low**	**-**	**-**

Tree No.	Botanical Name Common Name	Height (m)	DBH (m)	Crown Spread (m)	Age	Crown Class	Crown Aspect	Crown Ratio	SULE Rating	STARS Rating	TPZ	SRZ
Assessment		This tree provides the habit typical for the species, however, exhibits trunk pencilling[4]. This is reflective of an ailing vitality, likely related to the suppressed class and/or competition. Proposed works See section 7.1.1									**Remove**	
5	*Archontophoenix cunninghamiana* Bangalay Palm	9	0.19	3 x 3	M	I	Sym.	F	**A1**	**Medium**	**1.5**	**1.0**
Assessment		This tree provides the habit typical for the species Proposed works See section 7.1.4									**Retain**	
6	*Archontophoenix cunninghamiana* Bangalay Palm	8	0.24	3 x 3	M	I	Sym.	F	**A2/3**	**Low**	**1.5**	**1.0**
Assessment		This tree provides the habit typical for the species, however, exhibits trunk pencilling[4] and exhibits reduced leaf size and chlorosis. This is reflective of an ailing vitality, likely related to the suppressed class and/or competition. Proposed works See section 7.1.4									**Retain**	
7	*Archontophoenix cunninghamiana* Bangalay Palm	12	0.27	3 x 3	M	I	Sym.	F	**A3**	**Low**	**1.5**	**1.0**
Assessment		This tree provides the habit typical for the species, however, exhibits trunk pencilling[4]. This is reflective of an ailing vitality, likely related to the suppressed class and/or competition.									**Retain/Remove**	

[4] Hodel D.R., 2012, The Biology and Management of Landscape Palms, The Brittton Fund Inc. Western Chapter International Society of Arboriculture, USA

Tree No.	Botanical Name Common Name	Height (m)	DBH (m)	Crown Spread (m)	Age	Crown Class	Crown Aspect	Crown Ratio	SULE Rating	STARS Rating	TPZ	SRZ
		Proposed works See section 7.1.5										
8	*Archontophoenix cunninghamiana* Bangalay Palm	8	0.21	4 x 4	M	C	Sym.	F	**A1**	**Medium**	**-**	**-**
Assessment		This tree provides the habit typical for the species. Proposed works See section 7.1.1									**Remove**	
9	*Livistona australis* Cabbage Palm	15	0.34	3 x 3	M	I	S	F	**A2/3**	**Medium**	**3.0**	**1.0**
Assessment		This tree provides the habit typical for the species, however, exhibits a lean. This lean may be related to past partial windthrow. The root crown is based on a rock platform at the base of the water course, and the stem has been partially buried and retained with a rock retaining wall. The assessment of this tree is incomplete due to the buried root crown, however, may be presenting windthrow in progress. This tree will either require removal or further monitoring, pending on the significance attached Proposed works See section 7.1.6									**Retain/remove**	
10	*Archontophoenix cunninghamiana* Bangalay Palm	5	0.18	4 x 4	M	I	Sym.	F	**A1**	**Medium**	**1.5**	**1.0**
Assessment		This tree provides the habit typical for the species. Proposed works See section 7.1.3									**Retain**	

Tree No.	Botanical Name Common Name	Height (m)	DBH (m)	Crown Spread (m)	Age	Crown Class	Crown Aspect	Crown Ratio	SULE Rating	STARS Rating	TPZ	SRZ
11	*Cussonia spicata* Cabbage Tree	13	0.3[1] 0.2	2 x 5	M	C	E	F	**A2**[1]	**Medium**	**4.3**	**1.7**
Assessment		Located in the neighbouring lot and adjacent to the fence. This tree provides typical form, however, a biased habit due to the co-dominant class. The tree is composed of two leaders that divide from a small stem. The larger of the two leaders (containing 75% of the crown) bows east and entirely resides over the yard of no. 3; the remaining smaller leader is retained in the yard from where the tree is growing. <u>Proposed works</u> See section 7.1.7									**Retain**	
12	*Livistona australis* Cabbage Palm	13	0.35	3 x 3	M	I	Sym.	F	**A1**	**High**	**-**	**-**
Assessment		This tree provides the habit typical for the species. <u>Proposed works</u> See section 7.1.1									**Remove**	

1. Estimate due to overgrown area and/or limited access

7.0 Site Assessment

The area of assessment comprises a rectangular shaped lot with a medium gradient and southern aspect. A dwelling exists on the lot and detached garage serviced by a road running parallel with Bilgola Avenue and at the rear of the lot. The area of the lot where the extension is proposed, being the rear yard is composed of tiered garden beds. A natural water course extends through the yard and divides the garage from the dwelling. This water course has been retained on either side by sandstone walls, and the predominate garden areas are fill material. The bed of the creek is sandstone bedrock and acts as a natural barrier between either side of the yard, where no root travel crosses the creek. The trees appear to be planted and consist of Palm species only. The area has been overplanted, and the canopy cover is approximately 60%. Trunks of several palms are apparent within the area adjacent to the rear of the dwelling.

7.1 Proposed development

The proposed development consists of an extension to the rear of the dwelling. Only those trees that reside in the rear yard and adjacent to the area proposed for the extension have been included. All trees located between the dwelling and watercourse have been included. The root systems of the trees south of the water course are isolated and have not been included for this reason. This report discusses the impact of the proposed design will have on the trees. The trees nominated for retention, removal and respective zones of protection have been illustrated in Plan 2, Appendix C.

7.1.1 Trees no. 1, 4, 8 and 12

These trees are located within the footprint of the proposed extension to the dwelling. For the design to proceed, these trees would require removal.

7.1.2 Tree no. 2

This tree is subject to a *major encroachment*, where the proposed footing is to be located 1100mm from the tree centre. A strip footing within this location will remove a significant proportion of roots and potentially result with an impact on the vitality. The stability is not considered to be impacted upon. This tree is considered viable for retention, however, will require the following condition adhered to;

1. the use of a pier type footing in preference to strip type footings within the area of the TPZ (3m radius).

7.1.3 Tree no. 3 and 10

These trees are not located within the footprint of the proposed extension. However, the TPZ is encroached upon. The encroachment is 5% of the TPZ and is deemed a *minor encroachment* and will not impact the tree. These trees can be retained.

7.1.4 Trees no. 5 and 6

None of the proposed works conflict with the location of these trees or respective zones of protection.

7.1.5 Tree no. 7

This tree is not located within the footprint of the proposed extension. However, the TPZ is encroached upon by the proposed deck. The deck is proposed to be supported by piers. Therefore, the encroachment on the root zone is negligible. Though, because the tree is located close to the deck corner, a supporting post would likely be required on the corner, and the support footing would fall into the SRZ and be close to the stem. Such close vicinity could offer detriment to the tree. This tree is not considered to pose high significance, and the loss of this tree will not impact on the amenity of the area. An opportunity exists for retaining this tree by cantilevering the deck, or part of, to avoid any footing within the SRZ. This tree could be retained with modification to the deck support or removed. The outcome would be pending on the viability of the deck support, and preference for removal/retention by the owner and council.

7.1.6 Trees no. 9

The proposed works extend close to this tree and consist of the deck. This structure will be either supported by posts (pier footings) or cantilevered. Either way, the proposed design will not encroach on this tree adversely. However, relative to the assessment contained in Table 1, the stability of this tree is dubious and may present a potential risk for failure. Based on the size and slow growth rate of the species, this tree does present a significant age, and together with the size and species, would be considered to offer sufficient significance to retain. Pending the consideration of the owner and council, this tree will either require removal or if requested for retention, a further detailed assessment to consider any related risk and opportunity for retention.

7.1.7 Tree no. 11

This tree is located on the neighbouring lot and will require retention and protection. The proposed extension will encroach into the TPZ, and reside on the tangent of the SRZ. The encroachment has been calculated as 12% of the TPZ, and this forms a *major encroachment*. This encroachment is two percentage points in excess of the *minor encroachment* and is unlikely to offer any impact on the tree. Though the provision of a suspended slab on piers in preference to a strip footing would reduce significantly any impact provided to the root system and prevent issues related to root uplift with mature growth from this tree and other younger trees located in the neighbouring lot.

A large proportion of the crown (75%) extends into the area of no. 3 and the proposed design will require some pruning to accommodate the two story extension. The leader extending into the yard of no. 3, divides into two secondary leaders, and the larger of these two secondary leaders (being the eastern leader) has been scaled onto the south-west elevation (Drawing SK 07 A) and will likely conflict with the wall and require removal

to accommodate the design. This secondary leader (150mm in diameter and 6m long) has been estimated to contain 40% of the overall crown area.

7.2 Sub-surface utilities

No drawings have been provided for the proposed route of sub-surface utilities. Any trenching, other than what has been allowed for should be avoided within the area of the TPZ's for any tree nominated for retention. 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 a route that falls within the TPZ of a tree. Any excavation in the area of a TPZ must be authorised and conditioned by the project arborist.

7.3 Protection measures

Tree protection measures will be required during the demolition and construction stage. However, the design will be pending the work and design methodology. The project arborist should be contacted after the completion/confirmation of design work for the instruction of the protection measures implementation. The minimum requirement is the installation of Tree Protection fencing around those trees nominated for retention (see Table 1 and Plan 2) and Appendix B, methodology for fence installation.

7.4 Protection of trees

The retention and protection of trees provide for the requirement of the Tree Protection Zone (TPZ) to conform to the conditions outlined within the Protection Specification, Section 8.0. These conditions must be adhered to unless otherwise stated. The zones of protection have been illustrated in Plan 2, Appendix C.

8.0 Protection Specification

Limitations of work permitted within the area of the Tree Protection Zone (TPZ).

1. Foundation/footing types should not be strip type, but utilise footing types that are sympathetic towards retaining root system that is, screw, pier, etc. Slab on the ground can be accommodated in some circumstances and will be nominated by the project arborist. The extent of encroachment will be dependent upon the tree species, soil type (texture and profile) and gradients.

2. Subsurface utilities can extend through the TPZ and Structural Root Zone (SRZ), however, are limited to the method of installation. That is under boring is permitted, however trenching is limited and depends on the proposed route within the TPZ. No trenching is permitted within the area of the TPZ unless stipulated by the project arborist.

3. 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

vigour. The opportunity for, type and proportion of pruning will be required to be nominated by the project arborist.

4. Soil levels within the TPZ must remain the same. Any excavation within the TPZ must have been previously specified and allowed for by the project arborist:

   a) So it does not to 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.

   - 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.

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

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

7. 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.

8. 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.

9. 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.

10. 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.

11. 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.

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)[5].

[5] 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.

9.0 Recommendations

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

9.1 Trees no. 3, 5, 6, 9 and 10

These trees can be retained relative to the nominated zones of protection (TPZ, SRZ) and based on the requirements of the Protection Specification, section 8.0. The proposed design does not adversely affect these trees.

9.1.1 Tree no. 9

Pending consideration by the owner and council, this tree will either require removal or if requested for retention, a further detailed assessment to consider any related risk and opportunity for retention.

9.2 Trees no. 1, 4, 8 and 12

The proposed design will require removal of these trees.

9.3 Trees no. 2 and 11

The proposed works form a *major encroachment*, however, are not considered to pose an adverse impact on these trees. The following condition is required to reduce the impact on these trees.

1. The use of a pier type footing in preference to strip type footings within the area of the TPZ.

9.3.1 Tree no. 11

The easternmost secondary leader (150mm in diameter and 6m long) will require pruning to accommodate the proposed design.

9.4 Tree no. 7

This tree could be retained with modification to the deck support or otherwise removed. The outcome would be pending on the viability of a modified deck support, and preference for removal/retention by the owner and council.

9.5 Sub-surface utilities

No drawings have been provided for the proposed route of sub-surface utilities. Any trenching, other than what has been allowed for should be avoided within the area of the TPZ's for any tree nominated for retention. 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 a route that falls within the TPZ of a tree. Any excavation in the area of a TPZ must be authorised and conditioned by the project arborist.

9.6 Protection measures

Tree protection measures will be required during the demolition and construction stage. However, the design will be pending the work and design methodology. The project arborist should be contacted after the completion/confirmation of design work for the instruction of the protection measures implementation. The minimum requirement is the

installation of Tree Protection fencing around those trees nominated for retention (see Table 1 and Plan 2) and Appendix B, methodology for fence installation.

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.

DATED: 20th May 2016

Warwick Varley
Consulting Arborist; Level 5 and 8 (Arboriculture)
MIACA; Reg. #18,
MISA
MIAH; Reg. # 32

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 being the north-south span, the second being the east-west measurement.

Age

Is the estimate of the specimen's age based upon the expected life span 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 probably 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).

Crown Ratio;

Refers to the density of the crown in comparison to an example of the same species and age. The crown ratio can be expected to contain the following proportions of foliage in regard to a specimen of average vigour (being 100%).

F -	Full	85% - 100%
P -	Partial	40% - 85%
S -	Sparse	less than 40%

Live Crown Ratio

This is a ratio specific to conifers (and few genus of Angiosperms), and offers the proportion of existing crown relative to the overall height. This figure, expressed as a percentage acts as an indicator for stability, vigour and the potential for retention. Trees with a Live Crown Ratio less than 30% typically are "weak, lack vigour and have low diameter growth" [6]

Limb Diameter

Is measured adjacent to the branch collar, which is the cross-section offering the largest diameter of the limb.

[6] Dunster J. and Dunster K.
Dictionary of Natural Resource Management
UBC Press, University of British Columbia. Vancouver, B.C, Canada, 1996

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.

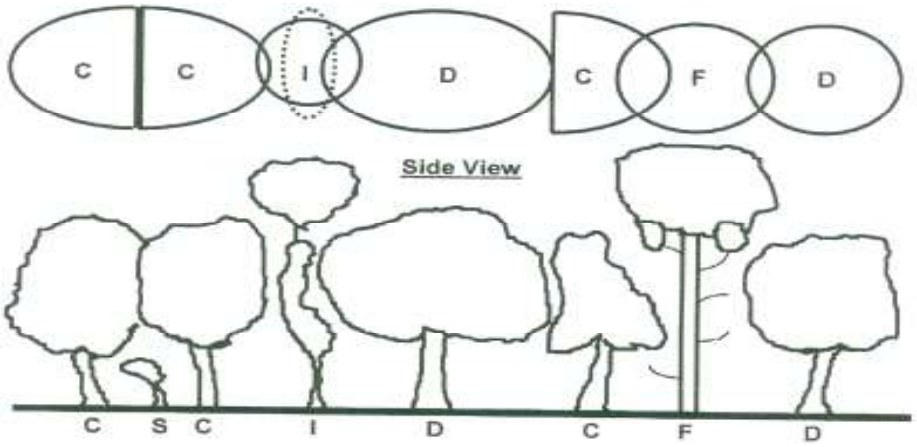
C – *Codominant* Crown is receiving light from above and one side of the crown.

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 for the purpose of managing large populations of trees within a limited time span 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 arborists whom 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.

All other definitions are referenced from;

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

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).	

TPZ; Tree Protection Zone
Is an area of protection required for maintaining the trees vigour 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.

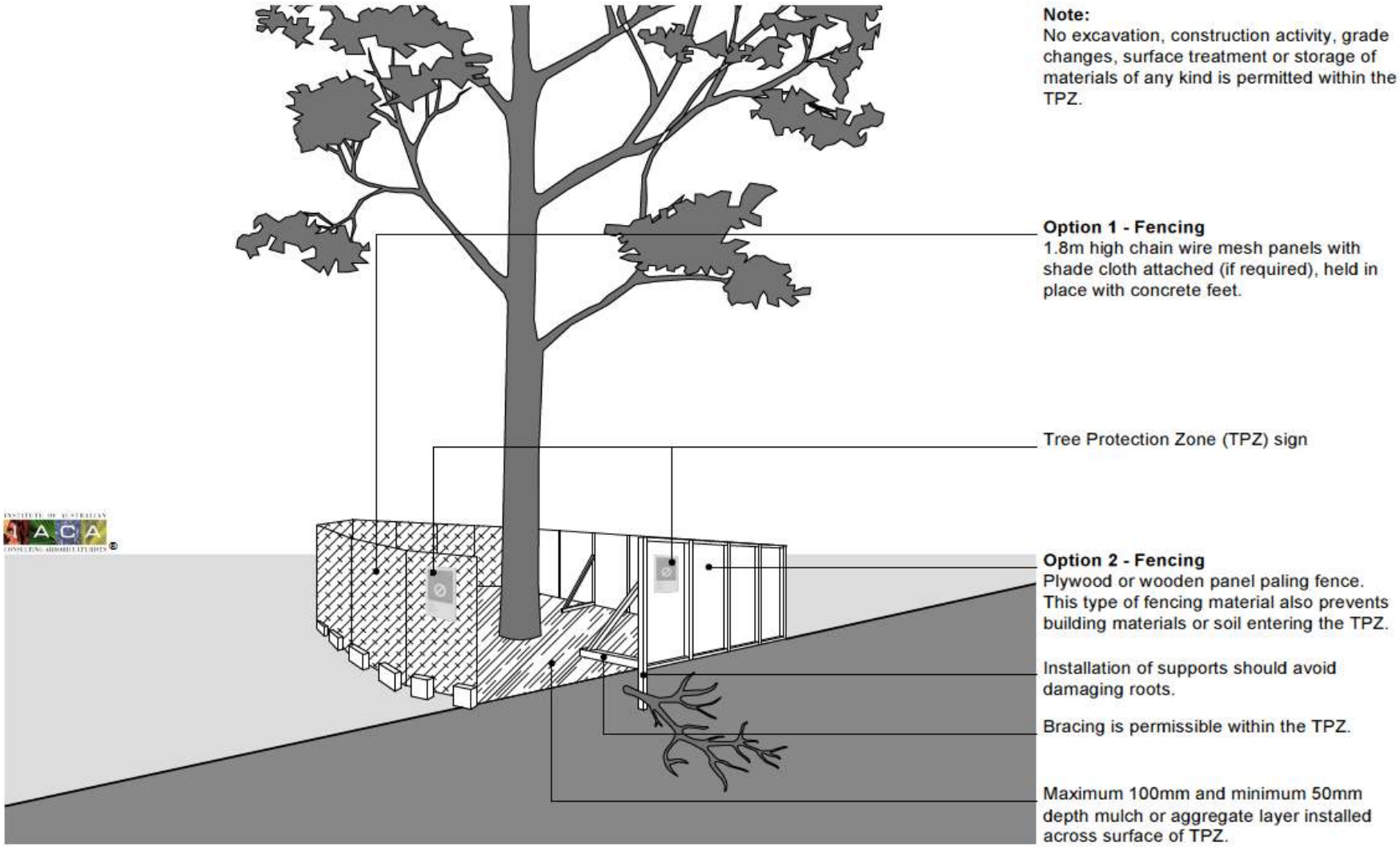
SRZ; Structural Root Zone
Is the area around the tree containing the woody roots necessary for stability. Measured in meters as a radius from the trees centre. The requirements of this zone are outlined within the Protection Specification, Section 8.0, and are to be adhered to, unless otherwise stated.

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 C.

Action
Refers to the requirement of the trees status and in regard to the condition/type of tree and proposed works. Trees that are required to be *Retained* may require 'protection measures', and will require the area of the 'TPZ' to be protected and in regard to the requirements of the 'Protection specification' (see section 8.0). Trees that require to be *Removed* are nominated based upon, being;

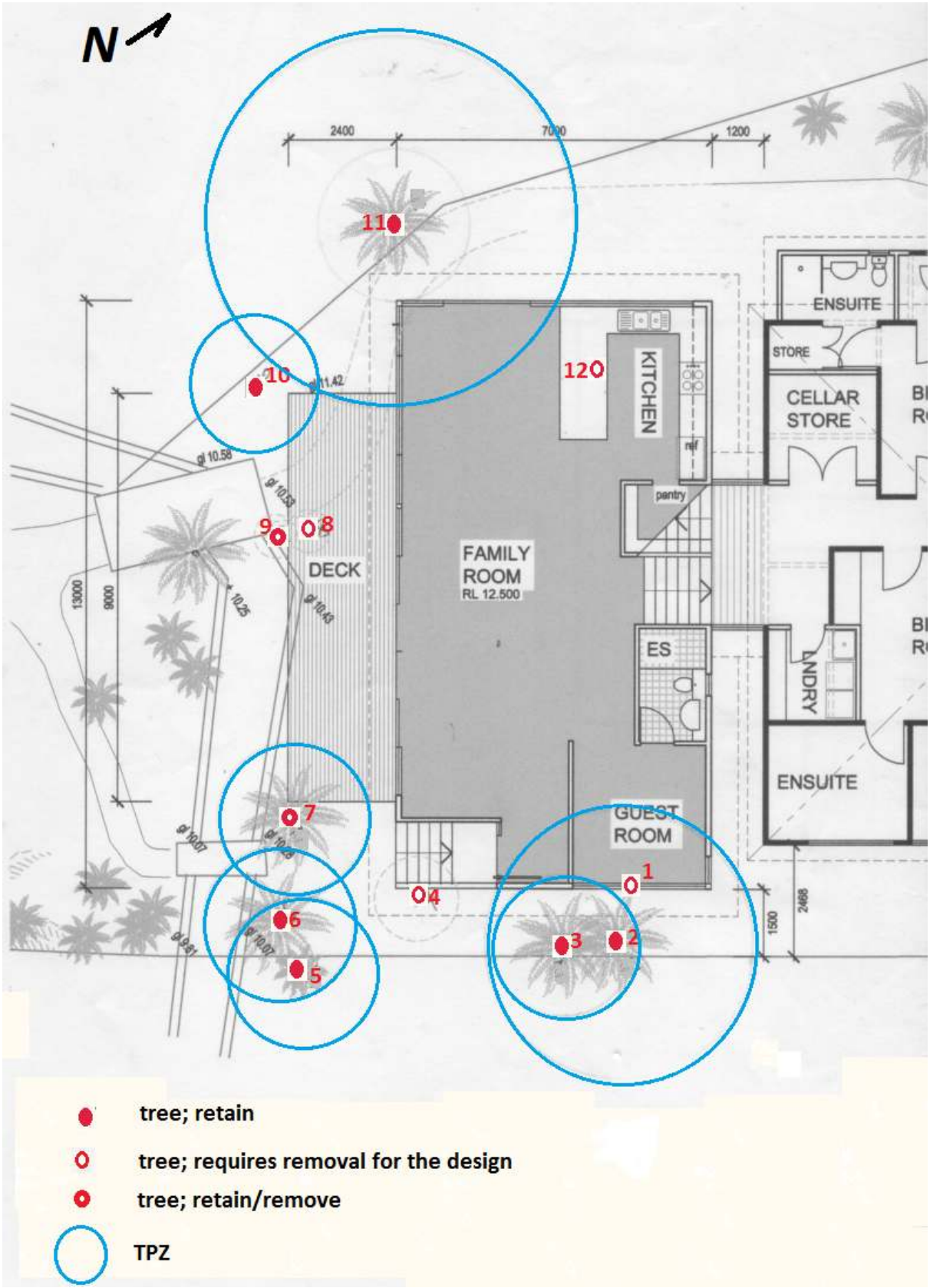
- o*ver planted*: the mature size is too large for the existing area to support
- *conflicting location*: the trees location exists within or too close to an existing structure or the proposed site works.
- *weed species*: Tree species deemed undesirable due to having been classed as an environmental weed
- *poor form*: the habit, vigour and/or ailing structural integrity reduces the safe, useful life expectancy. Those trees listed with a SULE rating of 3 or 4.

Appendix B- Protection measures; Protective fence



Tree protection zone sign; requirements

Appendix C- Plan 2; Tree plan, retain/removal and zones of protection



Not to scale

Source: Adapted from *The Site Foreman P/L,* dated March 2016, Drawing: SK 03 A