

Arboricultural Impact Assessment Report

Site address:

**88 Station Street
Mullumbimby NSW 2482**

Report prepared for:

North Coast Community Housing

Prepared on:

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1.0 Executive Summary

1.1 This report is to provide an assessment of one (1) established Fig Tree on Lot 1, DP 1227659, known as 88 Station Street Mullumbimby NSW 2482 (the site).

1.2 Potential impacts will be identified due to the plan redesign of additional carports; four located within the Tree Protection Zone (TPZ). Low impact building methods will be specified, along with tree protection measures to minimise the redesign plus possible impacts during construction.

1.3 Some of the low impact building methods are, installation of turf or gravel cells to proposed carport and driveway within the TPZ and support posts of the carport anchored with stirrups. Furthermore, the TPZ will be fully fenced, and the Tree Protection Plan (TPP) followed for the entirety of the development.

1.4 Protecting the above and below ground environment of the Fig Tree for the extent of the development is vital for long term tree health and vitality

1.5 Any works recommended within; will accompany additional information to support the submission for Development Application to the relevant consent authority for approval.

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2.0 Introduction

2.1 Catherine Russo (the author) from SHEgreen Arboriculture and Horticulture (SHEgreen) has been engaged to write this Arboricultural Impact Assessment Report by North Coast Community Housing (NCCH) or (the Client), the owner of 88 Station Street Mullumbimby NSW 2482 (the site).

2.2 The site is located in the Byron Shire (the Council) Local Government Area (LGA), being the consent authority for the proposed development.

2.3 This report will take into consideration the proximity of one (1) *Ficus microcarpa* 'Hillii' – Hill's Fig (subject tree) to the proposed development, considering revised drawings proposing four (4) additional carports within the Tree Protection Zone (TPZ)¹.

2.4 The assessment and specifications within this report are based on plans cited, calculations formulated from measurements taken at the time of the Visual Tree Assessment, and an understanding of how construction can affect trees and how trees can affect infrastructure.

2.5 The subject tree is protected under the Council's Tree Preservation Order (TPO).

2.5 Low impact building methods will be specified where practicable.

2.6 Only the plans cited in this report have been used to assess the impact of the proposed development on the subject tree. Specifications and recommendations made in this report should be implemented to protect the subject tree. If amendments to the current plan occur, including additions or a redesign; the conclusions reached in this report could be negated.

¹ The radius measurement in metres calculated by multiplying the DBH by twelve (12) to determine an area required to protect the root, trunk and crown area from construction disturbance, while retaining the tree's viability; as stated in Standards Australia AS4970-2009 Protection of Trees on Development Sites.

3.0 Brief

3.1 This report will:

- Assess the health and vitality of the subject tree,
- Identify potential impacts and adverse effects on the subject tree due to the proposed revised drawings,
- Specify low impact building methods that will reduce harm to the subject tree,
- Specify tree protection methods to be implemented for the duration construction, to minimise potential impacts.

4.0 Documents and plans

4.1 Plans cited and utilised in this report were supplied by KO:HO

- Byron Shire Council – Request for further information, dated 04.03.2020.
- North Coast Community Housing - The Millyard Mullumbimby– Station S96 Parking – Drawings – C-S-01, C-S-2, C-S-03, C-S-04, C-S-05, C-S-08, C-E-01, C-E-02, C-E-03, C-E-04, dated 04.05.2020.

5.0 Method

5.1 Catherine Russo inspected the site on Monday, 6th July 2020, at approximately 2:00 pm. The weather was fine and clear, with no impediment to visual assessment.

5.2 The Client's representative, Adam Bennet-Smith from KO:HO, was present at the inspection.

5.3 The site is Lot 1, DP 1227659, known as 88 Station Street Mullumbimby NSW 2482

5.4 A basic Visual Tree Assessment (VTA)² was conducted at ground level only, with the assessment covering only external features and condition of the subject trees at the time. No invasive or diagnostic testing or aerial inspection was undertaken as part of the assessment.

5.5 One (1) subject tree has been identified on plans. Tree location is determined by the plans supplied.

Appendix 2 and 3

5.6 Tree height is recorded as an estimated measurement. Crown spread measurements are paced estimates. **Appendix 1**

5.7 Identification of the tree is based on key taxonomical features, clearly visible at the time of inspection. No scientific or herbarium comparison has been completed. Where possible, genus and species have been specified.

5.8 No soil test was performed.

5.9 Photographs, diagrams, and the like contained in this report are intended as visual aids only. All images unless otherwise cited were taken by Catherine Russo and remain the property of SHEgreen.

Appendix 7

5.10 Only plans cited in this report have been used in assessing the impact of the proposed development on the subject tree.

5.11 This report adopts tree protection methods outlined in Standards Australia, *Australian Standard AS4970-2009 Protection of Trees on Development Sites (AS4970)* and tree pruning guidelines in Standards Australia, *Australian Standard 4373-2007 Pruning of Amenity Trees (AS 4373)* as a point of reference.

5.12 To minimise adverse impacts on the subject tree, low impact building methods will be specified where practicable.

² A Visual Tree Assessment (VTA) is an internationally recognised method of tree inspection, initially from the ground. It was developed by Mattheck and Breloer (1994) based on the Axiom of Uniform Stress, which assists experts to interpret the body language of trees by means of visual examination. It takes into account indicators of a tree's overall appearance and vitality, signs and symptoms of defects and/or pest and disease, and the potential risk at that point in time. Diagnosis of trees is not an absolute science as they are a self-optimizing dynamic organism, however through the methodological process of a VTA, necessity for further examination can be determined.

Breloer, H., and Mattheck, C., 1994, Field Guide for Visual Tree assessment (VTA), *Arboriculture Journal*, Vol 18, pp1-23, AB Academic Publications, Great Britain

Mattheck, C., Bethge, K., and Weber, K., 2015, *The Body Language of Trees: Encyclopedia of Visual Tree Assessment*, Germany

6.0 Observations

6.1 The subject tree is an established, single-stemmed specimen for the species, located in the south-west sector of the site. It shares a common boundary with Station Street Mullumbimby. **Figure 6**

6.2 The subject tree appears in fair health for the species and location. Visual indicators show the crown density is slightly sparse and leaf colour mildly chlorotic. **Figure 7**

6.3 Leaf size, branch extension, branch structure, trunk, root crown and buttress of the subject tree appear in good condition and form. The subject tree appears structurally sound with no indication of internal weakness. **Figure 8 and 9**

6.4 There is evidence of apical branch death over the crown. **Figure 10**

6.5 No noteworthy insect activity or fungal fruiting bodies were evident.

6.6 The subject tree is growing at or near natural grade.

6.7 The TPZ has a radius of fifteen (15) metres.

6.8 The proposed carports 09-12, crossover, a portion of the driveway, and footpath are located in the TPZ but outside the Structural Root Zone (SRZ)³ of 3.8m. At the closest point, the subject tree centre is approximate 4 m from the proposed parking space, 09. **Figure 2 and 5**

6.9 The strongly buttress root flare measures approximately seven (7) metres north to south and four (4) metres east to west.

6.10 The distance between the kerb and the western side of the root buttress is approximately two (2) metres. The ground between the subject tree's buttress and the kerb is heavily compacted. **Figure 11.** Cars park under the crown (Author's observation).

6.11 The subject tree has a low branching habit, mostly initiate between 2-2.5 metres high. **Figure 13**

6.12 There are a number of self-germinated tree species growing at the base of the tree. **Figure 12**

³ Structural Root Zone (SRZ) is the area required for tree stability. It is a radial measurement from the centre of the tree trunk defining the critical area required to maintain stability of the tree in the ground; as stated in Standards Australia AS4970-2009 Protection of Trees on Development Sites, clause 3.3.5 and Figure 1 and 2

7.0 Discussion

See **Appendix 4** for Tree Protection Zones (TPZ); **Appendix 5** for TPZ, SRZ and Encroachment measurements; **Appendix 8** for Tree Protection Plan (TPP).

7.1 The subject tree is considered in fair health due to the slightly sparse condition of the crown, the mild chlorotic (yellowing) appearance of the leaves and the dead apical growth (ends) over the crown. A contributing factor for the overall condition and appearance of the crown may be the extended dry and hot periods of the past two summers. Given time, improved soil moisture and condition, subject tree health and appearance should improve.

7.2 The overall condition of the trunk, root flare, buttress and structural and secondary branches appear in good health and condition. New leaf growth and branch extension over the majority of the crown, indicates good vigour, important features for a tree on a development site.

7.3 Severing roots, compaction of the soil and washing out contaminants in or near the TPZ are the most significant impacts to the subject tree. Maintaining the TPZ fenced area and following the TPP during the development will assist tree health and time in adjusting to the new environment. **Appendix 7**

7.4 Estimations show a major encroachment into the TPZ: greater than 10% of the TPZ, due to the proposed revised plans. **Appendix 5**. AS4970 guidelines state, if the 'encroachment is greater than 10% of the TPZ', the Project Arborist must consider the trees health, age, environmental conditions, and proposed development, then demonstrate that the tree/s will remain viable during the proposed development and associated disturbance

7.5 Fig Trees are known for their large and vigorous root systems. Equally, they can tolerate root disturbance and severe root cutting under the right conditions with appropriate care and experienced contractors, e.g. transplanting established Figs.

7.6 Plans cited, propose the foundations of the carports made of 150mm concrete slab on screw piers. Due to the proposed location of carports 09-12, the adjacent driveway, and footpath in the TPZ, plus the very nature of construction, root damage will occur.

7.7 Excavation for concrete footings for the crossover section is required. This section is between the kerb and the western common boundary, in the south western corner of the TPZ. A minor encroachment of 4.5% of the total area of the TPZ area will occur in this section. Following AS4970 guidelines, this is an allowable encroachment as long as there is contiguous unaffected area adjoined to the TPZ. Point 7.10 must be considered.

Small diameter roots will be severed during this excavation work in the crossover section. Section 7.14 must be considered.

The subject tree has large and vigorous root systems and will tolerate root disturbance and severe root cutting under the right conditions with appropriate care. Section 7.5 and 7.16 must be considered.

Increasing reinforcement to the crossover section is recommended. Section 7.8 must be considered.

7.8 Due to the very nature of root vigour and always expanding character of woody roots, in time the roots will almost certainly crack and lift shallow concrete footings mentioned above.

7.9 Implementing alternative style footings for the proposed infrastructure in the TPZ will reduce the impact on the root system, along with a no excavation by machine policy, (minimal manual trenching allowed), and reduce long-term infrastructure damage

7.10 Deferring all works near the subject tree to the last stage of construction is advised.

7.11 Turf or gravel cells are an available footing option, i.e. low impact building method, where judicious care of tree roots is required. Turf or gravel celled areas must be, carports 09-12, the driveway from site boundary level with the west extremity of carport 12, and the footpath from north of the stormwater drain to the northern edge of the cross over **Appendix 6**. Turf or gravel cells must be installed at or near ground level. Soil level adjustments must be added fill rather than removal. Removal of any soil in the TPZ, if required, must be by manual means only.

7.12 To minimise root damage support posts for carports 09-12 must be anchored by metal stirrups or something similar.

7.13 The proposed drainage associated with the rock filled drain in the TPZ is acceptable with strict conditions. The trenching associated with the pits and pipes must be manually excavated.

7.14 Roots greater than 30mm in diameter must remain in situ and not be damaged. All severed roots greater than 20mm in diameter must be trimmed cleanly to reduce the possibility of disease.

7.15 In high rainfall events, excess rainfall from the carport roof will fall to the rock drain. Natural overflow into the root zone of the subject tree is expected and acceptable at this time. An alternative drainage method is a socked slotted Draincoil (Aglinc); this will also require some manual excavation.

7.16 Low impact excavation methods near the TPZ boundary are advised. The excavation movement being straight down and pulled back away from the subject tree, in a cutting motion, rather than a sideways tearing motion.

7.17 No trenching for services or excavation must occur in the fenced-off TPZ. Any unforeseen earthworks required within the TPZ must be discussed with and approved by the Project Arborist and performed by manual means only.

7.18 The proposed footpath on the west side of the subject tree (TPZ between the subject tree and kerb edge) is a known parking space for nearby residents and visitors causing compaction to the root zone in that area. To prevent compaction and assist tree health, installing bollards from south of stormwater drain to the north side of the crossover at the kerb: footpath interface is recommended. **Appendix 6**

7.19 Natural ground level must be maintained in the TPZ at all times.

7.20 Pruning to crown lift, (AS4373, clause 7.3.3), of the subject tree is required for clearance and construction purposes. On the southern side of the subject tree, (over carports 09-12), the lower branches should be removed up to three (3) metres high on the trunk. The remaining circumference of lower branches on the subject tree should be removed up to two and a half (2.5) metres high on the trunk. Pruning cuts must be performed to the nearest branch union with the trunk. Further reduction in branch length may be required before/during construction; this must be discussed and approved by the Project Arborist.

7.21 A designated washout area: for contaminants such as cement and paint etc., must be allocated away from the subject tree and take into consideration the topography (natural fall) of the site. Washout of contaminants can be detrimental to tree health.

7.22 The self-germinating trees located in the buttress must be removed to reduce competition.

7.23 In the event, a machine is required in the TPZ, a load sharing device, e.g. rumble boards, or road plates must be placed over the top of the mulch before commencing. The Project Arborist must be in attendance.

7.24 In the event, the TPZ fencing needs to be moved to facilitate plant or machinery movement into the site, a load sharing device, e.g. rumble boards, or road plates must be placed over the top of the mulch before commencing. Discussion and approval by the Project Arborist must be sort.

7.25 Before construction work commencing on-site,

1. Pruning required to facilitate clearance, must be performed before construction commences and TPZ fencing installation. The chipped mulch can be left on-site and used in the mulching process.
2. An application of aged mulch to 100mm thick must be applied to the protected TPZ area. Mulch will assist tree health during the proposed development, through improving root growth, conserving soil moisture and minimise the effects of construction practices.
3. The TPZ perimeters must be isolated by a 1.8m high rigid temporary fence or an appropriate classed structure as per Tree Protection Zone (TPZ) drawing (**Appendix 4**). Proper signage of restricted activities, in accordance with AS 4970-2009 Clause 4.2, 4.3 and 4.4, must be attached to the fence. Isolating the tree with 1.8m chain wire fence panels will demonstrate that the TPZ is essential out of bounds area to contractors working on the site during construction. Any adjustment of the TPZ fencing, at any time, must be in conjunction and approval with the Project Arborist. The TPZ fencing must stay in situ for the duration of the development.
4. The TPZ must have an irrigation system installed to maintain soil moisture at field capacity as required during the development.

8.0 Specifications

See **Appendix 4** for Tree Protection Zone (TPZ); **Appendix 5** for TPZ, SRZ and Encroachment measurements; **Appendix 8** for Tree Protection Plan (TPP).

8.1 Before the development commencing, the Project Arborist and the Project Manager should meet to discuss the date of commencement of works, the TPZ and TPP, the timing of pruning and mulching, erection of the TPZ fencing and discuss general information regarding the subject tree.

8.2 Tree protection must be part of the site induction process, with all inductees made aware of the significance of the tree to be retained, the protection methods established and the prohibited activities within the TPZ.

8.3 Pruning works to crown lift branches to facilitate clearance should be performed before construction commencing and TPZ installation. Tree work must be performed by a qualified AQF III Arborist or above with relevant insurance, to guidelines of AS 4373-2007 Clause 7.3.2. Pruning cuts must be completed at the nearest branch union with the trunk, not cutting into the collar or stem tissue, as stated in AS 4373-2007 Clause 5.3. The Project Arborist is required on-site for the pruning works.

8.4 The full extent of the TPZ area must be mulched to a depth of 100 mm using aged tree mulch, e.g. Arborist Chip or Tea Tree Mulch. The Project Arborist needs to sign off on mulching performed.

8.5 An irrigation system must be installed and working appropriately to maintain adequate soil moisture to the root zone of the TPZ area throughout the entire construction period. The Project Arborist needs to sign off on irrigation implemented.

8.6 The TPZ must be isolated a 1.8m high rigid temporary fence or an appropriate classed structure, with suitable signage of restricted activities, in accordance with AS 4970-2009 Cause 4.2, 4.3 and 4.4. The fence will prevent entry or placement of machinery and materials into the TPZ. The fence will stay in situ until works are complete. TPZ fencing will be placed as per **Appendix 4**. The Project Arborist is required on-site for the fence installation.

8.7 Turf or gravel cells with the appropriate internal medium should be utilised as alternative low impact building methods for carports 09-12, the driveway from site boundary to level with the west extremity of carport 12, and the footpath from north of the stormwater drain to the northern edge of the cross over **Appendix 6**. Turf or gravel cells must be installed at or near ground level. Soil level adjustments must be added fill rather than removal. Removal of any soil in the TPZ, if required, must be by manual means only.

8.8 The crossover section requires excavation to install the driveway section. It is likely smaller diameter roots will be damaged, though due to the vigorous nature of Fig tree roots the tree will tolerate the disturbance. Increasing reinforcement to the crossover section is recommended. Scheduling construction works in and around the TPZ until the last stage of the development is recommended.

8.9 Carport posts are to be supported by stirrup support posts secured with concrete.

810 The proposed rock filled drain in the TPZ is acceptable with strict conditions. The trenching associated with the pits and pipes must be manually excavated. Roots greater than 30mm in diameter must remain in situ and not be damaged. All severed roots greater than 20mm in diameter must be trimmed cleanly to reduce the potential of disease.

8.11 Installation of bollards along the kerb: footpath interface from south of stormwater drain to the north side of the crossover is highly recommended.

8.12 Deferring all works near the subject tree until the last stage of construction is advised.

8.13 Low impact excavation methods near the TPZ boundary are advised. Machinery movements made in a downward cutting motion rather than a tearing sideways direction.

8.14 The Project Arborist must be on-site for the duration any excavation in the TPZ (if required).

8.15 Natural ground level must be maintained in the TPZ at all times. Under no circumstances shall the existing topsoil be stripped or compacted.

8.16 No stockpiling of soil or material, trenching for services, or parking of vehicles is permitted in the TPZ.

8.17 Under no circumstances shall concrete wastes or wash be disposed of in the TPZ. Concrete waste is highly alkaline and extremely damaging to tree roots.

8.18 The Project Arborist should maintain regular monthly inspection of the subject tree for the duration of construction. Inspections may vary if the Project Arborist is on-site in a consultative or supervisory capacity within that time frame.

9.0 Conclusion

9.1 Fig Trees are extremely tolerant of root disturbance and adjust to altered above and below environmental conditions readily given the correct care and protection.

9.2 The revised development plan constitutes a major encroachment into the Tree Protection Zone. However, with the implementation of a no machine excavation policy and specified low impact building methods in the Tree Protection Zone, there should be minimal impact on the subject tree. Additionally, scheduling construction of infrastructure in and around the subject tree and TPZ until the final stage of development is advisable.

9.3 The crossover section will require excavation to implement a structurally sound concrete driveway. This section is to the outer edge of the TPZ where larger diameter roots are unlikely. It is believed the subject tree will tolerate this encroachment.

9.5 Implementing the protection measures, specifications, recommendations, and guidelines in this report, along with continued supervision and advice from the Project Arborist, there should be no reason that the proposed development and revised plans should affect the health of the subject tree.

9.6 Therefore, with revised plans in place and as long as specifications in this report, and due care are implemented, it is considered the subject tree can be retained successfully, with structural integrity, health, and vigour for the extent of the development.

Yours sincerely



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Qualified QTRA and TRAQ Tree Risk Assessor
AQF Level IV in Training and Assessment
Arboriculture Australia General Member – membership number 2462
International Society of Arboriculture, Professional member - membership number 230523.
Queensland Arboriculture Association (QAA) - member number 01450

Appendices

Appendix 1: Tree data

Tree #	Scientific name <i>Genus species</i>	Height (m)	Spread (m)	DBH (mm)	TPZ (m)	SRZ (m)	Health condition	Retention value	Comment
T1	<i>Ficus microcarpa</i> 'Hillii' – Hill's Fig	12	30x27	-	15	3.8	Fair to good	High	Crown slightly sparse. Foliage mildly chlorotic. New leaf growth and branch extension evident. Trunk, root crown, structural branches in good condition. Buttress 7x4m. A moderate amount of apical death apparent throughout the crown. Appears structurally sound
All measurements are approximate									
Tree number	Identification number of trees								
Tree name	Genus and species and common name for identification purposes								
Height (m)	Approximate measurement from the ground to apex of the crown								
Spread (m)	Approximate diameter of the crown								
DBH-Diameter at Breast Height (mm)	Measurement is taken of the trunk at 1.4m above ground level determining the circumference, as stated in Australian Standard 4970-2009 Protection of Trees on Development Sites								
TPZ-Tree Protection Zone (m)	The radius measurement in metres calculated by multiplying the DBH by twelve (12) to determine an area required to protect the root, trunk and crown area from construction disturbance, while retaining the tree's viability; as stated in Standards Australia AS4970-2009 Protection of Trees on Development Sites.								
SRZ-Structural Root Zone (m)	The area around the base of the tree required for structural stability shown as a radial measurement in metres from the trunk centre . It will not necessarily assist the long-term health or vitality of the tree.								
Health and condition	Good = Tree in good health with no significant faults or defects Fair = Showing some faults or health problems. Serviceable and not likely to cause short-term problems Poor = Significant health issues or structural defects								
Retention value	High = Protected under relevant TPO. Local, cultural, environmental significance Moderate = Protected under relevant TPO. Visual and amenity value to the area Low = Environment, nuisance species. Poor specimen.								
Comments	Any other relevant information observed								

Appendix 2: Site map and tree location



Figure 1: Location of the site, an overview of approximate site boundaries site (black square) and approximate location of the subject trees (red circle). (Source: Google Maps 2020)

Appendix 3: Tree location with proposed plan



Figure 2 Overview of the proposed development with the subject tree location TPZ (black circle). Trunk location (red circle), Tree Protection Fence (red dash line). (Source: KO:HO – Site Plan - Drawing-C-S-02, dated 04.05.2020.)

Appendix 4: Tree Protection Zone specifications

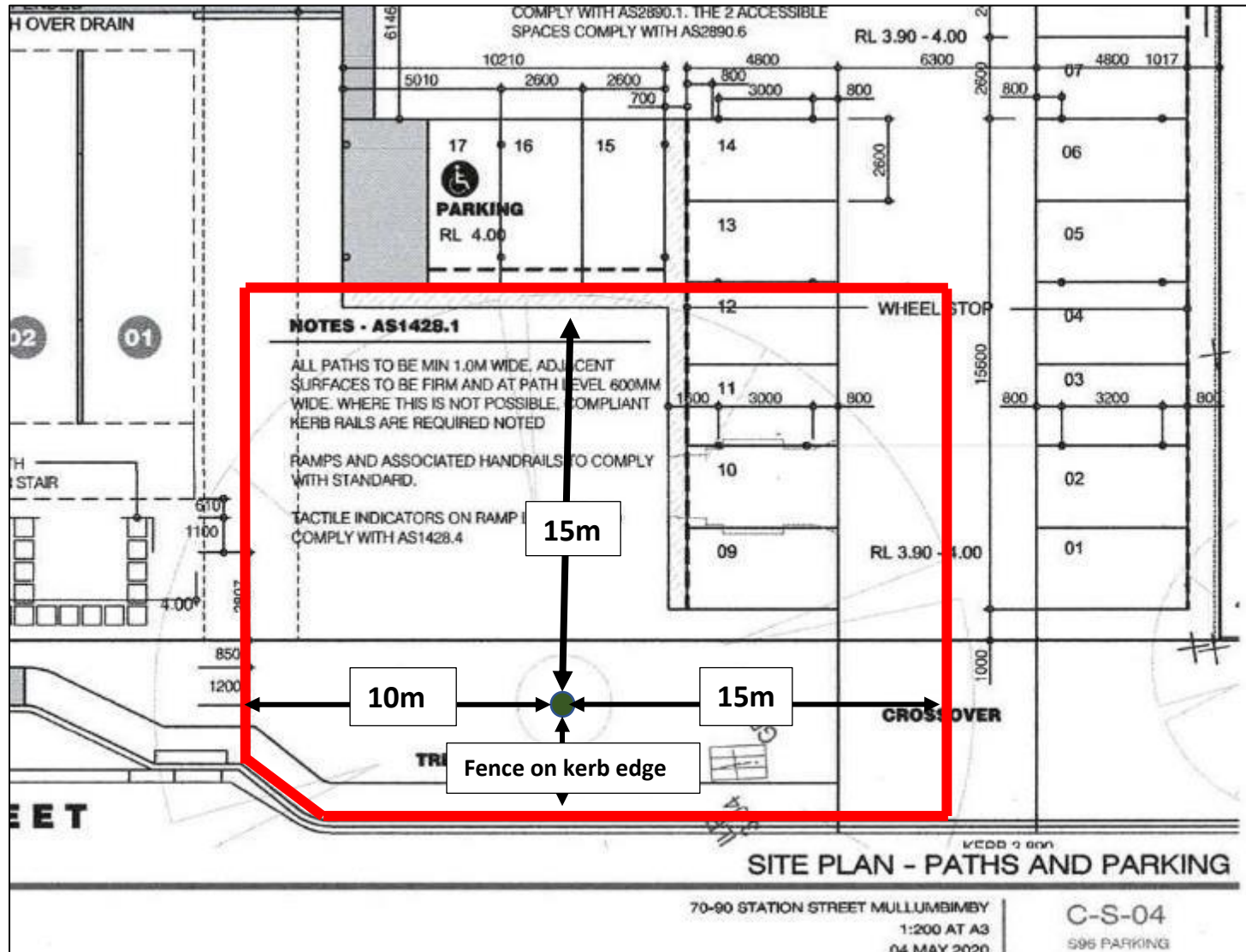


Figure 3 Tree Protection Zone where fencing must be located (red line).

Appendix 5: TPZ, SRZ and Encroachment measurements

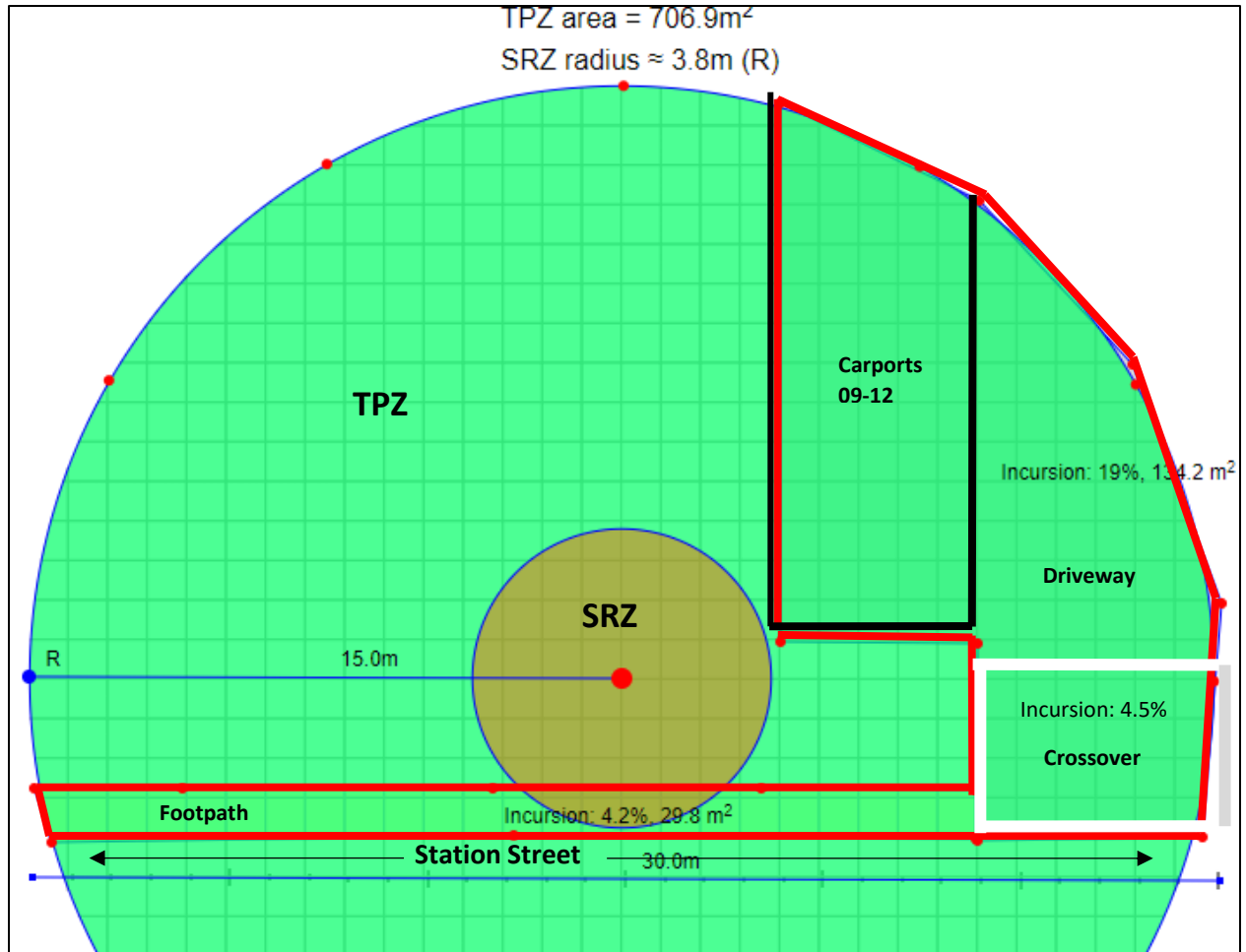


Figure 4: Encroachment calculator showing the major encroachment into the subject tree's TPZ. Red outlined indicates total encroachment. White outlined square is crossover encroachment where excavation required.
 (Source: ProofDocs 2019)

Appendix 6: Low Impact Building Methods

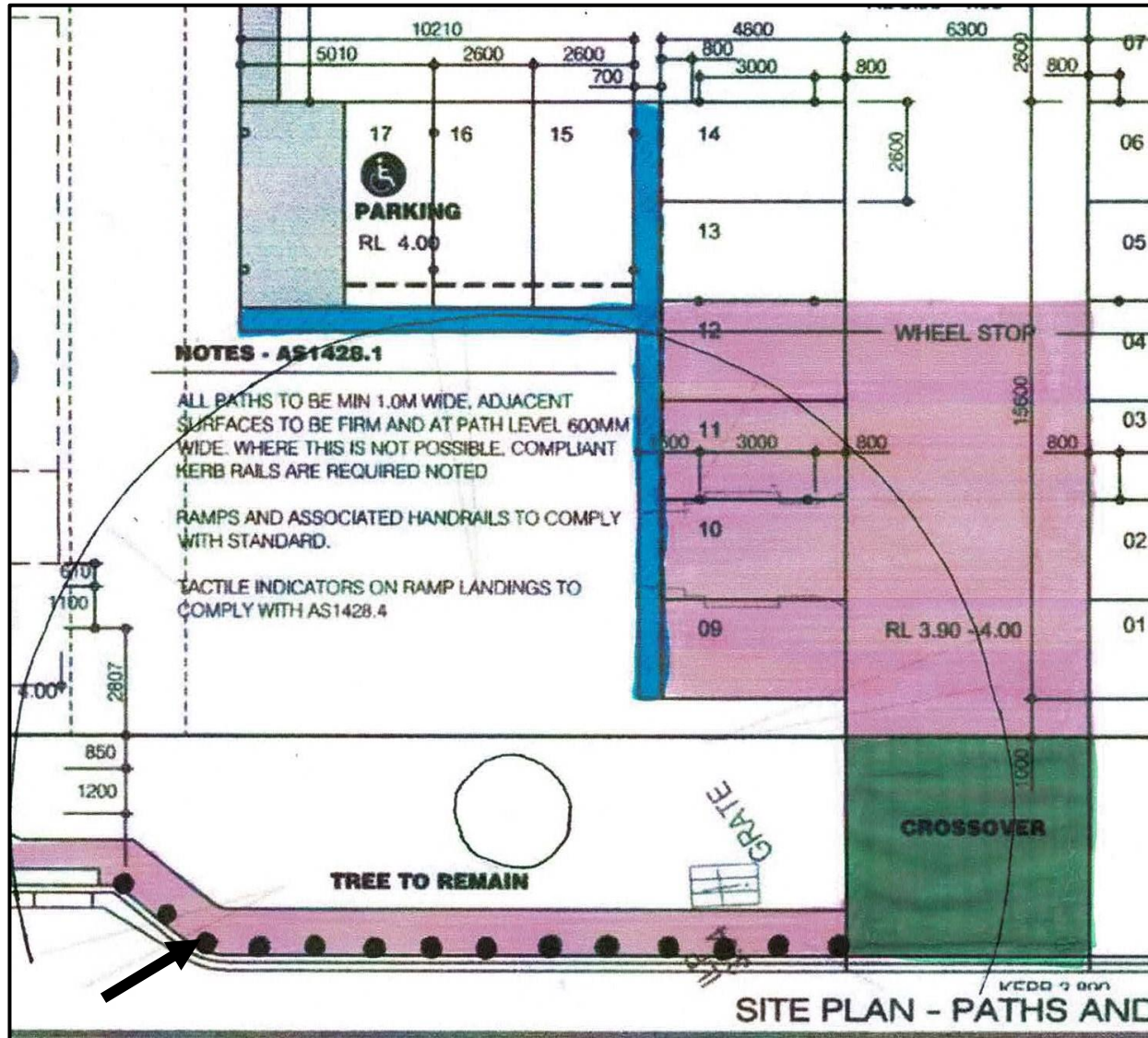


Figure 5: Specified turf or gravel cell (purple area), proposed bollard location (arrow pointing to black dots), proposed rock drain (blue) and proposed concrete crossover (green)

Appendix 6: Images



Figure 6: Image looking south showing the subject tree in relation to Station Street



Figure 7: A slightly sparse crown and mildly chlorotic leaves



Figure 8: Trunk, root flare and buttress in good condition



Figure 9: New foliage and branch extension



Figure 10: Apical branch death



Figure 11: Approximately 2m from edge of buttress to kerb. Highly compacted area



Figure 12: Self germinated trees in buttress area



Figure 13: Low branching habit

Appendix 7: Tree Protection Methods – Do’s and Don’ts



Image 1: Good – Fencing and mulch



Image 2: Poor effort



Image 3: Bad – Stockpiling in the TPZ



Image 4: Bad – Compaction due to no mulch or load sharing device over a high traffic area; with minimal tree protection



Image 5: Good signage



Image 6: Good – Load sharing device over mulch



Image 7: Bad – Torn roots as a result of trenching in TPZ



Image 8: Bad - Impact wound from machinery

Appendix 8: Tree Protection Plan (TPP)

Information indicated within is in accordance with guideline stated in *Australian Standard 4970-2009 Protection of Trees on Development Sites*, Section 4 and 5.

1.0 Pre-Construction

1.1 The engagement of a Project Arborist prior to the commencement of any work on-site will be required to write a report outlining tree protection measures and zones, and their installation in accordance with the current report.

1.2 The Project Arborist shall regularly inspect tree protection measure and maintenance activities, as per signed contract, to assess if compliance with the Arboriculture Report recommendations is being followed. Compliance documents shall be prepared for the consenting authority to view at their discretion and before Compliance Certificates are released.

1.3 The Project Arborist shall have a minimum Australian Qualification Framework (AQF) Level 5 in Arboriculture.

1.4 The Project Arborist should be on-site to supervise any works relevant to the approved Tree Protection Plan (TPP) and certify that works were completed.

1.5 Trees for removal or transplant should be marked on site as shown on the approved Tree Protection Plan (TPP). The Project Arborist should confirm, before removal, that all marked trees correspond with those on the plan.

1.6 Any tree removal proposed should occur prior to protection fencing being erected, with contractors inducted on tree protection and how to avoid any damage to retained trees, including the root zone.

1.7 Stumps to be removed will be done in a tree sensitive manner, which avoids unnecessary damaging or disturbance of roots of trees to be retained. Stump grinding would be the preferred method to an excavator.

1.8 Any pruning required should be undertaken at this stage, to guidelines stated in Australian Standard AS 4373 -2007, *Pruning of Amenity Trees*.

1.9 All protection measures, as detailed in Tree Protection Plan (TPP) should be in situ before demolition or construction commences (depending on if the former is required)

2.0 Tree Protection Plan

2.1 The specific requirements for Tree Protection Plan, including fencing, mulching, irrigation, and temporary access, if required, and any other specific tree protection methods should be confirmed in a meeting between the Project Manager and Project Arborist prior to the commencement of works.

2.2 The Tree Protection Plan must be available on-site prior to the commencement and during the construction of the proposed development where it is visible to all personnel.

2.3 All contractors and site workers will undertake an induction regarding the significance of trees to be retained, the Tree Protection Zone (TPZ), and activities excluded in the TPZ, and sign relevant paperwork confirming they understand the conditions prior to the commencement of working on-site.

3.0 Tree Protection Zone

Trees to be retained should be protected as per Tree Protection Plan, prior and during the construction from any activities that may be detrimental to their health and or structural condition. The area within the Tree Protection Zone (TPZ) shall exclude the following activities, and be stated on signage attached to TPZ fencing

- Existing soil levels modified
- Excavations and trenching
- Cultivation of the soil
- Mechanical removal of vegetation
- Soil disturbance
- Preparation of chemicals, including cement products
- Storage of materials, plant or equipment
- Erection of site sheds
- Affixing of signage or hoarding to the trees
- Preparation of building materials
- Wash down or cleaning of any equipment or tools
- Lighting fires
- Refuelling
- Movement of pedestrian or vehicular traffic
- Temporary or permanent location of services, or the works required for their installation
- Activities that may cause physical damage to the tree

Only with prior authorisation from the Project Arborist, that encroachment, access and incursion into the TPZ can occur.

4.0 Tree Protection Fencing

4.1 Tree Protection Fencing shall be installed at the perimeter of the TPZ as per TPP or deemed necessary by the Project Arborist. The optimal Tree Protection Fence shall consist of 1.8m high chain wire panels supported by concrete feet with supports every alternate fence panel or five (5) meters whichever comes first. The tree/s shall not be damaged during installation of tree protection fencing.

4.2 Where the TPZ occurs with adjacent properties, fencing will stop at the boundary; however, the existing boundary fences can be deemed part of the TPZ, if it is still in situ.

5.0 Signage

5.1 Signs identifying the TPZ should be attached to the outside of the fence, prior to the commencement of works on-site, at approximately 25-metre intervals, and be visible from within the development site. Australian Standard 1319 (1994) *Safety Signs for the Occupational Environment*, guidelines should be followed to provide clear and concise information. Signage shall be maintained in good condition for the duration of the development period. Appendix C in AS 4970-2009 provides an example.

5.2 The following phrase on a white background, with lettering 50mm in height, should state:

“TREE PROTECTION ZONE – KEEP OUT.”

On the same sign or a separate sign attached adjacent, the following phrase on a white background, with lettering 25mm in height stating:

“PROHIBITED ACTIVITIES”

Followed by the list below with lettering 15mm in height saying:

- Existing soil levels modified
- Excavations and trenching
- Cultivation of the soil
- Mechanical removal of vegetation
- Soil disturbance
- Preparation of chemicals, including cement products
- Storage of materials, plant or equipment
- Erection of site sheds
- Affixing of signage or hoarding to the trees
- Preparation of building materials
- Wash down or cleaning of any equipment or tools
- Lighting fires
- Refuelling
- Movement of pedestrian or vehicular traffic
- Temporary or permanent location of services, or the works required for their installation
- Activities that may cause physical damage to the tree

5.3 The Project Arborist name and contact details should be included on the bottom of the sign

6.0 Irrigation

Soil moisture shall be maintained throughout the development period. Testing by means of physical touch, by the Project Arborist at each inspection period will be required.

7.0 Mulching

Where deemed necessary by the Project Arborist, a layer of aged tree chip or a comparable alternative will be applied at a depth of 100 mm to the area inside of the TPZ.

8.0 Weed control

Weed control should be done by hand pulling or wiping or spraying with a glyphosate-based herbicide.

9.0 Pruning

9.1 Where deemed necessary by the Project Arborist pruning should be performed in accordance with AS 4373-2007 *Pruning of Amenity Trees*, by an AQF Level 3 Arborist or above, to specifications given by the Project Arborist.

9.2 The use of spurs is strictly prohibited on any trees to be retained.

10.0 Tree removal and Stump grinding

10.1 No tree shall be removed without prior inspection and marking by the Project Arborist.

10.2 Trees to be removed should be controlled felled or reduced in sections and lowered to avoid any damage to trees to be retained or surrounding infrastructure.

10.3 Any stumps to be removed in the area of a protected tree, shall be performed by stump grinding, to assist in reducing any detrimental effects to the retained tree.

11.0 Trunk and Branch Protection

11.1 Where deemed necessary by the Project Arborist, trunk and branch protection shall be installed as shown in AS4970-2009 Figure 4. The Project Arborist will specify materials and positioning of protection required.

11.2 Practices prohibited to the trunk and branches include:

- Temporary attachment of power lines
- Stay or guy ropes
- Driving nails or screws into live wood
- Anything that will harm the tree

12.0 Root protection and Pedestrian access

12.1 Where provision needs to be made for pedestrian access in the TPZ, the Project Arborist will specify tree protection measures such as mulch and a load sharing surface to be installed, to alleviate compaction in the root zone.

12.2 Where access is required for traffic heavier than 1 tonne, the ground surface shall be protected by a 100 mm deep mulch cover overlaid with a load sharing device, e.g. rumble boards or road plates, or methods specified by the Project Arborist.

13.0 Scaffolding

Where possible, scaffolding **shall not** be located within the TPZ, however, if required branch removal and pruning should be minimised by erecting scaffolding to avoid branches or tying them back temporarily. Where pruning is unavoidable, the Project Arborist must specify details in accordance with AS 4373-2007.

14.0 Construction stage

To ensure the protection of retained trees and that protection measures are being adhered to during pre-construction and construction, a predetermined number of site inspections and written reports should be agreed. Monitoring of details like tree condition, tree protection measures and the impact of site works would be observed.

14.0 Site establishment

The Project Arborist will monitor any impacts from demolition, earthworks, and installation of temporary infrastructure. The site office, stockpiles of materials, waste storage, temporary services or wash out bays shall not be located within the TPZ.

15.0 Works within the Tree Protection Zone

15.1 Works within the TPZ may be authorised by the consenting authority. These works should be overseen by the Project Arborist. When undertaking works within the TPZ, care should be taken to avoid damage to the tree's root system, trunks and lower branches.

15.2 Roots greater than 20 mm in diameter that is to be removed or severed, shall be cleanly cut and kept moist until hoarding is installed to stabilise the open cut. Backfilling with mulch and irrigation installed will assist in reducing any detrimental effects to the retained tree.

16.0 Underground services

Whenever possible, underground services shall not be located within the TPZ. If this cannot be alleviated, hand trenching or other tree sensitive methods shall be used to minimise damage to tree roots.

17.0 Inspection reports

A site log will be maintained and include the date of each inspection, the person who performed the inspection, features inspected or tested, maintenance or repairs required. The log must be signed at the end of each entry. The log must remain on-site at all time to be reviewed on request by any relevant parties.

18.0 Non-conformance Reports

A non-conformance report must be submitted to the Project Manager and relevant consent authority when issues arise, these would include but limited to:

- The removal or relocation closer to the protected tree of all or part of any protective fence
- Stipulated prohibited activities performed contrary to sign
- Inadequate soil moisture maintained
- Mechanical damage to the protected tree
- Indications of the sudden decline of the tree.

Appendix 9: About the Author

Catherine Russo

Consulting Arborist, Consulting Horticulturist

Catherine Russo is a qualified arborist and horticulturist with 30 years' experience in the parks and garden industry.

- Consultancy
- Garden design
- Planning and implementation
- Contract garden planting and maintenance
- Management, purchasing, stock control and customer service in the retail nursery sector

Current qualifications attained in the arboriculture and horticulture sectors include:

- International Society of Arboriculture (ISA) Tree Risk Assessment Qualified (TRAQ) - 2019
- AQF Level 4 in Training and Assessment – 2014 and 2019.
- AQF Level 3 in Chemical Accreditation Program- SMART train - 2018
- CPR - 2018
- Quantitative Tree Risk Assessment (QTRA)-#3917 – 2017
- Apply First Aid - 2017
- AQF Level 5 in Horticulture– Diploma of Horticulture – 2015
- AQF Level 5 in Arboriculture – Diploma of Arboriculture – 2014
- Working with Children - 2014
- AQF Level 4 in Horticulture (Arboriculture) – 2012
- AQF Level 2 in Arboriculture – 2012
- AQF Level 2 in Chainsaw operations - 2012
- AQF Level 1 in Chainsaw operations– 2011
- WorkCover-NSW OHS Construction Induction - 2011
- AQF Level 3 in Horticulture – 2011

Catherine is the principal of her garden design and maintenance business that has been operating for 30 years with clientele in the residential, commercial and industrial sectors. In 2014 she renamed her business to SHEgreen – Arboriculture and Horticulture after successfully achieved the AQF Level 5 in Arboriculture, qualifying her as a Consulting Arborist.

Current memberships to professional industry associations include:

- Arboriculture Australia Limited™ - General Member - member number 2462
- International Society of Arboriculture – Professional Member – member number 230523
- Queensland Arboriculture Association (QAA) - member number 01450

Operational and technical currency is maintained with regular attendance at trade conferences and training updates with short courses, i.e. arboriculture and horticulture. A consultancy and contract service across arboriculture and horticulture has created ongoing exposure to management, operational and technical issues within these industry sectors

Appendix 10: References

Breloer, H., and Mattheck, C., 1994, Field Guide for Visual Tree Assessment (VTA), Arboriculture Journal, Vol 18, pp1-23, AB Academic Publications, Great Britain

ProofDocs, 2019, www.proofdocs.com

Standards Australia, Australian Standard 4373-2007 *Pruning of Amenity Trees* (AS 4373-2007)

Standards Australia, Australian Standard 4970-2009 *Protection of Trees on Development Sites* (AS 4970-2009)

Appendix 11: Disclaimer

Obtaining information from reliable sources has been undertaken with care. All data has been verified as far as possible; consequently, the author cannot guarantee or be responsible for the accuracy of information provided by others.

All information contained in this document covers and reflects the health, condition, and details of the trees assessed at the time of inspection. Photographs, diagrams and the like contained within this report are intended as visual aids only; the author acknowledges that they may not be to scale.

There are no guarantees express or implied that unforeseen problems may in the future occur to a seemingly healthy tree. Anticipating conditions, structural failures or detecting defects of a dynamic structure, like a tree, is not absolute. It is advised, when living with trees, all persons should be clear of a treed area when inclement or severe weather events are predicted or occurring as it may then constitute a high risk.

It is a company policy that no person involved, owner, employee or other, will say a tree is safe, as there are too many parameters to encompass. Trees have a degree of risk as do most things in life; the degree of risk that is accepted is an individual's or business's choice.