

John Atkins  
Consulting Arborist  
11 Blandford St  
Fennell Bay NSW 2283  
PH: 02 4950 5353  
MOB: 0407 019 076  
[treeology@westnet.com.au](mailto:treeology@westnet.com.au)  
ABN 7610 7678 704

# **Arboricultural Impact Report**

**Site:**  
**Stockland Glendale**

**Prepared for:**

**Sym.studio**

**Prepared By**

**John Atkins**

**Ref No: 04 - 1113**

**Date: 20<sup>th</sup> March 2015**

# Contents

1. Summary .....	3
2. Introduction .....	4
2.1. Disclaimer.....	4
2.2. Brief .....	4
2.3. Methodology.....	5
3. . Site Details.....	6
3.1. Site location general.....	6
4. Impact of Proposed Development .....	8
4.1. Zone 1 impact assessment .....	8
Right angled parking spaces .....	8
Parallel parking spaces.....	8
4.2. Zone 2 impact assessment .....	11
4.3. Zone 3 impact assessment .....	15
4.4. Remainder of the site .....	19
5. Recommendations .....	20
References .....	21
Appendix 1 Structural Root Zone and Tree Protection	
Zone Dimensions and details.....	22
Structural root zone (SRZ).....	22
Tree Protection Zone (TPZ) Calculations .....	23

# 1. Summary

The proposed re-development of Stockland Glendale has been evaluated in this report. In particular the areas on the southern and south-western sides of the site have been assessed. The remainder of the site has been very broadly assessed.

Currently the zones about the southern and south-western boundaries have many trees planted as part of the initial landscape works. These trees are situated on either sloping terrain or garden spaces retained by retaining walls. The proposed development includes excavation for retaining walls and car parking spaces.

In this report, the general layout of the development plans has been provided and assessed. The plans provided only indicated new car parking spaces and wall locations, and the likely removal of some trees was indicated. It was found in a more detailed examination that tree removal will be required to an extent more than indicated on the plans.

However the plans provided are only at concept stage. The details of earthworks, retaining wall construction, drainage modifications and surface sealing were not assessed. Overall tree removals are difficult to accurately determine. This report indicates the likely extent of trees to be removed in images.

Recommendations at the end of the report have been developed and will require detailed assessment of individual trees once the extent of earthworks is detailed and set out.

The impact of all aspects of development was found to have no impact on trees outside the property boundaries, especially within 3 metres of the boundary. The extent of tree removal may reduce visual amenity of some adjacent properties in adjoining streets, but no other impact was identified.

Tree protection measures will be determined at this same stage. The individual structural root zones and tree protection measures shall be determined based on Australian Standard 4970- 2009 Protection of Trees on Development Sites.

The recommendations include the appointment of a Project Arborist to work with the Project Management in determining accurately trees to be retained or removed, tree protection zones and methods, methods of removal of branches, trunks and stumps, and processing of tree waste through recycling machinery.

## 2. Introduction

### 2.1. Disclaimer

This report has been prepared for the exclusive use of the client and Treeology Pty Ltd accepts no responsibility for its use by other persons. The client acknowledges that this report, and any opinions, advice or recommendations expressed or given in it, are based on the information supplied by the client and on the data obtained by inspections, measurements and analysis carried out or obtained by Treeology Pty Ltd. This report does not identify all structural defects of trees inspected and no responsibility is accepted for faults not identified or predicted.

It is not possible to accurately identify all structural defects at high levels in trees or internal structural faults that cannot be seen by the naked eye. Due to the nature of tree growth, the location of roots is unpredictable. The accurate detection of all structural defects in trees and their root systems is difficult to predict. Conditions such as extreme wind, storm activity, lightning and other events are unpredictable. Unforeseeable damage to trees may occur due to these unpredictable events.

The client should rely on the contents of this report, only to the extent that some structural faults have been observed, but not all. No responsibility for damage to persons or property is accepted for damage by trees referred to in this report due to unforeseen or extreme environmental events.

### 2.2. Brief

The purpose of this report is to assess the condition of all trees present on site and provide advice on the impact of the proposed development of the Stockland shopping centre. Lake Macquarie City Council has specifically what is to be addressed in previous communication, as provided by Conrad Grayson of Sym.studio

*The arborist report addressed all trees within the extent of the main car park area. It is noted however that the report did not address the proposed reconfiguration and increase of parking to the south and south western boundaries.*

*These additional parking results in cut or excavation into existing batters and retaining wall fill zones which impacts greatly on existing trees that form a buffer from the railway track and adjoining residential areas to the development site. The arborist report does not address these impacts as well as impacts to trees on adjoining lots.*

*Therefore it is required that an arboriculture impact report be provided and that the consultant arborist be provided with the Civil 'Northrop Plans' and landscape plans. The report should also address any vegetation that is within 3.0m of the subject site boundary.*

## 2.3. Methodology

Treeology has performed an on-site inspection on 20th March 2015 and previously on November 2013. The previous site visit detailed the condition of most trees prior to design work. This assessment used a less detailed method of assessment, considering broad impacts of the proposed development. The proposed development includes modifications that have only basic details of parking spaces and designs. To provide a detailed impact assessment is difficult without detailed engineering and architectural drawings.

### 3. . Site Details

#### 3.1. Site location general

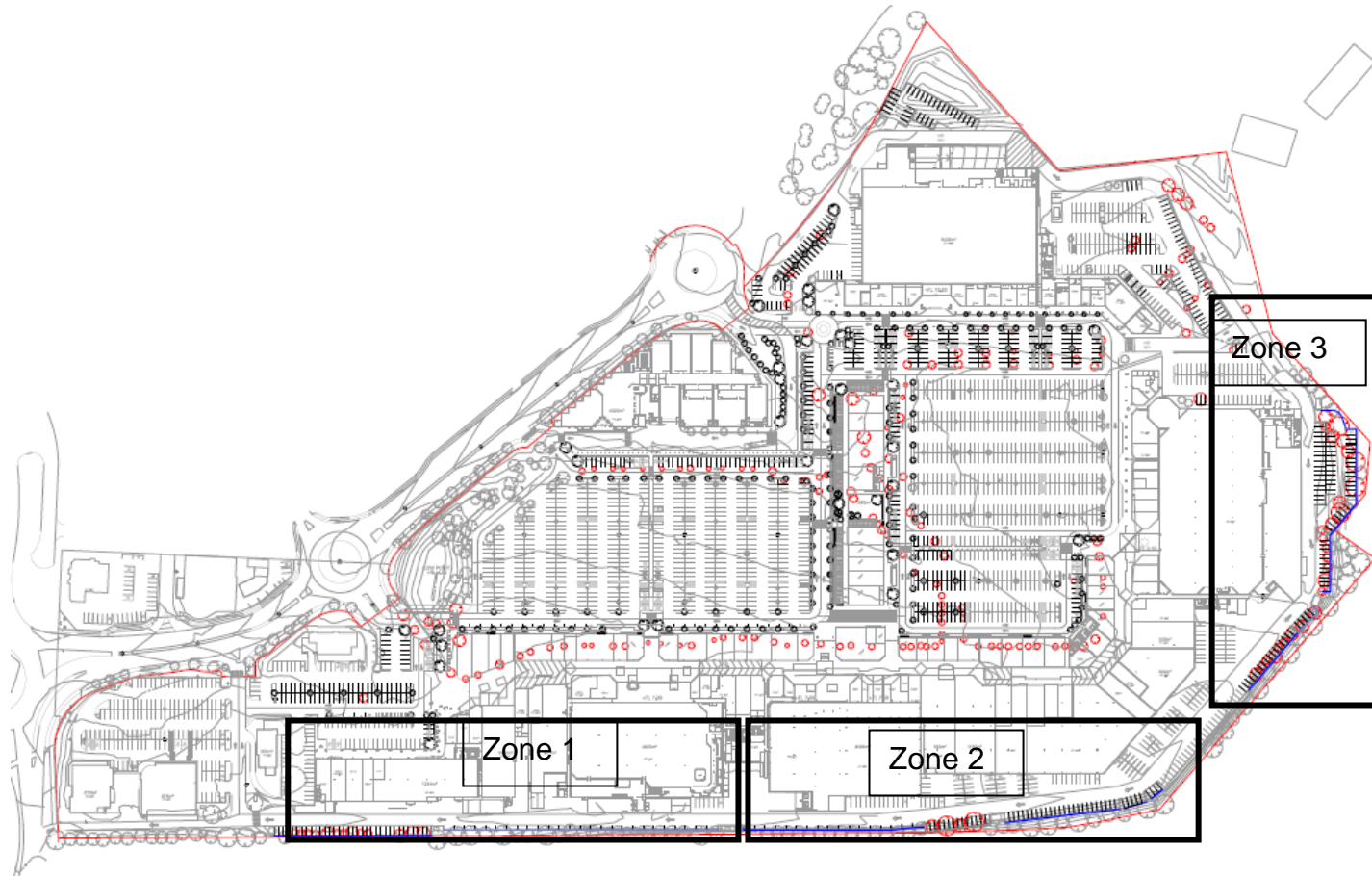


Figure 1 shows the overall Stockland site as supplied by Sym.studio

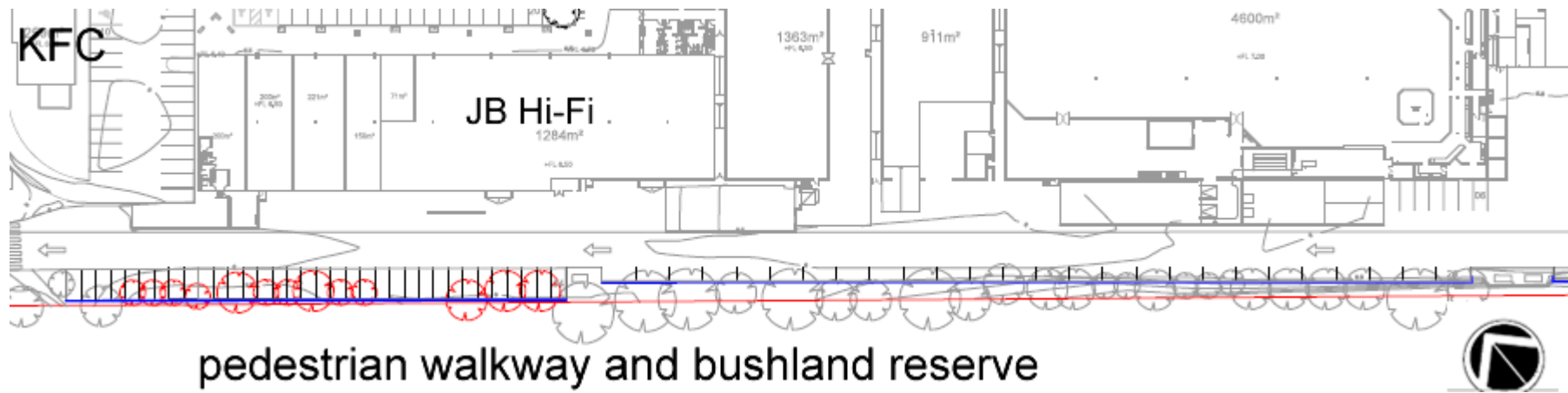


Figure 2 shows an expanded version of Zone 1 of the site.

## 4. Impact of Proposed Development

### 4.1. Zone 1 impact assessment

Zone 1 consists of semi-mature trees planted as part of original landscape works in the later part of the 1990's. The trees are between 15 – 20 years old. They consist of a range of species including Spotted Gums (*Corymbia maculata*), Grey Ironbark (*Eucalyptus paniculata*) and Grey Gum (*Eucalyptus punctata*). Most trees range in trunk diameter at breast height (DBH) from 300 – 450 mm. Most trees range in height from 15 – 24 metres.

The trees are protected on the south western side from strong winds by an area of remnant bushland about a natural drainage line. The full exposure to sunlight on the northern side has resulted in most trees developing a phototropic growth pattern with an asymmetric canopy on the northern side.

The trees were planted closely together as part of the original landscape work. They have been previously pruned to lift the canopy, presumably to reduce the likelihood of branches brushing or striking large trucks. The concern is that these trees have a poor height to diameter ratio. A desirable ratio is where the DBH is more than  $1/50^{\text{th}}$  of the height of the tree. A tree that is 20 metres tall would have a desirable trunk diameter of  $20 \div 50 = 0.4$  m. In some cases the height of the tree was 24 metres and the DBH was only 0.35 m. The ratio is 68:1, greater than 50:1. This situation is typical of forest trees that grow in close proximity to each other. When single trees are isolated, the trees have a greater likelihood of trunk failure.

#### Right angled parking spaces

The trees are growing at a distance set back from the edge of the kerb and the proposed development includes 36 parking spaces as right angle parking. These parking spaces will require the removal of all trees in the zone where the right angled parking spaces are planned. It is not suitable to attempt to retain trees except where they are well back from the edge of the parking zone, the height:DBH ratio is suitable and the DBH is small generally.

#### Parallel parking spaces

The zone where parallel parking is proposed is likely to have a lesser impact on existing trees but will require some removal. The existing trees are planted slightly closer to the zone of proposed work as the boundary to road distance is narrower. The trees are generally Swamp Oak (*Casuarina glauca*) and Grey Gum (*Eucalyptus punctata*). The trunk diameters are smaller generally and tree height is well proportioned. However the construction work is likely to require a low retaining wall and excavation close to existing trees. There is likely to be encroachment within the Structural Root Zones (SRZ) of trees (see Appendix 1 for more details of SRZ distances and explanation). A more detailed assessment is required once more detailed engineering plans are available. At this stage it is envisaged that many of the trees in zone 1 to the south of an electrical kiosk, set aside for parallel parking will have to be



removed because of root severance. See figure 7 below for a view of this section.



*Figure 3 shows the trees in Zone 1 where right angled parking spaces are proposed. These trees are to be removed.*





*Figure 4 shows a clearer view of the impact of the proposed development with right angled parking spaces. The close proximity of construction work will sever roots well within the Structural Root Zone of the trees. They are proposed for removal.*



*Figure 5 shows the view looking approximately north-west in Zone 1. The section where parallel parking is proposed is indicated and probably a retaining wall will be required.*

## 4.2. Zone 2 impact assessment

The trees in Zone 2 are situated above a higher concrete crib retaining wall in the north western end. The tree species in this area include Tallowwoods (*Eucalyptus microcorys*), Swamp mahoganies (*Eucalyptus robusta*) and Grey Gums (*Eucalyptus punctata*).

Trees at the southern end of Zone 2 are situated on a sloping section of ground with no retaining wall. These trees are mostly Spotted Gum (*Corymbia maculata*), Paperbarks (*Melaleuca quinquenervia*) and Wattles (*Acacia falcata*).

The trees above the retaining wall are largely unaffected by the proposed development as they parallel parking spaces will be located below the retaining wall. Four trees in close proximity to a large electrical kiosk are proposed to be removed. These trees currently provide some visual screening to an adjacent residence. The removal of these trees will possibly impact on the visual amenity from the neighbouring residence (1 Montgomery St).

The southern sloping section of zone 2 is shown as an area of right angled parking. Because of the steep slope of the site currently, it is assumed that a substantial retaining wall will be required. The extent of construction will include excavation into the current slope for the erection of such a wall. Trees present are likely to be impacted by the proposed retaining walls and have not been identified as requiring removal.

It is estimated that the extent of earthworks will include the car parking space length (5.5 metres) plus excavation for the retaining wall (2 – 2.5 metres). The overall extent of excavation will be 7.5 – 8.0 metres from the edge of the current roadway. Encroachment within the SRZ distances for many trees at the top of the current batter is highly likely. As this process will effectively make many trees less stable, further tree removal is likely to occur.



Figure 6 shows an expanded version of Zone 2





Figure 7 shows the section of Zone 2 where it is proposed 4 trees are to be removed to allow for parallel parking spaces below the wall.

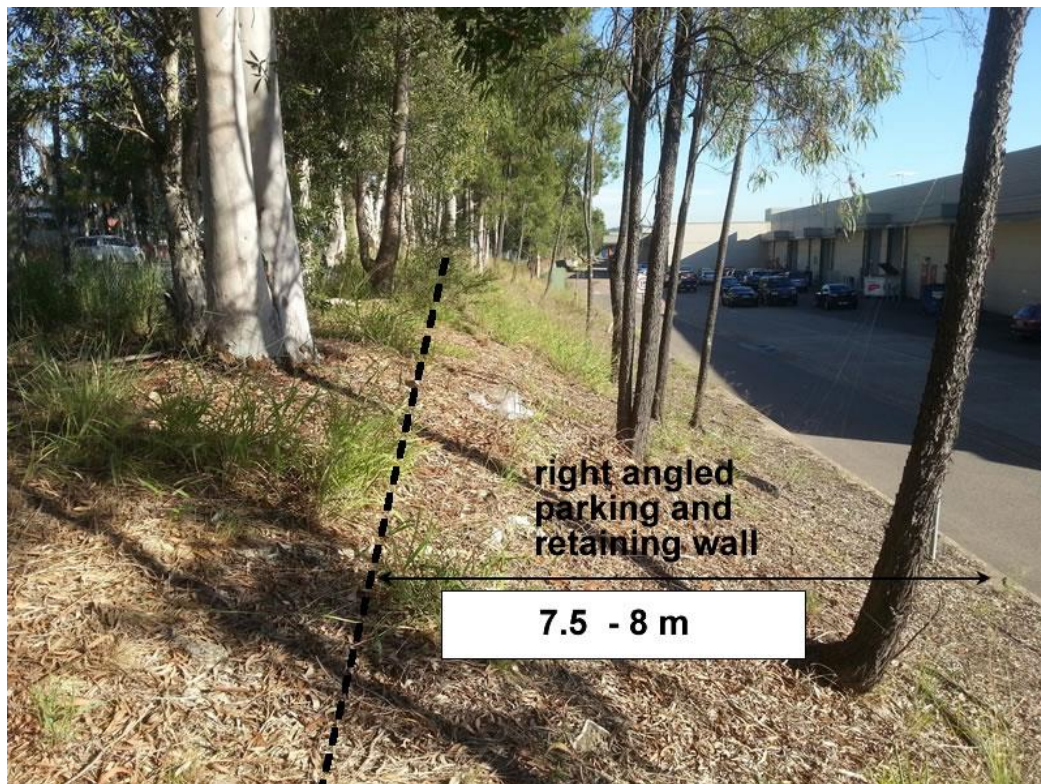


Figure 8 shows the zone where right angled parking is proposed. The trees on the left at the top of the slope may have excavation too close and the structural root zone is encroached.





*Figure 9 shows the same situation as in Figure 9 above but facing the opposite direction. The excavation required for retaining walls will encroach within the Structural Root Zones of trees at the top of the slope and additional tree removal is likely.*

#### 4.3. Zone 3 impact assessment

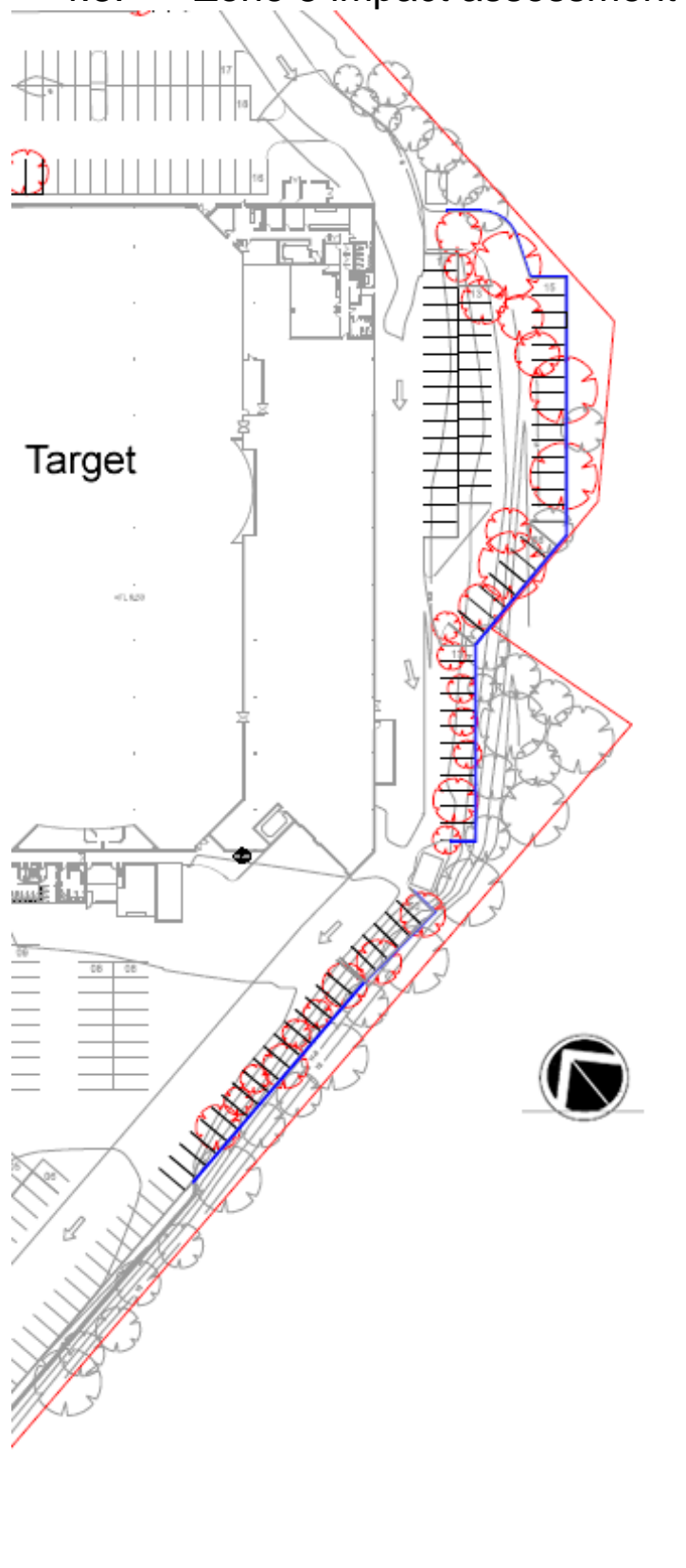


Figure 10 shows the zone 3 area. Red trees indicate trees to be removed.

Zone 3 includes the area of trees at the southern end of the site, adjacent to the common boundary with the rail corridor. Currently much of this zone is being used as a stockpile area for overburden from stormwater upgrading and other earthworks.

It is proposed to remove the current stockpiles and extend car parking spaces into these areas. Trees on the perimeter to the south of the stockpile areas are likely to be removed as indicated in Figure 10 above.

The extent of tree removal as shown in Figure 10 above is purely indicative as there are many more trees present.

There are more trees likely to be removed than shown on the plans and the following images reflect these removals.



*Figure 11 shows the edge of Zone 3 on the western side. The white dashed line indicates the likely position of the retaining wall and car park zones.*





Figure 12 shows a continuation of the view shown in Figure 11 with the extent of the proposed car parking spaces indicated by the white dashed line.



Figure 13 shows the zone on the southern side of the Target building. The extent of earthworks and car spaces is indicated.





Figure 14 shows the extent of works and the likely zone of tree removal adjoining the area depicted in Figure 13.



Figure 15 shows the area currently used as a stockpile zone. The proposed car parking spaces are mostly located in the same area.

#### 4.4. Remainder of the site

The remainder of the site is subject to significant changes. There will be the construction of a number of new commercial buildings in the centre of the site. Much of the current circulating road will be modified and additional commercial buildings constructed in the same position. New car parking patterns and roads will be built. Existing trees within these areas are likely to be removed and replaced or transplanted.

The overall changes may result in considerable improvement as many of the initial tree plantings have fared poorly. The planting method, the amount of root space allocated and the nutrient value of the planted zones is poor. Better tree planting vaults may be used, replacing or modifying the current planting points.

The plans provided only gave basic details, indicating tree removals and new tree plantings as well as trees that are to be retained. Evaluation of the changes is basic as final planting details of species, sub-surface planting vaults and other details have yet to be developed. In summary, the impact would best be described as balanced. Tree removal for buildings, car parking and roads are off-set by proposed new plantings.

## 5. Recommendations

- 5.1. Further design detail is necessary to understand the extent of tree removal. Once completed engineering drawings are available showing retaining walls and car park dimensions individual trees can be evaluated for the impact.
- 5.2. It is recommended that the extent of earthworks is pegged out prior to the detailed assessment. The extent of cut will need to be clearly indicated in the field and final determination of individual tree removal or retention can be determined.
- 5.3. The overall impact of the proposal removes trees along the southern and south western sections of the site. There is no indication of possible replacement plantings for the remaining garden spaces. The visual impact of tree loss may affect more than one residence in Brandon and Montgomery Streets, and replacement plantings will reduce the impact.
- 5.4. Once detailed plans are available, the site work should include regular consultation with a project arborist. It is recommended that a Project Arborist (PA) be engaged to oversee the earthworks and construction.
- 5.5. The PA shall assess and indicate all trees to be removed and those to be retained. This process shall be undertaken in consultation with the Project Manager. The PA shall determine the SRZ distances and Tree protection zones for all retained trees.
- 5.6. The PA shall provide a specification for the protection of retained trees during construction, and will oversee the placement of barriers or fencing of the Tree Protection Zones (TPZ's). All determinations of SRZ and TPZ's shall be in accordance with) *AS4970-2009: Protection of Trees on Development Sites*.
- 5.7. The PA shall consult with the Project manager on the best method and sequence for tree removal. The use of excavation machinery for tree removal may cause damage to other trees and affect stability of trees to be retained. The positioning and method of tree removal will need to be determined at an early stage of earthworks set up.
- 5.8. The PA shall advise the Project Manager on the method of recycling or disposing of tree waste from trunks and branches. In such a busy site, the use of large recycling machinery may be difficult. Wood chippers or tub-grinders generate considerable noise, require safe working zones and will most likely involve loaders to transport heavier trunk sections. Recycled wood chip may be used as part of landscape works.
- 5.9. The removal and disposal of stumps is a separate process and may require input from the PA. The recycling of stumps is likely best performed at a vegetation recycling centre off-site as this involves larger and more dangerous machinery.
- 5.10. When final details of replacement planting works are determined, the PA may advise on the method of tree vault construction, particularly soil qualities. The current poor tree pits and isolated trees throughout the site can be vastly improved through better tree vault construction.

This report has been prepared by John Atkins on 20<sup>th</sup> March 2015.



Contact details	Qualifications
<p>11 Blandford St Fennell Bay NSW 2283 Ph: 02 4950 5353 Mob: 0407 019 076</p> <p>treeology@westnet.com.au</p>	<ol style="list-style-type: none"> <li>1. Cert. Horticulture (1987)</li> <li>2. Cert. Tree Surgery (1987)</li> <li>3. Assoc. Diploma of Applied Science (Landscape) 1994</li> <li>4. Diploma of Arboriculture (2014)</li> <li>5. Tree Risk Assessment Qualified assessor (2015)</li> </ol>

## References

- Lake Macquarie City Council DCP Guidelines section 2.1
- Mattheck, K and Breloer, H. (1994) "*The Body Language of Trees – A handbook for failure analysis*" TSO London
- Standards Australia (2009) *AS4970: Protection of Trees on Development Sites*, Standards Australia, Sydney.

# Appendix 1 Structural Root Zone and Tree Protection Zone Dimensions and details

## Structural root zone (SRZ)

The SRZ is the area required for tree stability. A larger area is required to maintain a viable tree.

The SRZ only needs to be calculated when major encroachment into a TPZ is proposed.

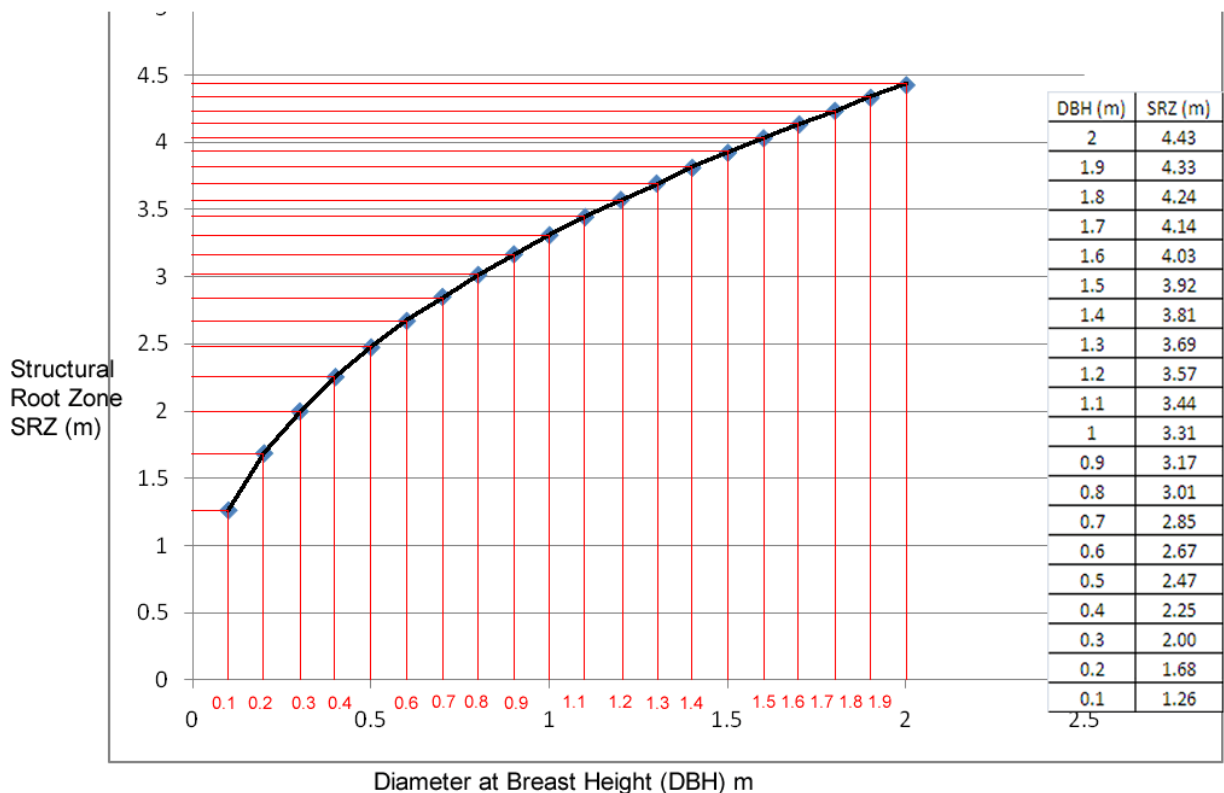
There are many factors that affect the size of the SRZ (e.g. tree height, crown area, soil type, soil moisture). The SRZ may also be influenced by natural or built structures, such as rocks and footings. An indicative SRZ radius can be determined from the trunk diameter measured immediately above the root buttress using the following formula or Figure 1. Root investigation may provide more information on the extent of these roots.

$$\text{SRZ radius} = (\text{DBH} \times 50)^{0.42} \times 0.64$$

where

DBH = trunk diameter at breast height in m, measured above the root buttress

NOTE: The SRZ for trees with trunk diameters less than 0.15 m will be 1.5 m (see graph below).



## Tree Protection Zone (TPZ) Calculations

Australian Standard 4970 – 2009 Protection of Trees During Construction states that the method of calculating the ideal TPZ is as follows:

$$\text{TPZ radial distance (m)} = \text{DBH (m)} \times 12$$

It is also noted that the TPZ can be encroached by 10 – 20% where the remainder of the TPZ remains undisturbed due to site restrictions. This formula has been applied as a guideline.

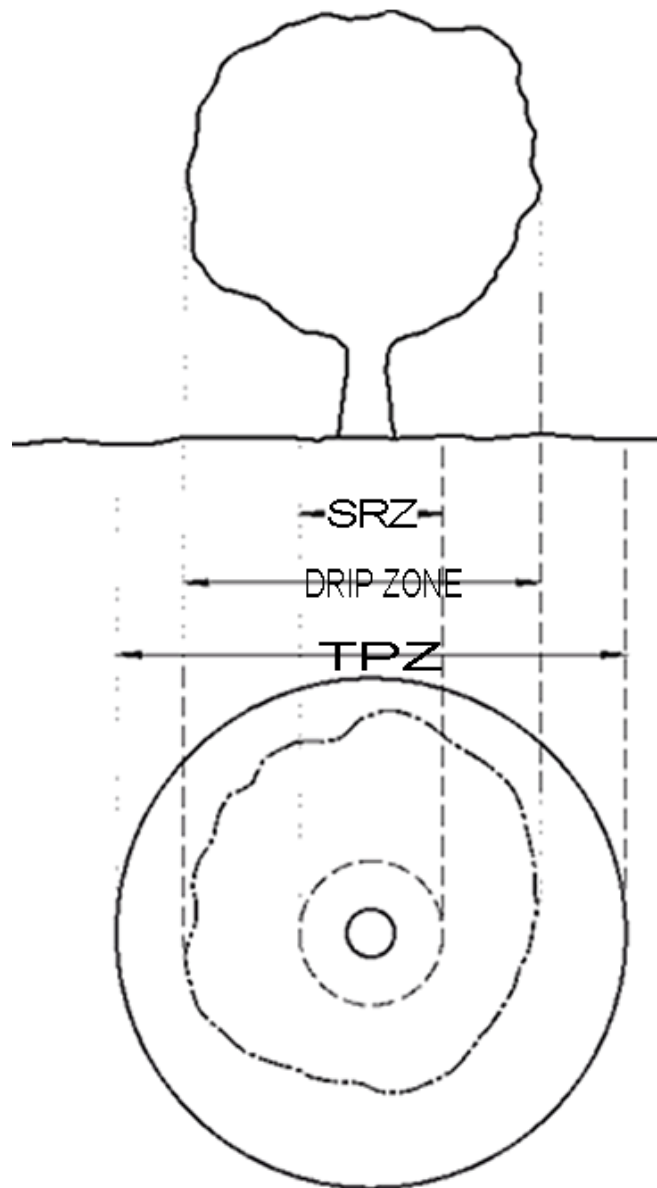


Figure 16 shows a sketch of the different dimensions related to tree preservation, SRZ, TPZ and Drip zone (the area directly under the canopy).