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# ARBORICULTURAL IMPACT ASSESSMENT REPORT

# CATHRINE McAULEY CATHOLIC COLLEGE

# 507 MEDOWIE ROAD

Prepared for

## CATHOLIC SCHOOLS OFFICE MAITLAND-NEWCASTLE

## 05th DECEMBER 2017

**By**
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# 1. EXECUTIVE SUMMARY

This report has been commissioned at the request of the Catholic Schools Office – Diocese of Maitland-Newcastle. It has been requested that an assessment be carried out on all trees within the subject area proposed for development as part of their development application.

It is proposed to demolish the existing dwelling and other associated structures and re-develop the site to include a seven stream secondary school, a three stream primary school and a place of worship.

The purpose of the report is to assess the impacts the proposed development will have on all trees within the proposed subject site.

**Based on the Site Plans:**

- **Tree Nos. 6, 9, 10, 11, 12, 19, 21, 22, 23, 24, 25, 26, 29, 30, 31, 32, 34, 35, 37, 38, 39, 40, 47, 65, 66, 69, 81, 84, 85, 89** are within the development footprint and as such their removal would be necessary to facilitate the development as proposed.

  The majority of trees general display good/fair overall condition however due to either their poor structure or habit and form Tree 6, 11, 29, 30, 32, 39, 40, 89 and not considered suitable for retention as remedial action is not likely to be beneficial in relation to satisfactorily reducing the risk to an acceptable level within a school environment or in improving their condition.

- Construction of driveways, footpaths and buildings as well as bulk earthworks and excavation for installation of utility services and other infrastructures services will encroach well into the calculated TPZ's of **Tree Nos. 20, 28, 42, 58, 59, 60, 61, 62, 63, 64, 67, 68** and will also extend into the calculated SRZ's.

  Due to the close proximity of construction and extent of encroachment into their TPZ's / SRZ's and canopy spread it is likely that the trees will be adversely impacted upon by the development that m be detrimental to both stability and their overall condition.

  Due to its poor structural condition Tree No. 28 is not considered suitable for retention. Remedial action is not likely to be beneficial in relation to satisfactorily reducing the risk to an acceptable level within a school environment or in improving their condition.

- **Tree Nos. 48, 90, 91, 92, 93** are located on the nature strip along the front eastern boundary and within close proximity to high voltage overhead powerlines and although they may not be significantly impacted upon by the proposed development due to their close proximity to high voltage powerlines are not considered suitable to position for long term retention.

  Whilst they still relatively small and are not in conflict with powerlines it is likely that as they begin to fully mature and increase in height they will eventually need to be pruned to maintain clearance.

- Tree No. 45 has had numerous failure of medium size branches including a large scaffold to west indicated by remaining stem stubs. The tree has a history of failure it is likely that branch failure will occur again. As remedial action is not considered beneficial in relation to satisfactorily reducing the risk to an acceptable level it is not considered suitable for retention particularly if the area is expected to be frequently used by students

- Tree No. 57 has lean of approximately 15 degree to west and the crown has been excessively raised. Due to its degree of lean combined with its relatively poor habit and form the tree is not considered suitable for retention particularly if area is expected to be frequently used by students

- Although construction is expected within the TPZ's of **Tree Nos. 8, 27, 33, 36, 41, 78, 82** encroachment is expected to be less than 10 % of the total TPZ, outside of their SRZ's and can be compensated for elsewhere and contiguous with the TPZ's.

  It is considered that provided encroachment including any other infrastructure works such as retaining walls and underground services does not exceed more than 10% and existing ground levels within the remaining TPZ remains unchanged that combined with careful excavation procedures and the implementation of Tree Protection Measures where construction activity is expected within the TPZ the tree will be provided with the best possible means to survive the impacts of construction and be retained in their current condition

- Development is not expected to encroach within the TPZ's of Tree Nos. **1, 2, 3, 4, 5, 7, 13, 14, 15, 16, 17, 18, 43, 44, 46, 54, 55, 56, 70, 71, 72, 73, 74, 75, 76, 77, 83, 86, 87, 88, 94, 95, 96.**

  It is considered that provided encroachment including any other infrastructure works such as retaining walls, bulk earthworks and underground services does not exceed more than 10% and existing ground levels within the TPZ's remains unchanged that combined with the implementation of tree protection measures they should not be impacted upon by the proposed development and can be retained

With the implementation of Tree Protection Measure in conjunction with the Tree Protection Zone Specification, to provide the developers with a guide during the development of this site can be protected whilst construction is undertaken, the trees identified for retention will be provided with the best possible means to survive/ tolerate the impacts associated with construction and should not be significantly impacted upon by the proposed development

## 2. INTRODUCTION

This report has been commissioned at the request of the Catholic Schools Office – Diocese of Maitland-Newcastle.

The owners of the property have requested that an assessment be carried out on all trees within the area proposed for development as part of their development application.

It is proposed to demolish the existing dwelling and other associated structures and re-develop the site to include a seven stream secondary school, a three stream primary school and a place of worship.

The purpose of the report is to assess the impacts the proposed development will have on all trees within the proposed subject site.

Assessment will take into consideration the health and structural integrity of the trees and impacts of construction on the condition of the trees.

Whilst comment is given regarding tree conditions this evaluation is not intended for use for any other purposed other than that proposed. Assessments and recommendations are not provided for in this evaluation in regards to the management of these trees in relation to their existing health and vitality or structural condition.

Native habitat or ecological significance of trees are not addressed in this report. An environmental report has been prepared as part of the development application and should be referred to in matter relating to habitat or ecological significance of trees

Assessment and outcomes of this report will be based on the Concept Design Site Plan by CKDS Architecture Project No. 1727 Drawing No. SK-005 Issue E

The report will contain the following information:

- Tree Assessment
- Impacts of development
- Tree Protection Plan
- Recommendations

The report should be read and considered in its entirety.

## 3. SITE LOCATION & DESCRIPTION

**Site Address:** 507 Medowie Road Medowie

The subject site is rural type property with a predominately easterly aspect on slightly undulating land that gradually rises from the south for approximately two thirds of the site before gradually sloping down to the north. A small creek line runs across the bottom southern boundary line

An existing residential dwelling and large rural type shed is located approximately halfway along the site towards the eastern side boundary. A bitumen ‘racing track’ has been established in the middle western part side of the site.

In general the development site is relatively open and mostly covered by grasses and weeds. Groups of trees are generally located in clusters mostly along the southern, western and northern parts of the site whilst some other trees are located in various other isolated positions.

The subject site is bordered by bushland forest to the south and west residential neighbouring properties to the north and by road side frontage to the east.
(Appendix 3 - Assessment Site Aerial view).

## 4. METHODOLOGY

A visual tree assessment was made on the 11th & 12nd of December to evaluate the health and condition of these trees in relation to the impacts of the proposed development.

Assessment of trees was undertaken by means of a Visual Tree Inspection (VTA) in conjunction with Level 2 – Basic Tree Assessment as described in the International Society of Arboriculture (ISA) Tree Risk Assessment Manual and conducted from the ground only.

A level 2 Basic Assessment consists of a detailed visual inspection of a tree and its surrounding site. It involves a complete walk around the tree looking at the site, buttress roots, trunk and branches. The tree is also looked at from a distance and close up to consider crown shape and surroundings. The use of simple tools to acquire more information about the tree or any potential defects may be used but is not mandatory

Where a level 2 assessment is inconclusive the technique best suited for diagnostic testing as outlined in Level 3 Advanced Techniques of the ISA Best Management Practices trees has been recommended in determining the condition of trees so that the appropriate remedial action can be taken.

Level 3 Advanced Assessment are preformed to provide additional detailed information about specific tree parts, defects, targets or site conditions. Specialized equipment, data collection and analysis and/ or expertise are usually required for advanced assessments

Tapping with a rubber mallet (within reach) was undertaken to assist in determining the possible extent of decay or cavity within the trunk of a tree where considered appropriate. However tapping is only a preliminary investigation and more thorough investigative methods would be required in determining the extent of decay in relation to wood strength and failure potential.

Trunk diameters were measured using a diameter tape and canopy spreads were estimated

In general tree heights were estimated however some taller trees were measures using a Haglof EC11 height measuring device to obtain their height and also used as a guide in estimating heights of the others

Binoculars were used to assist in inspecting for defects within the upper canopy

Photographs were taken using a digital camera; no enhancements were made to any photographs used in this report.

Assessment of all trees did not include soil testing, root inspection, aerial inspection or any other investigative inspection methods.

## 5. SULE – Safe Useful Life Expectancy

The SULE method (developed by Jeremy Barrell) of assessment involves classifying trees, after an inspection, into one of five categories that will give an indication of its safe useful life expectancy. The value system is a planning tool only and should be taken in context with other attributes, characteristics or site conditions. These values would change as a result of the proposed development.

SULE takes into consideration the species, age, location, health and condition in trying to determine the possible outcomes and future potential of a tree (Appendix 1).

## 6. LIMITATIONS

Tree health and environmental conditions can change at any time due to unforeseen circumstances and as such the contents contained in this assessment refer to the tree's condition on the day of inspection only.

Assessment of the tree was by visual inspection from the ground only and as such not all faults may have been detected or extent of defects able to be fully determined. In such cases further more advanced assessment techniques such as aerial inspections for evaluation of structural defects in trunks and branches, decay testing to determining the amount of sound and root inspections would need to be undertaken in further determining the structural integrity of the trees.

A visual assessment can only take into consideration the outward signs of a trees condition. There are many problems that can occur inside a tree that cannot be seen, such as fungal diseases and undetected structural faults such as decay and hollows. Problems can also occur within the root systems due to contaminated soils and root diseases.

These issues would require further investigative methods to be undertaken in further determining the health and condition of the tree.

No guarantee can be given nor can it be predicted that branch failure or uprooting (windthrow) would not occur as a result of extreme winds, storm activity, lightning strike and /or excessive rainfall.

No tree can be declared completely safe and total mitigation of risk can only be achieved by removal. As such there is always some degree of risk that branch or root crown failure may occur

# 7. TREE PRESERVATION

The main area of concern in relation to tree preservation and development is damage that may be caused to roots of these trees particularly where construction activity encroaches into their root zones and above ground parts.

Tree preservation is synonymous with root preservation, for the tree will die if the main root structure is adversely impacted upon.

The root system of a typical tree can be described as shallow, widespread and horizontally oriented. A root system can extend far beyond the edge of the canopy. A trees root system is to supply the crown with water and nutrients absorbed from the soil. Tree roots anchor the tree and their continued function is an important factor in a tree's survival during any construction. Any development /disturbance within the root zone can reduce the ability of roots to grow and function properly.

The main threats to tree preservation that need to be considered are:

- Excavation works
    - Soil cut - Lowering of natural ground level
    - Foundation footings
        - Buildings and other structures
        - Retaining walls
    - Trenching
        - Utility services etc.
- Soil Fill – Raising of natural ground level
- Soil Compaction
- Physical Damage to trunks and / or branches from machinery etc.

**7.1 Incorporation of trees into the design**

Retention and design is possible provided the design and subsequent construction methods and techniques can be incorporated in a compatible manner with trees so that severance or damage to structural roots and excessive damage to secondary and minor roots is avoided.

The key to maintaining tree heath and stability is to minimize root and soil disturbance within TPZ's as much as possible to avoid excessive damage to roots

In considering the viability for retention of trees the design would need to be able provide adequate Tree Protection Zones and a Tree Protection Plan to be implemented so that the trees can be protected during the development period and maintained in good condition.

However it is still possible that despite careful planning, construction and assessment of the impacts construction may have on trees it is still possible that the changed conditions surrounding may have an adverse effect on their condition in the future.

**7.2 Minor encroachments**

The main area of concern is damage that may be caused to secondary and minor roots. Excessive damage to secondary and minor roots may initiate decline in tree health and vigour. Excessive removal of smaller absorbing roots can cause immediate water stress. The survival of the tree is linked to its tolerance of water stress and the ability of the tree to form new root rapidly.

Where construction may be within the TPZ of a tree, provided encroachment does not exceed more than 10 % and that the area lost to encroachment is outside the SRZ and can be compensated for elsewhere and contiguous with the TPZ if only a few or no roots over 25mm in diameter are found the tree should not be significantly impacted upon and should tolerate the impacts of construction.

However this does not mean that excavation within the TPZ can be carried out without out regard to roots. Natural grade within the TPZ should be retained and any excavation activity within the TPZ must still be carried out carefully to avoid excessive damage to roots.

**7.3 Major Encroachment**

Encroachment is considered to be major where construction will **encroach into the SRZ or encroach more than 10%** into the calculated TPZ of a tree.

The main area of concern is damage that may be caused to roots particularly where construction may encroach into the SRZ of a tree

Damage to structural roots will significantly increase the risk of failure especially during high winds. Tree roots anchor the tree and their continued function is an important factor in a tree's survival during any construction. Decrease in structural stability will result regardless of species although to what degree depends on many factors such as how many and how close to the tree roots are cut.

Severing of roots on one side of a tree (such as may occur when excavation is past a tree trunk but still within the drip zone), may weaken the tree making it unstable and likely to collapse sometime in the future. Excessive removal of soil from around the root zone can significantly reduce roots anchorage capacity increasing the risk of root crown failure.

Retention and design may possible provided it can be demonstrated that severance or damage to structural roots and excessive damage to secondary minor roots is avoided. This can be achieved by the careful removal of soil within the TPZ to locate roots and determine potential impacts.

Based on the results of root investigations it can then be determined whether retention and design can be achieved or that alternative solutions are required.

If no structural roots are encountered and only a few secondary or smaller roots encountered it is possible that the tree or trees can be retained and tolerate the impacts of construction.

If root investigations conclude that construction will be detrimental to tree stability and / or health and removal is not permissible alternative designs to reduce the impact within the root zone of the trees would need to be considered.

Alternative designs to be considered would need to allow for adequate TRZ and SRZ to be established so that the tree could be retained in good, safe condition before during and after development and should involve discussions in conjunction with the Architect, Developer and Arborist.

**7.4 Soil Fill**

Soil build up around the root zone or trunk of trees is considered to have a detrimental effect on their health and vitality and in the long term can result in their decline and eventually their death.

Roots require oxygen, water and nutrients to survive which they get from spaces within the soil. Associated beneficial fungi and micro-organisms that help the tree obtain minerals also need oxygen to thrive.

When extra soil is placed over the root systems of established trees, the aeration of the soil is disrupted and they can no longer get sufficient oxygen, water or nutrients. This effect is more pronounced depending on the depth of fill and soil type.

Trees that have soil fill around the root zone usually become stressed and are more susceptible to attack by phloem- cambium feeders such as longicorn beetles and wood moths.

A tree that has soil build up usually develops a thinning crown and branches begin dieback as its health and vigour gradually declines.

Roots covered by soil fill may preferentially root in the fill and the original roots may die and reduce stability.

The effect of soil fill is usually a slow decline in the trees condition which can result in its death. These symptoms may take years to develop and several years or more may pass before a tree could die.

**7.5 Compaction**

Compaction is the reduction in the size of the soil pore spaces due to compression. This can become a limiting factor to root penetration and healthy growth. The problems associated with compacted soils include poor water infiltration and aeration, poor drainage and water run-off, water-logging and poor root penetration.

Compaction specification particularly for infrastructure purposes typically try to attain 96 to 99% which means that soil strength is maximized and pore space minimized.

Compaction reduces soil pore size and increases soil strength. At the compaction rate used for infrastructures sufficient oxygen, water and pore space essential to trees to function property is not available. As the top layer of soil is compacted roots begin to die. Water may be present but depending on the soil type may be not readily accessible to roots and not sufficient for tree use.

Oxygen supply is also a major problem in compacted soils. Available oxygen is quickly depleted by roots and not easily resupplied.

For effective root growth pore sizes in the soil must be larger than the root tip. If pore sizes are too small root growth will cease. Unless there are fissures, cracks or other large pore spaces a strong compacted soil will resist root expansion and generally will have an adverse impact on the overall condition of trees.

**7.6 Physical Damage.**

Physical damage to trunks and / or branches from machinery etc. can initiate a decline in tree health and predispose the trees to attack by pest or disease. Significant physical damage may also result in weakening of structural strength.

# 8. IMPACTS OF DEVELOPMENT

**8.1 Tree Nos: 6, 9, 10, 11, 12, 19, 21, 22, 23, 24, 25, 26, 29, 30, 31, 32, 34, 35, 37, 38, 39, 40, 47, 65, 66, 69, 81, 84, 85, 89**

Based on the Site Plans these trees are within the development footprint and as such their removal would be necessary to facilitate the development as proposed.

The retention of any of these trees would require significant changes to the design to be made to allow for adequate TPZ's to be established or alternative construction methods to be used that will reduce the impacts within the TPZ's that will enable them to survive the impacts of construction in good condition.

The majority of trees general displayed good/fair overall condition however due to either their poor structure or habit and form Tree 6, 11, 29, 30, 32, 39, 40, 89 and not considered suitable for retention. Remedial action is not likely to be beneficial in relation to satisfactorily reducing the risk to an acceptable level within a school environment or in improving their condition.

**8.2 Tree Nos. 20, 28, 42, 58, 59, 60, 61, 62, 63, 64, 67, 68**

Based on the Site Plans construction of driveways, footpaths and buildings as well as bulk earthworks and excavation for installation of utility services and other infrastructures services will encroach well into the calculated TPZ's of these trees and will also extend into their calculated SRZ's.

The main area of concern is damage that may be caused to structural roots and canopy structure.

Damage to structural roots will significantly increase the risk of failure, especially during high winds. Tree roots anchor the tree and their continued function is an important factor in a tree's survival during any construction. Decrease in structural stability will result regardless of species although to what degree depends on many factors such as how many and how close to the tree roots are cut.

Severing of roots on one side of a tree (such as may occur when excavation is past a tree trunk but still within the drip zone), may weaken the tree making it unstable and likely to collapse sometime in the future.

Excessive removal of soil from around the root zone can significantly reduce roots anchorage capacity increasing the risk of root crown failure.

Excessive damage to secondary and minor roots may initiate decline in tree health and vigour. Excessive removal of smaller absorbing roots can cause immediate water stress. The survival of the tree is linked to its tolerance of water stress and the ability of the tree to form new root rapidly.

Buildings will also partially encroach well into canopies of trees that would require some pruning to be undertaken to eliminate conflict between branches and development. This would result in trees with unbalanced crowns display poor habit & form and become aesthetically unappealing.

Due to the close proximity of construction and extent of encroachment into their TPZ's / SRZ's and canopy spread it is likely that the trees will be adversely impacted upon by the development that m be detrimental to both stability and their overall condition.

Due to its poor structural condition Tree No. 28 is not considered suitable for retention. Remedial action is not likely to be beneficial in relation to satisfactorily reducing the risk to an acceptable level within a school environment or in improving their condition.

The retention of any of these trees would require significant changes to the design to be made to allow for adequate TPZ's to be established or alternative construction methods to be used that will reduce the impacts within the TPZ's that will enable them to survive the impacts of construction in good condition.

**8.3 Tree Nos. 48, 90, 91, 92, 93**

There trees are located on the nature strip along the front eastern boundary and within close proximity to high voltage overhead powerlines.

Although they may not be significantly impacted upon by the proposed development due to their close proximity are not considered suitable to position for long term retention.

Tree No. 48 is a mature tree and is in reasonable good overall condition however branches on the eastern side are regularly pruned to maintain clearance.

Tree No. 90 is a mature tree however has been substantial affected by mistletoe. Although not requiring pruning at this stage it is likely that as it gradually fully matures that it will eventually come into conflict with overhead powerlines and require pruning. Mistletoe will eventually have an adverse impact on the tree if not regularly controlled.

Tree No. 91 have previously been cut to a short stump however numerous epicormic shoots have re-sprouted to form the canopy. Epicormic shoots are weakly attached and present high risk of failure. As the tree will not develop into a good representative of the species combined with its poor branch structure the tree is not considered suitable for retention regardless of the impacts of development

Tree Nos. 92 & 91 are young semi-mature trees that have been planted underneath the powerlines. At this stage as they still relatively small they are not in conflict with powerlines. However it is likely that as they begin to fully mature and increase in height they will need to be pruned to maintain clearance. Due to their close proximity to the overhead powerlines the trees are not considered suitable to position for long term retention

### 8.4 Tree No. 45

Tree No. 45 has had numerous failure of medium size branches including a large scaffold to west indicated by remaining stem stubs. The tree has a history of failure it is likely that branch failure will occur again.

As remedial action is not considered beneficial in relation to satisfactorily reducing the risk to an acceptable level it is not considered suitable for retention particularly if the area is expected to be frequently used by students

### 8.5 Tree No. 57

Tree No. 57 has lean of approximately 15 degrees to west. The crown has been excessively raised leaving only the top portion of the canopy remaining. Generally live crown ratio of a tree should be approximately two thirds in relation to tree height to distribute wind stress and some major branches should be left on the lower half of the trunk.

Due to its degree of lean combined with its relatively poor habit and form the tree is not considered suitable for retention particularly if area is expected to be frequently used by students

**8.6 Tree Nos. 8, 27, 33, 36, 41, 78, 82**

Based on the proposed plans construction will slightly encroach into the TPZ's of these trees but will remain outside of their SRZ's.

Although construction is expected within their TPZ's encroachment is expected to be less than 10 % of the total TPZ and the area lost to encroachment is outside of their SRZ's and can be compensated for elsewhere and contiguous with the TPZ's (See Attachment 1 Site Plan).

However this does not mean that construction activity (particularly excavation) within the TPZ can be carried out without out regard to roots. Excessive damage to minor roots may initiate decline in their health and vigour. Removal of smaller absorbing roots can cause immediate water stress. The survival of the tree is linked to its tolerance of water stress and the ability of the tree to form new root rapidly

As such any excavation activity within the TPZ must still be carried out carefully to avoid excessive damage to roots (see 9.5 Excavation within TPZ & SRZ).

It is considered that provided encroachment including any other infrastructure works such as retaining walls and underground services does not exceed more than 10% and existing ground levels within the remaining TPZ remains unchanged the trees should not be significantly impacted upon by the proposed development.

Combined with careful excavation procedures and the implementation of Tree Protection Measures where construction activity is expected within the TPZ the tree will be provided with the best possible chance to survive the impacts of construction and be retained in thier current condition

Tree No. 83 has been identified as a habitat tree. Habitat or ecological significance may need to be considered in regards to viability of retention or removal particularly if the area is expected to be frequently used by students

**8.7 Tree Nos: 1, 2, 3, 4, 5, 7, 13, 14, 15, 16, 17, 18, 43, 44, 46, 54, 55, 56, 70, 71, 72, 73, 74, 75, 76, 77, 83, 86, 87, 88, 94, 95, 96**

Based on the Site Plans the development is not expected to encroach within the TPZ's of these trees.

It is considered that provided encroachment including any other infrastructure works such as retaining walls, bulk earthworks and underground services does not exceed more than 10% and existing ground levels within the TPZ's remains unchanged that combined with the implementation of tree protection measures they should not be impacted upon by the proposed development and can be retained.

Tree Nos. 7, 10 & 54 has been identified as habitat trees. Habitat or ecological significance may need to be considered in regards to viability of retention or removal particularly if the area is expected to be frequently used by students

# 9. TREE PROTECTION PLAN

## 9.1 Tree Protection Zones

Tree Protection Zones (TPZ) are the principle means of protecting trees on development sites. The TPZ is a combination of the root area and crown area requiring protection. It is an area isolated from construction disturbance, so that the tree remains viable. The TPZ incorporates the Structural Root Zone (SRZ) (Figure 1).

The method used to determine the TPZ and SRZ for these trees have been based on Australian Standard 4970 – 2009 Protection of Trees on Development Sites 3.3.5.

## 9.2 TPZ - Tree Protection Zones

Australian Standard 4970 – 2009 Protection of Trees on Development Sites requires that the Diameter at Breast Height (DBH) of the trunk measured 1.4m above ground be multiplied by 12 to obtain the radius of a Tree Protection Zones (TPZ).

It is possible that minor encroachments can be established for these trees provided that encroachment is less than 10% and outside their Structural Root Zone and that the area lost to encroachment can be compensated for elsewhere and contiguous with the TPZ (Figure 2).

**Note:** A TPZ should not be less than 2 meters nor greater than 15 meters

## 9.3 SRZ – Structural Root Zones

Where major encroachment into the TPZ is expected the Structural Root Zone (SRZ) requires to be calculated (Figure 2). **The SRZ considers the trees structural stability only.** The woody root growth and soil cohesion in this area are necessary to hold the tree upright.

The method used to determine the SRZ for these trees have been based on Australian Standard 4970 – 2009 Protection of Trees on Development Sites3.3.5.

**Note:** An SRZ should not be less than 1.5 meters

- **Refer to Tree Evaluation Sheet (Appendix 4) in reference to calculated TPZ's & SRZ's and outline of Potential Impacts**

**Figure 1 – Indicative Tree Protection Zones**

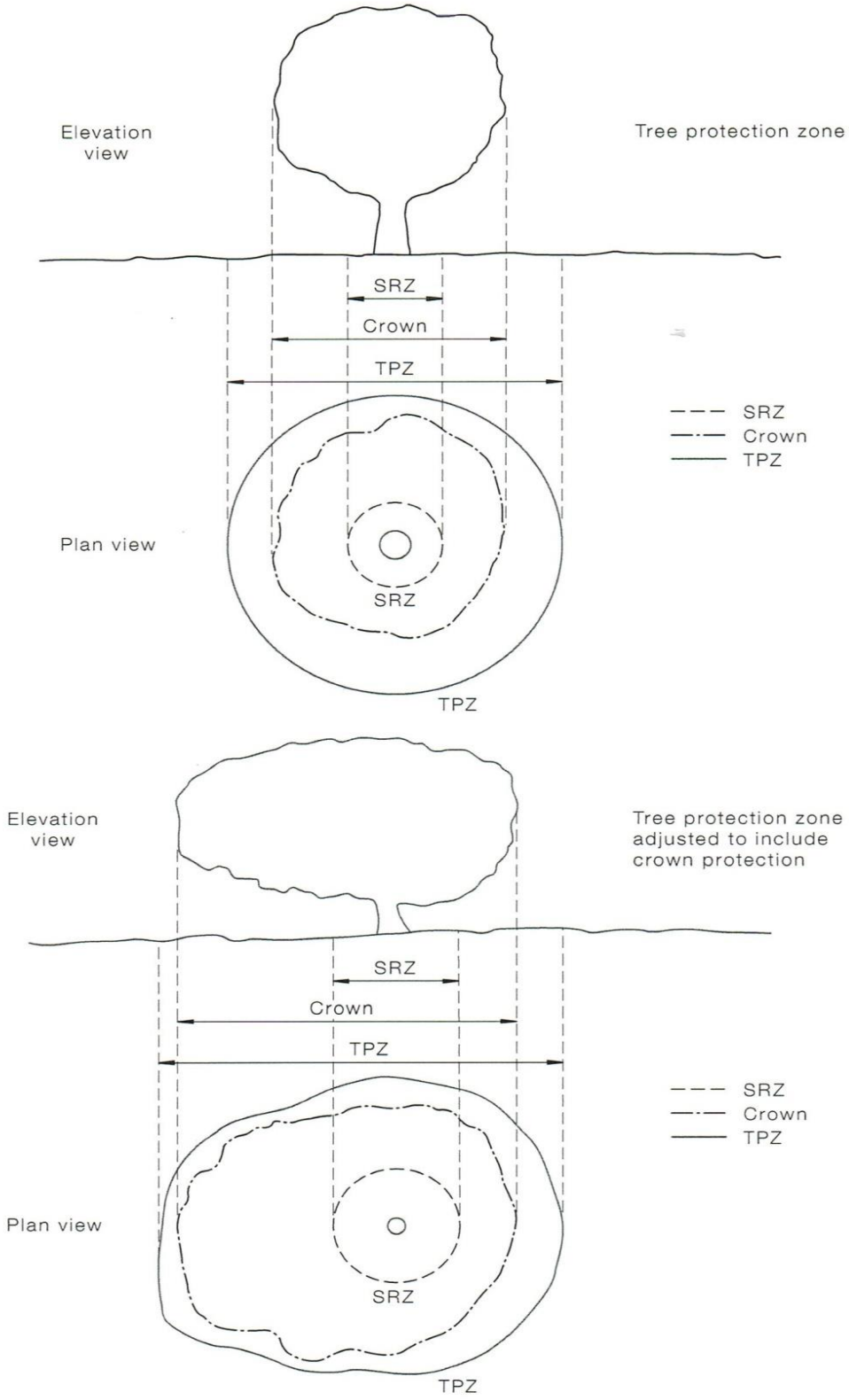


**Figure 2 - Example of TPZ encroachment**

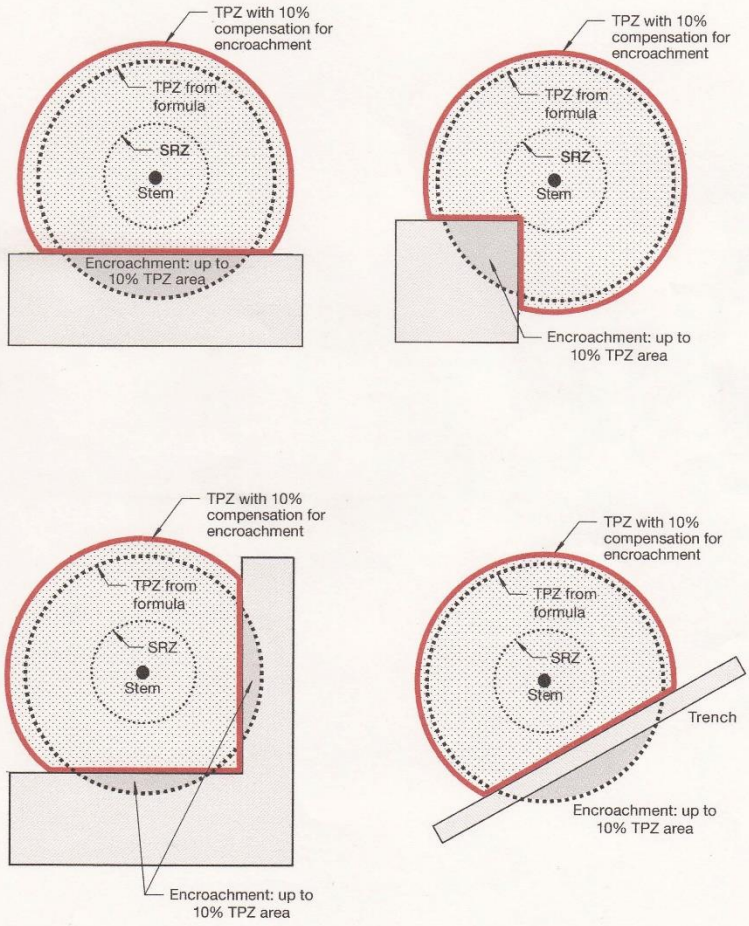


APPENDIX D

ENCROACHMENT INTO TREE PROTECTION ZONE

(Informative)

Encroachment into the tree protection zone (TPZ) is sometimes unavoidable. Figure D1 provides examples of TPZ encroachment by area, to assist in reducing the impact of such incursions.




NOTE: Less than 10% TPZ area and outside SRZ. Any loss of TPZ compensated for elsewhere.

FIGURE D1 EXAMPLES OF MINOR ENCROACHMENT INTO TPZ

**9.4 Tree Protection Measures**

The purpose of the Tree Protection Plan (TPP) is to provide the developers with a guide so that trees to be retained during the development of this site can be protected during the development process.

Based on the Site Plans it is possible that encroachment by machinery and other associated construction activity will occur within the TPZ of some trees and as such optimal TPZ's that would comply with Australian Standard 4970 – 2009 Protection of Trees on Development Sites may not be achievable for all trees.

Tree Protection Measures and works within nominated Tree Protection Zones must comply with Australian Standard 4970 – 2009 Protection of Trees on Development Sites

A Tree Protection Plan Specification has also been prepared to give trees the best possible chance to survive the impacts of construction so that they can be retained in their current condition during and after construction has been completed (Appendix 1).

Tree Protection Measures in conjunction with the Tree Protection Zone Specification must be adhered to before any construction activity occurs within the nominated TPZ of trees to be retained.

**Table 1 - Inventory of Tree to be Protected**

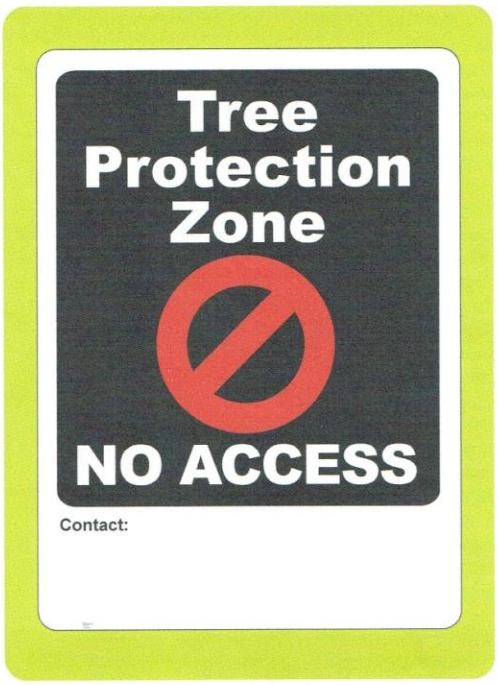
| **Tree No** | **Specific Protection Measures** |
|---|---|
| 1, 2, 3, 4, 5, 7, 13, 14, 15, 16, 17, 18, 43, 44, 46, 54, 55, 56, 83, 86, 87, 88, 70, 71, 72, 73, 74, 75, 76, 77, 94, 95, 96, | • Full extent of TPZ to be established where appropriate (Figure 4)<br>• Less 10% of total TPZ would be acceptable without the need for any further assessment<br>• Provided no construction activity is expected to occur within the TPZ's as protection is predominately to keep activity away from the trees the limits of Tree Protection Zones shall be staked and hi –visibility mesh 1.2m high to encompass the TPZ's would be acceptable<br>• Protection areas are to be clearly marked as a NO GO AREA and inspected by the consulting arborist (Figure 3)<br>• Tree Protection Zone Specification to be adhered to (Appendix 3) |
| 8, 27, 33, 36, 41, 78, 82 | • Where optimal Tree Protection Zones cannot be achieved the TPZ should encompass an area as close as possible to the edge of construction then incorporate remaining TPZ radius where possible (Figure 4)<br>• 1800mm high chain wire mesh linked temporary fencing with concrete feet to be erected where construction will encroach into the TPZ by more than 10%<br>• Provided no construction activity is expected to occur within the remaining TPZ's hi –visibility mesh 1.2m high to encompass the remaining TPZ's would be acceptable<br>• Protection areas are to be clearly marked as a NO GO AREA and inspected by the consulting arborist (Figure 3)<br>• Tree Protection Zone Specification to be adhered to (Appendix 3) |

**Figure 3**
**Example of TPZ signage**

TREE PROTECTION ZONE SIGN EXAMPLE

(Informative)

A TPZ sign provides clear and readily accessible information to indicate that a TPZ has been established. Figure C1 provides an example of a suitable sign.



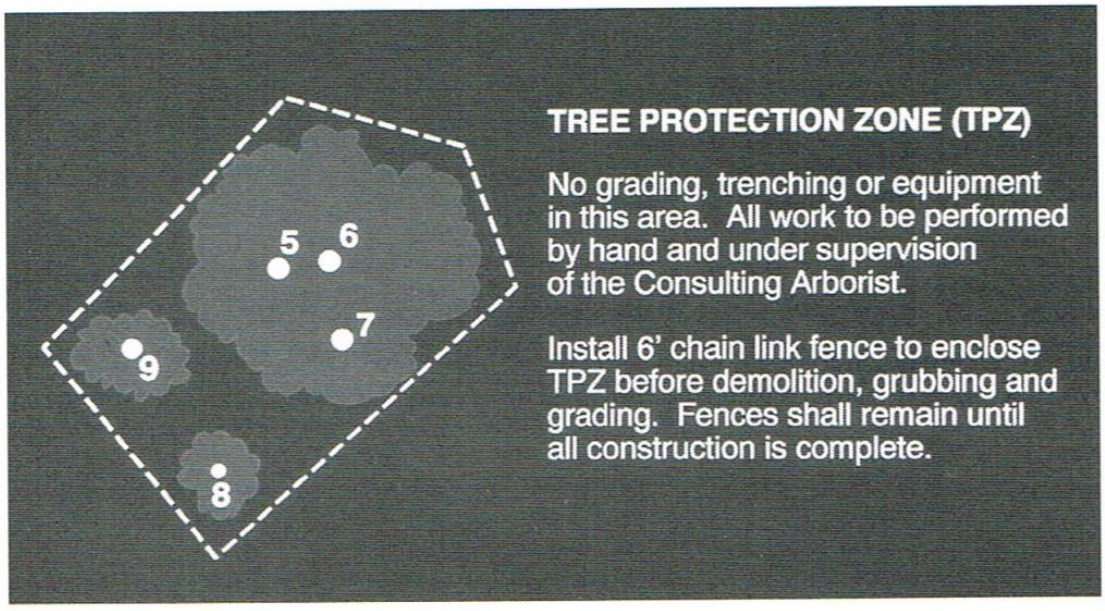
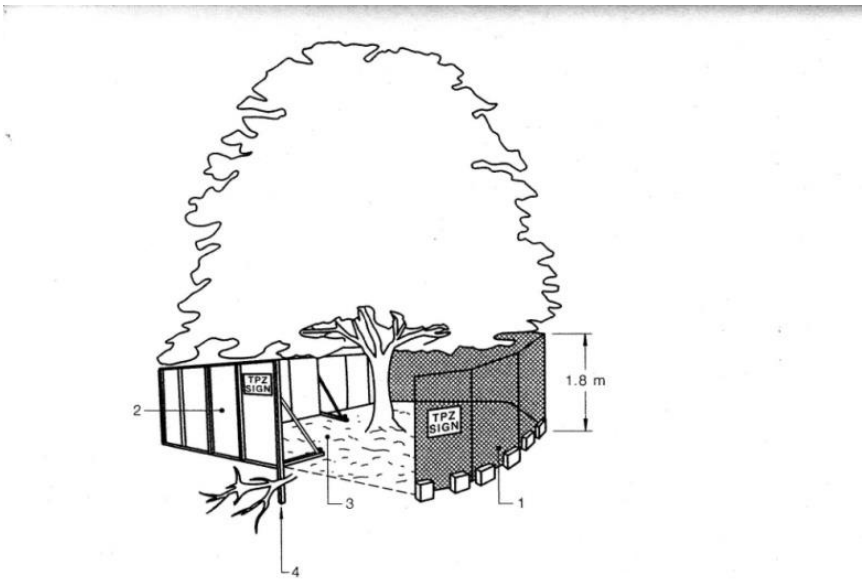



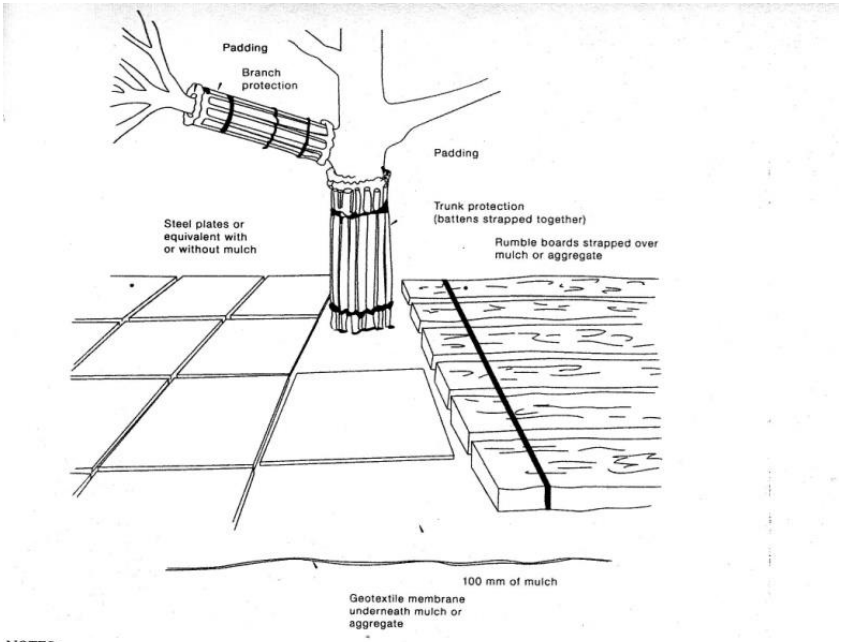

**Figure 4 Indicative TPZ incorporating stand or group of trees**

**Figure 5 – Indicative TPZ incorporating a single tree**




LEGEND:

1 Chain wire mesh panels with shade cloth (if required) attached, held in place with concrete feet.
2 Alternative plywood or wooden paling fence panels. This fencing material also prevents building materials or soil entering the TPZ.
3 Mulch installation across surface of TPZ (at the discretion of the project arborist). No excavation, construction activity, grade changes, surface treatment or storage of materials of any kind is permitted within the TPZ.
4 Bracing is permissible within the TPZ. Installation of supports should avoid damaging roots.




NOTES:

1 For trunk and branch protection use boards and padding that will prevent damage to bark. Boards are to be strapped to trees, not nailed or screwed.
2 Rumble boards should be of a suitable thickness to prevent soil compaction and root damage.

**Figure 6**
**Trunk & branch protection**

**Rumble boards to prevent soil compaction**

**9.5 Excavation within TPZ / SRZ**

Typically, most roots are found within the top 900mm of soil, and whilst most of the fine roots active in water and nutrient absorption are in the top 300mm of soil larger roots can also be encountered close to or above the surface.

Any excavation within a TPZ must be carried out carefully to avoid excessive damage to roots. The cutting of roots over 25mm within the SRZ could be critical to the stability and future condition of a tree.

The cutting of roots can severely reduce the structural integrity of a tree and /or exposes torn roots to attack from pest and disease creating an unhealthy tree and a weak root system that will further increase the risk of tree failure. The cutting of large roots close to the trunk inflicts much more structural injury than cutting smaller roots near or beyond the drip line.

The only reliable way to estimate root disturbance is to determine the location of the roots in relation to where construction will occur. The most effective method is to carefully remove the soil around the root zone and expose them.

This can be achieved by digging using hand tools only or by through other non-destructive means of excavation such as pneumatic or hydraulic methods.

This does not mean however that excavation can take place without regard to the damage that might be caused to the root system. Extreme care regardless of excavation method must be taken when working within nominated TPZ and SRZ not to damage the bark or tear wood of any roots. Equipment that pulls or shatters roots should not be used (e.g. backhoes or excavators).

Excavation should be undertaken around the area of the tree where works are expected to encroach into the TPZ to the depth that is expected for the required excavation works. If only a few or no roots over 25mm in diameter are found, the tree will probably tolerate the impact.

However if more than two or three large roots are found, evaluation of the impact of damage or cutting of these roots should be assessed taking into consideration species sensitivity and condition. A qualified arborist should be consulted to determine the amount of roots that can removed and still retain the tree or whether re-assessment is necessary.

**Upon exposure of roots within the TPZ:**

- Roots greater than 25mm in diameter should be retained where possible.
- Roots between 25 – 60mm in diameter should only be cut if absolutely necessary.
- Roots over 60mm in diameter should only be cut after consultation with a suitably qualified arborist.
- No roots shall be cut within the calculated SRZ of the tree.

## 10. CONCLUSION

After an inspection of tree conditions and assessment of impacts of development the following conclusions have been reached.

- In total 49 trees have been identified for removal of these:
  - Tree Nos. 6, 9, 10, 11, 12, 19, 21, 22, 23, 24, 25, 26, 29, 30, 31, 32, 34, 35, 37, 38, 39, 40, 47, 65, 66, 69, 81, 84, 85, 89 are within the development footprint and as such their removal would be necessary to facilitate the development as proposed

    The retention of any of these trees may require changes to the design to be made and /or alternative construction methods within the TPZ's to be considered that would reduce the impacts and enable them to survive the impacts of construction in good condition

  - Due to the close proximity of construction and extent of encroachment into the TPZ's / SRZ's and canopy spread of Tree Nos. 20, 28, 42, 58, 59, 60, 61, 62, 63, 64, 67, 68 it is likely that they will be adversely impacted upon by the development that may be detrimental to both stability and health & vigour.

    The retention of any of these trees may require changes to the design to be made and /or alternative construction methods within the TPZ's to be considered that would reduce the impacts and enable them to survive the impacts of construction in good condition

  - Tree Nos. 48, 90, 91, 92, 93 are located on the nature strip along the front eastern boundary and although they may not be significantly impacted upon by the proposed development due to their close proximity to overhead high voltage powerlines are not considered suitable to position for long term retention.

  - Tree No. 45 has a history of branch failure and as remedial action is not considered beneficial in relation to satisfactorily reducing the risk to an acceptable level it is not considered suitable for retention particularly if the area is expected to be frequently used by students

  - Tree No. 57 displays relatively poor habit & form and due to its degree of lean combined with its low live crown ration the tree is not considered suitable for long term retention particularly if area is expected to be frequently used by students

Provided construction activity including any other infrastructure associated with the development does not encroach into the TPZ's of Tree Nos. 1, 2, 3, 4, 5, 7, 8, 13, 14, 15, 16, 17, 18, 27, 33, 36, 41, 43, 44, 46, 54, 55, 56, 70, 71, 72, 73, 74, 75, 76, 77, 78, 82, 83, 86, 87, 88, 94, 95, 96 (40 in total) it is considered that with the implementation of the tree protection measures they should not be impacted upon by the proposed development and can be retained.

Tree Nos. 7, 10, 23, 28, 29, 30, 32, 35, 39, 54, 40 & 83 have been identified as habitat trees. Habitat or ecological significance may need to be considered in regards to viability of retention / removal

## 11. RECOMMENDATIONS

Based on the proposed Site Plans in relation to the impacts of the proposed development the following outcomes are recommended:

1. **Removal of Tree Nos. 6, 9, 10, 11, 12, 19, 21, 22, 23, 24, 25, 26, 29, 30, 31, 32, 34, 35, 37, 38, 39, 40, 47, 65, 66, 69, 81, 84, 85 & 89**
   **Reason:**
   Trees are within the development footprint and as such their removal would be necessary to facilitate the development as proposed

2. **Removal of Tree Nos. 20, 28, 42, 58, 59, 60, 61, 62, 63, 64, 67 & 68**
   **Reason:**
   Due to the close proximity of construction, bulk earthworks and other impacts associated with the development in relation to the extent of encroachment into their TPZ's / SRZ's and canopy spread the removal of these trees would be necessary as they are likely to be adversely impacted upon by the development that may be detrimental stability and/ or health & vigour

3. **Removal of Trees Nos. 48, 90, 91, 92, 93**
   **Reason:**
   The trees are located on the nature strip along the front eastern boundary and although they may not be significantly impacted upon by the proposed development however due to their close proximity to overhead high voltage powerlines it is considered that as they begin to fully mature and increase in height they will eventually need to be pruned to maintain clearance and as such are not considered suitable to position for long term retention.

4. **Consider Removal of Tree No. 45**
   **Reason:**
   The tree has a history of branch failure and as remedial action is not considered beneficial in relation to satisfactorily reducing the risk to an acceptable level it is not considered suitable for retention particularly if the area is expected to be frequently used by students

5. **Consider Removal of Tree No. 57**
   **Reason:**
   The Tree displays relatively poor habit & form and due to its degree of lean combined with its low live crown ration it is not considered suitable for long term retention particularly if area is expected to be frequently used by students

6. **Consider changes to the design or alternative construction methods within the TPZ's of any tree/s identified for removal that are directly impacted upon by the development if they are to be retained**
   **Reason:**
   To reduce the impacts associated with construction and enable them to survive the impacts of construction in good condition

7. **Retention of Tree Nos. 1, 2, 3, 4, 5, 7, 8, 13, 14, 15, 16, 17, 18, 27, 33, 36, 41, 43, 44, 46, 54, 55, 56, 70, 71, 72, 73, 74, 75, 76, 77, 78, 82, 83, 86, 87, 88, 94, 95, 96**
   **Reason:**
   Provided encroachment by construction including any other infrastructure works such as retaining walls, bulk earthworks and underground services does not exceed more than 10% and existing ground levels within the TPZ's remains unchanged that combined with the implementation of tree protection measures they should not be impacted upon by the proposed development and can be retained

8. **Ensure habitat and /or ecological significance of trees has been taken into consideration before any tree identified as a habitat tree is removed**
   **Reason:**
   To ensure the safety, protection and relocation of any inhabitants has been considered.

9. **Suitably qualified arborist (AQF level 5 or equivalent) should supervise any works that may be required within a TPZ.**
   **Reason:**
   To ensure that excavation works within the TPZ & SRZ are carried out carefully to avoid damage to roots

10. **Implementation of Tree Protection Measure & Tree Protection Zone Specification**
    **Reason:**
    To provide the developers with a guide so that the trees to be retained during the development of this site can be protected whilst construction is undertaken

10. **Tree Protection Measures must comply with Australian Standard 4970 – 2009 Protection of Trees on Development Sites.**
    **Reason:**
    To ensure best practices are implemented for the planning and protection of trees on or within close proximity to a development site.

11. **Any works within a nominated Tree Protection Zones must comply with Australian Standard 4970 – 2009 Protection of Trees on Development Sites**.
    **Reason:**
    To ensure best practices for the protection of trees to be retained are followed

## 12. REFERENCES

Australian Standards AS 4970 – 2009 Protection of Tree on Development Sites Standards Australia Sydney

Dunster, Julian A., E. Thomas Smiley, Nelda Matheny, and Sharon Lilly. 2013 Tree Risk Assessment Manual. Champaign, Illinois: International Society of Arboriculture

Matheny, Nelda and Clark, James R. 1998, Trees and Development: A Technical Guide to Preservation of Trees During Land Development, International Society of Arboriculture Champaign, USA.

Shigo, Alex 1989, A New Tree Biology: Facts, Photos and Philosophies on Trees and Their Problems and Their Care 2nd edition, Sherwin Dodge Printers, Littleton, New Hampshire.

Neely Dr,Dan and Watson Dr, Gary 1998, The Landscape Below The Ground ll: Proceedings of an International Workshop on Tree Root Development in Urban Areas, International Society Of Aboriculture Champaign, USA.

## 13. DISCLAIMER

The conclusions and recommendations contained in this report refer to the tree's condition on the day of inspection only. The report is to be read and considered in its entirety. All care has been taken using the most up to date arboricultural information in the preparation of this report.

The report is based on visual inspection only and as such not all defects may have been detected. No guarantee can be given nor can it be predicted that branch failure or uprooting (windthrow) would not occur as a result of high winds and /or excessive rainfall and other unpredictable events. Tree health and environmental conditions can change at any time

**Report by**

**Diploma of Arboriculture**

# APPENDIX 1

## SULE - Safe Useful Life Expectancy

**1. Long SULE**

a. Structurally sound and can accommodated future growth
b. Long term potential with minor remedial treatment
c. Trees of special significance which warrant extra care

**2. Medium SULE**

a. Will live between 15-40 years
b. Will live for more than 40 years but would be removed for safety or nuisance reasons
c. May live for more than 40 years but will interfere with more suitable specimens and need removal eventually
d. More suitable for retention in the medium term with some remedial care

**3. Short SULE**

a. Trees that may only live between 5-15 more years
b. May live for more than 15 years but would need removal for safety or other reasons
c. Will live for more than 15 years but will interfere with more suitable specimens or provide space for replacement plantings
d. Require substantial remedial care but are only suitable for short term retention

**4. Removals**

a. Dead, dying or seriously diseased
b. Dangerous trees through instability or loss of adjacent trees
c. Structural defects such as cavities
d. Damaged that are clearly not safe to retain
e. May or are causing damage to structures
f. That will become dangerous

**5. Moved or Replaced**

Trees, which can be reliably moved or replaced

a. Small trees less than 5 meters
b. Young trees between 5-15 years
c. Trees that have been regularly pruned to control growth

## APPENDIX 2

## CONDITION RATINGS

Each tree or group of trees has been placed into categories ranging from 1 to 6, with no.1 being in the worst condition through to no.6 in a health condition.

This is based on observations of their health and structure.

1. A dead tree.

2. A tree in severe decline. Major structural damage that cannot be repaired, dieback of trunk or scaffold branches and the majority of foliage consist of epicormic growth.

3. A tree in decline. Significant structural damage that cannot be repaired, dieback of medium to larger branches and epicormic growth.

4. A tree moderate vigor, dieback of smaller branches and twigs, thinning of crown, poor leaf colour and moderate structural defects that could be mitigated with regular care.

5. A tree in slight decline with only a small amount of twig dieback and minor structural damage that could be easily rectified.

6. A healthy vigorous tree that shows reasonably free signs of pest and diseases and good structural form.

## APPENDIX 3

## TREE PROTECTION ZONE SPECIFICATION

The following specification must be adhered to before any site activity occurs within established Protection Zones of trees to be retained.

1. All works within nominated Tree Protection Zones must comply with Australian Standard 4970 – 2009 Protection of Trees on Development Sites.

2. Contractors are required to meet with the consulting arborist at the site prior to beginning work to review all work procedures, access and haul routes and tree protection measures.

3. If temporary haul or access roads must pass over the root area of the trees to be retained a roadbed of 150mm of mulch or gravel shall be created to protect the soil. The roadbed shall be replenished as necessary to maintain a 150mm depth (See Figure 6).

4. Prior to construction contractors and machine operators are to be instructed in the requirements for the prevention of damage to trees and tree roots. Operators must be instructed to proceed with care to avoid the impacts of mechanical damage

5. Tree Protection Measures to be established as outlined in Item 9.4 Table 1 prior to the commencement of any construction works

6. The limits of Tree Protection Zones shall be staked and 1800mm high chain link temporary fencing or hi-visibility mesh or bunting as outlined Item 9.4 Table 1 installed.

7. Protection areas are to be clearly marked as Tree Protection Zone - NO GO AREA

8. Protection measures to be inspected and certified by the project arborist.

9. No construction activity allowed within established TPZ's without first consulting the project manager or project arborist

10. Natural grade shall be retained within established TPZ's & SRZ's.

11. Excavation must not encroach within a calculated TPZ of a tree without first consulting the project arborist

12. Any excavation within a TPZ is to be carried out as outlined in Item 9.5 Excavation within TPZ/SRZ.

13. No roots shall be cut or construction activity should occur within the SRZ of a tree unless confirmed by a suitably qualified arborist.

14. No materials, equipment, spoils, waste water or chemicals of any description may be disposed of or stored within a TPZ.

15. No parking of vehicles, trailers or machinery is allowed within a TPZ.

16. Any electrical cables, gas pipes, sewer pipes or other plumbing services to be routed outside the TPZ's.

17. Trees to be removed that have branches extending into trees of tree to remain must be removed by a qualified arborist and not by demolition or construction contractors. A qualified arborist shall remove the tree in a manner that causes no damage to the trees and understory to remain.

18. Any brush clearing required with the Tree Protection Zones shall be accomplished with hand-operated equipment.

19. Trees to be removed shall be felled so as to fall away from Tree Protection Zones and to avoid pulling and breaking of roots of trees to remain. If roots are entwined, the consultant may first require severing the major woody root mass before extracting the trees.

20. Trees to be removed from within the Tree Protection Zones shall be removed by a qualified arborist.

21. Trees removed within the TPZ of trees to be retained shall be cut near ground level and the stump ground out.

22. All downed brush and trees shall be removed from the Tree Protection Zones either by hand or by machinery sitting outside the Tree Protection Zones. Extraction shall occur by lifting the material out not by dragging or skidding across the ground.

23. Brush and branches shall be chipped and stored on site for future use in site rehabilitation.

24. The consulting arborist must be on site where any excavation works are to be carried out within the Tree Protection Zones.

25. If injury to the tree should occur during construction it should be evaluated as soon as possible so that appropriate treatments can be applied.

26. A consulting arborist must monitor any grading, construction, demolition or other work that is expected to encounter tree roots within the TPZ.

27. If excavation must occur within a Tree Protection Zone the consulting arborist will determine where tunneling, handwork and root pruning are required.

28. Any roots damaged during construction shall be exposed to sound tissue and cut cleanly with as saw.

29. Erosion control devises such as silt fencing shall be installed to prevent siltation and or erosion within the Tree Protection Zones.

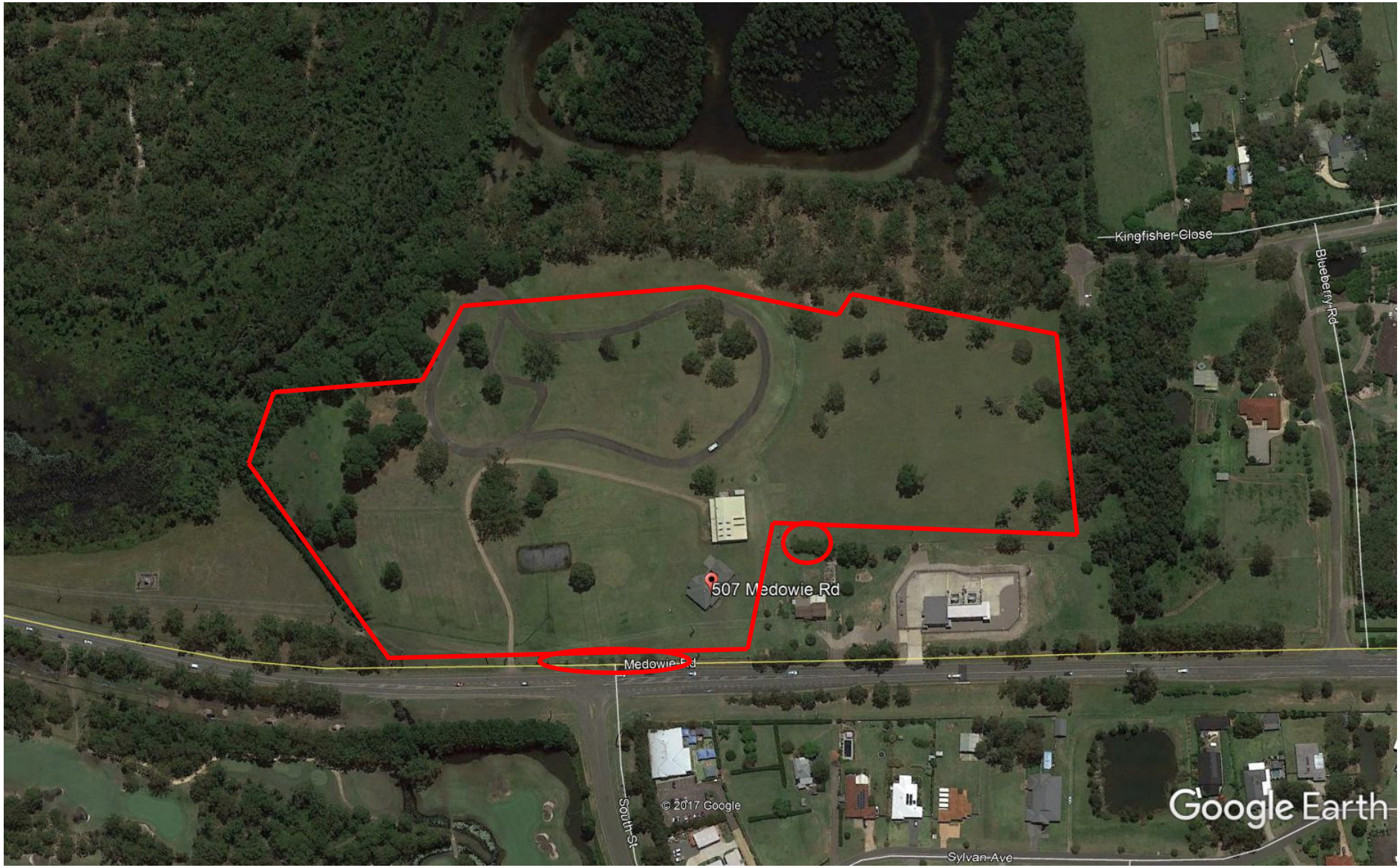
30. Surface drainage is not to be altered so as to direct water into or out of the Tree Protection Zones.

31. Any herbicides placed under paving material must be safe for use around trees and labeled for that use. Any pesticides used on site must be tree safe and not easily transported by water.

32. Tree Protection Measures are to remain in place until all site work has been completed. Fences may not be relocated or removed without the written permission of the consulting arborist.

33. All pruning work to be carried out by a qualified arborist working to Australian Standard 4373 –2007 and in accordance with the Code of Practice Amenity Tree Industry August 1998.

**APPENDIX 4 – ASSESSMENT SITE - AERIAL VIEW**



## APPENDIX 5 – TREE EVALUATION SHEETS

| Tree No | Botanical Name<br>Common Name | Age | HGT (m) | Canopy Spread NSEW (m) | Condition | DBH (mm) | DGL (mm) | TPZ Radius (m) | SRZ Radius (m) | Structure | Health | SULE | Comments | Impacts | Recommendations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | *Angophora floribunda*<br>Rough barked Apple | M | 18 | 3435 | 3 | 840<br>300 | 1050 | 10.6 | 3.38 | Fair | Fair/<br>Poor | 3b | Moderate state of decline. Numerous dead small & medium size branches & dieback of other branches<br>Moderate borer damage to branches along stems of numerous branches<br>Previous failure of some medium size branches indicated by remaining stem stubs | Retainable<br>Development not expected within TPZ<br>No direct impacts expected | Consider removal if area is expected to be frequently used<br>Tree in moderate state of decline<br>It is likely that dieback & decline will continue and over the short term the tree will eventually need to be removed<br>Not suitable for long term retention |
| 2 | *Angophora floribunda*<br>Rough barked Apple | M | 12 | 4855 | 3 | 920 | 1050 | 11.0 | 3.38 | Fair | Good | 3d | No significant signs of dieback or decline<br>Excessive end weight on overextended and /or laterally formed branches<br>Moderate size cavity & associated decay in trunk<br>Openings at the bottom & top of trunk indicates cavity & decay extends inside the length of trunk.<br>Previous failure of central leading branch | Retainable<br>Development not expected within TPZ<br>No direct impacts expected | Retainable with some remedial care |
| 3 | *Angophora floribunda*<br>Rough barked Apple | M | 18 | 9973 | 5 | 1100 | 1000 | 13.2 | 3.31 | Fair | Good | 2d | No significant signs of dieback or decline<br>Co-dominant scaffolds minor bark inclusion<br>Excessive end weight on west facing scaffold | Retainable<br>Development not expected within TPZ<br>No direct impacts expected | Retainable with some remedial care |
| 4 | *Angophora floribunda*<br>Rough barked Apple | M | 18 | 6633 | 5 | 480<br>420 | 1000 | 7.6 | 3.31 | Good/<br>Fair | Good/<br>Fair | 2d | Dieback of some small branches but no significant signs of decline<br>Co-dominant trunks minor bark inclusion<br>Moderate borer damage to branches along stems of numerous branches<br>Previous failure of some small & medium size branches indicated by remaining stem stubs | Retainable<br>Development not expected within TPZ<br>No direct impacts expected | Retainable with some remedial care |
| 5 | *Melaleuca quinquenervia*<br>Broad leafed<br>Paper Bark | M | 18 | 5555 | 5 | 740 | 840 | 8.9 | 3.08 | Good | Good | 1b | No significant signs of dieback or decline<br>No significant structural defects | Retainable<br>Development not expected within TPZ<br>No direct impacts expected | Retainable with some remedial care |
| 6 | *Angophora floribunda*<br>Rough barked Apple | M | 8 | 1223 | 3 | 420 | 600 | 5.0 | 2.67 | Poor | Fair/<br>Poor | 3b | Moderate state of decline. Numerous dead small & medium size branches & dieback of other branches<br>Crown density between 30 - 50%<br>Previous trunk failure resulting in loss of upper canopy | Remove<br>Within the development footprint | Consider removal particularly if area is expected to be frequently used<br>Poor structural condition<br>Remedial action is not considered beneficial in relation to satisfactorily reducing the risk to an acceptable level<br>Not suitable for long term retention |

| Tree No | Botanical Name Common Name | Age | HGT (m) | Canopy Spread NSEW (m) | Condition | DBH (mm) | DGL (mm) | TPZ Radius (m) | SRZ Radius (m) | Structure | Health | SULE | Comments | Impacts | Recommendations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 7 | *Angophora floribunda*<br>Rough barked Apple | M | | 10345 | 3 | 890<br>330 | 1150 | 11.4 | 3.51 | Poor | Fair | 3d | Dieback of some other branches<br>Some large dead branches<br>Excessive end weight particularly on lower overextended branches<br>Previous trunk failure at approx. 8m high resulting in loss of upper canopy<br>Diseased tree fungal brackets in trunk south side where trunk failure has occurred<br>Habitat tree | Retainable<br>Development not expected within TPZ<br>No direct impacts expected | Consider removal if not habitat significant<br>particularly if area is expected to be frequently used |
| 8 | *Eucalyptus robusta*<br>Swamp Mahogany | M | 18 | 8 6 10 8 | 5 | 920 | 1050 | 11.0 | 3.38 | Good/ Fair | Good | 2d | No significant structural defects<br>Some dead small size branches but no significant signs of decline<br>Excessive end weight particularly on lower overextended branches<br>Previous failure of some small & medium size branches indicated by remaining stem stubs<br>Hanging & broken branches caught up in canopy of adjacent tree. | Retainable<br>Potential damage to secondary and/ or minor roots | Retainable with some remedial care |
| 9 | *Angophora floribunda*<br>Rough barked Apple | M | 25 | 8568 | 5 | 950 | 1350 | 11.4 | 3.75 | Good | Good/ Fair | 2d | No significant signs of dieback or decline<br>Dieback of some small branches but no significant signs of decline<br>Previous failure of co-dominant trunk to north | Remove<br>Within the development footprint | Retainable with some remedial care |
| 10 | *Eucalyptus pilularis*<br>Blackbutt | M | 30 | 10 10 12 6 | | 960<br>360 | 1420 | 12.3 | 3.83 | Good/ Fair | Good/ Fair | 2d | No significant structural defects<br>Dieback of some medium & small size branches but no significant signs of decline<br>Excessive end weight particularly on lower overextended branches<br>Previous failure of some small & medium size branches indicated by remaining stem stubs<br>Habitat tree | Remove<br>Within the development footprint | Retainable with some remedial care |
| 11 | *Casuarina glauca*<br>Swamp Oak | M | 12 | 2511 | 3 | 400 | 550 | 4.8 | 2.57 | Poor | Good | 3b | No significant signs of dieback or decline<br>Poor habit & form unbalanced crown orientated to the west<br>Previous failure of co-dominant trunk to east | Remove<br>Within the development footprint | Remove<br>Major structural defects<br>Remedial action is not considered beneficial in relation to satisfactorily reducing the risk to an acceptable level<br>Not suitable for retention |

| Tree No | Botanical Name Common Name | Age | HGT (m) | Canopy Spread NSEW (m) | Condition | DBH (mm) | DGL (mm) | TPZ Radius (m) | SRZ Radius (m) | Structure | Health | SULE | Comments | Impacts | Recommendations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 12 | *Eucalyptus grandis*<br>Flooded Gum | M | 20 | 10 10 10 5 | 5 | 630 | 780 | 7.6 | 2.98 | Good/ Fair | Good | 2d | No significant signs of dieback or decline<br>No significant structural defects<br>Excessive end weight on overextended and /or laterally formed branches<br>Minor trunk defect missing bark affecting approx. 10% circumference<br>Good response growth | Remove<br>Within the development footprint | Retainable with some remedial care |
| 13 | *Erythrina x sykesii*<br>Coral Tree | M | 8 | 5353 | 5 | Multi Trunk | 650 | 4.0 | 2.76 | Good | Good | 2d | No significant signs of dieback or decline<br>No significant structural defects | Retainable<br>Development not expected within TPZ<br>No direct impacts expected | Retainable with some remedial care |
| 14 | *Erythrina x sykesii*<br>Coral Tree | S/M | 6 | 4223 | 5 | Multi Trunk | 500 | 4.0 | 2.47 | Good | Good/ Fair | | No significant structural defects<br>Dieback of central leading branches but no significant signs of decline | Retainable<br>Development not expected within TPZ<br>No direct impacts expected | Retainable with some remedial care |
| 15 | *Erythrina x sykesii*<br>Coral Tree | S/M | 6 | 3333 | 5 | Multi Trunk | 500 | 4.0 | 2.47 | Good | Good | 2d | No significant signs of dieback or decline<br>No significant structural defects | Retainable<br>Development not expected within TPZ<br>No direct impacts expected | Retainable with some remedial care |
| 16 | *Erythrina x sykesii*<br>Coral Tree | S/M | 6 | 3344 | 5 | Multi Trunk | 500 | 4.0 | 2.47 | Good | Good | 2d | No significant signs of dieback or decline<br>No significant structural defects | Retainable<br>Development not expected within TPZ<br>No direct impacts expected | Retainable with some remedial care |
| 17 | *Erythrina x sykesii*<br>Coral Tree | S/M | 6 | 3333 | 5 | Multi Trunk | 600 | 4.0 | 2.67 | Good | Good | 2d | No significant signs of dieback or decline<br>No significant structural defects | Retainable<br>Development not expected within TPZ<br>No direct impacts expected | Retainable with some remedial care |
| 18 | *Erythrina x sykesii*<br>Coral Tree | S/M | 6 | 4444 | 5 | Multi Trunk | 800 | 4.0 | 3.01 | Good | Good | 2b | No significant signs of dieback or decline<br>No significant structural defects | Retainable<br>Development not expected within TPZ<br>No direct impacts expected | Retainable with some remedial care |
| 19 | *Pinus radiata*<br>Radiata Pine | M | 18 | 5243 | 5 | 560 | 620 | 6.7 | 2.71 | Good | Good | 1b | No significant signs of dieback or decline<br>No significant structural defects<br>Excessive end weight on excessively bowed branches | Remove<br>Within the development footprint | Retainable with some remedial care |
| 20 | *Pinus radiata*<br>Radiata Pine | M | 18 | 4324 | 5 | 500 | 630 | 6.0 | 2.73 | Good | Good | 1b | No significant structural defects<br>Some dead small size branches but no significant signs of decline | Remove<br>Major encroachment into TPZ<br>Potential damage to roots within the TPZ & SRZ | Retainable with some remedial care |
| 21 | E*ucalyptus tereticornis*<br>Forest Red Gum | M | 20 | 5654 | 3 | 580 | 600 | 7.0 | 2.67 | Fair | Good | 3b | No significant signs of dieback or decline<br>Co-dominant trunk moderate bark inclusion & linear ribbing | Remove<br>Within the development footprint | Consider removal<br>Moderate structural defects<br>Remedial action is not considered beneficial in relation to satisfactorily reducing the risk to an acceptable level<br>Not suitable for long term retention |

| Tree No | Botanical Name Common Name | Age | HGT (m) | Canopy Spread NSEW (m) | Condition | DBH (mm) | DGL (mm) | TPZ Radius (m) | SRZ Radius (m) | Structure | Health | SULE | Comments | Impacts | Recommendations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 22 | *Pinus radiata*<br>Radiata Pine | M | 18 | 6555 | 4 | 630 | 740 | 7.6 | 2.92 | Good/ Fair | Good | 1b | No significant signs of dieback or decline<br>No significant structural defects<br>Excessive end weight on laterally formed or excessively bowed branches<br>Hanging & broken branches caught up in canopy of adjacent tree. | Remove<br>Within the development footprint | Retainable with some remedial care |
| 23 | *Eucalyptus pilularis*<br>Blackbutt | M | 34 | 17 10 14 10 | 4 | 1650 | 1800 | 19.8 | 4.24 | Good/ Fair | Good | 1c\|2b | No significant signs of dieback or decline<br>No significant structural defects<br>Excessive end weight on overextended and /or laterally formed branches particularly to the north<br>Previous failure of some medium size branches indicated by remaining stem stubs<br>Previous failure of large scaffold to south<br>Habitat tree | Remove<br>Within the development footprint | Retainable with some remedial care |
| 24 | *Casuarina glauca*<br>Swamp Oak | M | 15 | 2511 | 5 | 350 | 450 | 4.2 | 2.37 | Good | Good | 2d | No significant signs of dieback or decline<br>No significant structural defects<br>Previous failure of central upper leading branch to south | Remove<br>Within the development footprint | Retainable with some remedial care |
| 25 | *Casuarina glauca*<br>Swamp Oak | M | 14 | 2322 | 5 | 220<br>240 | 500 | 3.9 | 2.47 | Good | Good | 2d | No significant signs of dieback or decline<br>No significant structural defects | Remove<br>Within the development footprint | Retainable with some remedial care |
| 26 | *Casuarina glauca*<br>Swamp Oak | M | 18 | 1521 | 5 | 420 | 530 | 5.0 | 2.53 | Good | Good | 2d | No significant signs of dieback or decline<br>No significant structural defects<br>Fair habit & form unsymmetrical canopy spread orientated to the south | Remove<br>Within the development footprint | Retainable with some remedial care |
| 27 | *Angophora costata*<br>Smooth barked Apple | M | 25 | 8 9 9 12 | 5 | 1300 | 1430 | 15.6 | 3.85 | Good/ Fair | Good | 2b | No significant signs of dieback or decline<br>No significant structural defects<br>Minor defects along stems of some branches<br>Excessive end weight on overextended and /or laterally formed or excessively bowed branches | Retainable<br>Potential damage to secondary and/ or minor roots | Retainable with some remedial care |
| 28 | *Angophora costata*<br>Smooth barked Apple | O/M | 14 | 2535 | 2 | 800 | 950 | 9.6 | 3.24 | Poor | Poor | 4a | Dying tree<br>Dieback to all parts of tree<br>Dieback of small, medium & large branches<br>Crown density < than 20%<br>Habitat tree<br>Bee hive north side lower trunk at approx. 1.2m high | Remove<br>Major encroachment into TPZ<br>Potential damage to roots within the TPZ & SRZ | Dying tree<br>Consider removal if not habitat significant |
| 29 | Dead tree<br>Unidentified | O/M | 6 | 1116 | 1 | 1100 | 1250 | 13.2 | 3.63 | Poor | Poor | 4a | Dead Tree<br>Habitat tree | Remove<br>Within the development footprint | Dead tree<br>Consider removal if not habitat significant |

| Tree No | Botanical Name Common Name | Age | HGT (m) | Canopy Spread NSEW (m) | Condition | DBH (mm) | DGL (mm) | TPZ Radius (m) | SRZ Radius (m) | Structure | Health | SULE | Comments | Impacts | Recommendations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 30 | *Eucalyptus pilularis* Blackbutt | M | 30 | 12 9 10 8 | 3 | 1680 | 2100 | 20.2 | 4.52 | Fair/ Poor | Fair | 3b | North facing scaffold completely dead<br>Excessive end weight on overextended and /or laterally formed branches<br>Major trunk defect. Exposed dead & decaying wood affecting approx. 50% trunk circumference<br>Wound at base of trunk Missing bark & exposed dead wood affecting approx. 60% trunk circumference<br>Previous failure of some small & medium size branches indicated by remaining stem stubs<br>Previous failure of large scaffold to south<br>Moderate borer damage to scaffolds<br>Poor response growth<br>Habitat tree | Remove<br>Within the development footprint | Consider removal if not habitat significant<br>Major structural defects<br>Remedial action is not considered beneficial in relation to satisfactorily reducing the risk to an acceptable level<br>Not suitable for long term retention<br>History if branch failure<br>Not suitable for retention within a school environment |
| 31 | *Corymbia maculata* Spotted Gum | M | 20 | 7777 | 5 | 730 | 860 | 8.8 | 3.11 | Good | Good | 1b | No significant signs of dieback or decline<br>No significant structural defects | Remove<br>Within the development footprint | Retainable with some remedial care |
| 32 | *Angophora costata* Smooth barked Apple | M | 18 | 6636 | 3 | 680 520 | 1100 | 10.3 | 3.44 | Poor | Fair | 3b | Initial stage of decline. Dieback of small branches & thinning of crown foliage.<br>Crown density between 50 - 70%<br>Large size cavity & associated decay in root crown<br>Large size cavity & associated decay in trunk<br>Extensive cavity & decay along length of trunk affecting approx. 70% circumference of the north facing side trunk & 50% root crown area<br>Previous failure of some small & medium size branches indicated by remaining stem stubs<br>Habitat tree | Remove<br>Within the development footprint | Consider removal if not habitat significant<br>Major structural defects<br>Remedial action is not considered beneficial in relation to satisfactorily reducing the risk to an acceptable level<br>Not suitable for long term retention |
| 33 | *Angophora costata* Smooth barked Apple | M | 22 | 10 12 12 10 | 4 | 940 | 1060 | 11.3 | 3.39 | Good/ Fair | Good | 1b | No significant structural defects<br>Dieback of some small branches but no significant signs of decline<br>Excessive end weight on overextended and /or laterally formed or excessively bowed branches<br>Previous failure of some small & medium size branches indicated by remaining stem stubs | Retainable<br>Potential damage to secondary and/ or minor roots | Retainable with some remedial care |

| Tree No | Botanical Name Common Name | Age | HGT (m) | Canopy Spread NSEW (m) | Condition | DBH (mm) | DGL (mm) | TPZ Radius (m) | SRZ Radius (m) | Structure | Health | SULE | Comments | Impacts | Recommendations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 34 | *Angophora costata*<br>Smooth barked Apple | M | 22 | 10 10 10 10 | 4 | 1400 | 1400 | 15.0 | 3.81 | Good/ Fair | Good | 1b | No significant signs of dieback or decline<br>No significant structural defects<br>Excessive end weight on overextended and /or laterally formed or excessively bowed branches | Remove<br>Within the development footprint | Retainable with some remedial care |
| 35 | *Casuarina glauca*<br>Swamp Oak | M | 16 | 7554 | 5 | 480<br>260 | 720 | 6.6 | 2.88 | Good/ Fair | Good | 2d | No significant signs of dieback or decline<br>Co-dominant trunks minor bark inclusion<br>Excessive end weight on smaller size bowed branches<br>Habitat tree | Remove<br>Within the development footprint | Retainable with some remedial care |
| 36 | *Angophora costata*<br>Smooth barked Apple | M | 18 | 10 10 8 8 | 5 | 820 | 820 | 9.8 | 3.04 | Good/ Fair | Good/ Fair | 2d | Initial state of decline. Dieback of small branches & thinning of crown foliage.<br>Whilst no significant signs of decline were evident health & vigour appears to be slightly diminished<br>Excessive end weight on overextended and /or laterally formed branches<br>No significant structural defects | Retainable<br>Potential damage to secondary and/ or minor roots | Retainable with some remedial care |
| 37 | *Casuarina glauca*<br>Swamp Oak | M | 16 | 10 2 6 2 | 4 | 500<br>590 | 1040 | 9.2 | 3.36 | Good/ Fair | Good | 2d | No significant signs of dieback or decline<br>No significant structural defects<br>Excessive end weight on overextended branches<br>Fair habit & form unsymmetrical canopy spread orientated to the north partially restricted by larger adjacent tree | Remove<br>Within the development footprint | Retainable with some remedial care |
| 38 | *Casuarina glauca*<br>Swamp Oak | M | | 2236 | 5 | 470 | 520 | 5.6 | 2.51 | Good | Good | 2d | No significant signs of dieback or decline<br>No significant structural defects | Remove<br>Within the development footprint | Retainable with some remedial care |
| 39 | *Angophora costata*<br>Smooth barked Apple | M | 16 | 2214 | 3 | 620<br>450 | 1100 | 9.2 | 3.44 | Poor | Poor | 3b | Moderate to advanced state of decline.<br>Numerous dead small & medium size branches & dieback of other branches<br>Dieback of small, medium & large branches<br>Crown density between 30 - 50%<br>Major trunk defect. Exposed dead & decaying wood affecting approx. 30% trunk circumference<br>Exposed dead & decaying wood extending into root crown<br>Habitat tree | Remove<br>Within the development footprint | Consider removal if not habitat significant<br>Tree in decline<br>Remedial action is not considered beneficial in relation to satisfactorily reducing the risk to an acceptable level |

| Tree No | Botanical Name Common Name | Age | HGT (m) | Canopy Spread NSEW (m) | Condition | DBH (mm) | DGL (mm) | TPZ Radius (m) | SRZ Radius (m) | Structure | Health | SULE | Comments | Impacts | Recommendations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 40 | *Casuarina glauca*<br>Swamp Oak | M | 18 | 3384 | 3 | 900 | 1150 | 10.8 | 3.51 | Poor | Good | 3b | Some dead small size branches but no significant signs of decline<br>Co-dominant trunks moderate bark inclusion<br>Moderate size cavity & associated decay in root crown & west facing scaffold<br>Previous failure of a co-dominant trunk to north<br>Habitat tree | Remove<br>Within the development footprint | Consider removal if not habitat significant<br>Major structural defects<br>Remedial action is not considered beneficial in relation to satisfactorily reducing the risk to an acceptable level<br>Not suitable for long term retention |
| 41 | E*ucalyptus tereticornis*<br>Forest Red Gum | M | 30 | 12 12 12 14 | 4 | 1640 | 1770 | 15.0 | 4.21 | Good/ Fair | Good | 2d | No significant signs of dieback or decline<br>No significant structural defects<br>Co-dominant trunks minor bark inclusion<br>Excessive end weight on overextended and /or laterally formed branches | Retainable<br>Potential damage to secondary and/ or minor roots | Retainable with some remedial care |
| 42 | *Pinus radiata*<br>Radiata Pine | M | 22 | 6555 | 5 | 740 | 850 | 8.9 | 3.09 | Good/ Fair | Good | 1b | Some dead medium size branches but no significant signs of decline<br>Excessive end weight on excessively bowed branches<br>Hanging & broken branches caught up in canopy. | Remove<br>Major encroachment into TPZ<br>Potential damage to roots within the TPZ & SRZ | Retainable with some remedial care |
| 43 | *Pinus radiata*<br>Radiata Pine | M | 25 | 8636 | 4 | 620<br>550<br>270 | 1170 | 10.4 | 3.53 | Fair | Good | 2d | Some dead small size branches but no significant signs of decline<br>Excessive end weight on overextended and /or laterally formed or excessively bowed branches<br>Co-dominant trunks moderate bark inclusion | Retainable<br>Development not expected within TPZ<br>No direct impacts expected | Retainable with some remedial care |
| 44 | *Pinus radiata*<br>Radiata Pine | M | 22 | 10 3 8 5 | 4 | 820 | 940 | 9.8 | 3.22 | Good/ Fair | Good | 1b | Some dead medium size branches but no significant signs of decline<br>Excessive end weight on overextended and /or laterally formed or excessively bowed branches<br>Previous failure of some small & medium size branches indicated by remaining stem stubs<br>Hanging & broken branches caught up in canopy. | Retainable<br>Development not expected within TPZ<br>No direct impacts expected | Retainable with some remedial care |

| Tree No | Botanical Name Common Name | Age | HGT (m) | Canopy Spread NSEW (m) | Condition | DBH (mm) | DGL (mm) | TPZ Radius (m) | SRZ Radius (m) | Structure | Health | SULE | Comments | Impacts | Recommendations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 45 | *Pinus radiata*<br>Radiata Pine | M | 25 | 4847 | 4 | 790 | 860 | 9.5 | 3.11 | Fair | Good | 2d | No significant signs of dieback or decline<br>Excessive end weight on excessively bowed branches<br>Previous failure of some medium size branches indicated by remaining stem stubs<br>Previous failure of large scaffold to west | Remove<br>History of branch failure<br>Remedial action is not considered beneficial in relation to satisfactorily reducing the risk to an acceptable level<br>Not suitable for long term retention<br>Not suitable for retention particularly as area is expected to be frequently used | Consider removal<br>Remedial action is not considered beneficial in relation to satisfactorily reducing the risk to an acceptable level<br>Not suitable for long term retention<br>History of branch failure |
| 46 | *Pinus radiata*<br>Radiata Pine | M | 26 | 9799 | 4 | 1050 | 1120 | 12.6 | 3.47 | Good/ Fair | Good | 1b | No significant signs of dieback or decline<br>Excessive end weight on overextended and /or laterally formed or excessively bowed branches<br>Vine spreading throughout the crown<br>Previous failure of some small & medium size branches indicated by remaining stem stubs | Retainable<br>Development not expected within TPZ<br>No direct impacts expected | Retainable with some remedial care |
| 47 | *Pinus radiata*<br>Radiata Pine | M | 25 | 5555 | 5 | 900 | 1100 | 10.8 | 3.44 | Good/ Fair | Good | 1b | No significant signs of dieback or decline<br>No significant structural defects<br>Excessive end weight on excessively bowed branches | Remove<br>Within the development footprint | Retainable with some remedial care |
| 48 | E*ucalyptus tereticornis*<br>Forest Red Gum | M | 18 | 5525 | 5 | 580 | 680 | 7.0 | 2.81 | Good | Good | 2d | No significant signs of dieback or decline<br>No significant structural defects<br>Unsymmetrical canopy spread. Pruned to maintain clearance from overhead powerlines<br>Orientated to west | Consider removal<br>Will interferes with overhead powerlines and it fully matures<br>Not suitable to position for long term retention | Retainable with some remedial care |
| 54 | *Eucalyptus spp.*<br>Eucalyptus Tree | M | 25 | 10 8 8 8 | 4 | 1150 | 1150 | 13.8 | 3.51 | Good/ Fair | Good/ Fair | 2d | Initial stage of decline state of decline. Dead small & medium size branches & dieback of other branches<br>Co-dominant trunks moderate bark inclusion<br>Termite nest in trunk west side approx. 3m high<br>Termite tracks noticeable along trunk & scaffold<br>Habitat tree | Retainable<br>Development not expected within TPZ<br>No direct impacts expected | Retainable with some remedial care |
| 55 | *Pinus radiata*<br>Radiata Pine | M | 25 | 6666 | 5 | 850 | 970 | 10.2 | 3.27 | Good/ Fair | Good | 1b | No significant signs of dieback or decline<br>No significant structural defects<br>Excessive end weight on excessively bowed branches | Retainable<br>Development not expected within TPZ<br>No direct impacts expected | Retainable with some remedial care |

| Tree No | Botanical Name Common Name | Age | HGT (m) | Canopy Spread NSEW (m) | Condition | DBH (mm) | DGL (mm) | TPZ Radius (m) | SRZ Radius (m) | Structure | Health | SULE | Comments | Impacts | Recommendations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 56 | *Pinus radiata*<br>Radiata Pine | M | 30 | 6462 | 5 | 820 | 970 | 9.8 | 3.27 | Good/ Fair | Good | 1b | No significant signs of dieback or decline<br>No significant structural defects<br>Excessive end weight on overextended and /or laterally formed or excessively bowed branches | Retainable<br>Development not expected within TPZ<br>No direct impacts expected | Retainable with some remedial care |
| 57 | *Pinus radiata*<br>Radiata Pine | M | | 3411 | 4 | 540 | 620 | 6.5 | 2.71 | Fair | Good/ Fair | 3b | Some dead small size branches but no significant signs of decline<br>Moderate natural trunk lean approx. 15 degrees to west<br>Excessive crown raising | Remove<br>Poor habit & form<br>Not suitable for retention particularly as area is expected to be frequently used | Consider removal particularly if area is expected to be frequently used<br>Poor habit & form.<br>Generally live crown ratio of a tree should be approximately two thirds in relation to tree height to distribute wind stress and some major branches should be left on the lower half of the trunk. |
| 58 | *Pinus radiata*<br>Radiata Pine | M | 32 | 6626 | 4 | 840 | 1000 | 10.1 | 3.31 | Fair | Good | 2d | No significant signs of dieback or decline<br>Co-dominant trunk major bark inclusion & linear ribbing<br>Excessive end weight on overextended and /or laterally formed branches<br>Previous failure of some small & medium size branches indicated by remaining stem stubs | Remove<br>Major encroachment into TPZ<br>Potential damage to roots within the TPZ & SRZ | Consider removal<br>Remedial action is not considered beneficial in relation to satisfactorily reducing the risk to an acceptable level<br>Not suitable for long term retention<br>History of branch failure |
| 59 | *Pinus radiata*<br>Radiata Pine | M | 33 | 6226 | 4 | 670 | 760 | 8.0 | 2.95 | Good/ Fair | Good/ Fair | 1b | No significant signs of dieback or decline<br>Some dead medium size branches but no significant signs of decline<br>Excessive end weight on excessively bowed branches<br>Previous failure of some small & medium size branches indicated by remaining stem stubs | Remove<br>Major encroachment into TPZ<br>Potential damage to roots within the TPZ & SRZ | Retainable with some remedial care |
| 60 | *Pinus radiata*<br>Radiata Pine | M | 33 | 5532 | 5 | 900 | 1020 | 10.8 | 3.34 | Good/ Fair | Good | 1b | No significant signs of dieback or decline<br>No significant structural defects<br>Excessive end weight on overextended and /or laterally formed branches<br>Previous failure of some small & medium size branches indicated by remaining stem stubs | Remove<br>Major encroachment into TPZ<br>Potential damage to roots within the TPZ & SRZ | Retainable with some remedial care |
| 61 | *Pinus radiata*<br>Radiata Pine | M | 33 | 6233 | 5 | 850 | 950 | 10.2 | 3.24 | Good/ Fair | Good | 1b | No significant signs of dieback or decline<br>No significant structural defects<br>Excessive end weight on excessively bowed branches | Remove<br>Major encroachment into TPZ<br>Potential damage to roots within the TPZ & SRZ | Retainable with some remedial care |

| Tree No | Botanical Name Common Name | Age | HGT (m) | Canopy Spread NSEW (m) | Condition | DBH (mm) | DGL (mm) | TPZ Radius (m) | SRZ Radius (m) | Structure | Health | SULE | Comments | Impacts | Recommendations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 62 | *Pinus radiata*<br>Radiata Pine | M | 33 | 2824 | 5 | 800 | 920 | 9.6 | 3.20 | Good/ Fair | Good | 1b | No significant structural defects<br>Some dead small & medium size branches but no significant signs of decline<br>Fair habit & form Suppressed canopy orientated to the south partially restricted by larger adjacent tree<br>Previous failure of some medium size branches indicated by remaining stem stubs | Remove<br>Major encroachment into TPZ<br>Potential damage to roots within the TPZ & SRZ | Retainable with some remedial care |
| 63 | *Pinus radiata*<br>Radiata Pine | M | 32 | 3634 | 4 | 650 | 740 | 7.8 | 2.92 | Fair | Good | 2d | No significant signs of dieback or decline<br>Split/ cracked lower large branches to south due to excessive end weight<br>Minor trunk defects affecting approximately 15% circumference<br>Good response growth & wound wood developing | Remove<br>Major encroachment into TPZ<br>Potential damage to roots within the TPZ & SRZ | Retainable with some remedial care |
| 64 | *Pinus radiata*<br>Radiata Pine | M | 33 | 2622 | 5 | 730 | 880 | 8.8 | 3.14 | Good/ Fair | Good | 1b | No significant signs of dieback or decline<br>No significant structural defects<br>Excessive end weight on overextended and /or laterally formed branches | Remove<br>Major encroachment into TPZ<br>Potential damage to roots within the TPZ & SRZ | Retainable with some remedial care |
| 65 | *Pinus radiata*<br>Radiata Pine | M | 32 | 7333 | 5 | 770 | 870 | 9.2 | 3.12 | Fair | Good | 2d | No significant signs of dieback or decline<br>Excessive end weight on lateral/bowed branches<br>Moderate natural lean approx. 15 degrees to north<br>No soil mounding, cracking, root lifting or damage was noticeable that would indicate failure was imminent or probable<br>Co-dominant trunks moderate bark inclusion<br>Moderate trunk defects affecting approximately 15% circumference<br>Good response growth & wound wood developing<br>Previous failure of some medium & large size branches indicated by remaining stem stubs | Remove<br>Within the development footprint | Retainable with some remedial care |
| 66 | *Pinus radiata*<br>Radiata Pine | M | 30 | 4452 | 5 | 840 | 980 | 10.1 | 3.28 | Good/ Fair | Good | 1b | No significant signs of dieback or decline<br>Dieback of some small branches but no significant signs of decline<br>Excessive end weight on excessively bowed branches | Remove<br>Within the development footprint | Retainable with some remedial care |

| Tree No | Botanical Name Common Name | Age | HGT (m) | Canopy Spread NSEW (m) | Condition | DBH (mm) | DGL (mm) | TPZ Radius (m) | SRZ Radius (m) | Structure | Health | SULE | Comments | Impacts | Recommendations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 67 | *Pinus radiata*<br>Radiata Pine | M | 25 | 5435 | 5 | 720 | 880 | 8.6 | 3.14 | Good/ Fair | Good | 1b | No significant structural defects<br>Some dead small size branches but no significant signs of decline<br>Excessive end weight on excessively bowed branches | Remove<br>Major encroachment into TPZ<br>Potential damage to roots within the TPZ & SRZ | Retainable with some remedial care |
| 68 | *Pinus radiata*<br>Radiata Pine | M | 25 | 4553 | 5 | 720 | 970 | 8.6 | 3.27 | Good/ Fair | Good | 1b | No significant structural defects<br>Some dead small & medium size branches but no significant signs of decline<br>Excessive end weight on excessively bowed branches | Remove<br>Major encroachment into TPZ<br>Potential damage to roots within the TPZ & SRZ | Retainable with some remedial care |
| 69 | *Pinus radiata*<br>Radiata Pine | M | 25 | 5555 | 5 | 760 | 1000 | 9.1 | 3.31 | Good/ Fair | Good | 1b | No significant signs of dieback or decline<br>No significant structural defects<br>Excessive end weight on excessively bowed branches | Remove<br>Within the development footprint | Retainable with some remedial care |
| 70 | *Eucalyptus robusta*<br>Swamp Mahogany | M | 23 | 7546 | 5 | 620 | 720 | 7.4 | 2.88 | Good | Good | | No significant signs of dieback or decline<br>No significant structural defects | Retainable<br>Development not expected within TPZ<br>No direct impacts expected | Retainable with some remedial care |
| 71 | *Eucalyptus robusta*<br>Swamp Mahogany | M | 18 | 3472 | 5 | 460 | 560 | 5.5 | 2.59 | Good/ Fair | Good | | No significant signs of dieback or decline<br>No significant structural defects<br>Fair habit & form Suppressed canopy orientated to the east partially restricted by larger adjacent tree | Retainable<br>Development not expected within TPZ<br>No direct impacts expected | Retainable with some remedial care |
| 72 | *Eucalyptus robusta*<br>Swamp Mahogany | M | 22 | 3365 | 5 | 540 | 660 | 6.5 | 2.78 | Good | Good | 1b | No significant signs of dieback or decline<br>No significant structural defects | Retainable<br>Development not expected within TPZ<br>No direct impacts expected | Retainable with some remedial care |
| 73 | *Eucalyptus robusta*<br>Swamp Mahogany | M | 25 | 2471 | 5 | 550 | 650 | 6.6 | 2.76 | Good | Good | 1b | No significant signs of dieback or decline<br>No significant structural defects<br>Fair habit & form Suppressed canopy orientated to the east<br>partially restricted by larger adjacent tree | Retainable<br>Development not expected within TPZ<br>No direct impacts expected | Retainable with some remedial care |
| 74 | *Eucalyptus robusta*<br>Swamp Mahogany | M | 25 | 2523 | 5 | 530 | 630 | 6.4 | 2.73 | Good | Good | 1b | No significant signs of dieback or decline<br>No significant structural defects | Retainable<br>Development not expected within TPZ<br>No direct impacts expected | Retainable with some remedial care |
| 75 | *Melaleuca quinquenervia*<br>Broad leafed Paper Bark | M | 18 | 4414 | 5 | 580 | 670 | 7.0 | 2.80 | Good | Good | 1b | No significant signs of dieback or decline<br>No significant structural defects | Retainable<br>Development not expected within TPZ<br>No direct impacts expected | Retainable with some remedial care |

| Tree No | Botanical Name Common Name | Age | HGT (m) | Canopy Spread NSEW (m) | Condition | DBH (mm) | DGL (mm) | TPZ Radius (m) | SRZ Radius (m) | Structure | Health | SULE | Comments | Impacts | Recommendations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 76 | *Eucalyptus robusta*<br>Swamp Mahogany | M | 25 | 6 6 10 5 | 4 | 1040 | 1100 | 12.5 | 3.44 | Good/ Fair | Good/ Fair | 1b | Some dead medium size branches but no significant signs of decline<br>Dieback of some other branches & large suze branches<br>Previous failure of some small & medium size branches indicated by remaining stem stubs | Retainable<br>Development not expected within TPZ<br>No direct impacts expected | Retainable with some remedial care |
| 77 | *Eucalyptus robusta*<br>Swamp Mahogany | M | 25 | 7777 | 5 | 530<br>650<br>600 | 1250 | 12.3 | 3.63 | Good/ Fair | Good | 1b | No significant signs of dieback or decline<br>Co-dominant trunks minor bark inclusion<br>Multi-stemmed trunks<br>Previous failure of some small & medium size branches indicated by remaining stem stubs | Retainable<br>Development not expected within TPZ<br>No direct impacts expected | Retainable with some remedial care |
| 78 | *Eucalyptus robusta*<br>Swamp Mahogany | M | 20 | 6616 | 5 | 760<br>440 | 940 | 10.5 | 3.22 | Good/ Fair | Good/ Fair | 2d | Co-dominant trunks minor bark inclusion<br>Dieback of central leading branches but no significant signs of decline | Retainable<br>Potential damage to secondary and/ or minor roots | Retainable with some remedial care |
| 81 | E*ucalyptus tereticornis*<br>Forest Red Gum | M | 22 | 4546 | 5 | 630 | 750 | 7.6 | 2.93 | Good/ Fair | Good | 2d | No significant signs of dieback or decline<br>Co-dominant trunks moderate bark inclusion | Remove<br>Within the development footprint | Retainable with some remedial care |
| 82 | *Angophora floribunda*<br>Rough barked Apple | M | 22 | 7577 | 5 | 820 | 1000 | 9.8 | 3.31 | Good | Good/ Fair | 2d | No significant structural defects<br>Dieback of some small branches but no significant signs of decline<br>Some dead small size branches but no significant signs of decline<br>Previous failure of some medium size branches indicated by remaining stem stubs | Retainable<br>Potential damage to secondary and/ or minor roots | Retainable with some remedial care |
| 83 | *Angophora costata*<br>Smooth barked Apple | M | 24 | 10 10 10 10 | | 810<br>400 | 1180 | 10.8 | 3.55 | Good/ Fair | Good/ Fair | 2d | No significant signs of dieback or decline<br>Dieback of some medium & small size branches but no significant signs of decline<br>Excessive end weight on overextended and /or laterally formed or excessively bowed branches<br>Previous failure of some small & medium size branches indicated by remaining stem stubs<br>Habitat tree | Retainable<br>Development not expected within TPZ<br>No direct impacts expected | Retainable with some remedial care |

| Tree No | Botanical Name Common Name | Age | HGT (m) | Canopy Spread NSEW (m) | Condition | DBH (mm) | DGL (mm) | TPZ Radius (m) | SRZ Radius (m) | Structure | Health | SULE | Comments | Impacts | Recommendations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 84 | *Angophora floribunda*<br>Rough barked Apple | M | 23 | 7736 | 4 | 900 | 1000 | 10.8 | 3.31 | Good/ Fair | Good/ Fair | 2d | Initial stage of decline. Dieback of small branches and twigs.<br>Initial stage of decline Thinning of crown foliage<br>Moderate size cavity & associated decay in trunk<br>Minor hollow sound produced around lower south side trunk high when tapped indicated possible decay/cavity within<br>Whilst no significant signs of decline were evident health & vigour appears to be slightly diminished | Remove<br>Within the development footprint | Retainable with some remedial care |
| 85 | *Angophora floribunda*<br>Rough barked Apple | M | 20 | 8836 | 4 | 840 | 1000 | 10.1 | 3.31 | Good | Good/ Fair | 2d | Initial state of decline.<br>Dieback of small branches & thinning of crown foliage.<br>Crown density approx. 70%<br>Whilst no significant signs of decline were evident health & vigour appears to be slightly diminished<br>Previous failure of some medium size branches indicated by remaining stem stubs | Remove<br>Within the development footprint | Retainable with some remedial care |
| 86 | *Angophora floribunda*<br>Rough barked Apple | M | 23 | 10 8 10 10 | 5 | 880 | 1050 | 10.6 | 3.38 | Good/ Fair | Good/ Fair | 1b | No significant structural defects<br>Dieback of some medium & small size branches but no significant signs of decline<br>Excessive end weight on overextended and /or laterally formed or excessively bowed branches | Retainable<br>Development not expected within TPZ<br>No direct impacts expected | Retainable with some remedial care |
| 87 | *Melaleuca quinquenervia*<br>Broad leafed Paper Bark | M | 18 | 6555 | 5 | 1200 | 1300 | 14.4 | 3.69 | Good/ Fair | Good | 2d | No significant signs of dieback or decline<br>Co-dominant trunks moderate bark inclusion | Retainable<br>Development not expected within TPZ<br>No direct impacts expected | Retainable with some remedial care |
| 88 | *Melaleuca quinquenervia*<br>Broad leafed Paper Bark | M | 20 | 5453 | 5 | 1000 | 1100 | 12.0 | 3.44 | Good/ Fair | Good | 2d | No significant signs of dieback or decline<br>Multi-stemmed trunks<br>Moderate bark inclusions | Retainable<br>Development not expected within TPZ<br>No direct impacts expected | Retainable with some remedial care |
| 89 | *Casuarina glauca*<br>Swamp Oak | M | 12 | 7127 | 3 | 500<br>200<br>100 | 900 | 6.6 | 3.17 | Poor | Good | 4c | No significant signs of dieback or decline<br>Poor habit & form unbalanced crown orientated to the north<br>Soil mounding, cracking & root lifting indicates root plate movement has occurred & failure is probable or imminent<br>Due to excessive top weight | Remove<br>Within the development footprint | Remove<br>Major structural defect<br>High risk root crown failure<br>Remedial action is not considered beneficial in relation to satisfactorily reducing the risk to an acceptable level<br>Not suitable for retention |

| Tree No | Botanical Name Common Name | Age | HGT (m) | Canopy Spread NSEW (m) | Condition | DBH (mm) | DGL (mm) | TPZ Radius (m) | SRZ Radius (m) | Structure | Health | SULE | Comments | Impacts | Recommendations |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 90 | E*ucalyptus tereticornis*<br>Forest Red Gum | M | 18 | 5232 | 4 | 440 | 480 | 5.3 | 2.43 | Good/ Fair | Fair | 3d | Dieback of some small branches but no significant signs of decline<br>Co-dominant trunks minor bark inclusion<br>Mistletoe affected branches | Consider removal<br>Will interferes with overhead powerlines and it fully matures<br>Not suitable to position for long term retention | Retainable with some remedial care |
| 91 | *Eucalyptus spp.*<br>Eucalyptus Tree | M | 5 | 2222 | 3 | Multi stem | 1000 | 2.0 | 1.50 | Poor | Good | 3b | Basal sprouts<br>Epicormic shoots re-sprouting from stump forming canopy | Consider removal<br>Will interferes with overhead powerlines and it fully matures<br>Not suitable to position for long term retention | Remove<br>Poor structure<br>Will not develop into a good representative of the species<br>Not suitable for retention |
| 92 | *Eucalyptus spp.*<br>Eucalyptus Tree | S/M | 5 | 1111 | 5 | 100 .80 | 200 | 2.0 | 1.68 | Good/ Fair | Good | 2d | No significant signs of dieback or decline<br>Co-dominant trunks moderate bark inclusion | Consider removal<br>Will interferes with overhead powerlines and it fully matures<br>Not suitable to position for long term retention | Consider removal<br>Not suitable to location for long term retention<br>Will eventually interfere with overhead powerlines as it fully matures |
| 93 | *Eucalyptus spp.*<br>Eucalyptus Tree | S/M | 4 | 1111 | 6 | 100 .80 | 200 | 2.0 | 1.68 | Good/ Fair | Good | 2b | No significant signs of dieback or decline<br>Co-dominant trunks minor bark inclusion | Consider removal<br>Will interferes with overhead powerlines and it fully matures<br>Not suitable to position for long term retention | Consider removal<br>Not suitable to location for long term retention<br>Will eventually interfere with overhead powerlines as it fully matures |
| 94 | *Casuarina glauca*<br>Swamp Oak | M | 22 | 6666 | 4 | Multi Avg. 8x250 | 1500 | 7.0 | 3.92 | Good/ Fair | Good | 2d | No significant signs of dieback or decline<br>Excessive end weight on excessively bowed branches<br>Multi-stemmed trunks<br>Clump of 8 trunks | Retainable<br>Development not expected within TPZ<br>No direct impacts expected | Retainable with some remedial care |
| 95 | *Casuarina glauca*<br>Swamp Oak | M | 22 | 1514 | 5 | Multi Avg. 4x190 | 1100 | 7.0 | 3.44 | Fair | Good | 2d | No significant signs of dieback or decline<br>Co-dominant scaffolds major bark inclusion<br>Split in co-dominant scaffold to south<br>Clump of 4 trunks<br>Excessive end weight on lateral/bowed branches | Retainable<br>Development not expected within TPZ<br>No direct impacts expected | Retainable with some remedial care |
| 96 | E*ucalyptus tereticornis*<br>Forest Red Gum | M | 18 | 7575 | 5 | 560 | 690 | 6.7 | 2.83 | Good | Good | 1b | No significant signs of dieback or decline<br>No significant structural defects | Retainable<br>Development not expected within TPZ<br>No direct impacts expected | Retainable with some remedial care |