



Tree Assessment Report Lions Pioneer Park Streaky Bay

Prepared for
District Council of Streaky Bay

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1. Executive summary

This tree assessment and construction impact report was prepared for the District Council of Streaky Bay. The report covers all large trees within Lions Pioneer Park and includes trees located on Alfred Terrace to the north of the reserve, twenty-seven (27) specimens in total.

The District Council of Streaky Bay has received funding via the Federal Government Roads Funding Program to upgrade the park which is reported to be under-utilised. Council's planned refresh of the park includes access and movement reconfigurations, park infrastructure upgrades, landscaping and the installation of water sensitive urban design treatments. Council has commissioned this arboricultural report as part of the upgrade project to determine retention values of the park's existing tree plantings considering their age, current state of health and useful life expectancies.

This report describes the health, condition, relative risk and overall retention value of the subject trees. The report considers the current condition and useful life expectancy of trees in the context of park development and evaluates potential impact of works on the trees and their ongoing viability. Options to minimise impacts and enhance viability of plantings are discussed and recommendations provided.

2. Introduction

2.1. Scope

Active Green Services (AGS) was commissioned by the District Council of Streaky Bay to undertake tree assessments (including risk assessment where required) of approximately four hundred and thirty (430) trees throughout the Streaky Bay township. As part of this project, a Tree Policy review and preparation of a new Species Palette was also requested to be undertaken.

The Lions Pioneer Park component of the tree assessment scope was requested to be provided in an individual report to help guide tree retention/removal requirements for an upcoming upgrade of the park. Council has indicated that it intends to use this report to determine trees that will be retained and removed (using expected life as a guide for this determination). Council has also made a commitment to the Streaky Bay community that if some of the younger trees need to be removed, designers will be looking to relocate them to other parts of the park.

This report provides tree assessment and risk data for the twenty-seven (27) subject trees, discussion of the potential impact of works on the trees and strategies for minimisation of these. The report provides recommendations for minor design amendment and/or sensitive construction methodologies, tree works and ongoing maintenance requirements to help guide management of the park trees into the future.

2.2. Documents reviewed

Table 1 - Schedule of Drawings and Documents Reviewed

Document reference	Title	Type
DCSB-EM-05.04	District Council of Streaky Bay Tree Management Policy	Policy
Project No, 22LIO	Lions Park Redevelopment	Landscape Concept Plan

2.3. Applicable policy positions from the District Council of Streaky Bay Tree Management Policy

6.1 Tree removal

6.1.1. Delegation to approve the removal of trees, shall be the officer listed in Clause 8 of this Policy, unless the Officer deems that the removal of the tree is of significant community value, or affects nearby areas.

6.1.2 For every tree that Council removes, Council will replace the equivalent number of trees, the location and placement of equivalent trees shall be in accordance with Clause 6.4 of this Policy.

6.2 Tuart Tree Retention

All Tuart Trees Eucalyptus gomphocephala upon reaching their "useful" life and after the Tree Removal Assessment has been undertaken, the decision to replace Tuarts with a Tuart shall be in accordance with Clause 6.4.

6.4. Tree Planting

6.4.1 New tree selection

- (a) Aims to improve the quality and suitability of trees throughout the district. b) All new trees shall be selected on the basis of Clause 6.4.3 of this Policy and (Appendix 1) - Preferred species list.*
- (b) b) All new trees shall be selected on the basis of Clause 6.4.3 of this Policy and (Appendix 1) - Preferred species list.*

2.4. Notes

- The hybridization of flora species can cause an intermediate or incomplete form of morphological features and thereby affect the accuracy of field identification.
- Seasonal variations influence the presence of flowering and fruiting in flora species and thereby can affect the accuracy of field identification. Seasonal variation was not captured during the field assessment due to the short duration of the assessment.
- Active Green Services has not undertaken any of the following items which may impact tree health:
 - Soil analysis
 - Below ground root analysis
 - Aerial tree inspections

2.5. Methodology

Tree Assessments were undertaken by Senior Consulting Arborists of AGS - Ali Jasper and Sarah Nunn - on Tuesday February 8, 2023. This stand of trees was assessed using both Visual Tree Assessment (VTA) methodology and Quantified Tree Risk Assessment methodology (QTRA).

Visual Tree Risk Assessment methodology (Mattheck, C & Breleor, H., 1994) allows for the inspection and consideration of all tree parts and is typically used in most arboricultural inspections.

Quantified Tree Risk assessment provides a framework by which to assess the risk presented by a tree. This methodology results in the presentation of the risk as a ratio where, 1:1 is considered to be the highest level of risk i.e. will most definitely fail, to 1:1,000,000 or greater which is an extremely low level of risk. Risks between 1:1 and 1:10,000 are generally considered unacceptable and actions to reduce the risk would be required. Risks greater than 1:10,000 are generally tolerable.

Tree risk assessments were undertaken considering the potential for failure, targets in the event of failure and consequence of a failure event. Potential changes to target values as an outcome of park redevelopment and a likely increased use of the open space area as a result, were also considered in tree works recommendations.

The assessment of risk considered three main factors: the likelihood of a tree or tree part failing, the target on which it might fail, and its value and the size of the tree part may fail. These factors are used in QTRA to calculate the final 'risk score'.

This inspection has been limited to only those features and defects visible from the ground. No aerial or internal inspections were performed.

QTRA Advisory Risk Thresholds

Thresholds	Description	Action
1/1 000	Unacceptable Risks will not ordinarily be tolerated	Control the risk
	Unacceptable (where imposed on others) Risks will not ordinarily be tolerated	Control the risk Review the risk
1/10 000	Tolerable (by agreement) Risks may be tolerated if those exposed to the risk accept it, or the tree has exceptional value	Control the risk unless there is broad stakeholder agreement to tolerate it, or the tree has exceptional value Review the risk
	Tolerable (where imposed on others) Risks are tolerable if ALARP	Assess costs and benefits of risk control Control the risk only where a significant benefit might be achieved at a reasonable cost Review the risk
1/1 000 000	Broadly Acceptable Risk is already ALARP	No action currently required Review the risk

Figure 1 QTRA Advisory Risk Thresholds (Source: QTRA 2016)

Construction impact assessments were made through review and scrutiny of the Lions Park Redevelopment Landscape Concept Plan considering how the proposed works are likely to be delivered and considering these details against the condition and Useful Life expectancies of existing trees.

3. Site description

3.1. Site location

Lions Pioneer Park is located at the eastern end of the Streaky Bay township with Alfred Terrace to the north, Mudge Terrace to the south and East Terrace forming the eastern boundary. The park is a key focal point for visitor entry into the Steaky Bay township and provides the only open space recreation area on the east side of Streaky Bay.



Figure 2 –Aerial image of Lions Pioneer Park, Streaky Bay.

3.2. Description of vegetation

The park contains mixed aged tree plantings with both a mature tree canopy with groups of trees to the north and several mature trees dotted around the park. Young trees are establishing throughout the open space reserve in the south-eastern, central and eastern areas of the park.

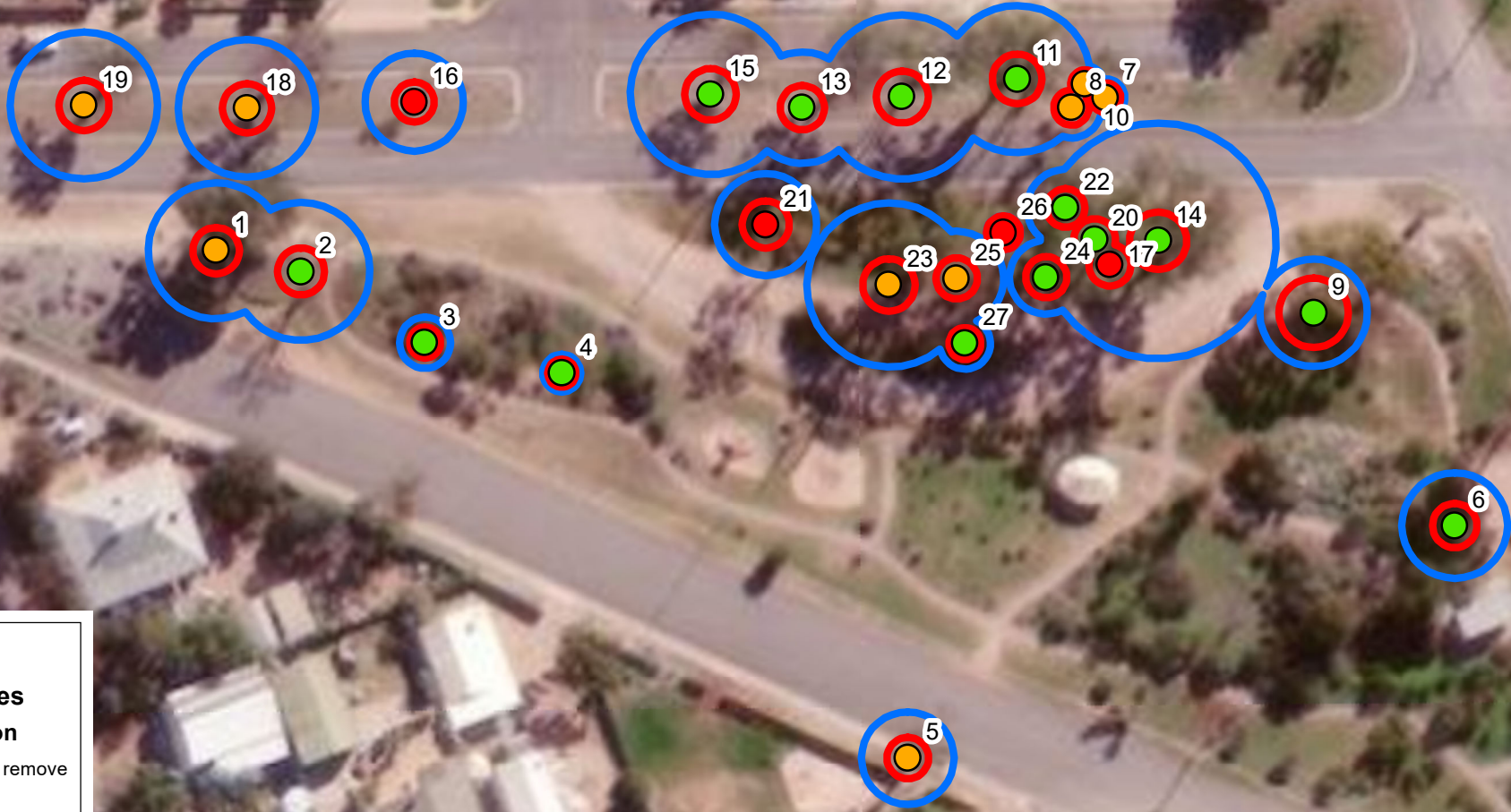
The mature trees are comprised mostly of tuart (*Eucalyptus gomphocephala*) specimens which display varying degrees of health. A significant proportion of these are showing signs of decline including crown retrenchment, epicormic shooting and branch development, canopy thinning and dieback.

Younger trees growing in the park including quandongs and casuarinas are established and in good health.



Figure 3 (top) young tree establishment. Figure 4 (centre) grey gum at park entry. Figure 5 (bottom) varying condition of existing tuart trees.

3.3 Site map



Legend

Lions Park Trees Recommendation

- Potentially remove
- Remove.
- Retain.

SRZ

TPZ

Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Streaky Bay Lions Park Redevelopment Arboricultural Survey



Created by: Active Green Services

Drawn By: C. King

Date: 20/02/2023

Active Green Services
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4. Tree assessments

Twenty-seven (27) trees were included in the tree survey and risk assessment for Lions Pioneer Park. Trees for assessment were selected by council and assessed by AGS on Tuesday February 8, 2023. All tree data can be found in Appendix 1: Tree Impact Assessment Data Table with Fields and Descriptions provided in Appendix 3: Explanation of terms and ratings.

4.1. Summary of results

- Four (4) trees are dead and are recommend for removal.
- Fourteen (14) trees are recommended for retention.
 - Three (3) of these trees require no action.
 - Nine (9) require pruning (mostly relating to deadwood) to minimise risk.
 - Two (2) are recommended specifically for mulching or irrigation to improve health (although all trees within the park would benefit from such treatments).
- Nine (9) trees with low useful life expectancies are recommended for potential removal or major pruning works to reduce risk.
 - Seven (7) of these require substantial pruning works if they are to be retained.
 - Three (3) require plant health treatments (mulch, irrigation and/or soil tonic) if they are to be retained.
- Eight (8) trees have been rated as high value. All of these trees are recommended for retention with one tree currently in very poor health recommended for plant health care treatments or possible removal (per above).
- Twenty-four (24) of the twenty-seven (27) trees assessed represent the species *Eucalyptus gomphocephala* (tuart).
 - Four (4) of these are dead and are recommended for removal.
 - Nine (9) of these specimens have been categorised as “over mature” with a life expectancy of 1- 5 years and are listed for potential removal with planning for their removal and succession now required.
 - Twelve (12) specimens are recommended for retention with nine (9) requiring management action to reduce risk or help restore health.

4.2. Life expectancy of trees

Many of the tuart trees in the survey area are reaching the end of their useful lives. Recent stress-inducing events (namely drought) appears to have triggered decline in some, while others currently in very poor health may recover with appropriate action (irrigation, mulching, soil treatments). With regard to the specimens growing on Alfred Terrace, lopping practices of the past have rendered the trees structurally unviable with re-lopping (structural pruning) the only management practice available to sufficiently address risk potential if they are to be retained (this is a short-term measure only and ongoing maintenance of regrowth will be required).

While these trees can be retained in the short term with significant pruning to reduce their risk of failure, replacement of these trees specifically, needs to be planned for.

4.3. Tree risk

A high proportion of trees require minor or more substantial pruning works to reduce risk. Existing targets including road traffic as well as pedestrians have been considered along with the expected increases in occupation of the park as an outcome of the upcoming redevelopment. These works are considered high priority and should be undertaken in the short-term (within 3 months). It is also recommended that these risk reduction works are completion prior to commencement of construction works on site.

4.4. Tree health

Many trees showing signs of stress and decline appear to have been impacted by severe drought and may recover with irrigation, mulch (to aide water retention and generally improve soils) and the application of soil tonics (seaweed solution, fish emulsions etc) to help restore soil microorganism numbers and/or rebalance bacterial and fungal composition. While site soils are generally low in nutrient value and free draining, mulch will assist with organic matter build up in the soil as well as general moisture retention and active irrigation will be beneficial for all trees – 1 to 3 applications of deep watering may be enough to restore health in some of the trees. Deep watering consists of gentle application of approximately 100L of water per mature tree specimen. Water can be applied via water barriers, drip irrigation or manually at low pressure. Deep watering ensures that enough water is applied to the soil area to infiltrate deep into the soil profile to ensure the rhizosphere (tree roots and surrounding soil) is sufficiently wetted and to also encourage roots to grow deeper into the soil profile to access water (applying a small amount of water at a high frequency encourages tree roots to grow near the soil surface rather than search for water deeper in the soil profile).

5. Lions Park redevelopment

5.1. Project outline

Funding has been allocated from the Local Roads Infrastructure Federal Government funding program to upgrade Lions Pioneer Park. Upgrade works are proposed to be completed by August 2023.

A landscape concept plan for the park (Lions Park Redevelopment - Landscape Concept Plan) was formulated via analysis of existing site conditions including park access and circulation, infrastructure and services; and consideration of these alongside community priorities and desired strategic outcomes for the park as listed below (including retention of existing trees and provision for new legacy shade trees).

Desired outcomes of park redevelopment consist of;

- Provision of a community destination for social gatherings,
- Provide a family destination for visitors to orientate themselves to the township,
- Improved play spaces for residents and visitors,
- Create a sense of arrival for visitors,
- Opportunity to provide traffic management and improvement to Mudgee Terrace,
- Improve traffic flow on East Terrace particularly around the dump point area,
- Opportunity to improve and provide passive stormwater harvesting and management.

Key features of the Landscape Concept Plan consist of;

- Improved open space and greening of sections of the precinct,
- Tree management assessment and retention of existing large trees,
- Retention of existing stonewalling with replanting of garden beds and irrigation,
- Nature based play space inclusion,
- Improved pathways and connectivity,
- Seating, shelter, and BBQ's,
- Visitor Services (signage and water fill point duplication),
- Replacement and relocation of toilet facilities,
- Duplication of dump point to improve traffic management,
- Traffic management treatment to Mudge Terrace and Wells Street Intersection.

Figure 6 provides spatial mapping of the concept's various zones while Figure 7 shows the landscape concept overall.



Figure 6 Concept plan: Spatial mapping



Figure 7 Overall concept

5.2. Tree impact assessments

Without detailed design drawings, impacts of the park upgrade on the existing trees cannot be fully understood however a broad assessment of the likely impacts has been made, using landscape concepts to determine the nature and setback of works to trees and by applying the principles of *AS 4970 – 2009 Protection of trees on development sites*.

While plans have been developed with retention of existing trees in mind, some elements of the upgrade may still damage trees, either directly or indirectly, and these elements should be further reviewed as detailed design is developed and/or the project is progressed and implemented.

It is envisaged that most trees growing within and adjacent to areas proposed for upgrade will be able to be retained, however minor design amendments and tree-sensitive construction treatments may be required to ensure ongoing viability of trees post construction works.

According to the landscape concepts, direct impacts of the entry way and open space features may include;

- (4) Open lawn and impacts to young trees,
- (6) Parallel parking bays and potential impacts to the group of tuart trees to the north of the park,
- (8) Spray seal road preparation works potentially impacted trees located near the roadway (depending on the construction treatment – namely preparation of the road substrate),
- (11) New paved footpaths – most notably through TPZ of Tree 9 (this should be made without grade changes nor footprint extension into currently open, undisturbed areas of the surrounding soil),
- (19) Swale and detention basin – grade changes may impact the existing stand of tuart trees to the north of the park.

According to the Landscape concepts, indirect impacts of the entry way and open space features may include;

- (27) Conduit installation or realignment/new feeds for lighting and BBQ,
- (14) (27) Water connection for drinking fountains, new amenities,
- General construction activities including storage access and movement during delivery of the upgrade.

5.3. Impact minimisation strategies

5.3.1. New footpath alignment

Where new footpath surface treatments are to be installed within close proximity to existing trees, grade, width and alignment changes should be avoided wherever possible. Ramped and built-up or bridged/elevated footpath treatments may be possible for incorporation where any of the above elements of construction cannot be avoided and, in most cases, can be retro-fitted around existing trees.

5.3.2. Open lawn area

It is understood that most of the young trees growing within the park will be able to be retained in their existing locations as an outcome of minor re-design in response to community feedback. Any young trees that may be impacted by establishment of the irrigated lawn area or other new park or playground elements should be considered for transplanting. While retaining trees in-situ is always preferable, most of the specimens that may be impacted are small enough to survive transplanting so long as an appropriate maintenance regime for ensuring these trees are continually watered for at least twelve months following repositioning is put in place.

5.3.3. Parallel carparks and road respray

Pavement works for the road respray and new parallel car parks may impact nearby trees as an outcome of sub-grade works – namely sub-base preparation as tree roots are likely to grow beneath the existing informal road surface. If the road spray works do not require sub-surface preparation, short-term impacts will be minimal however the longer-term impacts of likely soil compaction and altered soil moisture regimes (including overland flow direction) may contribute to further decline of the tuart trees. Where possible, directing flow of water (overland or through drainage solutions) towards the stand of tuart trees would be highly beneficial. Potential repositioning of car parking bays proposed for construction within the TPZs of any existing trees should also be investigated.

5.3.4. Swale and detention basin

Grade changes and larger areas of excavation may be required for water sensitive urban design treatment installation which is likely to impact tuart trees to the north of the park. Ensuring works are setback as far as possible from trees and that any excavation works are undertaken by non-destructive digging (NDD) methods (for example hand digging, vacuum excavation with very low water pressure) under the supervision of a Qualified Arborist will help minimise impacts, however a closer analysis of the extent/footprint and nature of these works will be required to confirm the overall damage potential.

5.3.5. New electrical and water connections

Conduit installations/new feeds for electrical connections to the BBQ or for park lighting and potential new water connections for the drinking fountains, new amenities or to provide irrigation to landscape elements of the park are also recommended for installation via NDD methods where works are proposed to occur within TPZs of existing trees. Sensitive work methods include hand digging, vacuum excavation or where significant conflict exists with high value trees, under-boring options may need to be explored.

5.3.6. General impacts of construction activities

The method to protect against ancillary or indirect damage that may occur as an outcome of project works is ensuring trees are appropriately protected at the time of works. Tree Protection Zones should be formally fenced off prior to commencement of any construction on site and the areas within should be excluded from construction related activities at all times.

Where works must occur within these exclusion zones, a Qualified Arborist should be present to supervise and provide guidance as necessary. Demolition works should consider ongoing protection of existing trees ensuring that no specimen is compromised as an outcome of a work plan or method that could have been undertaken another way to better avoid existing trees.

Tree protection requirements should be discussed during induction of construction personnel and at project pre-commencement meetings to ensure all involved in delivery of the project understand the value of the trees, the relative tree protection requirements and implications of damage occurring.

5.4. Succession planning and replacement planting

Planning for the replacement of trees with low useful life expectancies should be commenced as part of the park upgrade project.

Options include:

- Removing all declining trees and replacing as part of the upgrade.
- Removing and replacing some of the declining specimens as part of the upgrade and staging removal of the remaining specimens when replacement trees have established enough to soften the visual impacts of removal of remaining trees.
- Planting succession trees as part of the park upgrade and retaining all trees with low useful lives in the short-term, and removing these when succession trees have established.

*All trees with low useful life expectancies will need to be pruned in the short-term to reduce risk if they are to be retained.

5.5. Ongoing inspection and maintenance requirements

Regular inspection and/or routine maintenance should be ongoing in the park, especially in relation to declining trees selected for short-term retention. In long periods of dry, irrigation may be required to aide tree survival. This may be as little as one deep watering during hot and dry weather conditions (the application of water over several visits throughout the year however will benefit stressed trees especially and maximise the cooling benefits of the entire park tree population).

6. Conclusion

Significant risk reduction pruning works and health enhancement treatments are currently required to help facilitate retention of many trees in Lions Pioneer Park Streaky Bay due to their high-risk and poor health in general. While the majority of trees within the park can be retained with pruning works (high priority) a large number of trees have no long-term future and options for succession of these trees – either staged or via direct removal and replacement in the short term should be explored.

7. Recommendations

The following recommendations are provided health of the trees currently growing in Lions Pioneer Park.

- Review and action recommendations in the tree data tables, specifically works required.
- Review trees listed for possible removal and consider the benefits of removing some or all of these trees in the short-term and replacing with new trees, removing and replacing a portion of trees in the short-term; or planting succession trees as part of the park upgrade and removing existing trees once new trees have established.
- Enact a mulching and watering program for all trees for retention in the park.
- Provide soil treatments to highly stressed trees as directed in the data table (seaweed solution or similar and/or gentle cultivation of the soil to enhance water infiltration).
- Review the Lions Pioneer Park Landscape Concept for the potential for minor design amendments relating to potential tree impacts as outlined within this report.
- Ensure tree-sensitive work methods are utilised where works within TPZs cannot be avoided.
- Ensure a Qualified Arborist is present to supervise works within TPZs of trees as required.
- Ensure that all site staff are aware of tree protection requirements and risks of damage.
- Ensure all removed trees are appropriately replaced.
- Transplant young trees that may be impacted by works.
- Install formal tree protection measures – namely exclusion fencing - prior to commencement of any works on site and maintain these Tree Protection Zones for the duration of site works.

8. Appendix 1: Tree Impact Assessment Data Table

Tree ID	Genus	Common name	Height (m)	Width (m)	DBH (cm)	TPZ (m)	SRZ (m)	Health	Structure	Maturity	ULE (years)	Form	Value	Recommendation	Works Req	Priority
1	<i>Eucalyptus gomphocephala</i>	tuart	14	8	72	8.6	2.9	Very poor	Fair	Overmature	1-5	Fair	Low	Potentially remove	Mulch	Low
2	<i>Eucalyptus gomphocephala</i>	tuart	16	14	73	8.7	3	Fair	Fair	Mature	15 – 25	Good	High	Retain	Deadwood > 25mm	High
3	<i>Eucalyptus eremophila</i>	sandy mallet	6	6	27	3.2	2	Very poor	Good	Mature	1-5	Good	Low	Retain	Irrigate	Low
4	<i>Eucalyptus gomphocephala</i>	tuart	8	6	20	2.4	1.8	Good	Good	Semimature	25 - 50	Good	Moderate	Retain	No action required	N/a
5	<i>Eucalyptus gomphocephala</i>	tuart	15	7	49	5.8	2.6	Poor	Poor	Overmature	1-5	Fair	Moderate	Potentially remove	Structural prune to below live crown height	High
6	<i>Eucalyptus gomphocephala</i>	tuart	13	15	56	6.7	2.8	Poor	Fair	Overmature	1-5	Fair	Moderate	Retain	Deadwood > 25mm	High
7	<i>Eucalyptus gomphocephala</i>	tuart	12	4	20	2.4	1.9	Poor	Fair	Overmature	1-5	Fair	Low	Potentially remove	Deadwood > 25mm	High
8	<i>Eucalyptus gomphocephala</i>	tuart	16	5	32	3.8	2.2	Very poor	Fair	Overmature	1-5	Fair	Low	Potentially remove	Deadwood > 25mm	High
9	<i>Eucalyptus propinqua</i>	grey gum	13	18	57	6.8	4.4	Good	Good	Mature	25 - 50	Good	High	Retain	Deadwood > 25mm	High

Tree ID	Genus	Common name	Height (m)	Width (m)	DBH (cm)	TPZ (m)	SRZ (m)	Health	Structure	Maturity	ULE (years)	Form	Value	Recommendation	Works Req	Priority
10	<i>Eucalyptus gomphocephala</i>	tuart	13	4	20	2.4	1.8	Very poor	Fair	Overmature	1-5	Fair	Low	Potentially remove	Irrigate	High
11	<i>Eucalyptus gomphocephala</i>	tuart	17	15	78	9.3	3.2	Fair	Fair	Mature	25 - 50	Fair	High	Retain	Deadwood > 25mm	High
12	<i>Eucalyptus gomphocephala</i>	tuart	17	15	87	10.4	3.3	Fair	Fair	Mature	25 - 50	Fair	High	Retain	Deadwood > 25mm	High
13	<i>Eucalyptus gomphocephala</i>	tuart	18	15	59	7	2.8	Fair	Fair	Mature	25 - 50	Good	High	Retain	Deadwood > 25mm	High
14	<i>Eucalyptus gomphocephala</i>	tuart	19	18	125	15	3.6	Fair	Fair	Mature	15 - 25	Fair	High	Retain	No action required	N/a
15	<i>Eucalyptus gomphocephala</i>	tuart	14	14	85	10.2	3.3	Fair	Fair	Mature	15 - 25	Fair	Moderate	Retain	Deadwood > 25mm	High
16	<i>Eucalyptus gomphocephala</i>	tuart	6	5	52	6.2	2.5	Very poor	Poor	Dead	0	Poor	Low	Remove	Remove tree	High
17	Unknown	(dead tree)	8	4	30	3.6	2.7	Dead	Poor	Dead	0	Poor	Very low	Remove	Remove tree	High
18	<i>Eucalyptus gomphocephala</i>	tuart	13	13	73	8.7	3.1	Very poor	Poor	Overmature	1-5	Poor	Low	Potentially remove	Deadwood > 25mm	High
19	<i>Eucalyptus gomphocephala</i>	tuart	12	11	78	9.3	3.2	Poor	Poor	Mature	5-15	Fair	Moderate	Potentially remove	Structural prune	High
20	<i>Eucalyptus gomphocephala</i>	tuart	17	12	48	5.7	2.7	Fair	Poor	Mature	15 - 25	Poor	Moderate	Retain	Deadwood > 25mm	High

Tree ID	Genus	Common name	Height (m)	Width (m)	DBH (cm)	TPZ (m)	SRZ (m)	Health	Structure	Maturity	ULE (years)	Form	Value	Recommendation	Works Req	Priority
21	<i>Eucalyptus gomphocephala</i>	tuart	13	12	54	6.4	3	Dead	Poor	Dead	0	Fair	Low	Remove	Remove tree	High
22	<i>Eucalyptus gomphocephala</i>	tuart	16	20	41	4.9	2.5	Good	Fair	Mature	25 - 50	Fair	High	Retain	No action required	N/a
23	<i>Eucalyptus gomphocephala</i>	tuart	17	19	87	10	3.3	Very poor	Fair	Overmature	1-5	Good	High	Potentially remove	Deadwood, mulch and irrigate	High
24	<i>Eucalyptus gomphocephala</i>	tuart	23	12	39	15	6.9	Good	Fair	Mature	25 - 50	Fair	Moderate	Retain	Weight- reduce limb over road	High
25	<i>Eucalyptus gomphocephala</i>	tuart	14	13	50	8.6	2.6	Fair	Fair	Mature	5-15	Fair	Moderate	Potentially remove	Deadwood and irrigate	High
26	<i>Eucalyptus gomphocephala</i>	tuart	8	6	18	8.7	2.2	Dead	Poor	Dead	0	Fair	Low	Remove	Remove tree	Moderate
27	<i>Eucalyptus gomphocephala</i>	tuart	14	6	27	3.2	2	Good	Fair	Semimature	25 - 50	Fair	Moderate	Retain	Mulch	Moderate

9. Appendix 2: Tree data cards

Note: Where **Retention value** = "**Remove**" only the arboricultural attributes of the tree (i.e. health, structure and ULE) are considered. Other factors that may affect the decision to retain or remove the tree are not considered.

- The following information should be read in conjunction with the '**Explanation of Terms**' and the '**Glossary / Notes**' sections found later in this report.

SRZ (m): AS 4970-2009 Protection of trees on development sites (Radius)
TPZ (m): AS 4970-2009 Protection of trees on development sites (Radius).
mTPZ (m): TPZ modified to allow for canopy projection beyond the TPZ

Risk Score

Total Number of trees 27

The risk score system used in this report uses the methodology proposed by Ellison (2007). This system is probabilistic and the risk score is expressed as a ratio or fraction of 1. Therefore the higher the "risk score" the lower the risk (e.g. 1:50,000 indicates a lower level of risk than 1:15,000. Ellison proposes a risk score threshold of 1:10,000 and suggests that further action is required for risks greater than 1:10,000 per year (i.e. between 1:1 and 1:10,000). The required actions may be further investigation or other action to actually reduce the risk posed by the tree and will generally be detailed under Works Required.

Tree ID: 1

Genus / species: *Eucalyptus gomphocephala* Tuart

Common name: Tuart

Height (m): 14	Structure: Fair
Width (m): 8	Health: Very poor
DBH (cm): 72 Measured	Maturity: Overmature
Origin: Australian	ULE (years): 1 - 5
Retained?: Retained.	Form:
Ret Value: Very low	Dormancy: Evergreen
Amenity value: Low	Recommendation: Potentially remove.
Works Required:	
Mulch	



SRZ (m): 2.9

TPZ (m): 8.6 **mTPZ (m):** = TPZ

Risk Score Values: **Risk Score:** 1: 59040000

Occupancy = Property-\$2,200 - \$22,000. Pedestrians >1 per hour - 10 per hour. Road-363 vehicles @ 110kph; 449 vehicles @ 80kph; 649 vehicles @ 50kph: 1/72 (72). Failure Size = 2.5cm - 10cm 1/82 (82). Failure potential = 0.001% - 0.01% 1/10,000 (10000).

Tree ID: 2

Genus / species: *Eucalyptus gomphocephala* Tuart

Common name: Tuart

Height (m): 16	Structure: Fair
Width (m): 14	Health: Fair
DBH (cm): 73 Measured	Maturity: Mature
Origin: Australian	ULE (years): 15 - 25
Retained?: Retained.	Form: Good
Ret Value: High	Dormancy: Evergreen
Amenity value: High	Recommendation: Retain.

Works Required:

Deadwood > 25mm



SRZ (m): 3.0

TPZ (m): 8.8

mTPZ (m): = TPZ

Risk Score Values: Risk Score: 1: 5904000

Occupancy = Property-\$2,200 - \$22,000. Pedestrians ->1 per hour - 10 per hour. Road-363 vehicles @ 110kph; 449 vehicles @ 80kph; 649 vehicles @ 50kph: 1/72 (72). Failure Size = 2.5cm - 10cm 1/82 (82). Failure potential = 0.01% - 0.1% 1/1,000 (1000).

Tree ID: 3

Genus / species: *Eucalyptus eremophila* Sand mallee

Common name: Sand mallee

Height (m): 6	Structure: Good
Width (m): 6	Health: Very poor
DBH (cm): 27 Measured	Maturity: Mature
Origin: Australian	ULE (years): 1 - 5
Retained?: Retained.	Form: Good
Ret Value: Very low	Dormancy: Evergreen
Amenity value: Low	Recommendation: Retain.

Works Required:

Irrigate



SRZ (m): 2.0

TPZ (m): 3.2

mTPZ (m): = TPZ

Risk Score Values: Risk Score: 1: 1800000000

Occupancy = Property-\$100 - \$2,200. Pedestrians - >1 per day - 1 per hour. Road-36 vehicles @ 110kph; 45 vehicles @ 80kph; 65 vehicles @ 50kph: 1/720 (720). Failure Size = <2.5cm 1/2500 (2500). Failure potential = 0.001% - 0.01% 1/10,000 (10000).

Tree ID: 4

Genus / species: *Eucalyptus gomphocephala* Tuart

Common name: Tuart

Height (m): 8	Structure: Good
Width (m): 6	Health: Good
DBH (cm): 20 Measured	Maturity: Semi Mature
Origin: Australian	ULE (years): 25 - 50
Retained?: Retained.	Form: Good
Ret Value: Moderate	Dormancy: Evergreen
Amenity value: Moderate	Recommendation: Retain.

Works Required:

No action required



SRZ (m): 1.8

TPZ (m): 2.4

mTPZ (m): = TPZ

Risk Score Values: Risk Score: 1: 1800000000

Occupancy = Property-\$100 - \$2,200. Pedestrians - >1 per day - 1 per hour. Road-36 vehicles @ 110kph; 45 vehicles @ 80kph; 65 vehicles @ 50kph: 1/720 (720). Failure Size = <2.5cm 1/2500 (2500). Failure potential = 0.001% - 0.01% 1/10,000 (10000).

Tree ID: 5

Genus / species: *Eucalyptus gomphocephala* Tuart

Common name: Tuart

Height (m): 15	Structure: Poor
Width (m): 7	Health: Poor
DBH (cm): 49 Measured	Maturity: Overmature
Origin: Australian	ULE (years): 1 - 5
Retained?: Retained.	Form: Fair
Ret Value: Low	Dormancy: Evergreen
Amenity value: Moderate	Recommendation: Potentially remove.

Works Required:

Deadwood > 25mm



SRZ (m): 2.6

TPZ (m): 5.9

mTPZ (m): = TPZ

Risk Score Values: Risk Score: 1: 5904000

Occupancy = Property-\$2,200 - \$22,000. Pedestrians >1 per hour - 10 per hour. Road-363 vehicles @ 110kph; 449 vehicles @ 80kph; 649 vehicles @ 50kph: 1/72 (72). Failure Size = 2.5cm - 10cm 1/82 (82). Failure potential = 0.01% - 0.1% 1/1,000 (1000).

Tree ID: 6

Genus / species: *Eucalyptus gomphocephala* Tuart

Common name: Tuart

Height (m): 13	Structure: Fair
Width (m): 15	Health: Poor
DBH (cm): 56 Measured	Maturity: Overmature
Origin: Australian	ULE (years): 5 - 15
Retained?: Retained.	Form: Fair
Ret Value: Low	Dormancy: Evergreen
Amenity value: Moderate	Recommendation: Retain.

Works Required:

Deadwood > 25mm



SRZ (m): 2.8

TPZ (m): 6.7

mTPZ (m): = TPZ

Risk Score Values: Risk Score: 1: 5904000

Occupancy = Property-\$2,200 - \$22,000. Pedestrians >1 per hour - 10 per hour. Road-363 vehicles @ 110kph; 449 vehicles @ 80kph; 649 vehicles @ 50kph: 1/72 (72). Failure Size = 2.5cm - 10cm 1/82 (82). Failure potential = 0.01% - 0.1% 1/1,000 (1000).

Tree ID: 7

Genus / species: *Eucalyptus gomphocephala* Tuart

Common name: Tuart

Height (m): 12	Structure: Fair
Width (m): 4	Health: Poor
DBH (cm): 20 Measured	Maturity: Overmature
Origin: Australian	ULE (years): 1 - 5
Retained?: Retained.	Form: Fair
Ret Value: Very low	Dormancy: Evergreen
Amenity value: Low	Recommendation: Potentially remove.

Works Required:

Deadwood > 25mm



SRZ (m): 1.9

TPZ (m): 2.4

mTPZ (m): = TPZ

Risk Score Values: Risk Score: 1: 5904000

Occupancy = Property-\$2,200 - \$22,000. Pedestrians >1 per hour - 10 per hour. Road-363 vehicles @ 110kph; 449 vehicles @ 80kph; 649 vehicles @ 50kph: 1/72 (72). Failure Size = 2.5cm - 10cm 1/82 (82). Failure potential = 0.01% - 0.1% 1/1,000 (1000).

Tree ID: 8

Genus / species: *Eucalyptus gomphocephala* Tuart

Common name: Tuart

Height (m): 16	Structure: Fair
Width (m): 5	Health: Very poor
DBH (cm): 32 Measured	Maturity: Overmature
Origin: Australian	ULE (years): 1 - 5
Retained?: Retained.	Form: Fair
Ret Value: Very low	Dormancy: Evergreen
Amenity value: Low	Recommendation: Potentially remove.
Works Required:	
Deadwood > 25mm	



SRZ (m): 2.2

TPZ (m): 3.8

mTPZ (m): = TPZ

Risk Score Values: Risk Score: 1: 59040000

Occupancy = Property-\$100 - \$2,200. Pedestrians - >1 per day - 1 per hour. Road-36 vehicles @ 110kph; 45 vehicles @ 80kph; 65 vehicles @ 50kph: 1/720 (720). Failure Size = 2.5cm - 10cm 1/82 (82). Failure potential = 0.01% - 0.1% 1/1,000 (1000).

Tree ID: 9

Genus / species: *Eucalyptus propinqua* Grey Gum

Common name: Grey Gum

Height (m): 13	Structure: Good
Width (m): 18	Health: Good
DBH (cm): 57 Measured	Maturity: Mature
Origin: Australian	ULE (years): 25 - 50
Retained?: Retained.	Form: Good
Ret Value: High	Dormancy: Evergreen
Amenity value: High	Recommendation: Retain.
Works Required:	
Deadwood > 25mm	



SRZ (m): 4.4

TPZ (m): 6.8

mTPZ (m): = TPZ

Risk Score Values: Risk Score: 1: 1.8E+11

Occupancy = Property-\$100 - \$2,200. Pedestrians - >1 per day - 1 per hour. Road-36 vehicles @ 110kph; 45 vehicles @ 80kph; 65 vehicles @ 50kph: 1/720 (720). Failure Size = <2.5cm 1/2500 (2500). Failure potential = 0.0001% - 0.001% 1/100,000 (100000).

Tree ID: 10

Genus / species: *Eucalyptus gomphocephala* Tuart

Common name: Tuart

Height (m): 13	Structure: Fair
Width (m): 4	Health: Very poor
DBH (cm): 20 Measured	Maturity: Overmature
Origin: Australian	ULE (years): 1 - 5
Retained?: Retained.	Form: Fair
Ret Value: Very low	Dormancy: Evergreen
Amenity value: Low	Recommendation: Potentially remove.

Works Required:

Irrigate



SRZ (m): 1.8

TPZ (m): 2.4

mTPZ (m): = TPZ

Risk Score Values: Risk Score: 1: 5904000

Occupancy = Property-\$2,200 - \$22,000. Pedestrians >1 per hour - 10 per hour. Road-363 vehicles @ 110kph; 449 vehicles @ 80kph; 649 vehicles @ 50kph: 1/72 (72). Failure Size = 2.5cm - 10cm 1/82 (82). Failure potential = 0.01% - 0.1% 1/1,000 (1000).

Tree ID: 11

Genus / species: *Eucalyptus gomphocephala* Tuart

Common name: Tuart

Height (m): 17	Structure: Fair
Width (m): 15	Health: Fair
DBH (cm): 78 Measured	Maturity: Mature
Origin: Australian	ULE (years): 25 - 50
Retained?: Retained.	Form: Fair
Ret Value: High	Dormancy: Evergreen
Amenity value: High	Recommendation: Retain.

Works Required:

Deadwood > 25mm



SRZ (m): 3.2

TPZ (m): 9.4

mTPZ (m): = TPZ

Risk Score Values: Risk Score: 1: 5904000

Occupancy = Property-\$2,200 - \$22,000. Pedestrians >1 per hour - 10 per hour. Road-363 vehicles @ 110kph; 449 vehicles @ 80kph; 649 vehicles @ 50kph: 1/72 (72). Failure Size = 2.5cm - 10cm 1/82 (82). Failure potential = 0.001% - 0.01% 1/10,000 (10000).

Tree ID: 12

Genus / species: *Eucalyptus gomphocephala* Tuart

Common name: Tuart

Height (m): 17	Structure: Fair
Width (m): 15	Health: Fair
DBH (cm): 87 Measured	Maturity: Mature
Origin: Australian	ULE (years): 25 - 50
Retained?: Retained.	Form: Fair
Ret Value: High	Dormancy: Evergreen
Amenity value: High	Recommendation: Retain.

Works Required:

Deadwood > 25mm



SRZ (m): 3.3

TPZ (m): 10.4

mTPZ (m): = TPZ

Risk Score Values: Risk Score: 1: 180000000

Occupancy = Property-\$2,200 - \$22,000. Pedestrians >1 per hour - 10 per hour. Road-363 vehicles @ 110kph; 449 vehicles @ 80kph; 649 vehicles @ 50kph: 1/72 (72). Failure Size = <2.5cm 1/2500 (2500). Failure potential = 0.01% - 0.1% 1/1,000 (1000).

Tree ID: 13

Genus / species: *Eucalyptus gomphocephala* Tuart

Common name: Tuart

Height (m): 18	Structure: Fair
Width (m): 15	Health: Fair
DBH (cm): 59 Measured	Maturity: Mature
Origin: Australian	ULE (years): 25 - 50
Retained?: Retained.	Form: Good
Ret Value: High	Dormancy: Evergreen
Amenity value: High	Recommendation: Retain.

Works Required:

Deadwood > 25mm



SRZ (m): 2.8

TPZ (m): 7.1

mTPZ (m): = TPZ

Risk Score Values: Risk Score: 1: 5904000

Occupancy = Property-\$2,200 - \$22,000. Pedestrians >1 per hour - 10 per hour. Road-363 vehicles @ 110kph; 449 vehicles @ 80kph; 649 vehicles @ 50kph: 1/72 (72). Failure Size = 2.5cm - 10cm 1/82 (82). Failure potential = 0.01% - 0.1% 1/1,000 (1000).

Tree ID: 14

Genus / species: *Eucalyptus gomphocephala* Tuart

Common name: Tuart

Height (m): 19	Structure: Fair
Width (m): 18	Health: Fair
DBH (cm): 125 Measured	Maturity: Mature
Origin: Australian	ULE (years): 15 - 25
Retained?: Retained.	Form: Fair
Ret Value: High	Dormancy: Evergreen
Amenity value: High	Recommendation: Retain.

Works Required:

No action required



SRZ (m): 3.6

TPZ (m): 15.0

mTPZ (m): = TPZ

Risk Score Values:

Risk Score: 1: 6192000

Occupancy = Property-\$100 - \$2,200. Pedestrians - >1 per day - 1 per hour. Road-36 vehicles @ 110kph; 45 vehicles @ 80kph; 65 vehicles @ 50kph: 1/720 (720). Failure Size = 10cm - 25cm 1/8.6 (8.6). Failure potential = 0.01% - 0.1% 1/1,000 (1000).

Tree ID: 15

Genus / species: *Eucalyptus gomphocephala* Tuart

Common name: Tuart

Height (m): 14	Structure: Fair
Width (m): 14	Health: Fair
DBH (cm): 85 Measured	Maturity: Mature
Origin: Australian	ULE (years): 15 - 25
Retained?: Retained.	Form: Fair
Ret Value: Moderate	Dormancy: Evergreen
Amenity value: Moderate	Recommendation: Retain.

Works Required:

Deadwood > 25mm



SRZ (m): 3.3

TPZ (m): 10.2

mTPZ (m): = TPZ

Risk Score Values:

Risk Score: 1: 5904000

Occupancy = Property-\$2,200 - \$22,000. Pedestrians >1 per hour - 10 per hour. Road-363 vehicles @ 110kph; 449 vehicles @ 80kph; 649 vehicles @ 50kph: 1/72 (72). Failure Size = 2.5cm - 10cm 1/82 (82). Failure potential = 0.01% - 0.1% 1/1,000 (1000).

Tree ID: 16

Genus / species: *Eucalyptus gomphocephala* Tuart

Common name: Tuart

Height (m): 6	Structure: Poor
Width (m): 5	Health: Very poor
DBH (cm): 52 Measured	Maturity: Overmature
Origin: Australian	ULE (years): 0
Retained?: Retained.	Form: Poor
Ret Value: Very low	Dormancy: Evergreen
Amenity value: Low	Recommendation: Remove.

Works Required:

Tree remove



SRZ (m): 2.5

TPZ (m): 6.2

mTPZ (m): = TPZ

Risk Score Values: Risk Score: 1: 141696000

Occupancy = Property-\$16 - \$100. Pedestrians-> 1 per week - 1 per day. Road-2 vehicles @ 110kph; 2 vehicles @ 80kph; 3 vehicles @ 50kph: 1/17,280 (17280). Failure Size = 2.5cm - 10cm 1/82 (82). Failure potential = 0.1% - 1% 1/100 (100).

Tree ID: 17

Genus / species: *Unknown sp. Unknown*

Common name: Unknown

Height (m): 8	Structure: Poor
Width (m): 4	Health: Dead
DBH (cm): 30 Measured	Maturity: Overmature
Origin: Unknown	ULE (years): 0
Retained?: Retained.	Form: Poor
Ret Value: Very low	Dormancy: Unknown
Amenity value: Very low	Recommendation: Remove.

Works Required:

Tree remove



SRZ (m): 2.7

TPZ (m): 3.6

mTPZ (m): = TPZ

Risk Score Values: Risk Score: 1: 72000000

Occupancy = Property-\$100 - \$2,200. Pedestrians - >1 per day - 1 per hour. Road-36 vehicles @ 110kph; 45 vehicles @ 80kph; 65 vehicles @ 50kph: 1/720 (720). Failure Size = >45cm 1/1 (1). Failure potential = 0.0001% - 0.001% 1/100,000 (100000).

Tree ID: 18

Genus / species: *Eucalyptus gomphocephala* Tuart

Common name: Tuart

Height (m): 13	Structure: Poor
Width (m): 13	Health: Very poor
DBH (cm): 73 Measured	Maturity: Overmature
Origin: Australian	ULE (years): 1 - 5
Retained?: Retained.	Form: Poor
Ret Value: Very low	Dormancy: Evergreen
Amenity value: Low	Recommendation: Potentially remove.
Works Required:	
Tree remove	



SRZ (m): 3.1

TPZ (m): 8.8

mTPZ (m): = TPZ

Risk Score Values: Risk Score: 1: 61920

Occupancy = Property-\$2,200 - \$22,000. Pedestrians >1 per hour - 10 per hour. Road-363 vehicles @ 110kph; 449 vehicles @ 80kph; 649 vehicles @ 50kph: 1/72 (72). Failure Size = 10cm - 25cm 1/8.6 (8.6). Failure potential = 0.1% - 1% 1/100 (100).

Tree ID: 19

Genus / species: *Eucalyptus gomphocephala* Tuart

Common name: Tuart

Height (m): 12	Structure: Poor
Width (m): 11	Health: Poor
DBH (cm): 78 Measured	Maturity: Mature
Origin: Australian	ULE (years): 5 - 15
Retained?: Retained.	Form: Fair
Ret Value: Low	Dormancy: Evergreen
Amenity value: Moderate	Recommendation: Potentially remove.
Works Required:	
Structural prune	



SRZ (m): 3.2

TPZ (m): 9.4

mTPZ (m): = TPZ

Risk Score Values: Risk Score: 1: 619200

Occupancy = Property-\$2,200 - \$22,000. Pedestrians >1 per hour - 10 per hour. Road-363 vehicles @ 110kph; 449 vehicles @ 80kph; 649 vehicles @ 50kph: 1/72 (72). Failure Size = 10cm - 25cm 1/8.6 (8.6). Failure potential = 0.01% - 0.1% 1/1,000 (1000).

Tree ID: 20

Genus / species: *Eucalyptus gomphocephala* Tuart

Common name: Tuart

Height (m): 17	Structure: Poor
Width (m): 12	Health: Fair
DBH (cm): 48 Measured	Maturity: Mature
Origin: Australian	ULE (years): 15 - 25
Retained?: Retained.	Form: Poor
Ret Value: Moderate	Dormancy: Evergreen
Amenity value: Moderate	Recommendation: Retain.

Works Required:

Deadwood > 25mm



SRZ (m): 2.7

TPZ (m): 5.8

mTPZ (m): = TPZ

Risk Score Values: Risk Score: 1: 59040000

Occupancy = Property-\$100 - \$2,200. Pedestrians - >1 per day - 1 per hour. Road-36 vehicles @ 110kph; 45 vehicles @ 80kph; 65 vehicles @ 50kph: 1/720 (720). Failure Size = 2.5cm - 10cm 1/82 (82). Failure potential = 0.01% - 0.1% 1/1,000 (1000).

Tree ID: 21

Genus / species: *Eucalyptus gomphocephala* Tuart

Common name: Tuart

Height (m): 13	Structure: Poor
Width (m): 12	Health: Dead
DBH (cm): 54 Measured	Maturity: Overmature
Origin: Australian	ULE (years): 0
Retained?: Retained.	Form: Fair
Ret Value: Very low	Dormancy: Evergreen
Amenity value: Low	Recommendation: Remove.

Works Required:

Tree remove



SRZ (m): 3.0

TPZ (m): 6.5

mTPZ (m): = TPZ

Risk Score Values: Risk Score: 1: 590400

Occupancy = Property-\$2,200 - \$22,000. Pedestrians >1 per hour - 10 per hour. Road-363 vehicles @ 110kph; 449 vehicles @ 80kph; 649 vehicles @ 50kph: 1/72 (72). Failure Size = 2.5cm - 10cm 1/82 (82). Failure potential = 0.1% - 1% 1/100 (100).

Tree ID: 22

Genus / species: *Eucalyptus gomphocephala* Tuart

Common name: Tuart

Height (m): 16	Structure: Fair
Width (m): 20	Health: Good
DBH (cm): 41 Measured	Maturity: Mature
Origin: Australian	ULE (years): 25 - 50
Retained?: Retained.	Form: Fair
Ret Value: High	Dormancy: Evergreen
Amenity value: High	Recommendation: Retain.

Works Required:

No action required



SRZ (m): 2.5

TPZ (m): 4.9

mTPZ (m): = TPZ

Risk Score Values: Risk Score: 1: 59040000

Occupancy = Property-\$100 - \$2,200. Pedestrians - >1 per day - 1 per hour. Road-36 vehicles @ 110kph; 45 vehicles @ 80kph; 65 vehicles @ 50kph: 1/720 (720). Failure Size = 2.5cm - 10cm 1/82 (82). Failure potential = 0.01% - 0.1% 1/1,000 (1000).

Tree ID: 23

Genus / species: *Eucalyptus gomphocephala* Tuart

Common name: Tuart

Height (m): 17	Structure: Fair
Width (m): 19	Health: Very poor
DBH (cm): 87 Measured	Maturity: Overmature
Origin: Australian	ULE (years): 1 - 5
Retained?: Retained.	Form: Good
Ret Value: Low	Dormancy: Evergreen
Amenity value: High	Recommendation: Potentially remove.

Works Required:

Irrigate



SRZ (m): 3.3

TPZ (m): 10.4

mTPZ (m): = TPZ

Risk Score Values: Risk Score: 1: 61920

Occupancy = Property-\$2,200 - \$22,000. Pedestrians >1 per hour - 10 per hour. Road-363 vehicles @ 110kph; 449 vehicles @ 80kph; 649 vehicles @ 50kph: 1/72 (72). Failure Size = 10cm - 25cm 1/8.6 (8.6). Failure potential = 0.1% - 1% 1/100 (100).

Tree ID: 24

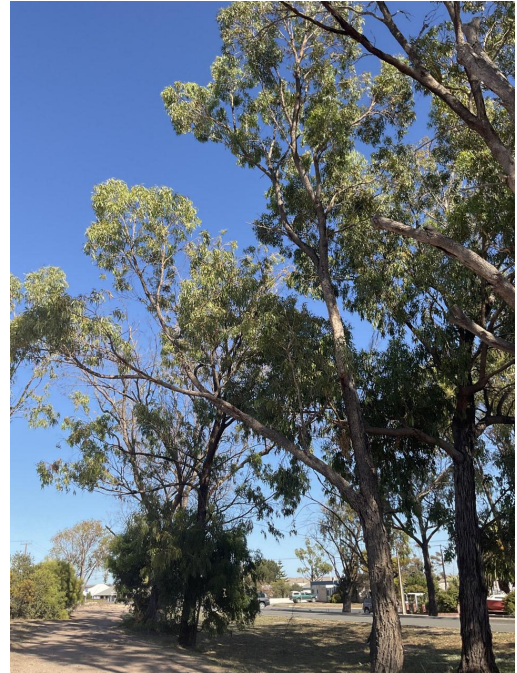
Genus / species: *Eucalyptus gomphocephala* Tuart

Common name: Tuart

Height (m): 23	Structure: Fair
Width (m): 12	Health: Good
DBH (cm): 39 Measured	Maturity: Mature
Origin: Australian	ULE (years): 25 - 50
Retained?: Retained.	Form: Fair
Ret Value: Moderate	Dormancy: Evergreen
Amenity value: Moderate	Recommendation: Retain.

Works Required:

No action required



SRZ (m): 2.6

TPZ (m): 4.7

mTPZ (m): = TPZ

Risk Score Values:

Risk Score: 1: 5904000

Occupancy = Property-\$2,200 - \$22,000. Pedestrians ->1 per hour - 10 per hour. Road-363 vehicles @ 110kph; 449 vehicles @ 80kph; 649 vehicles @ 50kph: 1/72 (72). Failure Size = 2.5cm - 10cm 1/82 (82). Failure potential = 0.01% - 0.1% 1/1,000 (1000).

Tree ID: 25

Genus / species: *Eucalyptus gomphocephala* Tuart

Common name: Tuart

Height (m): 14	Structure: Fair
Width (m): 13	Health: Fair
DBH (cm): 50 Measured	Maturity: Mature
Origin: Australian	ULE (years): 5 - 15
Retained?: Retained.	Form: Fair
Ret Value: Low	Dormancy: Evergreen
Amenity value: Moderate	Recommendation: Potentially remove.

Works Required:

Irrigate



SRZ (m): 2.6

TPZ (m): 6.0

mTPZ (m): = TPZ

Risk Score Values:

Risk Score: 1: 5904000

Occupancy = Property-\$2,200 - \$22,000. Pedestrians ->1 per hour - 10 per hour. Road-363 vehicles @ 110kph; 449 vehicles @ 80kph; 649 vehicles @ 50kph: 1/72 (72). Failure Size = 2.5cm - 10cm 1/82 (82). Failure potential = 0.01% - 0.1% 1/1,000 (1000).

Tree ID: 26

Genus / species: *Eucalyptus gomphocephala* Tuart

Common name: Tuart

Height (m): 8	Structure: Poor
Width (m): 6	Health: Dead
DBH (cm): 18 Measured	Maturity: Semi Mature
Origin: Australian	ULE (years): 0
Retained?: Retained.	Form: Fair
Ret Value: Very low	Dormancy: Evergreen
Amenity value: Low	Recommendation: Remove.
Works Required:	
Deadwood > 25mm	



SRZ (m): 2.2

TPZ (m): 2.2

mTPZ (m): = TPZ

Risk Score Values: Risk Score: 1: 5904000

Occupancy = Property-\$2,200 - \$22,000. Pedestrians >1 per hour - 10 per hour. Road-363 vehicles @ 110kph; 449 vehicles @ 80kph; 649 vehicles @ 50kph: 1/72 (72). Failure Size = 2.5cm - 10cm 1/82 (82). Failure potential = 0.01% - 0.1% 1/1,000 (1000).

Tree ID: 27

Genus / species: *Eucalyptus gomphocephala* Tuart

Common name: Tuart

Height (m): 14	Structure: Fair
Width (m): 6	Health: Good
DBH (cm): 27 Measured	Maturity: Semi Mature
Origin: Australian	ULE (years): 25 - 50
Retained?: Retained.	Form: Fair
Ret Value: Moderate	Dormancy: Evergreen
Amenity value: Moderate	Recommendation: Retain.
Works Required:	
Mulch	



SRZ (m): 2.0

TPZ (m): 3.2

mTPZ (m): = TPZ

Risk Score Values: Risk Score: 1: 5904000

Occupancy = Property-\$2,200 - \$22,000. Pedestrians >1 per hour - 10 per hour. Road-363 vehicles @ 110kph; 449 vehicles @ 80kph; 649 vehicles @ 50kph: 1/72 (72). Failure Size = 2.5cm - 10cm 1/82 (82). Failure potential = 0.001% - 0.01% 1/10,000 (10000).

10. Appendix 3: Description of terms and ratings

10.1. Tabulated field data

The following data is provided for each tree:

1. **ID** – Autogenerated number unique to each tree. Please note that numbering is not consecutive on plans and is provided as a unique identifier for each tree only.
2. **Genus / species** – Identification of the genus / species on site based on accessible visual characteristics. Given that key identify features are often not available at the time of inspection the accuracy of identification is not guaranteed.
3. **Common name** – Commonly accepted name used for each tree. Please note that common names can be used to describe several different genus and species and therefore the use of Genus / Species is the most accurate manner to communicate tree identification.
4. **Height** -Provided in m as estimated on site.
5. **Width** – Provided in meters as an estimated canopy diameter.
7. **DBH** - Diameter at breast height measured at 1.4 metres. This has been measured unless stated.
8. **Measured** - States whether the DBH has been measured or estimated. DBH has been estimated where clear access to a tree was not possible either due to dense undergrowth or the tree being in private property.
9. **Health** – The health of the tree as per the descriptors provided in Section 10.4.2– Arboricultural information of this report.
10. **Structure** – The structure of the tree as per the descriptors provided in Section 10.4.3 Appendix 3 – Arboricultural information of this report.
11. **U.L.E.** – Useful life expectancy as per the descriptors provided in Section 10.4.4. Arboricultural information of this report.
12. **Maturity** – The maturity of the tree as per the descriptors provided in Section 10.4.1 Arboricultural information of this report.
13. **Form** – The form of the tree as per the descriptors provided in Section 10.4.5 Arboricultural information of this report.
14. **SRZ** – Structural Root Zone calculated as per *AS 4970 – 2009 Protection of trees on development sites*. Provided as a radius from stem centre in metres.
15. **TPZ** – Tree Protection Zone calculated as per *AS 4970 – 2009 Protection of trees on development sites*. Provided as a radius from stem centre in metres.
16. **Value** – The value of a tree based on both U.L.E. & Amenity value
17. **Recommendation** – Remove, retain, potentially retain, potentially remove.
18. **Works required** per the descriptors provided in Section 10.4.6 Arboricultural information of this report.
19. **Priority** per the descriptors provided in Section 10.4.7 Arboricultural information of this report

10.2. Arboricultural information

The following sections are presented to provide an introduction to the process of tree root system protection. A trees root system is the critical element to be protected during the development process and if the trees roots are adequately protected then the rest of the tree will generally survive without significant injury.

10.2.1. Root plate estimation

One of the primary purposes of this report is to estimate the impact of the development on the trees on this site. This is mainly achieved by estimating the extent of the root plate area of the trees that are proposed to be retained and the proportion of this area that is likely to be excised or affected during the construction process.

In this report two elements of the tree root area are described. These are:

- *Structural Root Zone*

This is an estimate of the radius that is likely to encompass the major scaffold roots of the tree. These roots are critical to anchoring the tree and damage to these roots will increase the risk of entire tree failure (i.e. uprooting). This radius is based on AS 4970-2009.

- *Tree Protection Zone*

This is an estimate of the radius that is likely to encompass enough of the smaller absorbing roots to allow the tree to obtain sufficient nutrients and water to allow it to survive in the long term. This radius is based on AS 4970-2009 and is based on the size of the tree.

Estimation of the likely root plate radius for both methods are based on the DBH (Diameter at Breast Height) of each tree. This is usually measured but where the tree is inaccessible or has numerous trunks a visual estimation may be used. Whether the DBH is estimated or measured is noted within the "Tree Data" section of the report.

The two elements of each trees' root zone is transposed over the site survey and building footprint and the degree of root injury is calculated from this.

10.2.2. Tree rooting patterns

Contrary to common belief, trees usually have a broad flat plate of roots that may extend 1.5 – 3 times the radius of the canopy (Harris, Matheny & Clark, 1999; Coder, 1996; Hitchmough, 1994). Relatively few trees have deep roots and Harris, Matheny and Clark (2004) note that most tree roots will be found in the top 1.0 metre of the soil profile.

While the models used to approximate the size of tree root plates assume a uniformly radial root system, in highly disturbed urban soils root systems often develop in a highly asymmetric manner (Matheny & Clarke, 2004). This may require the modification of the models used where it is likely that the root system is asymmetric.

10.2.3. Construction impacts

Construction in the vicinity of trees can have several negative impacts on their health, longevity and structural stability. Harris, Matheny and Clark (2004) note that some level of tree root injury or root zone change is almost inevitable during construction around trees and maintain that the goal of tree preservation is to reduce the injury or change to a level that will enable the long term preservation of the retained trees.

Negative impacts can include;

a) root severance from trenching and grading activities. Damage to the transport and absorbing root system may deprive the tree of the ability to absorb nutrients and water and damage to the structural scaffold roots that support the tree may result in instability and uprooting. Depending on the percentage of the root plate affected and proximity to the tree, the affects can range from minor degradation of health through to total root plate failure (i.e. uprooting).

b) Compaction and root injury. Most trees require a well aerated and friable soil to allow normal physiological processes to occur and to allow root growth.

Soil compaction from pedestrian or vehicular traffic can result in direct injury to the roots, indirect injury through soil drainage changes, reduced soil aeration or decreased soil penetrability. If severe enough soil compaction can lead to a rapid decline in many tree species and may eventually result in instability and uprooting.

c) Changes in drainage patterns. Changes in drainage patterns may result from hard surfacing, trenching, land shaping and other construction activities. These can result in either drought stress or waterlogging, both of which can cause a rapid decline in trees and may result in instability and uprooting.

10.3. AS 4970 -2009

This report generally conforms to *AS 4970 – 2009 Protection of Trees on Development Sites* except in the following areas.

10.3.1.

AS 4970 notes that the project arborist should verify the accuracy of feature survey for the subject site.

- a. This is generally not feasible and the feature survey is taken as being an accurate representation of the features of the site.
- b. However if trees are found on the site that are not represented in the feature survey then these trees will be added to the report plans based on a visual estimation of their location.
 - i. Accordingly the location of these trees may not be sufficiently accurate for the purposes of the report.
 - ii. The location of these trees should be verified by a qualified surveyor where appropriate.

10.3.2.

AS 4970-2009 Protection of Trees on Development Sites makes no differentiation between the Tree Protection Zone (TPZ) derived from the trees DBH and the modified TPZ derived from the trees canopy where it extends past the DBH derived TPZ. As the two forms of TPZ are independent a differentiation between the two forms of TPZ needs to be made. In this report:

- a. “TPZ” refers to the DBH derived Tree Protection Zone (12 x DBH) and “mTPZ” pertains to the TPZ where it is modified to account for a canopy that extends beyond the DBH derived TPZ.
- b. The modified Tree Protection Zone (mTPZ) for all trees is taken as being identical to the Tree Protection Zone (TPZ) except where the canopy of the tree extends beyond the TPZ. Where this is the case the TPZ is shown on the site plans and any tree canopy impacts are addressed as required within the report. Otherwise the mTPZ is recorded within this report as “= TPZ”.

10.4. Explanation of terms

The assessment of Health, Structure, Condition, U.L.E. (Useful Life Expectancy), Origin, Maturity, Form and Retention value are based on the following definitions. In the case of health and structure these definitions encompass only the more common indicators for these assessments. Other indicators not included in these definitions may lead to the ascribing of a particular health or structure category.

10.4.1. Maturity

The notation of “Maturity” is based on the following categories.

•	Immature	Less than 20% of the life expectancy for that tree.
•	Mature	20 – 80% of the life expectancy for that tree.
•	Over mature	> 80% of the life expectancy for that tree.

10.4.2. Health

Pertains to the health and growth potential of the tree. The notation of “Health” is based on the following categories.

Category	Example
• Good	Crown full, with good foliage density. Foliage is entire with average colour, minimal or no pathogen damage. Above average growth indicators such as extension growth, leaf size and canopy density. Little or no canopy die-back. Generally no dead wood on the perimeter of the canopy. Good wound wood development. Tree exhibits above average health and no works are required.
• Fair	Tree may have more than 30% dead wood, or may have minor canopy dieback. Foliage density may be slightly below average for the species. Foliage colour may be slightly lower than average and some discolouration may be present. Typical growth indicators, e.g. extension growth, leaf size, canopy density for species in location. Average wound wood development. The tree exhibits below average health and remedial works may be employed to improve health.
• Poor	Tree may have more than 30% dead wood and canopy die back may be present. Leaves may be discoloured and/or distorted, often small, and excessive epicormic growth may be present. Pathogens and/or stress agents may be present that could lead, or are leading to, the decline of tree. Poor wound wood development. The tree exhibits low health and remedial works or removal may be required.
• Very poor	The tree has more than 30% dead wood. Extensive canopy die back is present. Canopy is very sparse. Pathogens and/or stress agents are present that are leading to the decline of the tree. Very poor wound wood development. The tree exhibits very low health and remedial works or removal are required.
•	Dead Tree is dead and generally should be removed.

10.4.3. Structure

Pertains to the physical structure of the tree including the main scaffold branches and roots. Structure includes those attributes that may influence the probability of major trunk, root or limb failure.

The notation of “Structure” is based on the following categories.

Category	Example
• Good	The tree has a well-defined and balanced crown. Branch unions appear to be strong with no defects evident in the trunk or the branches. The tree is unlikely to suffer trunk or branch failure under normal conditions. The tree is considered a good example of the species with a well-developed form.
• Fair	The tree has some minor problems in the structure of the crown. The crown may be slightly out of balance and some branch unions may exhibit minor structural faults or have the potential to create faults. If the tree is single trunked, this may be on a slight lean or be exhibiting minor defects. These defects are not likely to result in catastrophic trunk or branch failure although some branch failure may occur under normal conditions.

- **Poor** The tree has significant problems in the structure of the scaffold limbs or trunk. It may be lop-sided or have few branches on one side or have large gaps in the crown. Large branches may be rubbing or crossing over. Branch unions may be poor, and faults at the point of attachment or along the branches may be evident. The tree may have a substantial lean. The tree may have suffered significant root damage. The tree may have some degree of basal or trunk damage.
These defects may predispose the tree to major trunk or branch failure.

- **Very poor** The tree has some very significant problems in the structure of the crown. It may be lop-sided or have few branches on one side or have large gaps in the crown. Branches may be rubbing or crossing over and causing damage to each other. Branch unions may be poor, and faults at the point of attachment or along the branches may be evident. The tree may have a substantial lean. The tree may have suffered major root damage. The tree may have extensive basal or trunk damage.
These defects are likely to predispose the tree to trunk or scaffold limb failure.

10.4.4. U.L.E. (Useful Life Expectancy)

U.L.E. pertains to the span of time that the tree might reasonably be expected to provide useful amenity value with an acceptable level of safety at an acceptable cost. Depending on the situation, available financial resources and other factors, two identical trees may be accorded different longevity ratings. The notation of U.L.E. is based on the following categories.

<u>Category</u>	<u>Example</u>
• 0	The tree is dead or almost dead or constitutes an immediate and unacceptable hazard. The tree should generally be removed unless other considerations require its' retention.
• 0 – 5	The tree is unlikely to provide useful amenity for longer than 5 years. The tree is in serious decline, poses an unacceptable hazard and/or requires a level of maintenance disproportionate with its' value. The tree should generally be removed unless other considerations require its' retention.
• 5 – 15	The tree is unlikely to provide useful amenity for longer than 15 years. The tree may be in serious decline, be a very short-lived species, present a moderately elevated hazard and/or require high levels of maintenance. The tree could be retained or removed depending on the situation.
• 15 – 25	The tree is unlikely to provide useful amenity for longer than 25 years. The tree may be in moderate decline, be a short-lived species, present a slightly elevated hazard and/or require moderate levels of maintenance. The tree should generally be retained unless other factors dictate its' removal.
• 25 – 50	The tree is likely to provide useful amenity for up to 50 years. The tree may be in fair to good condition, have a moderate life-span, present a low to moderate level of hazard and/or require moderate levels of maintenance. The tree should generally be retained unless other factors dictate its' removal.
• > 50	The tree is likely to provide useful amenity for greater than 50 years. The tree may be in good to excellent condition, a long lived species, present a low level of hazard and/or require low levels of maintenance. The tree should generally be retained unless other factors dictate its' removal.

10.4.5. Form

The notation of “Form” pertains to the aesthetic qualities of the trees live canopy. Generally good form is indicative of a symmetrical, well-balanced canopy although this is dependent on the particular species. Some species naturally develop an asymmetric canopy and in this case a highly irregular canopy might be described as good.

The form of a tree is considered assuming that the tree stands in isolation from any surrounding trees. This may mean that a group of trees that exhibit good form as a group, may be described as having poor form as individuals. The notation of “Form” is based on the following categories.

Category	Example
<ul style="list-style-type: none"> • Very good 	<p>An outstanding specimen of that species. Generally, a very evenly balanced and symmetrical canopy with no deformation. If the development of that species is naturally irregular, then an outstanding specimen of that species.</p>
<ul style="list-style-type: none"> • Good 	<p>A good specimen of that species. Generally a well-balanced and symmetrical canopy with minor deformation. If the development of that species is naturally irregular, then a good specimen of that species.</p>
<ul style="list-style-type: none"> • Fair 	<p>An average specimen of that species. Generally a balanced canopy with some minor to moderate asymmetry. If the development of that species is naturally irregular, then an average specimen of that species.</p>
<ul style="list-style-type: none"> • Poor 	<p>A below average specimen of that species. Generally, a moderate to high degree of asymmetry. If the development of that species is naturally irregular then a poor specimen of that species.</p>
<ul style="list-style-type: none"> • Very poor 	<p>A very poor specimen of that species. Generally a high to extreme degree of asymmetry. If the development of that species is naturally irregular then a very poor specimen of that species.</p>

10.4.6. Works required

The works required listed in this report are of a general nature only and should be reviewed following the completion of any works on the site.

Where a tree is recommended for removal (Recommendation) it is not listed in the Works required section of the report. Works required include deadwood >25mm branches, weight reduce, irrigate, and mulch.

10.4.7. Priority

The priority accorded particular works is based on a projected increased site usage following the completion of a development on the site. The priority is of a general nature only and should be reviewed following the completion of any works on the site.

“Priority” is based on the following categories.

<u>Category</u>	<u>Description</u>
• N/A.	No tree works are required
• Very low	Tree works are optional and could be performed at any time.
• Low	Works should be performed within five years.
• Moderate	Works should be performed within 3 years.
• High	Works should be performed within 12 months.
• Urgent	Works should be performed immediately.

10.4.8. Value

The value ascribed to each tree in this report is not definitive and should be used as a guide only. Many factors influence the comparative value of a tree and a number of these factors are outside the scope of arboricultural assessment. These factors cannot therefore be addressed in a single rating system.

Value is comprised of two parts. These are the Amenity Value of the tree rated as Very Low to Very high and the Useful Life Expectancy (ULE) of the tree.

The Amenity Value of the tree relates to the contribution of the tree to the aesthetic amenity of the area. The primary determinants of amenity value are tree health, size and form.

The Amenity Value is then modified by the ULE of the tree with short ULE values reducing the Value of the tree and long ULE values increasing the Value of the tree.

Trees that are listed on a register of heritage or significant trees are not accommodated within this rating system as these values are often independent from the arboricultural attributes of the tree. Heritage and significant trees may be ascribed a very low retention value despite their listing on any register. Where known, any heritage or significant register listing it will be noted in the report.

Value is assessed on each tree as a single entity. The value of a group of trees is not considered in this context and each tree within the group will be assessed as an individual.

Value is based on the following categories.

<u>Category</u>	<u>Example</u>
• Very high	Generally a very large tree that exhibits excellent health and/or form or a tree that is listed on a heritage or significant tree register.
• High	Generally a large tree that exhibits good health and/or form.
• Medium	Generally a medium tree that exhibits good health and/or form. May be a large tree that exhibits fair health and/or form.
• Low	Generally a small tree that exhibits good health and/or form. May be a large or medium tree that exhibits fair or poor health and/or form.
• Very low	Generally a small tree that exhibits poor health and/or form. May be a large or medium tree that exhibits poor, or worse, health and/or form.

10.5. Glossary

<u>Tree Protection Zone (TPZ)</u>	Is based on AS 4970-2009 <i>Protection of trees on development sites</i> and defines the soil volume that is likely to be required to encompass enough of the trees absorbing root system to ensure the long-term survival of the tree. The radius specified as the TPZ is an estimate of the minimum distance from the tree that excavation or other activities that might result in root damage should occur to avoid negative impacts on the health and longevity of the tree. AS 4970 states that intrusion of up to 10% of the surface area of the TPZ may occur without further assessment or analysis.
<u>Structural Root Zone (SRZ)</u>	Is based on AS 4970-2009 (Protection of trees on development sites) and defines the likely spread of the trees scaffold root system. These roots are the primary anchoring roots for the tree and damage to these roots may render the tree liable to uprooting. SRZ is based on measurement of the trunk above the root flair (AS 4970) However in this report SRZ is based on the measured or estimated DBH and there should be taken as an estimate only. Additional measurement may be required if construction near the SRZ is expected to occur.
<u>Modified Tree Protection Zone (mTPZ)</u>	Is based on the TPZ and includes any requirement to protect the above ground parts of the tree that project beyond the TPZ. However generally the mTPZ will be equal to the TPZ. TPZ extension beyond the TPZ to protect the tree canopy will be shown on the site plan but will not be reflected in the TPZ radius measurements quoted in this report.
<u>DBH (Diameter at Breast Height)</u>	Is the diameter of the tree at approximately 1.4 meters above ground level. Where a trunk is divided at or near 1.4 meters above ground the DBH is generally measured at the narrowest point of the trunk between ground level and 1.4 meters. Alternatively, where a higher level of accuracy is required with multi stemmed trees, DBH is derived from the combined cross-sectional area of all trunks. The DBH of all accessible trees is measured unless otherwise stated in the Tree Data section of this report. The DBH of trees on adjoining properties is measured where access can be readily gained to the property, otherwise it is estimated.
<u>Measured</u>	Indicates whether the DBH has been measured or estimated. DBH may be estimated for small low value multi stem trees or trees that are inaccessible.
<u>Retained?</u>	Indicates whether the tree is shown as being removed or retained on the plans provided. This is generally derived from the site plans provided but the removal or retention of trees might be communicated by other means.
<u>Recommendation reason</u>	Pertains to the reason that removal or retention or other works are recommended. Other than trees on adjoining properties or road reserves a reason for retention is usually not given. In this case N/A is used.
<u>Height & width</u>	Tree height is generally measured for moderate, high and very high value trees and is measured with an Impulse Laser infrared range finder. The height of low and very low value trees is usually estimated. Canopy width is estimated unless otherwise stated.
<u>Genus / species</u>	The identification of trees is based on accessible visual characteristics and given that key identifying features are often not available at the time of assessment the accuracy of identification is not guaranteed. Where the species of any tree is not known, sp. is used.

