Prepared for: Emerge associates

Prepared by: ARBORITE TREE MANAGEMENT SOLUTIONS

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Tree Survey Report

Lathlain Club Rooms
Carlisle WA 6101

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Table of Contents

"The trees encountered on a country stroll

Reveal a lot about that country's soul…

A culture is no better than its woods."

— *W.H.Auden*

1. Client

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2. Introduction

The purpose of this report is to provide an independent Arboricultural assessment of all trees located at 34 Goddard St, Lathlain WA 6100 (Fig. 1). Arborite Tree Management Solutions has been employed to establish; tree details, health & condition, useful life expectancy (ULE) & tree significance to assist with tree retention priorities. Information will be provided on potential impacts of construction on the subject trees and a risk assessment (QTRA) will be conducted on each tree and recommendations to mitigate associated risks where necessary.

3. Key objectives

- Retain the subject tree through appropriate management
- Perform visual tree inspection (VTA) on the subject tree to determine health and structure
- Identify scientific and common names
- Determine the subject trees height, width, trunk diameter, tree protection zone (TPZ) and structural root zone (SRZ)
- Determine retention values to assist with a tree retention plan
- Perform a risk assessment on the subject trees and provide risk mitigation recommendations where necessary
- Supply a tree protection plan (TPP) that will outline measures to protect the tree through the entire construction process

4. Methodology

- The site was assessed from observations made from ground level on the 25th February 2022
- Field notes were taken and the information documented was an accurate account of the subject trees on the above specified date
- The Quantified Tree Risk Assessment (QTRA) methodology was used to calculate risk
- The height and spread of the trees were estimated
- A circumference tape was used to determine relevant trees diameter at breast height (DBH)
- Trees/shrubs with a DBH <100mm have not been assessed
- TPZ & SRZ were determined based on the DBH measurement
- A Samsung tablet and Geographic Information System (GIS) have been used to capture the tree(s) and its location imposed on Google satellite imagery
- Some information contained in this report is derived from conversations with the client

5. Limitations

Information contained in this report pertains only to the tree(s) examined on the above specified date of inspection. The tree assessment was performed by a suitably qualified arborist (AQF 8) using a recognised model (VTA) that aligns with the International Society of Arboriculture (ISA). The assessment was limited to a ground based VTA that did not extend to aerial inspections, nor below ground evaluations. The documented, observations, results, recommendations and conclusions given may vary after the site visit due to environmental conditions or variances in site conditions. There is no warranty or guarantee, expressed or implied, that problems or deficiencies of the subject tree may not arise in the future.

6. Site details

6.1 Site Map

Fig. 1 – Subject trees located at 34 Goddard St, Lathlain WA 6100 (Google maps)

6.2 Concept plan

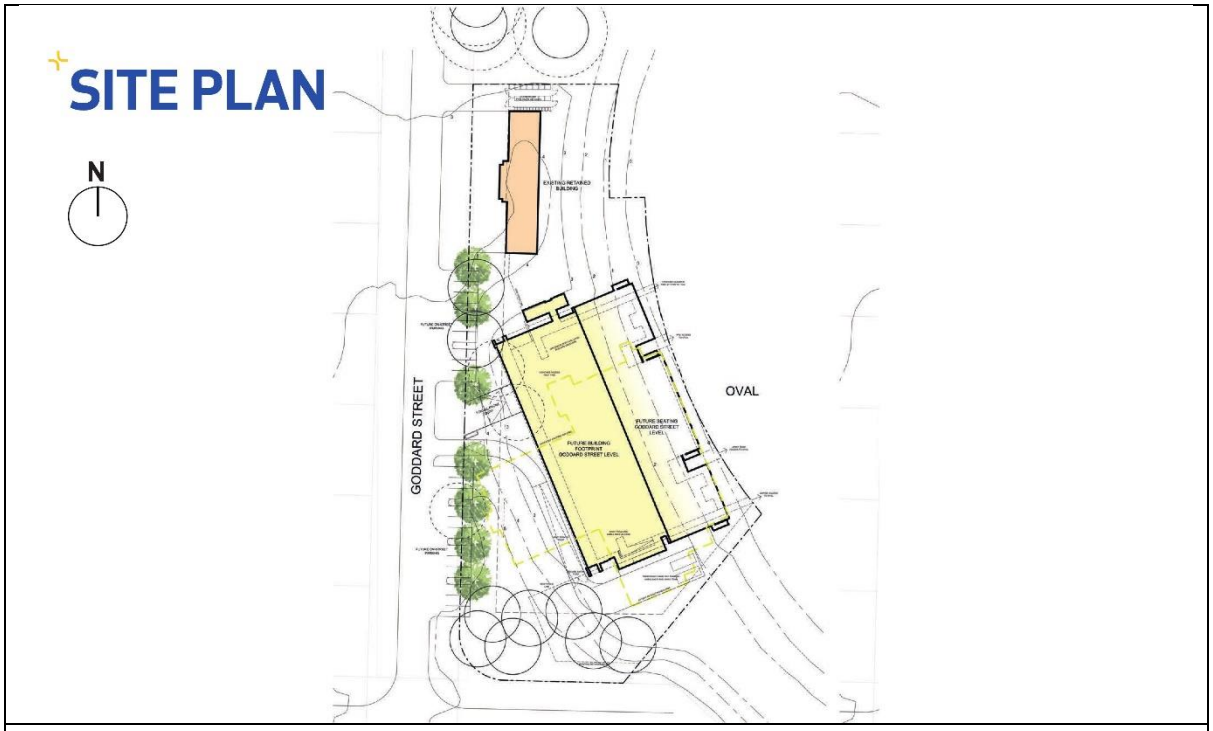


Fig. 2 – Perth football concept plan

7. Tree details

7.1 Tree survey

Tag no	Species	Height (m)	Width (m)	DBH (m)	TPZ	SRZ	Health & condition	Age class	ULE	Retention value
1	*Jacaranda mimosifolia*	5-10	1-5	0.15	2	1.50	average	juvenile	25+	High
2	*Jacaranda mimosifolia*	5-10	1-5	0.15	2	1.50	average	juvenile	25+	High
3	*Jacaranda mimosifolia*	5-10	5-10	0.35	4.2	2.13	average	semi-mature	25+	High
4	*Agonis flexuosa*	5-10	5-10	0.8	9.6	3.01	poor	mature	5-15	Medium
5	*Agonis flexuosa*	10-15	5-10	0.55	6.6	2.57	average	mature	15-25	Medium
6	*Corymbia citriodora*	15-20	10-15	0.6	7.2	2.67	good	mature	25+	High
7	*Agonis flexuosa*	10-15	5-10	0.8	9.6	3.01	average	mature	5-15	Medium
8	*Jacaranda mimosifolia*	15-20	10-15	0.45	5.4	2.37	good	mature	25+	High
9	*Corymbia citriodora*	15-20	10-15	0.6	7.2	2.67	good	mature	25+	High
10	*Corymbia citriodora*	15-20	10-15	0.5	6	2.47	average	semi-mature	15-25	Medium

Tag no	Species	Height (m)	Width (m)	DBH (m)	TPZ	SRZ	Health & condition	Age class	ULE	Retention value
11	*Jacaranda mimosifolia*	5-10	5-10	0.25	3	1.85	average	semi-mature	15-25	Medium
12	*Corymbia citriodora*	15-20	10-15	0.4	4.8	2.25	average	semi-mature	15-25	Medium
13	*Jacaranda mimosifolia*	5-10	1-5	0.15	2	1.50	average	juvenile	15-25	High
14	*Jacaranda mimosifolia*	10-15	5-10	0.4	4.8	2.25	average	mature	15-25	High
15	*Eucalyptus sp*	15-20	10-15	0.6	7.2	2.67	good	mature	25+	High

Table 1: Tree survey

8. Risk Assessment (QTRA)

8.1 QTRA overview

The QTRA system applies established and accepted risk management principles to tree safety management. The system moves the management of tree safety away from labelling trees as either 'safe' or 'unsafe' and thereby away from requiring definitive judgements from either tree assessors or tree managers. Instead, QTRA quantifies the risk of significant harm from tree failure in a way that enables tree managers to balance safety with tree values and operate to predetermined limits of tolerable or acceptable risk.

Tree safety management should not seek to minimise the risk of falling trees, but should balance the benefits of risk reduction with the associated costs in terms of both lost tree value and financial expenditure and maintain risks and benefits at a reasonable level.

The QTRA method provides a framework for the assessment of the three primary components of tree failure risk. The input values for these components are set out in broad ranges of Target, Size, and Probability of Failure. The QTRA User estimates values for the three components and inputs them to either the QTRA manual calculator or software application to calculate the Risk of Harm.

8.2 Risk management

When managing risks in all walks of life we strive to balance the costs of our actions and choices with the benefits that they provide. If, for example, you want to travel by car you must accept that even with all the extensive risk control measures, such as seat-belts, speed limits, airbags, and crash barriers, there is still a significant risk of death. This is an everyday risk that is taken for granted and accepted by millions of people in return for the benefits of convenient travel. Managing risks and benefits from trees should be no different.

8.3 Tree risk management

The risks from tree failure are generally very low and high risks will usually be encountered only in areas with either high levels of human occupation or where valuable property can be affected by the structural failure of trees. Where human occupation and the value of property are sufficiently low, we may be able to identify that the risk is 'broadly acceptable'.

8.4 Tree risk management vs. cost

Risk minimisation is often cited as an objective when managing risks from trees. This is not a reasonable aim because it does not take account of the cost of risk reduction. If reasonable management decisions are to be made, the benefits of controlling a risk must be balanced with its costs, and those costs are not just financial. The tree-related benefits that are lost to risk control are often a substantial cost of managing risks from falling trees.

When considering risks from falling trees, the cost of risk control will usually be too high when it is clearly 'disproportionate' to the reduction in risk. The issue of 'gross disproportion'[5], where decisions are heavily biased in favour of safety, is likely to be considered only where there are annualised risks greater than 1/10 000.

8.5 Weather affected targets

Often the nature of a structural weakness in a tree is such that the probability of failure is greatest during windy weather, while the probability of the site being occupied by people during those weather conditions is often low. As wind speeds increase to 60-70 knots the failure of branches will increase both in size and number and the population is put on notice that catastrophic tree failure is increasingly likely. In most recreational areas, including the streets of our towns and cities, pedestrian access reduces with inclement weather.

8.6 QTRA result

Tag no	Species	Tree defect 1	Tree defect 2	Tree defect 3	Tree defect 4	Risk rating	Pruning rec.	Action	Residual risk	Comments
1	*Jacaranda mimosifolia*					very low	No		very low	Council verge tree
2	*Jacaranda mimosifolia*					very low	No		very low	Council verge tree
3	*Jacaranda mimosifolia*					very low	No		very low	Council verge tree
4	*Agonis flexuosa*	Canopy dieback	Major deadwood	Epicormic growth		medium	Yes	1. Major deadwood removal	low	
5	*Agonis flexuosa*	Suppressed growth	Hanger			medium	Yes	1. Remove large suspended hanger	low	
6	*Corymbia citriodora*	History of failures (100-150mm)				low	No		low	trees on embankment, 2 to 3 m above road height
7	*Agonis flexuosa*	Canopy dieback	Major deadwood	Included union	Bracket fungus	medium	Yes	1. Major deadwood removal 2. Reduce underperforming limbs to appropriate growth point	low	Reduced amenity value and possible decline. consider removal and replant
8	*Jacaranda mimosifolia*					low	No		low	
9	*Corymbia citriodora*					low	No		low	
10	*Corymbia citriodora*	Thinning canopy				low	No		low	
11	*Jacaranda mimosifolia*	Canopy dieback				low	No		low	
12	*Corymbia citriodora*	Yellowing foliage	Major deadwood			low	No	1. irrigate tree	low	Possible tree decline without supplementary irrigation
13	*Jacaranda mimosifolia*	History of failures				very low	No		very low	Council verge tree
14	*Jacaranda mimosifolia*	Minor canopy dieback	Premature yellowing of leaves			low	No		low	Council verge tree
15	*Eucalyptus sp*	Low hanging limbs	Weighted lateral limbs	Exposed roots		medium	Yes	1. Uplift canopy to 2.5m 2. Weight reduce northern facing limb extending towards structure and over footpath and park bench	low	Council verge tree

Table 1 – Risk assessment

9. Tree retention, tree significance & ULE

9.1 Retention value

There is always a compromise between retaining trees on a development site and the economic imperatives of land development. Establishing priorities for the retention of trees is an important part of the planning process if amenity is to be sustained in the long term.

The methodology for the purpose of this report focus primarily on the sustainability of the tree in the landscape as a way of determining its value for retention, thus a tree with high amenity value with a long remaining life expectancy is considered the best candidate for retention on a development site.

If the trees are found to have high significance plans may be altered or construction methods changed to accommodate tree retention. Excavation within the TPZ can be conducted in a non-intrusive manner that can dramatically reduce disturbance to the trees roots.

9.2 Useful life expectancy (ULE)

ULE is an estimate of the number of years a tree is expected to stay alive and is a method of assessing the relative importance of individual trees and the amenity value that can be realised for the remaining duration of the trees lifespan. In conjunction with landscape significance, ULE helps making informed decisions on the retention value of trees on site.

To arrive at a ULE figure, it is necessary to consider the present age of the tree, the average life span of the species and any local environmental modifying factors that may influence that potential.

9.3 High retention value trees

9 trees has been classified as having a high retention values (Fig. 3). Typically trees in this category are of high quality with an estimated remaining life expectancy of at least 25 years, have high amenity value and may make significant environmental contributions.

Fig. 3 – Indicating high priority trees

9.4 Medium retention value trees

6 Trees where categorized as having a medium retention value (Fig. 4). Typically trees in this category were of average quality with an estimated remaining life expectancy of 15–25 years. They have moderate amenity value and make low/moderate environmental contributions. Trees with this retention value warrant minor design consideration in an attempt to allow for their retention or a suitable replanting scheme.

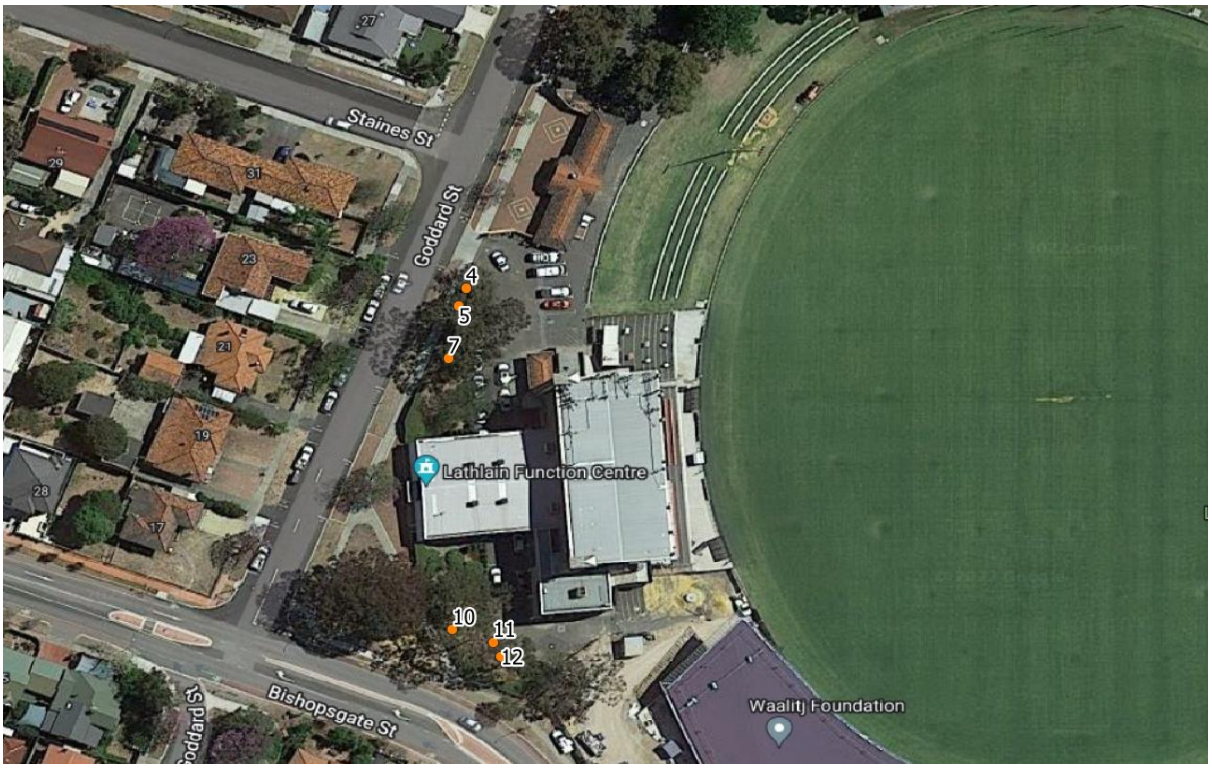


Fig. 4 – Indicating medium priority trees

9.5 Small trees

With present day abilities to easily move small trees or replace them with virtually identical semi-matures, it is inappropriate that they should dictate the long term layout of a new construction site. For the purpose of this report, trees/shrubs with a DBH of <100mm have not been regarded.

10. Tree protection Zones (TPZ & SRZ)

10.1 Tree protection Zone (TPZ):

Tree protection zones (TPZ) are the principal means of protecting trees on development sites and are defined by AS 4970-2009 Protection of Trees on Development Sites (Standards Australia 2009). The TPZ is a combination of the root area and crown area requiring protection. It is an area that is required to be isolated from construction disturbance to ensure continued viability of the tree.

The TPZ for an individual tree is determined as follows (Standards Australia 2009):

TPZ = DBH × 12

That is, the radius of the TPZ = 12 X the DBH measured at 1.4 metres (m).

A TPZ should not be less than 2 m nor greater than 15 m except where crown protection is required.

The TPZ incorporates the structural root zone (SRZ).

10.2 Structural Root Zone (SRZ):

The structural root zone (SRZ) is the minimum volume of roots required by the tree to remain stable in the ground (Standards Australia 2009). If the SRZ is breached the chances of windthrow are significantly increased, especially if roots are cut on the same side as prevailing winds. Windthrow is an event where the entire tree fails/falls over. Often, the tree is completely uprooted with devastating results.

It is important to note that the SRZ is not related to tree health. It refers to the physical volume of roots required for the tree to remain stable in the ground. It is in no way related to the physiological requirements of the tree but is the minimum volume of roots required for the tree to remain standing.

The SRZ for an individual tree is determined as follows (Standards Australia 2009):

SRZ = (D × 50)0.42 x 0.64

The SRZ should not be less than 1.5m

10.3 TPZ and modifications

In urban settings, the trees roots are not often where they are expected and can also be influenced by soil type and tree species. A majority of Perth's suburbs are situated on sandy soils that typically have low compaction rates and high filtration that can result on tree roots growing downwards as opposed to the more conventional lateral growth. As a result, it may be possible in certain circumstances to make significant encroachments into the TPZ and often the structural root zone.

Currently one of the biggest areas of contention and legal dispute centers around what is an acceptable (or unacceptable) level of impact. These concerns intersect with issues surrounding encroachment. Theoretically, the standard allows 100% impact on the TPZ, provided that the project arborist can adequately demonstrate that the tree will remain viable.

11. Impact assessment summary

11.1 TPZ summary

Tag no	Species	DBH (m)	TPZ	SRZ
1	*Jacaranda mimosifolia*	0.15	2	1.50
2	*Jacaranda mimosifolia*	0.15	2	1.50
3	*Jacaranda mimosifolia*	0.35	4.2	2.13
4	*Agonis flexuosa*	0.8	9.6	3.01
5	*Agonis flexuosa*	0.55	6.6	2.57
6	*Corymbia citriodora*	0.6	7.2	2.67
7	*Agonis flexuosa*	0.8	9.6	3.01
8	*Jacaranda mimosifolia*	0.45	5.4	2.37
9	*Corymbia citriodora*	0.6	7.2	2.67
10	*Corymbia citriodora*	0.5	6	2.47
11	*Jacaranda mimosifolia*	0.25	3	1.85
12	*Corymbia citriodora*	0.4	4.8	2.25
13	*Jacaranda mimosifolia*	0.15	2	1.50
14	*Jacaranda mimosifolia*	0.4	4.8	2.25
15	*Eucalyptus sp*	0.6	7.2	2.67

Table 2: Impact assessment summary

11.2 Tree ID 1 -3

Trees 1 -3 are at a distance from the proposed development and incursions into the TPZ are not likely. However, the installation of a TPZ barrier is recommended to protect trees throughout the construction process.

11.3 Tree ID 4 - 7

Trees 4 – 7 are on an embankment 2-3 meters above the current height of the access road and incursions into the TPZ are not anticipated. Further arboricultural input will be required if the soil gradient is modified by >200mm. Pruning may be require to achieve appropriate clearances from the new structure.

11.4 Tree ID 8

The proposed plans will make incursions into the TPZ of Tree 8. Once plans have been finalized, a tree viability assessment will be required to determine tree retention.

11.5 Tree ID 9, 10 & 12

Trees 9, 10 & 12 are on an embankment above the current height of the access road and incursions into the TPZ are not anticipated. Further arboricultural input will be required if the soil gradient is modified by >200mm. Pruning may be require to achieve appropriate clearances from the new structure.

11.6 Tree ID 11

The proposed plans will likely make incursions into the TPZ of Tree 11. Once plans have been finalized, a tree viability assessment will be required to determine tree retention.

11.7 Tree ID 13

Construction will not likely make incursions into the TPZ of this tree.

11.8 Tree ID 14

Construction will not likely make incursions into the TPZ of this tree.

11.9 Tree ID 15

Construction will not likely make incursions into the TPZ of this tree.

12. Recommendations

1. Arborist to review finalized plans to be included in the Tree Protection Plan (TPP)
2. Draft a TPP detailing measures required to protect tree marked for retention for the entirety of the construction process
3. Prune necessary trees before the commencement of works

13. Disclaimer

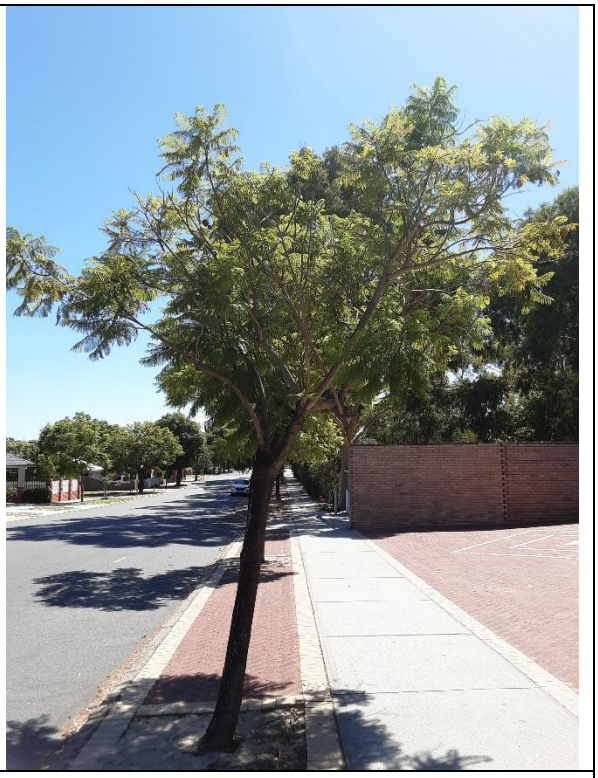
The conclusions and recommendations contained in this report refer to the trees' condition on the day of inspection only. The report should be read and considered in its entirety. All care has been taken using the most up to date arboricultural information in the preparation of this report. The report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

inspection only. 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 due to unforeseen circumstances.

14. Appendices

14.1 Photos

Tree ID 1



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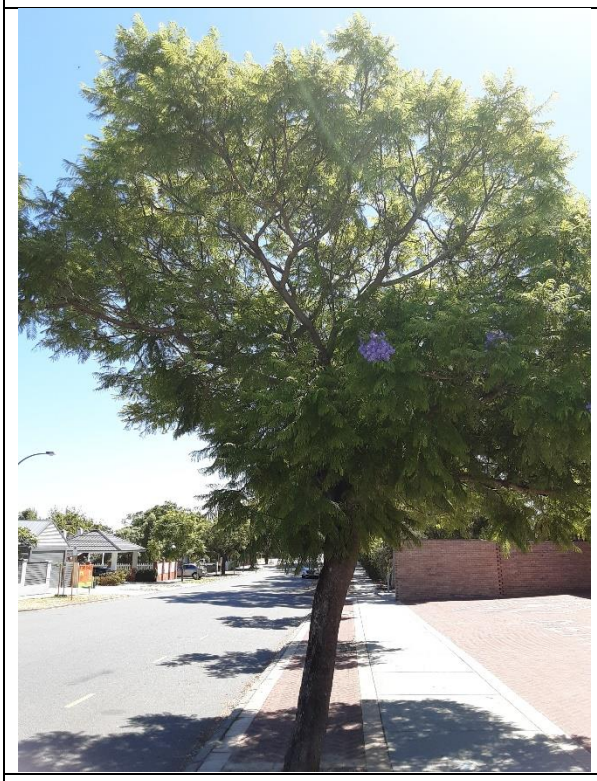

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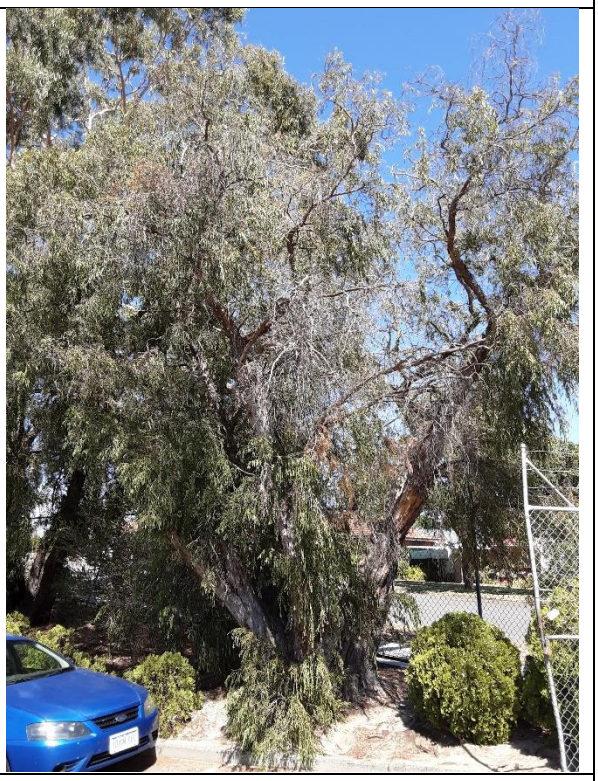

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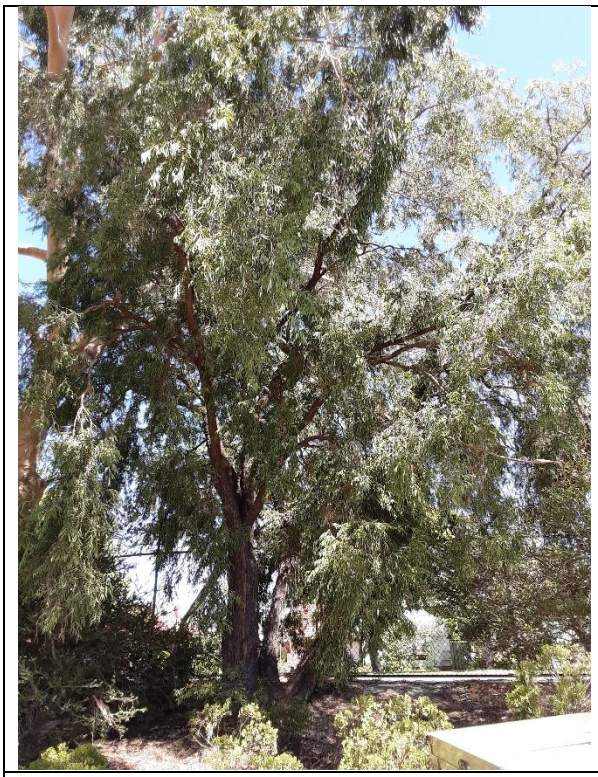
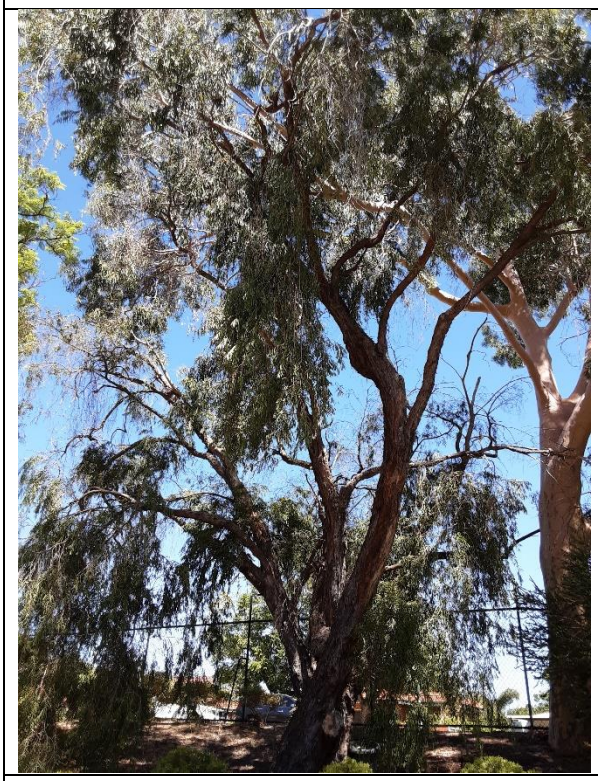
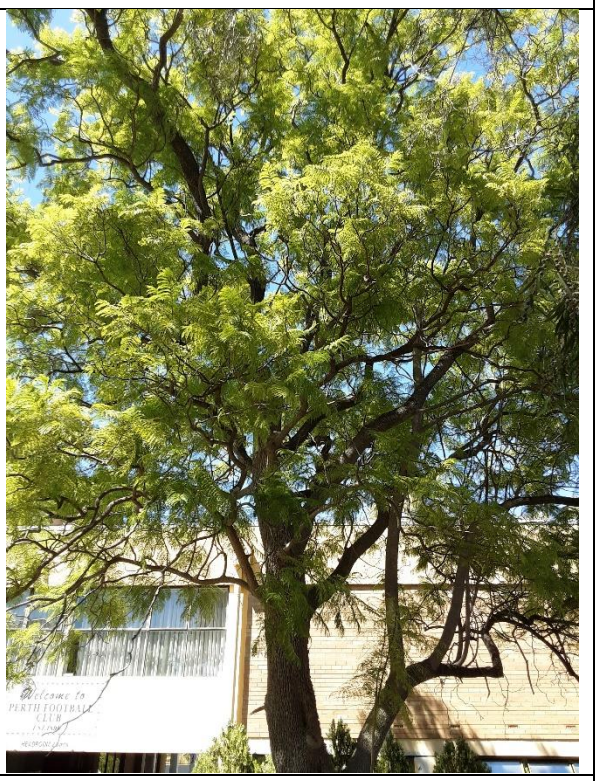


Tree ID 5

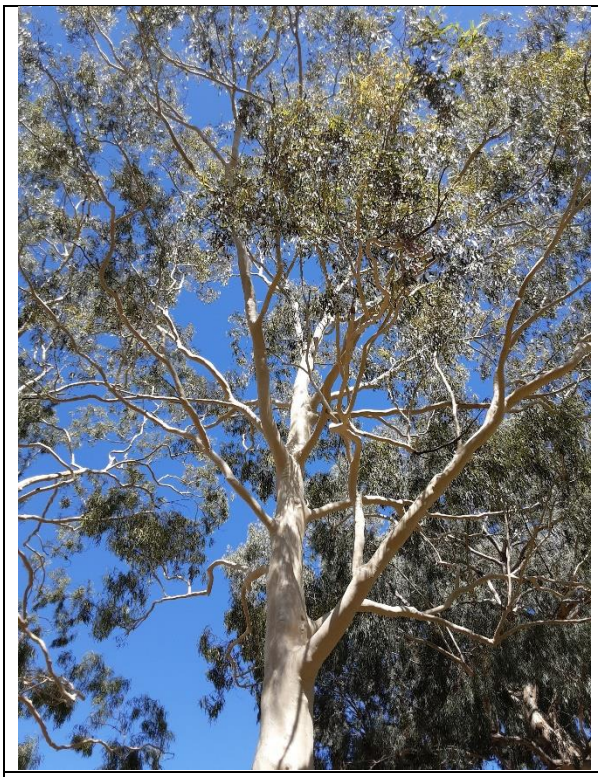
Tree ID 6



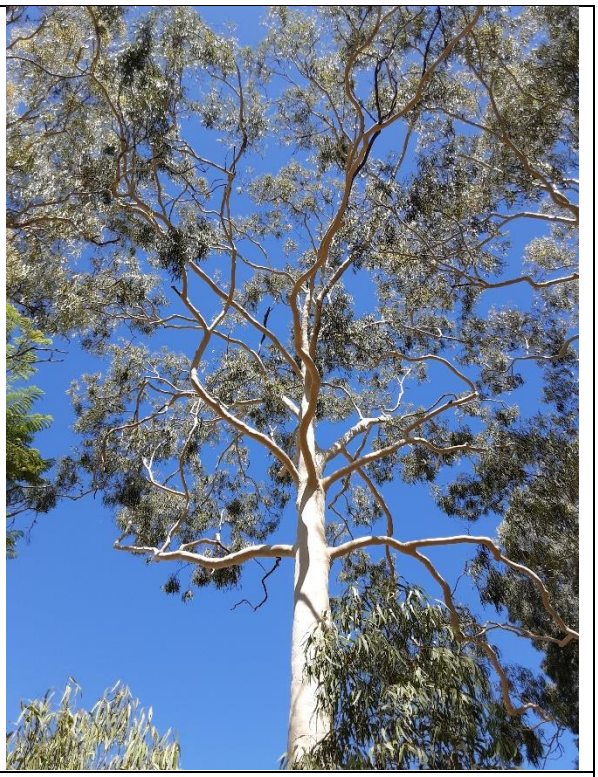
Tree ID 7



Tree ID 8



Tree ID 9



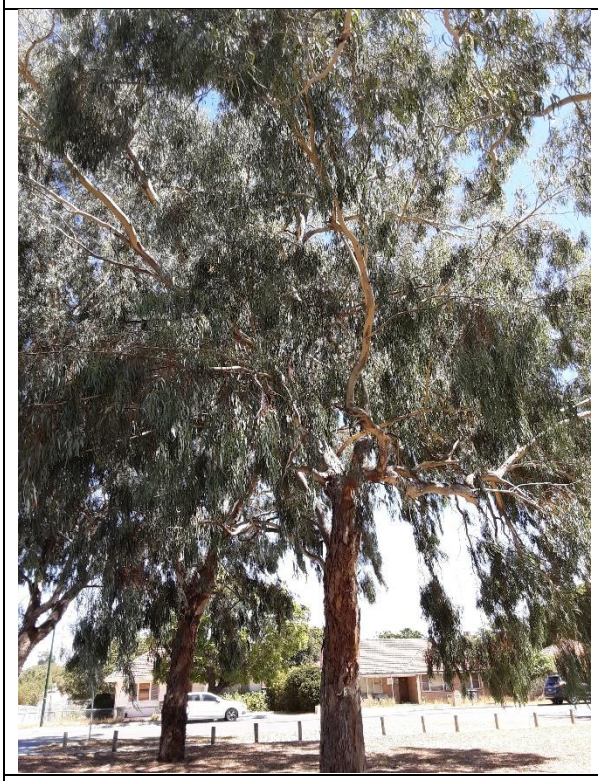
Tree ID 10

Tree ID 11

Tree ID 12

Tree ID 13

Tree ID 14



Tree ID 15