URBAN FOREST

TRAINING & CONSULTANCY

Arboricultural Impact Assessment

Risby Street, Ulverstone, 2024

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Contents

Element	Detail
UFT&C Reference	
Client	Kurt Chamberlin - FMG Engineering
Location	Risby Street, Ulverstone
Site Assessment Date	18th of September, 2024
Consultant	Paul Suidgeest, Dip Horticulture (Arb), QTRA No. 3744
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Version	1
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1. Summary

An Arboricultural Impact Assessment was conducted to evaluate the effects of the proposed road reconstruction along Risby Street, Ulverstone, between the Alexandra Road and Leven Street intersections. This report focuses on the street trees in this section, assessing their growing environment, overall condition, retention value, and the relevant regulatory controls.

The primary objective of this report is to determine the impact of the proposed road reconstruction on these trees. It provides recommendations for impact mitigation for trees with high and moderate retention values where feasible. Additionally, the report offers guidance on tree replacement in cases where retention is impossible.

The site survey identified a total of 25 trees within the project footprint. Trees located on private property were not considered as part of this assessment. The table below summarizes the retention values of the assessed trees and their potential to be retained based on the level of encroachment from the proposed road reconstruction.

Retention Value	Tree Numbers
High	0
Medium	3, 10, 11, 12 and 13
Low	1, 4, 5, 6, 7, 8, 14, 15, 16, 17, 18, 19, 20, 21, 22, 24 and 25
None	2, 9, 23

Trees with No Retention Value

Three (3) trees attracted no retention value. These trees exhibited poor health and structural conditions that could not be remedied through arboricultural treatments. The removal and replacement of these trees was recommended.

Trees with Medium retention values

Five (5) trees attracted Moderate retention values. These trees exhibited fair health and structural indicators resulting from historical pruning practices (lopping). These pruning practices have resulted in minor decay at the attachment points of secondary growth and have an elevated risk of failure.

While these trees could be managed in the future, the proposed encroachments required to undertake the proposed road reconstruction works will result in significant encroachments and root severance with the tree's Tree Protection Zone (TPZ) and Structural Root Zones (SRZ). Retention of these trees within the context of the proposed road reconstruction is not recommended due to the risk of root plate failure. Accordingly, these trees are recommended for removal and replacement.

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Trees with Low retention values

Seventeen (17) trees attracted Low retention values. These were newly planted trees that could easily be replaced, as well as trees that exhibited fair health indicators and poor structural indicators resulting from historical pruning practices (lopping). These pruning practices have resulted in significant decay at the attachment points of secondary growth and have an elevated risk of failure.

While these trees could be managed in the future, the proposed encroachments required for road reconstruction will result in significant root severance with the tree's Tree Protection Zone (TPZ) and Structural Root Zones (SRZ). Retention of these trees within the context of the proposed road reconstruction is not recommended due to the risk of root plate failure. Accordingly, these trees are recommended for removal and replacement.

The Tree Location Plan can be found in Section 6.2 – Figure 1 of this report, the full tree inventory can be found in Section 6.2 – Table 1 of this report and a visual representation of the encroachment (if applicable) into the TPZ and SRZ areas can be found in Section 7.2 – Table 2 fo this report.

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2. Introduction

Kurt Chamberlin of FMG Engineering engaged urban Forest Training and Consultancy to inspect twenty-five council-owned street trees in the road reserve along Risby Street, Ulverstone, between the Alexandra Road and Leven Street intersections. This assessment did not include trees within the front setbacks of adjacent properties. Field data was collected on 19th September 2024 by Paul Suidgeest.

This report aims to evaluate the trees' condition and assess their suitability for retention in the context of the proposed road reconstruction along Risby Street. Retention values were determined based on the condition of the trees, their impact on the surrounding landscape, and relevant regulatory controls, including environmental or heritage overlays and exemptions under the Tasmanian Planning Scheme.

The tree assessment followed the methodology and descriptors outlined in Section 5 and Appendix 2, which should be referred to when reading this report.

Development impacts were evaluated according to the guidelines outlined in Australian Standard AS4970-2009, Protection of Trees on Development Sites.

3. Key Objectives

This Arboricultural Impact Assessment has been prepared per Australian Standard AS4970-2009, Protection of Trees on Development Sites. The objectives of this report are as follows:

- To identify the species, age, and dimensions of the subject trees.
- To assess the condition of the trees using Level 2 ground-based Visual Tree Assessment (VTA) methodology.
- To determine the retention value of the trees based on their condition, useful life expectancy (ULE), ecological and environmental value, and impact on the landscape.
- To identify the legal status of the trees within the context of applicable Local Laws and Planning Schemes.
- To assess the impact of the proposed works on the trees, in line with Australian Standard AS4970-2009.
- To provide recommendations for mitigating construction impacts and implementing tree protection measures for trees with high and moderate retention values.
- To suggest suitable replacement tree species and appropriate planting locations.

Retention recommendations are based on the trees' condition, significance in the landscape and useful life expectancy.

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4. Reference Documents

The following plans, standards, websites, guidelines and plans were reviewed as part of this report:

Plans

- Road and Drainage Reconstruction Works - Existing Conditions and Demolition, prepared by FMG Engineering (Ref No.: S67588-289337, Drawings: C003-C005, Revision B., Dated: 11/04/2024)
- Road and Drainage Reconstruction Works – General Layout Plan, prepared by FMG Engineering (Ref No.: S67588-289337, Drawings: C006-C008, Revision B., Dated: 11/04/2024)
- Road and Drainage Reconstruction Works – Drainage Layout Plan, prepared by FMG Engineering (Ref No.: S67588-289337, Drawings: C009-C0011, Revision B., Dated: 11/04/2024)

Planning Schemes

- The List – Department of Natural Resource and Environment Tasmanian (https://www.thelist.tas.gov.au/app/content/home/)

Websites

- Trust Trees – National Trust (https://trusttrees.org.au/)
- Trove – National Library of Australia (https://trove.nla.gov.au/)

Standards

- AS4970 - 2009 - Protection of Trees on Development Sites – Standards Australia
- Tasmanian Standard Drawings V3, 2020 – Local Government Association Tasmania

5. Methodology

The data for this report was collected using the following processes, tools, and equipment:

- An iPad with PlanITGeo Tree Plotter software was used to gather and record data.
- Unless stated otherwise, tree locations were recorded with an accuracy of approximately +/- 5 meters.
- Tree dimensions were measured using industry-approved tools, including a height meter/laser rangefinder, DBH tape, and measuring wheel.
- A ground-based, Level 2 tree inspection was performed using the Visual Tree Assessment (VTA) method (Mattheck and Breloer 1994).
- No root inspections were conducted through soil excavation or aerial examinations of the tree structure.
- Tree Retention Values were assessed using the Institute of Australia Consulting Arborists' Significance of a Tree Assessment Rating System (STARS).

6. Observations

6.1 Site Observations

The subject site is a north-south aligned residential road, with asphalt footpaths running along the length of the street adjacent to residential properties. The assessed trees are situated within a 2.5-meter-wide road reserve. This reserve is interrupted at various points by concrete, gravel, asphalt crossovers, and parking bays located at varying distances from the trees.

Low- and high-voltage powerlines run along the street's eastern side, requiring significant clearance and pruning of the trees on this side to maintain safe distances from the lines. These powerlines and clearance requirements have notably influenced the growth patterns and structural condition of the trees on the street's eastern side.

6.2 Tree Observations

The Arboricultural Impact Assessment evaluated 25 trees along Risby Street, Ulverstone, representing three species: English Elm (*Ulmus procera*), Crepe Myrtle (*Lagerstroemia indica*), and Willow Myrtle (*Agonis flexuosa*). Most of the trees were English Elms, with 23 individuals assessed, while only one Crepe Myrtle and one Willow Myrtle were present. The location of the assessed trees is detailed in Figure 1, while the full tree dataset is outlined in Table 1.

The English Elms were in varied conditions, with health ratings ranging from "fair" to "poor." Many of these trees showed clear signs of decline, including decay at points where they had been previously lopped, deadwood accumulation, and limited bud development.

Structurally, most elms were rated as "poor" or "fair." Notably, trees 1 and 2 exhibited 10mm diameter drill holes in their root plates, which could indicate poisoning. Tree 2 also showed significant dieback, evidenced by large-diameter deadwood (over 100mm) scattered throughout its crown.

Trees 9 and 23 demonstrated more severe structural concerns, with longitudinal columns of dieback affecting more than one-third of the trunk diameter, extending into major structural branches. These conditions compromise these trees' stability and long-term survival, reducing their retention suitability.

The Willow Myrtle, although healthy, had poor structural integrity due to repeated lopping for powerline clearance, leading to a weakened form and reduced retention value despite its good overall condition. In contrast, the lone Crepe Myrtle was healthy and exhibited sound structural characteristics.

Selected images of the assessed trees can be seen in **Section 6.3** – Photographic Catalogue.

Figure 1 – Tree Location Map

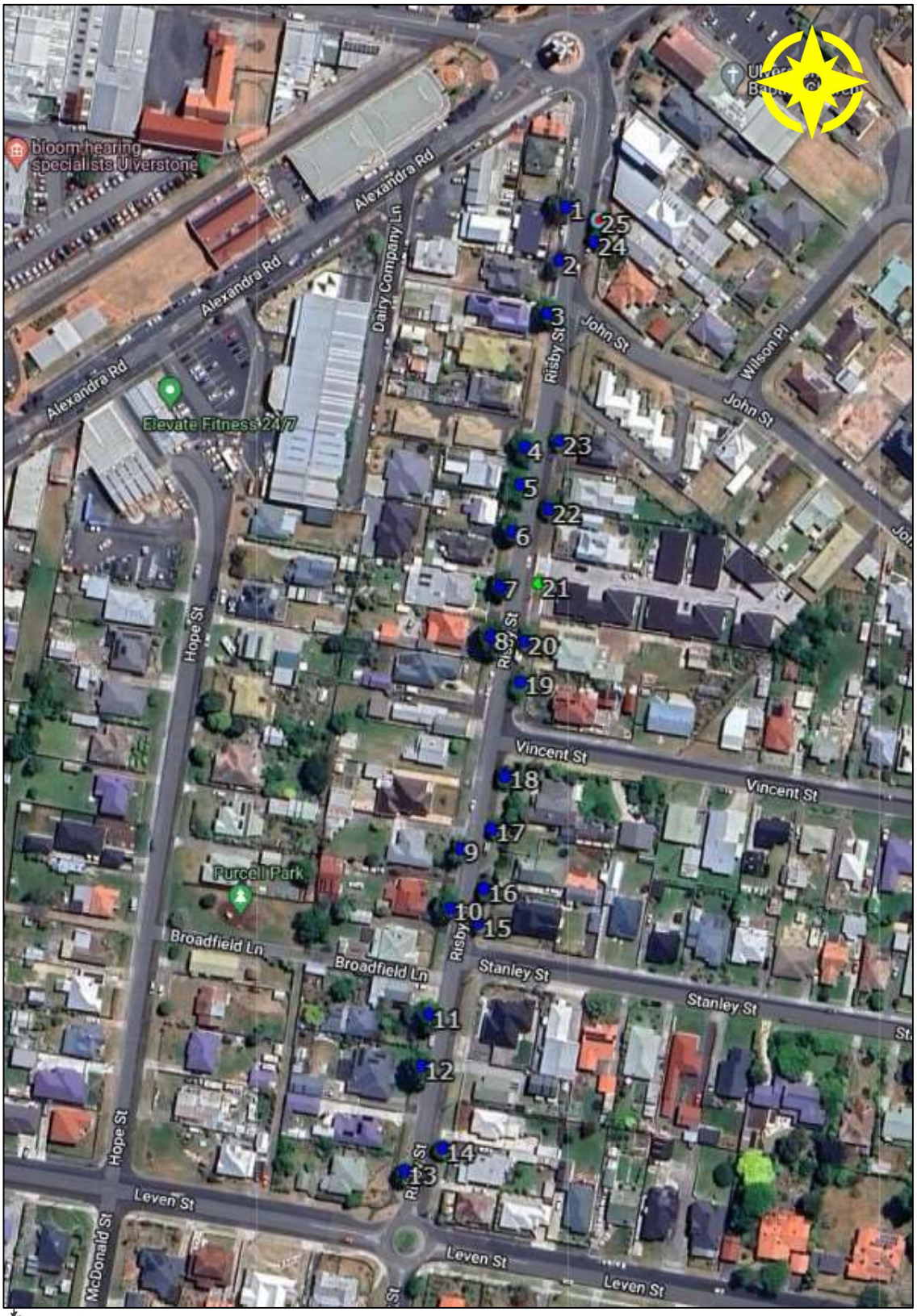

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Table 1 – Tree Data

Tree Number	Tree Name	Tree Age	DBH (cm)	TPZ (m)	DAB (cm)	SRZ (m)	Height (m)	Spread (m)	Health	Health Comments	Structure	Structure Comments	Retention Value
1	English Elm (*Ulmus procera*)	Mature	79	9.48	85	3.1	15	10	Fair	The tree is in bud swell, with light deadwood in the canopy. Drill holes ~10mm in diameter were observed in the root crown.	Poor	The was lopped at ~3m above ground level. Evidence of lopping is also visible at ~5m from ground level.	Low
2	English Elm (*Ulmus procera*)	Mature	74	8.88	73	2.9	15	10	Poor	Limited signs of bud swell. Deadwood to 100mm dia. with a broken, hanging branch in the crown. Drill holes ~10mm in diameter were observed in the root crown.	Poor	The was lopped at ~3m above ground level.	None
3	English Elm (*Ulmus procera*)	Mature	65	7.8	68	2.8	15	11	Fair	The tree has signs of bud swell and appears in fair health and condition, with some small deadwood and a small hanging branch in the crown.	Fair	The tree was lopped at ~3m above ground level.	Moderate

Tree Number	Tree Name	Tree Age	DBH (cm)	TPZ (m)	DAB (cm)	SRZ (m)	Height (m)	Spread (m)	Health	Health Comments	Structure	Structure Comments	Retention Value
4	English Elm (*Ulmus procera*)	Mature	56	6.72	61	2.7	10	12	Fair	The tree has signs of bud swell, some deadwood and a small hanging branch in the crown	Poor	The tree was lopped at ~3m above ground level with congested branch attachments. Evidence of decay at the lop points.	Low
5	English Elm (*Ulmus procera*)	Mature	55	6.6	56	2.6	10	13	Fair	The tree has signs of bud swell, some deadwood in the crown	Poor	The tree was lopped at ~3m and ~5 above ground level with congested branch attachments. Evidence of decay at the lop points.	Low
6	English Elm (*Ulmus procera*)	Mature	55	6.6	65	2.8	15	10	Fair	The tree has signs of bud swell, some minor deadwood, and a crown pruned for service lines	Poor	The tree was lopped at ~3m above ground level with congested branch attachments. Decayed structural roots to the north and south.	Low

Tree Number	Tree Name	Tree Age	DBH (cm)	TPZ (m)	DAB (cm)	SRZ (m)	Height (m)	Spread (m)	Health	Health Comments	Structure	Structure Comments	Retention Value
7	English Elm (*Ulmus procera*)	Mature	70	8.4	65	2.8	15	10	Fair	The tree has signs of bud swell and some minor deadwood.	Poor	The tree was lopped at ~3m above ground level with congested branch attachments. Evidence of decay at the lop points. Decayed structural roots to the north and east.	Low
8	English Elm (*Ulmus procera*)	Mature	78	9.36	87	3.1	20	14	Fair	The tree has signs of bud swell, some minor deadwood, and a small diameter broken hanging branch in the crown.	Poor	The tree was lopped at ~3m and ~5 above ground level with congested branch attachments. Evidence of decay at the lop points. Decayed structural roots to the north and west.	Low
9	English Elm (*Ulmus procera*)	Mature	66	7.92	70	2.8	15	10	Poor	The tree has signs of bud swell significant (>100mm dia.) deadwood in the crown, concentrated to the west.	Poor	Lopped at ~3m with decay at lop points and congested branch attachments. Cambium dieback on the western side of the trunk.	None

Tree Number	Tree Name	Tree Age	DBH (cm)	TPZ (m)	DAB (cm)	SRZ (m)	Height (m)	Spread (m)	Health	Health Comments	Structure	Structure Comments	Retention Value
10	English Elm (*Ulmus procera*)	Mature	76	9.12	72	2.9	15	10	Fair	The tree has signs of bud swell, with minor deadwood in the crown.	Fair	The tree was lopped at ~3m with congested branch attachments.	Moderate
11	English Elm (*Ulmus procera*)	Mature	80	9.6	76	2.9	15	13	Fair	The tree has signs of bud swell and minor deadwood in the crown.	Fair	The tree was lopped at ~3m with congested branch attachments. Crown reduced to the north-west	Moderate
12	English Elm (*Ulmus procera*)	Mature	89	10.68	86	3.1	20	11	Fair	The tree has signs of bud swell minor deadwood in the crown.	Fair	The tree was lopped at ~3m and ~5 above ground level with congested branch attachments. Pruned for the service line to the north.	Moderate
13	English Elm (*Ulmus procera*)	Mature	62	7.44	85	3.1	10	8	Fair	The tree has signs of bud swell minor deadwood in the crown.	Fair	The tree was lopped at ~3m and ~5 above ground level with congested branch attachments. Pruned for the service line to the north	Moderate

Tree Number	Tree Name	Tree Age	DBH (cm)	TPZ (m)	DAB (cm)	SRZ (m)	Height (m)	Spread (m)	Health	Health Comments	Structure	Structure Comments	Retention Value
14	English Elm (*Ulmus procera*)	Mature	65	7.8	68	2.8	5	7	Fair	The tree has signs of bud swell.	Poor	The tree was lopped at ~3m for electric line clearance. All secondary growth was epicormic in origin. Evidence of decay at lop points.	Low
15	English Elm (*Ulmus procera*)	Mature	44	5.28	51	2.5	5	6	Fair	The tree has signs of bud swell.	Poor	The tree had been lopped at ~3m for electric line clearance. All secondary growth was epicormic in origin. Evidence of decay at lop points.	Low
16	English Elm (*Ulmus procera*)	Mature	65	7.8	56	2.6	5	7	Fair	The tree has signs of bud swell.	Poor	The tree had been lopped at ~3m for electric line clearance. All secondary growth was epicormic in origin. Evidence of decay at lop points.	Low

Tree Number	Tree Name	Tree Age	DBH (cm)	TPZ (m)	DAB (cm)	SRZ (m)	Height (m)	Spread (m)	Health	Health Comments	Structure	Structure Comments	Retention Value
17	English Elm (*Ulmus procera*)	Mature	63	7.56	61	2.7	5	7	Fair	The tree has signs of bud swell.	Poor	The tree had been lopped at ~3m for electric line clearance with evidence of decay. All secondary growth was epicormic in origin.	Low
18	English Elm (*Ulmus procera*)	Mature	60	7.2	64	2.7	5	8	Fair	The tree has signs of bud swell.	Poor	The tree had been lopped at ~3m for electric line clearance with evidence of decay. All secondary growth was epicormic in origin.	Low
19	English Elm (*Ulmus procera*)	Mature	57	6.84	59	2.7	5	9	Fair	The tree has signs of bud swell.	Poor	The tree had been lopped at ~2m and ~4m for electric line clearance. All secondary growth was epicormic in origin. Evidence of decay at lop points.	Low

Tree Number	Tree Name	Tree Age	DBH (cm)	TPZ (m)	DAB (cm)	SRZ (m)	Height (m)	Spread (m)	Health	Health Comments	Structure	Structure Comments	Retention Value
20	English Elm (*Ulmus procera*)	Mature	62	7.44	62	2.7	5	9	Fair	The tree has signs of bud swell.	Poor	The tree had been lopped at ~2m and ~4m for electric line clearance with evidence of decay. All secondary growth was epicormic in origin.	Low
21	Crepe Myrtle (*Lagerstroemia indica*)	Young	2	0.24	3	1.5	3	1	Good	The tree has signs of bud swell.	Good	Typical structural for a newly planted tree.	Low
22	English Elm (*Ulmus procera*)	Mature	59	7.08	55	2.6	5	8	Fair	The tree has signs of bud swell.	Poor	The tree had been lopped at ~2m and ~4m for electric line clearance with evidence of decay. All secondary growth was epicormic in origin	Low
23	English Elm (*Ulmus procera*)	Mature	53	6.36	57	2.6	5	7	Poor	The tree had limited signs of bud swell. Cambial dieback on the northern side extending to the lopped crown.	Poor	The tree had been lopped at ~2m and ~4m with evidence of decay. Exposed and damaged root plate.	None

Tree Number	Tree Name	Tree Age	DBH (cm)	TPZ (m)	DAB (cm)	SRZ (m)	Height (m)	Spread (m)	Health	Health Comments	Structure	Structure Comments	Retention Value
24	English Elm (*Ulmus procera*)	Mature	59	7.08	61	2.7	5	6	Fair	The tree has signs of bud swell.	Poor	The tree had been lopped at ~3m for electric line clearance. All secondary growth was epicormic in origin. Evidence of decay at lop points.	Low
25	Willow Myrtle (*Agonis flexuosa*)	Mature	143	17.16	137	3.8	5	7	Good	Although lopped for powerlines, the tree had a full crown or healthy, dense foliage	Poor	The tree had been lopped at ~3m for electric line clearance. All secondary growth was epicormic in origin.	Low

6.3 Photographic Catalogue

Image 1 – Show the restricted growing environment of Tree 1. Note the disruption to surrounding infrastructure.

Image 2 – Shows the western side of Tree 2. The red circle indicates the location of the 10mm Ø drill holes.

Image 3 – Shows Tree 9. Note significant deadwood throughout the crown. Insert shows a large girdling root and peeling bark indicative of vascular necrosis.

Image 4 – Shows Tree 23. The circled area indicates the northern aspect of the trunk, where all vascular tissue has died. Note the proximity of the NBN box from the tree.

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Image 5 – Shows Tree 16 and other trees on the eastern side of the road that were heavily lopped to provide clearance from the powerlines above.

7. Discussion

The English Elms along Risby Street once formed a continuous avenue of trees stretching from Dunning Street in the south to Alexandra Street in the north. A local newspaper, The Advocate, published an article on 12 August 1947, stating:

"*Following an arrangement between the council and the local branch of the Tourist and Progress Association, a line of deciduous trees has been planted along Risby Street. They are English elms of a dwarf variety, and it is understood they will not grow high enough to interfere with the telephone and electrical wires*."

Aside from this article, no evidence suggests that these trees hold any cultural or heritage significance. The elms are not listed on the National Trust Significant Tree Register, there are no relevant planning controls under the Tasmanian Planning Scheme, and the local council, which owns the trees, has no active by-laws protecting them.

Site observations revealed that many trees are growing in constrained environments, including narrow 2-meter-wide road reserves, and are affected by nearby crossovers and parking bays. Trees on the eastern side of the street are particularly impacted by powerline clearance, which has affected their growth and structural integrity.

Additionally, the crowns of the trees on the non-wire side of the street appear to have been historically lopped, resulting in crowns supported by epicormic growth. These epicormic shoots, ranging from approximately 150mm to 400mm in diameter, have developed decay at many of the lop points.

Lopping, the practice of indiscriminately cutting branches to stubs or lateral branches too small to assume the dominant role, often removes between 50 to 100 per cent of a tree's leaf-bearing crown, temporarily starving the tree of nutrients. This process triggers survival mechanisms such as the activation of dormant buds, leading to epicormic growth.

While epicormic shoots that arise from these buds assist in crown recovery, they are only anchored in the outermost layers of the parent branches and are weakly attached. This means they are prone to breaking, especially during storm events, when they are young.

Trees are biologically equipped to close wounding at a branch collar, provided the tree is healthy and the wound is not too large. However, cuts made along a limb create stubs that the tree may not be able to occlude (seal), thereby enabling the ingress of pathogens that decay and weaken the tree's structure.

7.1 Tree Retention Values

Tree retention values are an assessment tool used to determine the suitability of trees for preservation, especially in the context of development or construction projects. These values consider several factors, including the tree's health, structural condition, useful life expectancy (ULE), ecological and environmental benefits, and its contribution to the landscape. A tree with a high retention value is typically healthy, structurally sound, and provides significant environmental or aesthetic benefits, making it a priority for preservation. Conversely, trees with low retention values may be in poor health or pose safety risks due to structural defects, making them less suitable for retention and more likely candidates for removal or replacement. Retention values also consider legal and planning frameworks, such as local environmental overlays or heritage designations, that may further influence whether a tree can or should be retained. The retention values of the assessed trees are outlined below in Table 1

Table 1 – Tree Retention Values

Retention Value	Tree Numbers
High	0
Medium	3, 10, 11, 12 and 13
Low	1, 4, 5, 6, 7, 8, 14, 15, 16, 17, 18, 19, 20, 21, 22, 24 and 25
None	2, 9, 23

Trees with No Retention Value

Three (3) trees attracted no retention value. These trees exhibited poor health and structural conditions that could not be remedied through arboricultural treatments. The removal and replacement of these trees is recommended.

Trees with Low retention values

Seventeen (17) trees attracted Low retention values. These were either newly planted trees that could easily be replaced or trees that exhibited fair or poor health indicators and poor structural indicators resulting from historical pruning practices (lopping). These pruning practices have resulted in significant decay at the attachment points of secondary growth and have an elevated risk of failure.

Trees with Medium retention values

Five (5) trees attracted Moderate retention values. These trees exhibited fair health and structural indicators resulting from historical pruning practices (lopping). These pruning practices have resulted in minor decay at the attachment points of secondary growth and have an elevated risk of failure.

7.2 Development Impacts

Tree roots are predominantly found in the upper 30-60 centimetres of the soil, where oxygen, water, and nutrients are abundant for root function and growth. While some roots may extend deeper for stability, most remain in this shallow zone, especially the fine feeder roots responsible for nutrient and water absorption. These roots often spread laterally well beyond the tree's canopy, sometimes two to three times the tree's height, to access resources. Roots generally avoid compacted, poorly aerated soils and may grow along the surface or adjust based on soil conditions.

Tree Protection Zones (TPZ) and Structural Root Zones (SRZ) are essential to protect a tree's health and stability during construction or development. The TPZ is calculated based on trunk diameter and extends around the tree to safeguard its roots, soil, and canopy from damage caused by excavation, compaction, or changes in water availability. The SRZ, a smaller zone within the TPZ, focuses on the tree's critical structural roots that provide support and stability. Disturbing the SRZ can compromise the tree's integrity, increasing the risk of failure or collapse.

While the proposed road reconstruction is unlikely to impact the trees with a Moderate retention value due to the highly compacted road base, which would inhibit root development, there are significant concerns regarding installing new kerbing drainage systems and parking bays.

The kerbing and installation of reinforced concrete drainage systems within the structural root zones of the trees will almost certainly sever structural roots that play a critical role in anchoring the trees to the ground. Severing these roots can destabilize the trees, making them more vulnerable to failure, especially in adverse weather conditions and lead to the loss of vital roots, further compromising the trees' structural integrity and potentially impacting their long-term health and stability.

Image 6 – The failure of Brush Box trees in Sydney during strong winds in 2015 highlights the severe consequences of restricted growing environments combined with root severance.

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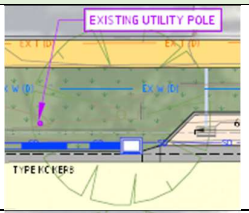
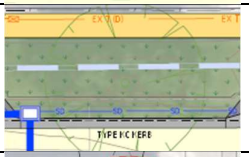
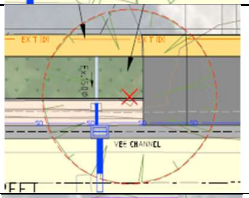
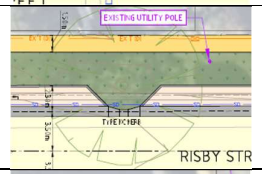
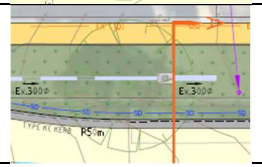
Table 2 below shows the TZP and SRZ of the trees that attracted a Moderate retention rating and the encroachment distances into these zones.

Table 2 – Encroachments Distances

Tree Number	TPZ (m)	SRZ (m)	Development encroachment	Plan Image
3	7.8	2.8	Major - New drainage pipe to be installed ~0.5m from the eastern side of the tree with an excavation depth of 600mm. Proposed parking bay ~2m to the north of the tree with an excavation depth of 240mm	
10	9.12	2.9	Major – Surface drainage to be installed ~0.5m from the eastern side of the tree with an excavation depth of 600mm.	
11	9.6	2.9	Major – The tree is located within the footprint of a new parking bay.	
12	10.68	3.1	Major – Surface drainage to be installed ~0.5m from the eastern side of the tree with an excavation depth of 600mm. Proposed parking bay ~2m to the north and south of the tree with an excavation depth of 240mm	
13	7.44	3.1	Major – Surface drainage to be installed ~0.5m from the eastern side of the tree with an excavation depth of 600mm.	

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8. Recommendations

It is recommended that trees with No or Low retention values be removed due to their poor condition and elevated risk of failure, regardless of the proposed road reconstruction. These trees present safety concerns that cannot be mitigated effectively.

Trees with Moderate retention values, while potentially manageable through arboricultural interventions to address issues from past pruning practices, cannot be retained in the context of the proposed road reconstruction. The extensive root severance required for new infrastructure would compromise their stability and long-term health. Therefore, trees with moderate retention values are also recommended for removal.

Replacement trees are advised to ensure the area's long-term canopy coverage. Recommended replacement tree species are detailed in Table 3.

Tree planting is best undertaken in late winter to spring (August to October) when the weather is mild and the soil is moist. Advance tree stock (45ltr +) is recommended and should be sourced from a reputable tree nursery. Tree stock should be self-supporting (not require staking) and be free of pests and, diseases, and significant structural defects, as per AS2303 – Tree Stock for Landscape Use.

Correctly establishing newly planted trees ensures they become valuable long-term landscape assets. Tree planting specifications are provided in Appendix 1. Practical advice can be found on Arboriculture Australia's webpage under the heading: *About Trees*.

Table 3 – Recommended replacement tree species

Powerline side		
Tree species	**Mature size**	**Comments**
Chinese Redbud (*Cercis chinensis*)	5 x 5 meters	Attractive small tree with abundant groups of rosy-purple spring flowers and attractive heart-shaped green leaves.
Crepe Myrtle (purple) (*Lagerstroemia indica* x *fauriei* 'Zuni')	4 x 3 meters	Small tree with young red foliage that matures to a shiny dark green, colourful display of orange, red and maroon foliage in autumn. Stunning masses of violet-purple flowers in summer through to autumn.
Betchel's Crab Apple (*Malus ioensis* 'Plena')	6 x 4 meters	Hardy small tree producing masses of fragrant double pink spring blossoms. Small, rounded purple fruits follow the flowers. In autumn, the leaves are burnt orange and red before falling.

Powerline side		
Griffith Pink Brachychiton (*Brachychiton populneus* x *discolor* 'Griffith Pink')	6 x 3 meters	Evergreen rounded pyramid-shaped tree with densely packed panicles of pink flowers in late spring or early summer. The trunk is long and thick, foilage green and lobed and creates a dense canopy.
Risdon Peppermint Gum (*Eucalyptus risdonii*)	5 x 5 meters	Distinct blue-green foliage with a smooth trunk. Attractive pointed deep blue-green leaves and masses of cream flowers in late spring and summer.
Dwarf Yellow Gum (*Eucalyptus leucoxylon* 'Euky Dwarf')	5 x 5 meters	Dwarf Eucalypt has an open form, single trunk, and smooth bark that sheds. Nectar-rich, pink, red and sometimes cream blossoms from late autumn to early summer.
Non-wire side		
Tree species	**Mature size**	**Comments**
Autumn Blaze Maple (*Acer x freemanii* 'Jeffersred')	13 x 10 meters	Deciduous trees with deeply lobed, rich green leaves change to intense red in early autumn.
Tupelo (*Nyssa sylvatica*)	11 x 6 meters	Deciduous tree with ornamental bark and deep green foliage that turns yellow to scarlet in autumn. Produces smallish blue egg-shaped berries.
'Worplesdon' Sweetgum (*Liquidambar styraciflua* 'Worplesdon')	10 x 7 meters	A moderate-growing, pyramidal tree becoming rounded with age. Bright red, green, yellow and purple foliage, sometimes all simultaneously in autumn.
Kanooka Gum (*Tristaniopsis laurina*)	15 x 6 meters	A relatively slow-growing evergreen Australian native with an oval form. Clusters of yellowish-white flowers during the warmer months. The bark is smooth and light grey.
Red-flowering Yellow Gum (*Eucalyptus leucoxylon* rosea)	15 x 7 meters	This tree has a smooth trunk with cream to grey-coloured bark, which sheds in flakes. It has narrow-shaped green leaves and forms a large open canopy as it matures. From Autumn to Spring, an abundance of red flowers appear in clusters of three, attracting a variety of birdlife.
Flowering Gum (*Corymbia ficifolia*)	15 x 10 meters	Tight, rounded shape with thick, dark green foliage, which is lighter in colour on the underside. The trunk is rough and dark brown, and in summer, a profusion of brightly coloured flowers appears. Following, large urn-shaped gum nuts appear.

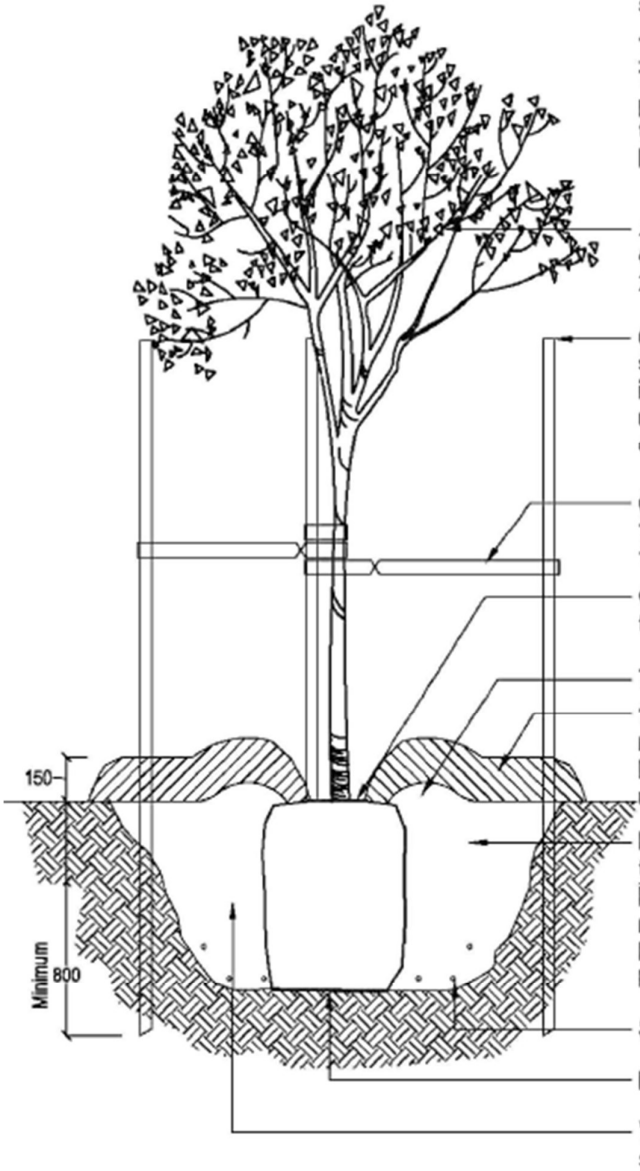
9. Conclusion

The site survey identified a total of 25 trees within the project footprint. After a thorough evaluation, it was determined that 20 of these trees should be removed due to their poor condition. This decision is based on assessing the trees' health and structural integrity, revealing an elevated failure risk. The poor condition of these trees presents safety concerns that cannot be overlooked, and their removal is warranted regardless of the planned construction activities.

The remaining five trees, while attracting a moderate retention value, also cannot be retained in light of the proposed road reconstruction. The extensive root severance required for the new infrastructure would compromise their stability and long-term viability. Consequently, removing these five trees has also been recommended to ensure safety and effective project implementation.

To maintain the area's long-term canopy coverage, it is essential to plant replacement trees. The selection of suitable replacement species will help restore and enhance the landscape, contributing to the area's ecological balance. Recommended replacement tree species are detailed in Table 3, which provides information on their suitability and expected benefits for the environment.

Appendix 1 – Planting Specification



Tree watering (1): Immediately after planting, tree shall be watered thoroughly regardless of weather conditions. Quantity of water will be adequate to saturate the root ball to its core.

Tree watering (2): post planting, provide a minimum of 15 litres of water (for tree in a 45 litre pot) to the newly planted tree per 7 days. Water at a slow rate so as not to displace mulch. For trees in pot size larger than 45 litres, provide quantity of water one third of that pot size.

All trees to be healthy specimens free of pests and diseases. Trees to be well watered a maximum of 24 hours prior to planting.

(3) 50x50x2400mm hardwood or recycled plastic stakes set vertically and clear of rootball and minimum 800mm into ground. Stakes are to be offset from the nearest underground services a minimum of 200mm to ensure no damage is caused to underground services.

(3) 50mm wide Hessian ties wrapped around trunk at 1/3 tree height and stapled /nailed to stakes allowing some trunk movement.

Create dish to keep mulch clear of tree trunk. top of root ball flush with finished level of planting hole.

75mm high berm to form a watering basin.

150mm depth of approved mulch shall be spread a minimum of 1200mm diameter from centre of tree and beyond the edge of the planting hole, overlapping undisturbed soil.

Excavate a shallow planting hole with sloping sides 3 times the width of the root ball and break-up sides and base. Refirm base (see note below). Top of rootball must be at the same height as surrounding level. Backfill with 50/50 blend imported topsoil/site topsoil broken up to friable texture, firming progressively.

Slow release fertiliser (for exotic species only).

Lightly compact soil under rootball to prevent settling.

Water retaining product to be mixed into backfilled soil as per manufacturers specifications.

Note: It is the responsibility of the contractor to confirm the location of all underground services prior to commencement of any excavation or staking works.

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Appendix 2 – Tree Descriptors

Tree Name - Common names, genus and species are based on the international code of taxonomical classification.

Tree Age

- Young - sapling or recently planted <5 years in the location
- Semi-mature -The tree is actively growing and is yet to achieve the expected size in growing environment
- Mature - The Tree has reached its expected size in the growing environment
- Senescent -Tree has started to decline with evidence of crown retrenchment

Height - Listed in meters and measured using a height meter

Spread — Listed in meters and measured using Google Earth measuring tool on the east/west axis

Diameter at Breast Height (DBH) - Listed in centimetres, measured 1.4m above ground level using a diameter tape

Diameter at Base (DAB) - Listed in centimetres, measured immediately above the root flare using a diameter tape

Health

- Good - Crown full with good density, foliage entire, with good colour, minimal or no pest or disease. Good growth indicators, e.g., extension growth. Negligible crown dieback. Good wound response and callus formation.
- Fair - Tree is exhibiting one or more of the following: Tree has <30% deadwood, minor crown dieback. Foliage generally has a good colour; some discolouration may be present, and minor pathogen damage may be present. Typical growth indicators, e.g., extension growth, leaf size, and crown density for species in location, may be slightly abnormal.
- Poor - Tree has >30% deadwood. Significant crown dieback present. Discoloured or distorted leaves and/or excessive epicormic regrowth. Pathogens present and/or stress symptoms that could lead to or contribute to the tree's decline.

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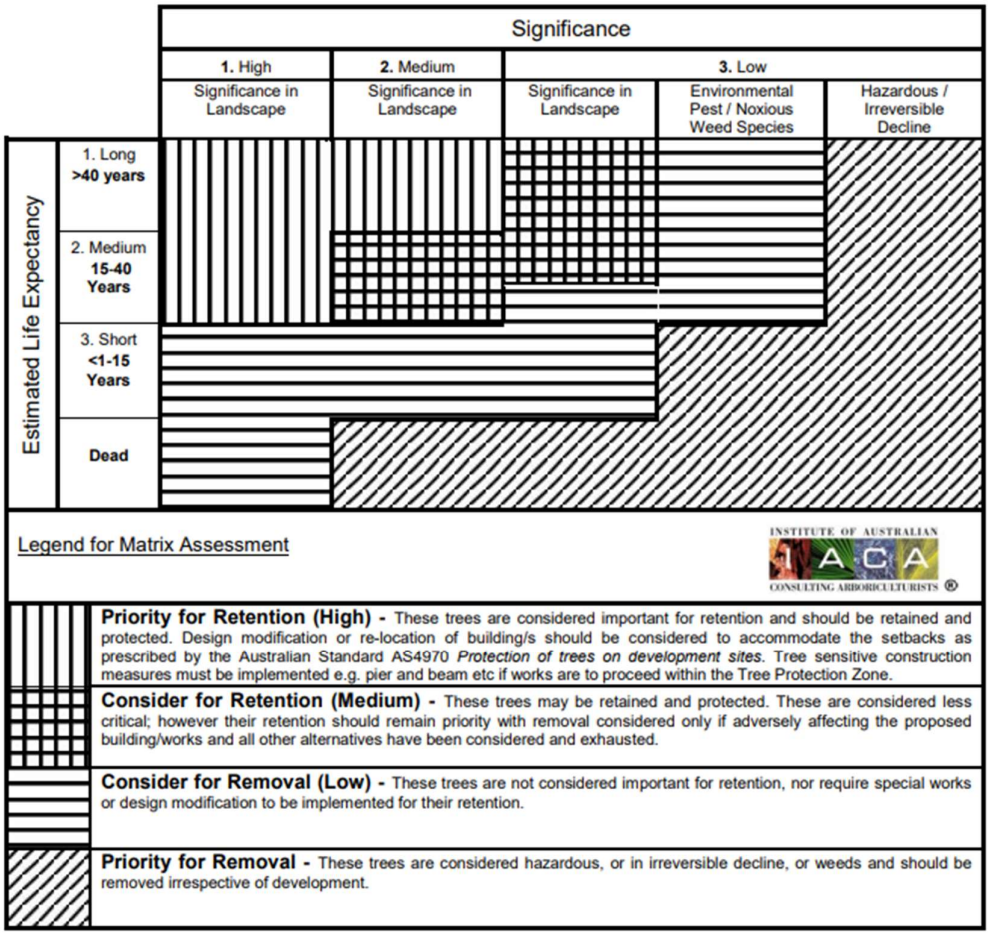
Structure

- Good - Sound branch attachment and/or no minor structural defects. Trunk and
  structural branches sound or only minor damage. Good trunk and structural branch taper. No overextension. No damage to structural roots and good buttressing is present. No obvious root pests or diseases.
- Fair - Some minor structural defects and/or minimal damage to the trunk. Bark missing. Cavities could be present. Minimal or no damage to structural roots. Typical structure for species.
- Poor - Major structural defects and/or trunk damage and/or missing bark. Large cavities and/or girdling or damaged roots that are problematic.

Retention Value



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