# APPENDIX D – ARBORIST REPORT

UTILITY TREES

# Tree Assessment Report

For

## Esso



## Long Island Facility, Hastings

DRAFT

[redacted]

November 2021

2021 at 10:20 am

**TABLE OF CONTENTS**


1. DISCLAIMER ..... 3
2. SCOPE ..... 3
3. METHODOLOGY ..... 3
4. MAPS ..... 4
5. RECOMMENDATIONS ..... 6
6. TREE DATA ..... 7
7. TREE ASSESSMENT DETAIL ..... 8
8. TREE HEALTH DEFINITION ..... 26
9. TREE STRUCTURE DEFINITIONS ..... 27
10. TARGET DEFINITION ..... 28
11. GLOSSARY OF ARBORICULTURE TERMS ..... 29
12. REFERENCES ..... 31

# 1. DISCLAIMER

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Due to the nature of trees and the practical limitations in accurately assessing the structural integrity of all parts of a tree it is not possible to make a completely accurate assessment of the condition of a tree. The recommendations in this report are based on visual assessments and external indicators and there is also some degree of subjectivity. This report is intended to be used as a tool to assist in the risk management of trees growing in the vicinity of the general public, private property and infrastructure. It should be noted that any tree near any structure or property or person(s) poses a risk.

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# 2. SCOPE

Utility Trees were requested to visually assess the trees at the Long Island facility in Hastings. The assessment is to include health and structure ratings and provide recommendations. Tree data and photos is to be collected and reported. Recommendations are to be made for trees with significant defects. The assessment is a level 1 assessment where a visual examination is conducted from the ground. It is not expected to identify all possible potential points of failure.

# 3. METHODOLOGY

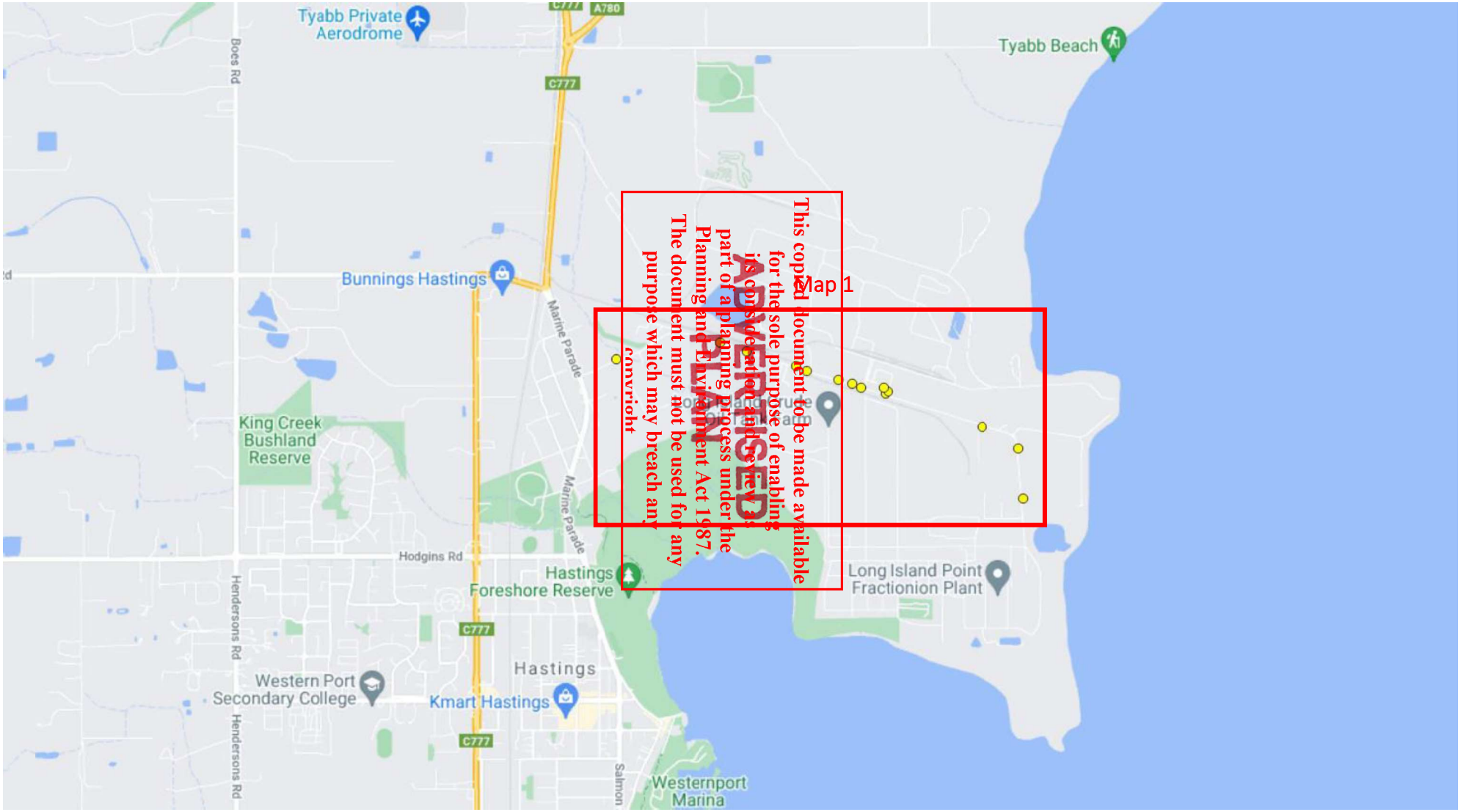
Assessments were carried out utilising an android tablet with GPS and customised app for data collection and photos. The DBH was measured using a DBH tape, approximately 1.4m above the ground when practicable to do so. Assessments on the trees were visual assessments carried out from the ground. The assessments were carried out by or under the Supervision of a level 5 Arborist.

Due to tree coverage and other limitations the latitude and longitude readings were not precise compared to the QGIS map and the GPS locations of some trees may have been manually adjusted to align to the known locations to create the Maps within this report. Groups of trees with similar health, structure and risk rating were assessed as one site with the number of trees noted in the recommendations and Tree Detail. Where several trees are listed under the same site, the DBH and tree height values will refer to the largest trees at this site, the retention value and ULE will refer to the tree in the poorest state whereas comments and recommendations can contain information from all trees at this location.

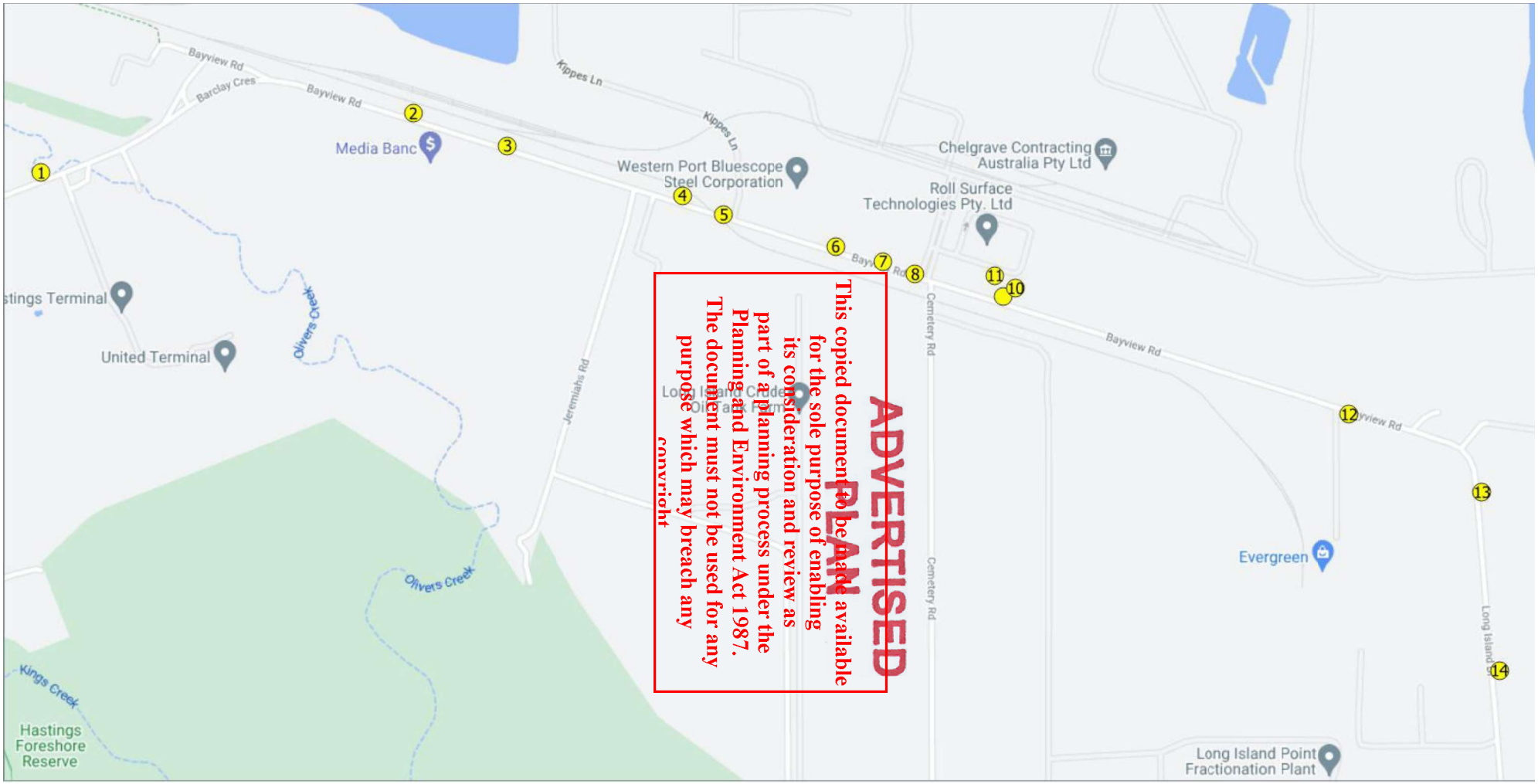
The trees were numbered with the number of the tree and located as indicated in the Map in Section 4.

# 4. MAPS

Key Map: All Trees



## Map 1



# 5. RECOMMENDATIONS

1. Recommend a follow up Inspection after the Conductors have been Strung & Sagged and prior to the Overhead Powerline being energized to precisely measure the distance between the Trees and Conductors

2. Some Major Pruning and Removals of the Mature Pine Trees from Pole 2 to Pole 11 as currently the Trees are trimmed back to the Main Stem and with the Larger Conductor and increased Voltage of 66KV extra Clearances will be required.

3. As less than 33% of the canopy of the Eucalypts & Melaleuca's will be removed to allow for the required clearances it is envisaged that Planning Permits will not be required to undertake these works

# 6. TREE DATA

| Tree ID | Street | House No. | Pole No. | LIS | Voltage | Land Owner | Trims | Removals | Species | Longitude | Latitude | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | Barkley cres | | 0 | 0 | 66kV | 0 | 2 | | Mel | 145.19329834 | -38.289150238 | Melaleuca and 2 trims in substation HGS |
| 2 | Barkley cres | | 0 | 0 | 66kV | Vic Roads | 3 | | Pine | 145.200485229 | -38.2882499695 | |
| 3 | Barkley road | | 19 | 11- 06878 | 66kV | Vic Roads | 4 | | Pine | 145.202316284 | -38.2887382507 | |
| 4 | Barkley st | | 0 | 0 | 66kV | Vline | 10 | | Pine | 145.205703735 | -38.2894935608 | |
| 5 | 0 | | 0 | 0 | 66kV | Vline | 3 | | Pine | 145.206497192 | -38.2897834778 | |
| 6 | Barkley st | | 18 | 11=06886 | 66kV | Vic Roads | 8 | | Pine | 145.20866394 | -38.2902679443 | 23 metre |
| 7 | Barkley st | | 19 | 11-06887 | 66kV | Vic Roads | 26 | | Pine | 145.209579468 | -38.2904930115 | 23 metre |
| 8 | Barkley st | | 0 | 0 | 66kV | Vic Roads | 8 | | Pine | 145.210205078 | -38.290687561 | Trim top out of 6 pines 23 metre EWP |
| 9 | Barkley st | | 22 | 11-06890 | 66kV | Vic Roads | 20 | | Pine | 145.211898804 | -38.2910308838 | Check clearances after conductors strung & sagged |
| 10 | Barkley st | | 23 | 11-06891 | 66kV | Vic Roads | 20+ | | Pine | 145.212142944 | -38.2909011841 | Check clearance after condors strung & sagged, some trees will require heads taken out |
| 11 | Barkley st | | 24 | 11-06892 | 66kV | Vic Roads | 4 | | Pine | 145.211746216 | -38.2907066345 | 23 metre EWP |
| 12 | 0 | | 32 | 11-06901 | 66kV | Other | | | Euc | 145.218597412 | -38.2928161621 | Minor trim |
| 13 | Barkley st | | 36 | 11-06906 | 66kV | Vic Roads | 4 | | Euc | 145.221160889 | -38.2939949036 | Trim 4 x spotted gums |
| 14 | Long Island drive | | 38 | 6908 | 66kV | Vic Roads | 3 | | Euc | 145.221496582 | -38.2966995239 | Trim 3 eucalypts |

# 7. TREE ASSESSMENT DETAIL

| JOB 1 | |
|---|---|
| Street | Barkley cres |
| House Number | |
| Pole Number | |
| LIS # | |
| Voltage | 66kV |
| Land Owner | |
|  Photo 1 | |
| Trims | 2 |
| Removals | |
| Species | Mel |
| Equipment Required | EWP |
| Comments | Melaleuca and 2 trims in substation HGS |

| JOB 2 | |
|---|---|
| Street | Barkley cres |
| House Number | |
| Pole Number | |
| LIS # | |
| Voltage | 66kV |
| Land Owner | Vic Roads |
|  Photo 2 | |
| Trims | 3 |
| Removals | |
| Species | Pine |
| Equipment Required | EWP |
| Comments | |

| JOB 3 | |
|---|---|
| Street | Barkley road |
| House Number | |
| Pole Number | 19 |
| LIS # | 11-06878 |
| Voltage | 66kV |
| Land Owner | Vic Roads |
|  Photo 3 | |
| Trims | 4 |
| Removals | |
| Species | Pine |
| Equipment Required | EWP |
| Comments | |

| JOB 4 | |
|---|---|
| Street | Barkley st |
| House Number | |
| Pole Number | |
| LIS # | |
| Voltage | 66kV |
| Land Owner | Vline |
|  Photo 4 | |
| Trims | 10 |
| Removals | |
| Species | Pine |
| Equipment Required | EWP |
| Comments | |

| JOB 5 | |
|---|---|
| Street | |
| House Number | |
| Pole Number | |
| LIS # | |
| Voltage | 66kV |
| Land Owner | Vline |
|  Photo 5 | |
| Trims | 3 |
| Removals | |
| Species | Pine |
| Equipment Required | EWP |
| Comments | |

| JOB 6 | |
|---|---|
| Street | Barkley st |
| House Number | |
| Pole Number | 18 |
| LIS # | 11=06886 |
| Voltage | 66kV |
| Land Owner | Vic Roads |
|  Photo 6 | |
| Trims | 8 |
| Removals | |
| Species | Pine |
| Equipment Required | EWP |
| Comments | 23 metre |

| JOB 7 | |
|---|---|
| Street | Barkley st |
| House Number | |
| Pole Number | 19 |
| LIS # | 11-06887 |
| Voltage | 66kV |
| Land Owner | Vic Roads |
|  Photo 7 | |
| Trims | 26 |
| Removals | |
| Species | Pine |
| Equipment Required | EWP |
| Comments | 23 metre |

| JOB 8 | |
|---|---|
| Street | Barkley st |
| House Number | |
| Pole Number | |
| LIS # | |
| Voltage | 66kV |
| Land Owner | Vic Roads |
|  Photo 8 | |
| Trims | 8 |
| Removals | |
| Species | Pine |
| Equipment Required | EWP |
| Comments | Trim top out of 6 pines 23 metre EWP |

| JOB 9 | |
|---|---|
| Street | Barkley st |
| House Number | |
| Pole Number | 22 |
| LIS # | 11=06890 |
| Voltage | 66kV |
| Land Owner | Vic Roads |
|  Photo 9 | |
| Trims | 20+ |
| Removals | |
| Species | Pine |
| Equipment Required | EWP |
| Comments | Check clearances after conductors strung & sagged |

| JOB 10 | |
|---|---|
| Street | Barkley st |
| House Number | |
| Pole Number | 23 |
| LIS # | 11-06891 |
| Voltage | 66kV |
| Land Owner | Vic Roads |
|  Photo 10 | |
| Trims | 20+ |
| Removals | |
| Species | Pine |
| Equipment Required | |
| Comments | Check clearance after condors strung & sagged, some trees will require heads taken out |

| JOB 11 | |
|---|---|
| Street | Barkley st |
| House Number | |
| Pole Number | 24 |
| LIS # | 11-06892 |
| Voltage | 66kV |
| Land Owner | Vic Roads |

Photo 11

| | |
|---|---|
| Trims | 4 |
| Removals | |
| Species | Pine |
| Equipment Required | |
| Comments | 23 metre EWP |

| JOB 12 | |
|---|---|
| Street | |
| House Number | |
| Pole Number | 32 |
| LIS # | 11-06901 |
| Voltage | 66kV |
| Land Owner | Evergreen garden care |
|  Photo 12 | |
| Trims | |
| Removals | |
| Species | Rough hardest mana gum |
| Equipment Required | EWP |
| Comments | Minor trim |

| JOB 13 | |
|---|---|
| Street | Barkley st |
| House Number | |
| Pole Number | 36 |
| LIS # | 11-06906 |
| Voltage | 66kV |
| Land Owner | Vic Roads |
|  Photo 13 | |
| Trims | 4 |
| Removals | |
| Species | Euc |
| Equipment Required | Ground Crew |
| Comments | Trim 4 x spotted gums |

| JOB 14 | |
|---|---|
| Street | Long Island drive |
| House Number | |
| Pole Number | 38 |
| LIS # | 06908 |
| Voltage | 66kV |
| Land Owner | Vic Roads |
|  Photo 14 | |
| Trims | 3 |
| Removals | |
| Species | Euc |
| Equipment Required | EWP |


Photo 1


Photo 2



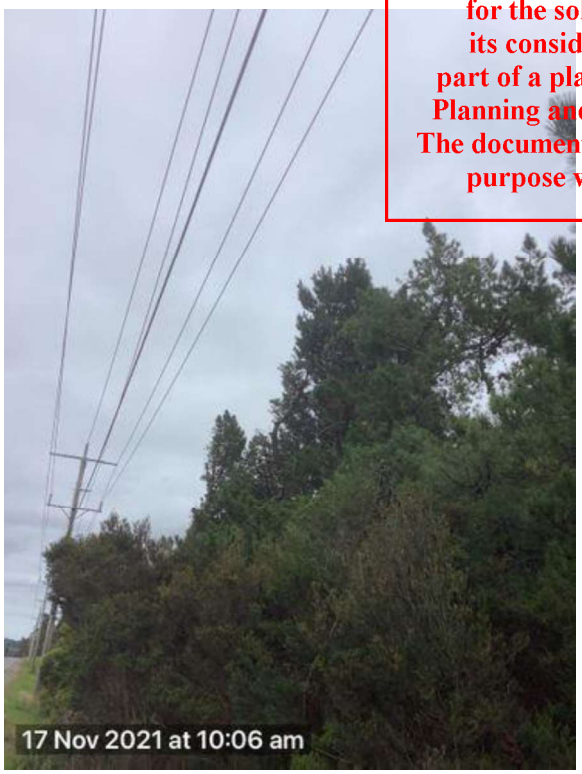



Photo 3


Photo 4


Photo 5


Photo 6


Photo 7


Photo 8


Photo 9


Photo 10


Photo 11


Photo 12


Photo 13


Photo 14

# 8. TREE HEALTH DEFINITION

| Rating | Term | Definition |
|---|---|---|
| 10 | Excellent | The tree is demonstrating excellent or exceptional growth. The tree should exhibit a full canopy of foliage, and be free of pest and disease problems |
| 9 | Very Good | The tree is functioning very well and is free of pest and diseases. |
| 8 | | |
| 7 | | |
| 6 | | |
| 5 | Good | The tree is in reasonable condition and growing well. The tree should exhibit a full canopy of foliage, and only minor pest and disease problems |
| 4 | Fair | The Tree is in reasonable condition and growing well. The tree should exhibit an adequate canopy of foliage. There may be some deadwood present in the crown. Some grazing of insects of possums may be evident |
| 3 | Poor | The tree is not growing to its full capacity; extension growth of the laterals is minimal. The crown may be thinning or sparse. Large amounts of deadwood may be evident or symptoms of stress indicating tree decline |
| 2 | Very Poor | The Tree appears to be dying, with a significant amount of deadwood in the canopy. Pest and disease problems maybe causing a severe decline in tree health |
| 1 | Dead | The Tree is Dead – No evidence of any live tissue |

# 9. TREE STRUCTURE DEFINITIONS

| Rating | Term | Definition |
|---|---|---|
| 10 | Excellent | |
| 9 | | |
| 8 | | |
| 7 | | |
| 6 | | |
| 5 | Good | The tree has a well-defined and balanced crown. Branch unions appear to be strong, with no defects evident in the trunk or in the branches. Major limbs are well defined. The tree is considered a good example of the species. |
| 4 | 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 be exhibiting minor structural faults. If the tree has a single trunk, it may be on a slight lean or exhibiting minor defects. |
| 3 | Poor | The tree may have a poorly structured crown. The crown may be unbalanced or exhibit large gaps. Major limbs may not be well defined. Branches may be rubbing or crossing over. Branch unions may be poor or faulty at the point of attachment. The tree may have suffered root damage. |
| 2 | Very Poor | The tree has a poorly structured crown. The crown is unbalanced or exhibit large gaps with possibly large sections of deadwood. Major limbs may not be well defined. Branches may be rubbing or crossed over. Branch unions may be poor or faulty at the point of attachment. Branches may exhibit large cracks that are likely to fail in the future. The tree may have suffered major root damage |
| 1 | Failed | The tree has a very poorly structured crown. A section of the tree has failed or is in imminent danger of failure |

# 10. TARGET DEFINITION

| Rating | Term | Definition | Vehicle exposure | Human exposure | $$ loss |
|---|---|---|---|---|---|
| 10 | Very Severe | Under normal environmental conditions, the tree or part of the tree will fail where there is constant Human occupancy and the tree or a branch is large enough to cause significant impact. It is overhanging or will fall in an area that is constantly occupied by people or significant infrastructure. | 26k cars @ 110kmh<br><br>32k cars @80kmh<br><br>47k cars @ 50kmh | Constant | $2m |
| 9 | Severe | Under normal environmental conditions it is likely that The tree or branch will fail | 2.5k cars @ 110kmh<br>32k cars @80kmh<br>47k cars @ 50kmh | 16 hrs per day | $200k |
| 8 | High | Under normal environmental conditions it is likely that The tree or branch will fail | 1000 cars @ 110kmh<br>1400 cars @80kmh<br>2000 cars @ 50kmh | 12 hrs per day | $100k |
| 7 | | Under normal environmental conditions it is likely that The tree or branch will fail | 1000 cars @ 110kmh<br>1400 cars @80kmh<br>2000 cars @ 50kmh | 10 hrs per day | $25k |
| 6 | | | | | |
| 5 | | | 36 cars @ 110kmh<br>45 cars @80kmh<br>65 cars @ 50kmh | 1 Pedestrian per hour | $2,500 |
| 4 | | | | | |
| 3 | | | 2 cars @ 110kmh<br>2 cars @80kmh<br>3 cars @ 50kmh | 1 Pedestrian per day | $200 |
| 2 | Remote Risk | | None | 1 pedestrian per week | <$100 |
| 1 | No Risk | The Structure and Health ratings do not need to be considered as there will be no loss | | | |



Rate the target assuming the tree will fail.

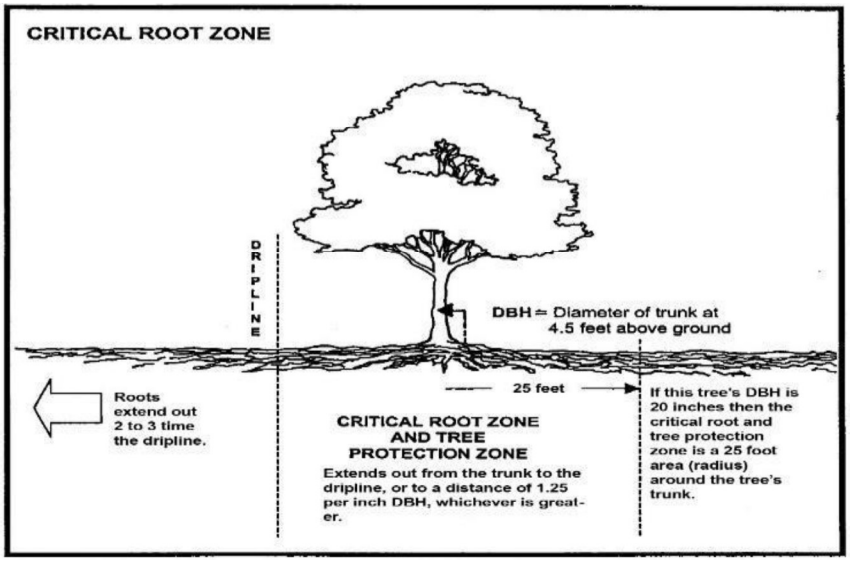
# 11. GLOSSARY OF ARBORICULTURE TERMS

- **Ants**: ants are scavengers, with different species foraging for different foods. Some ants live within damp/decaying wood, but do not actually eat the wood.

- **Bifurcation:** To divide into two parts or branches. Also referred to as Co-dominant stems where two stems or trunks of equal size that develop from 2 apical buds at the tip of the same stem. Each co-dominant stem is a direct extension of the stem below its origin. There are no branch collars or truck collars at the base of co-dominant stems. Also, there is no 'built in' protection zone at the base of each co-dominant stem as there is at the base of branches. When a pathogen spreads downwards in a co-dominant stem, there are no natural protection boundaries to resist its spread, A stem bark ridge separates the 2 stems from each other. The 2 stems may have a strong union and the ridge of the stem will point upwards. If included bark separates the 2 stems, a very weak union develops and the stem bark ridge turns inwards or invaginated. This leads to structural failure and branch splitting. (Shigo 1986)

- **Buttress Zone;** The region at the base of a tree where the major lateral roots join the stem.
- **Cambium;** Layer of dividing cells producing xylem (woody) tissue internally and phloem (bark) tissue externally
- **Co-dominant stem**; two or more main stems (or "leaders") that are about the same diameter and emerge from the same location on the main trunk.
- **Compartmentalization of decay in Trees (CODIT):** A model leading to the modern concept of tree decay in which when trees are wounded (or pruned, a form of wounding) in which fungi and other organisms infect wood causing trees to respond to this infection with both physical and chemical changes which seek to limit the spread of the infection through compartmentalizing of the wound. This is achieved through wounded cells undergoing changes to form 'walls' around the wound creating a physical barrier and chemical barrier, to prevent decay spread
- **Coppice Growth;** Growth Shoots from the previously cut stump or roots.
- **Critical Root Zone**





- **Diameter at breast height (DBH)** The nominal trunk diameter at 1.4 m above ground level determined by the circumference of the trunk divided by pi. For trees with multiple trunks Total DBHT = (DBH1 + DBH2 + DBH3)

- **Epicormic Shoot;** A shoot having developed from a dormant or adventitious bud and not having developed from a first-year shoot.
- **Included bark; I**s bark embedded between opposing branches, a branch and a main stem or two co-dominant stems creating a structurally weak point in the tree.
- **Retention Value:** A measure of the retention or preservation value of a particular tree. The tree may be significant on account of its size, species, contribution to the landscape, and rarity or maybe a worthwhile specimen in terms of its health, structure and form. Further it may be a significant tree for historical reasons, or as a valuable habitat tree for birds and wildlife. Local councils often deem a tree significant based on its size, usually as a measure of trunk diameter. Other authorities such as the National Trust will deem a tree significant based on the other criteria already listed. Categories: High, Medium, Low
- **Root Plate; I**s the primary structural roots extending out from the trunk.
- **Senescence:** The point of the tree lifecycle where the tree has its resources degraded leading to decreased physiological activity. This occurs as the tree approaches the end of its life whether due to age or damage and disturbance through changes to its environment.



- **Shape/Form**: Refers to the shape of the tree, whether the trunk has a lean, whether it has single or multiple trunks and whether the growth of the tree is balanced and symmetrical in nature; Categories: Very Good, Good, Fair, Poor.

- **Structural Root Zone (SRZ):** The area around the base of a tree required for the trees stability in the ground. The woody root growth and soil cohesion in this area are necessary to hold the tree upright. The SRZ is nominally circular with the trunk at its centre and is expressed by its radius in meters. This zone considers a tree's structural stability only, not the root zone required for a tree's vigour and long-term viability, which will usually be a much larger area. It is calculated as: -0.42 SRZ radius = (D x 50) x 0.64 where D = trunk diameter in m, measured above the root buttress (AS 4970:2009) The SRZ for trees with trunk diameters less than 0.15 will be 1.5 m

- **Termites**: termites are plant tissue specialists, feeding on wood and grasses, and some species can cause extensive damage to buildings and trees through their feeding

- **Tree Health & Vigour:** Is used to describe the overall health of the tree, and considers growth rates, fullness of the canopy, the presence of any pest and disease, an assessment of any branch dieback, and the level of deadwood in the tree Categories: Very Good, Good, Fair, Poor, Dead.

- **Tree Protection Zone (TPZ)**: A specified area above and below the ground and at a given distance from the trunk set aside for the protection of a trees roots and crown to provide for the viability and stability of a tree to be retained where it is potentially subject to damage by development. As per the Australian Standard AS 4970:2009 It is calculated as 12 x DBH of the tree trunk.

- **Tree Structure:** Refers to the trunk form and branch structure. It refers to the arrangement of scaffold branches, the degree of trunk taper, the symmetry of the canopy, whether the tree has any decay present in the branches, trunk or roots, or other structural problems such as included bark in the union of co-dominant stems. It covers tree stability and branch points of attachment. It also pertains to the root system which may or may not have been disturbed through earthworks, or other structural root problems such root girdling which may affect a trees stability Categories: Very Good, Good, Fair, Poor.

- **U.L.E –** Useful Life Expectancy: That age at which a tree is sufficiently healthy and free of problems which can cause the tree to be hazardous. If the tree has structural or other health anomaly's the tree may be managed through arboricultural inputs that are not excessive and justify the trees ongoing management and preservation. Once a tree undergoes senescence the tree will have usually entered the end of its U.L.E **'Included' Trunk or branch Unions:** where the branch bark ridge turns inward creating a structurally flawed union. It typically occurs with co – dominant stems that originate from the same position often growing to a similar diameter as the stem diameter increases the stems or trunks push against one another and may cause cracks below the stems which are prone to failure under moderate loading.

- **Windthrow:** is defined as the uprooting of a whole tree at the interface of the trunk with the soil, which may involve the lifting of roots, snapping of roots or the failure of the trunk at the soil surface

## 12. REFERENCES

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- Powercor Powerline Bushfire Safety Program Otways Region Flora and Fauna Assessment – Jacobs SKM

- Dicke S.G 2006. 'Tree Protection Standards in Construction Sites' Publication #FO468 of the Forest and Wildlife

- Research Center, Mississippi State University Matheny, N and Clarke, J. 1998. Trees and Development – A Technical Guide to Preservation of Trees During Land Development. International Society of Arboriculture. Champaign, USA. 183pp.