Tree Management Plan

for

the Kingston Avenue of Honour

Prepared by

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Prepared for

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Executive Summary

Homewood Consulting Pty Ltd has been engaged by Kingston Friends of the Avenue to undertake an assessment of and prepare a management plan for the Kingston Avenue of Honour.

The Avenue lines both sides of Kingston Road, from Victoria Road in the north, towards the Midland Highway in the south, spanning just over 2.9km. There are 286 trees in the Avenue, predominantly Dutch Elm, with English Elm and Wych Elm also present. The trees were planted by the local community in 1918 and 1919 to commemorate the Word War I service of men and women associated with the former Shire of Creswick.

The Kingston Avenue of Honour is largely intact, and the uniformity of the individual trees, their size and stature create an impressive vista. The Avenue is an iconic and dominant feature of the local landscape and prized asset of the council and community. It is of historic and aesthetic significance and is listed on the Victorian Heritage Register.

Figure 1: The Kingston Avenue of Honour

An inspection of each tree was undertaken to assess the health, structure and risk that the trees currently present in the landscape, to identify arboricultural works required and to provide recommendations for the ongoing management of the trees.

The vast majority of the Elms are in Fair (and occasionally Good) health and have Fair (occasionally Good) structure, appearing typical of the species in the later stages of maturity.

10% of the trees have Poor health, 2% have Very poor health and 1% (two trees) are dead. Indicators of inferior health included a thinning or sparse canopy, usually with insect and/or mammal defoliation, and significant deadwood in the canopy.

17% of the trees have Poor structure, and 1% (four trees) have Very poor structure. Indicators of inferior structure included large gaps and/or hanging branches in the canopy, leaving over-extended and exposed limbs, codominant trunks and/or branches with poor attachment in the union, and significant indication of buttress root, trunk and/or canopy decay.

Figure 2: Canopy density, leaf size and deadwood are indicators of tree health

Figure 3: Poorly structured canopy following significant storm damage

A risk assessment using Quantified Tree Risk Assessment (QTRA), Version 5 (Ellison 2015) has been undertaken for each tree. The wide verge in which the Avenue trees are planted, the significant setback from the road (for the majority of trees), and the virtual absence of pedestrian movement along this section of road means that most of the trees have a very low target occupancy, and subsequently represent a very low risk of harm to people and property.

Risk is not the only driver for undertaking works on significant trees. Works to extend the Useful Life of individual trees and retain them in the landscape for as long as possible are also a major driver, and are certainly the most common objective for the works that have been recommended in the Kingston Avenue of Honour.

Works have been recommended for 106 trees to improve health, structure and extend Useful Life Expectancy (ULE) where possible. Works have been given a priority timeframe to assist with urgency, budgets and work scheduling.

Table 1: Recommended works and priority

No. of trees	Recommended Works	Works Priority Rating			
		Urgent (ASAP)	High((12 months)	Moderate (3 years)	Low (5 years)
17	Tree removal & replacement	0	3	3	11
5	Installation or inspection of cables	1	4	0	0
84	Pruning and/or mulching	0	0	49	35
106	TOTAL	**1**	**7**	**52**	**46**

180 trees did not require any works at the time of inspection.

Overall, the Avenue is in fair condition, but with the oldest trees now at 104 years, the single largest threat to the Avenue at the moment is its age and the expected lifespan of the trees. The Avenue is expected to decline over the coming decades as the mature trees continue to age, and progress through the over maturity and senescence life stages.

A remedial works program and tree removal and replacement recommendations have been made for the next 5 years, and while these will address immediate and short-term tree issues, consideration must also be given to the future prospects and longevity of the Avenue of trees as a homogenous landscape unit and living memorial.

Recommendations

It is recommended that:

- Tree removal and pruning works identified herein are undertaken within the prescribed timeframes.
- Pruning works are undertaken by qualified arborists (minimum AQF Level 5) with demonstrated experience in the management of large, high value trees.
- At least one fully qualified arborist is present on site at all times during pruning or removal operations.
- All pruning conforms to the Australian Standard 4373: *Pruning Amenity Trees* (Standards Australia 2007).
- Pruning should be undertaken in late Winter or early Spring, when there is no moisture stress, combined with good carbohydrate reserves. Avoid cutting after flushes of Spring growth as the tree has used up food reserves for flushing and these are only replenished after leaves heave matured.
- Pruning tools are disinfected between trees to minimise the spread of bacterial wetwood.
- Tree pruning and removal works are undertaken in consultation with the relevant stakeholders including the community.
- The trees are reassessed every 2 years to inspect condition, ensure the trees are maintained at an acceptable level of risk and to determine any further work requirements.
- The Kingston Avenue of Honour Tree Management Plan is reviewed and updated every 5 years.

Table 2: Table of Revisions

Rev No.	Report Date	Description	Author	Internal Review Date	Reviewed by
1	*28/02/2022*	*Draft for internal review*	*MNB*	*01/03/2022*	*TSO*
0	*28/02/2022*	*Draft for internal review*	*MNB*	*28/02/2022*	*BDK*

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1. Introduction

The Kingston Avenue of Honour (AoH) is an avenue of mature Elms planted in recognition of the World War I service of men and women associated with the former Shire of Creswick. The Avenue is an iconic and dominant feature of the local landscape and prized asset of the council and community. It is of historic and aesthetic significance and is listed on the Victorian Heritage Register.

Homewood Consulting Pty Ltd has been engaged by Kingston Friends of the Avenue to undertake an assessment of and prepare a management plan for the Kingston Avenue of Honour.

Each tree has been assessed to determine current health and condition. Recommendations have been made for the maintenance of individual trees and the Avenue as a whole to ensure public safety, and extend the lifespan of trees where possible.

2. Method

On Wednesday, 19 January and Thursday, 20 January 2022, Megan Brittingham conducted a site inspection and assessed the trees.

Data collected for the trees included:

- Botanical Name
- Canopy Dimensions
- Diameter at Breast Height (DBH)
- Health
- Structure
- Useful Life Expectancy (ULE)
- Risk Assessment (QTRA)
- Recommended Works

A Visual Tree Assessment (VTA) was conducted for each tree. A VTA consists of a detailed visual inspection of a tree and its surrounding site, including a complete walk around the tree, looking at the buttress roots, trunk, branches and leaves. Each tree is observed from a distance and close up to consider crown shape, landscape context and surroundings.

The assessment was conducted from ground level. Trunk Diameter at Breast Height (DBH) was measured at 1.4m height using a diameter tape. Tree height was estimated and periodically checked using a laser range finder, and canopy width was estimated by pacing out canopy width parallel to the alignment of the road. All assessments of decay are qualitative only.

A risk assessment using A risk assessment using Quantified Tree Risk Assessment, Version 5 (Ellison 2015) was conducted for each tree.

The Kingston AoH tree ID system has been used to number the trees, where trees on the eastern side are the road are numbered East 1 through to East 144, (from north to south) and trees on the western side of the road are numbered West 1 through to West 142 (from north to south).

Tree location was plotted in the field and locations were aligned to the GPS coordinates recorded for each tree in the Kingston AoH “Tree Map web app”.

For definitions and descriptors of the data collected on site see Appendix 1. Appendix 4 shows the data collected for each individual tree.

3. Site Map

Figure 4: The Kingston Avenue of Honour is on Kingston Road and runs from Victoria Road in the north, to just before the Midland Highway in the south

4. Observations/ Discussion

4.1 Site Details

The Kingston Avenue of Honour lines both sides of Kingston Road, from Victoria Road in the north, towards the Midland Highway in the south, spanning just over 2.9km. There are 286 trees in the Avenue; the eastern side consists of 144 trees and the western side has 142 trees.

Figure 5: The Kingston Avenue of Honour, looking South with trees East 1 (left) and West 1 (right)

This section of Kingston Road is a sealed single carriageway with two-way traffic and a speed limit of 100kph. There is no kerb and channel, and the shoulders are not sealed. The trees are planted in the grassed road verge which varies in width but on average is approximately 20m wide. Spacing between trees varies in some sections but again, on average trees are spaced approximately 20m apart. The grass around the trees is slashed and weeds and suckers are periodically removed around tree trunks.

Local soils are derived from volcanic basalt flows and the surrounding area is predominantly used for agriculture. Elevation ranges from approximately 550m at Victoria Road at the northern end of the Avenue, rising to approximately 575m and 570m in association with Forest Hill and Spring Hill (adjacent volcanic rises), to approximately 555m at Morrisons Road at the Southern end of the Avenue.

High voltage powerlines span the length of the Avenue, running along the private property boundary on the western side, transitioning to high and low voltage lines where residential blocks are set among the farmland.

4.2 Tree Details

4.2.1 Brief History

250 trees were planted in August 1918, with additional plantings undertaken in the following year bringing the total to 286 trees. The trees were planted by the local community to commemorate the Word War I service of men and women associated with the former Shire of Creswick. Of the 286 trees, nine commemorate women who served as nurses, and five remain unnamed.

The history of the Avenue and the service men and women each tree represents is well documented in numerous records including the book Sentinels of Service – Volunteers of the Kingston Avenue of Honour (Rickard 2017), and the key stages in the development of the Avenue are also listed in a previous management plan (Jeffery 2002).

While the Avenue was the site for numerous memorial services in the decade or so following the planting, over time the trees were left largely unmanaged until the Kingston Friends of the Avenue group was formed in 1999, with a mission to restore and preserve the Avenue. Fundraising events, grant submissions, donations and working bees were organised to enable works on the Avenue to be undertaken. The original Friends of the Avenue dissolved in 2000, but subsequently reformed in 2014 and now care for the trees and their history. The Kingston Avenue of Honour was listed on the Victorian Heritage Register in 2015.

A Management Strategy Plan was prepared by arborist Shane Jeffery in 2002. The Strategy is comprehensive and many of the recommendations are still relevant and applicable. Utility Trees undertook a tree assessment in 2017, recommending works for all trees and Homewood Consulting undertook a walkover assessment of the trees in 2018, identifying trees that required works in the short term in order to reduce risk.

4.2.2 Species

The Avenue is predominantly made up of three Elm species: *Ulmus x hollandica* (Dutch Elm), *Ulmus procera* (English Elm) and *Ulmus glabra* (Wych Elm), as well as one Ash tree.

Table 3: Tree species present in the Kingston Avenue of Honour

Botanical Name	Common Name	No. of Trees
Ulmus x hollandica	Dutch Elm	185
Ulmus procera	English Elm	70
Ulmus glabra	Wych Elm	30
Fraxinus angustifolia	Desert Ash	1

Elms became popular avenue trees in south-eastern Australia in the late 19th century and were widely planted on public land (Hawker 1990). Elms were the preferred species for Avenues of Honour planted after World War I, and a number of rural towns in Victoria now have striking avenues made up of mature elms.

The identification of Elm species and cultivars in Australia is complex due to wide variation within species, particularly from those grown in Europe, and to hybridisation between species (Hawker 1990). Elm identification in Australia is largely based on leaf characters (Spencer, Hawker and Lumley 1991), and these have been used to identify the Kingston AoH trees for this report.

The key characteristics used to identify the trees in the Avenue are described below, and representative leaves, taken from trees within the Avenue are shown.

4.2.2.1 Ulmus x hollandica - Dutch Elm

A large, suckering tree to a height of 20m or more with suckers and many epicormic shoots.

Leaves generally larger and narrower than those of English Elm. Generally smooth above and relatively long tipped. Vein pairs of most leaves more than 13. (Spencer, Hawker and Lumley 1991, Spencer 1997).

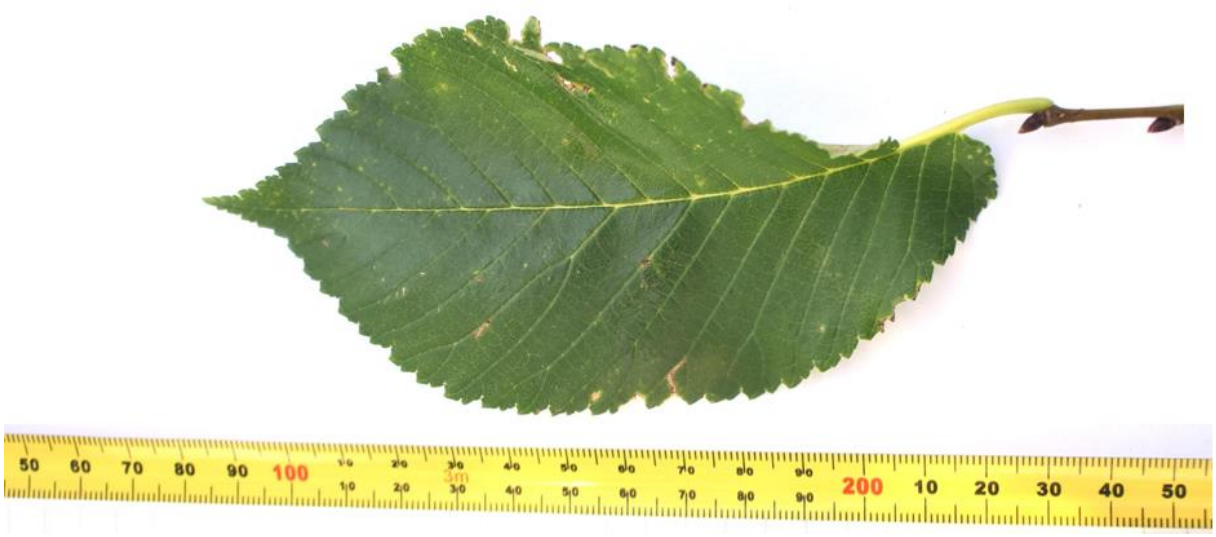

Figure 6: *Ulmus x hollandica* leaf

4.2.2.2 Ulmus procera - English Elm

A compact, densely-branched, suckering tree growing to a maximum height of about 25m in cultivation.

Mature leaves roundish, 4-9cm long, tips of leaves are abruptly pointed, upper surface more or less rough, with dense soft hairs on the branchlets, leaf stalks and lower surface of young leaves. Vein pairs of most leaves less than 13. Basal lobe rarely covers the leaf stalk (Spencer, Hawker and Lumley 1991, Spencer 1997).

Figure 7: *Ulmus procera* leaf

Interestingly, Tree E79 (English Elm) shows variegation in the southern canopy, with leaves randomly blotched and speckled with creamy white.

4.2.2.3 Ulmus glabra - Wych Elm

A wide spreading rounded tree, rarely more than 20m tall in cultivation in Australia.

Generally non-suckering but will shoot from damaged surface roots.

Leaves large (mostly 8 – 16cm long) and long pointed with a very rough upper surface. Leaf is widest above middle. Vein pairs 12 to 18, margins with double serrations, basal lobe extends well over the branchlet as well as the leaf stalk (Spencer, Hawker and Lumley 1991, Spencer 1997).

Figure 8: *Ulmus glabra* leaf

It is noted that some of the identification of the Elms in the Avenue differs between this report and that of previous assessments. While reasonable efforts have been made to provide definitive identification of species for this report, the identification of the Elms does not significantly impact the management of the trees while they are alive.

It is however, of considerable importance when determining replacement species for any trees that are removed, as the Heritage Listing requires that removed trees are replanted with the same species.

To this end, a permit may be required to replace the existing Ash tree with an Elm when the tree is removed.

4.2.3 Health

Of the 286 trees in the Kingston Avenue of Honour:

- 25 trees have Good health with a full or near full canopy of foliage and no, or only minor pest or disease observed.
- 225 trees have Fair health and are in reasonable condition and growing well. They exhibit an adequate canopy of foliage, there may be some deadwood present in the crown. Some grazing by insects may be evident.
- 28 trees have Poor health and are not growing to their full capacity. The canopy may be thinning or sparse and large amounts of deadwood may be evident throughout the crown.
- Six trees have Very Poor health and are in an advanced state of decline with a markedly reduced canopy and a significant volume of deadwood.
- Two trees are dead.

Table 4: Assessment of tree health in the Kingston AoH

Health	No. of Trees	% of total
Good	25	9%
Fair	225	79%
Poor	28	10%
Very Poor	6	2%
Dead	2	1%
Total	**286**	

Figure 9: Tree E21 – Good health

Figure 10: Tree W40 – Fair health

Figure 11: Tree W17 – Poor health

Figure 12: Tree E51 - Very Poor health

4.2.4 Structure

Of the 286 trees in the Kingston Avenue of Honour:

- 14 trees have Good structure, a well-defined and balanced crown. Branch unions appear to be sound, with no significant defects evident in the trunk or the branches.
- 220 trees have Fair structure and show minor problems in the structure of the crown. The crown may be slightly out of balance, branches may be overextended, and/or some branch unions may be exhibiting minor structural faults.
- 48 trees have Poor structure. The crown may be unbalanced or exhibit large gaps due to previous limb failures of significant size. Stems and branches may be codominant with poor attachment and there may be evidence of significant trunk and/or canopy decay. There may be significant mechanical damage around buttress roots and/or the base of the trunk.
- Four trees have Very poor structure. Three are single trunked at the base but develop into codominant trunks with deep bark inclusions in the union, with or without signs or internal cracking and/or decay in the union. One is a young tree that has a restricted rootball and is unstable at the base.

Table 5: Assessment of tree structure in the AoH

Structure	No. of Trees	% of total
Good	14	5%
Fair	220	77%
Poor	48	17%
Very poor	4	1%
Total	**286**	

Figure 13: Tree E68 – basal trunk/ buttress root decay and cavities

Figure 14: Tree E82 – large stem failure in canopy with evidence of included bark in union

Figure 15: Tree W58 – codominant stems with included bark and internal trunk cavity

Figure 16: Tree W103 – codominant stems with signs of internal cracking down the trunk

4.2.5 Useful Life Expectancy

Useful Life Expectancy (ULE) is an approximation of how long a tree can continue to provide benefits in the landscape and retained at an acceptable level of risk. The biological life span of any species invariably far exceeds its ULE. Elms in Europe live for around 250 years, rarely exceeding 350 years, however in Australia, Elms that are well managed and maintained have a shorter biological lifespan and could be expected to live up to 150 years (Spencer, Hawker and Lumley 1991), and may have a lower ULE.

ULE includes considerations of tree health and structure, ongoing maintenance costs and risk to public safety. The benefits derived from vegetation, be they functional or visual, typically decrease during the over maturity/decline phase. This is concurrent with a steep rise in management costs as aging trees tend to require increasing arboricultural inputs to maintain them in a safe, attractive condition.

The ULE assigned to the assessed trees is conditional on any recommended works being completed within specified timeframes.

Of the 286 trees in the Kingston Avenue of Honour:

- Seven trees have a ULE in excess of 40 years. Most are young and semi-mature plantings with Good health and Good or Fair structure which, under normal conditions and with appropriate management are expected to continue as viable landscape components far into the future.
- 83 trees have a ULE of 20 - 40 years. Almost all are mature plantings and have Good or Fair health and Good or Fair structure. These trees require minimal remedial works at present. Under normal conditions and with appropriate ongoing management they are expected to continue as a viable landscape component for 20 to 40 years.
- 140 trees have a ULE of 10 - 20 years. These mature trees all have Fair health, and the majority have Fair structure. Some remedial pruning works may be recommended to achieve the ULE. Under normal conditions and with appropriate ongoing management these trees are expected to continue as a viable landscape component for 10 to 20 years.
- 37 trees have a ULE of 5 - 10 years. These mature trees all have either Poor health, Poor structure, or both. This includes trees with substantial storm damage and trees with either active or potential trunk splits, some of which will require significant works in order to achieve the ULE. Strategic planning for the eventual replacement of these trees needs to commence.
- 16 trees have a ULE of less than 5 years. These mature trees are in poor condition due to advanced decline or structural defect. The trees have surpassed their peak aesthetic value and are recommended for removal and replacement over the next 5 years.
- Three trees are dead, or near dead, and require removal and replacement.

Table 6: Assessment of tree ULE in the AoH

ULE	No. of Trees	% of total
40+ years	7	2%
20 to 40 years	83	29%
10 to 20 years	140	49%
5 to 10 years	37	13%
Less than 5 years	16	6%
0 years	3	1%
Total	**286**	

5. QTRA Risk Assessment

A risk assessment using Quantified Tree Risk Assessment, Version 5 (Ellison 2015) has been undertaken for each tree. The risk assessment method has the following components:

- Probability of failure (PF) - The probability of failure rating is attributed to the tree part that is most likely to fail under normal conditions within the next 12 months.
- Size of part likely to fail (FS) - The failure size rating is attributed to the branch or trunk that is most likely to fail and cause the most damage under normal conditions over the next 12 months.
- Target occupancy (TO) - The target occupancy is attributed to the object that is most likely to be hit /injured /damaged in the event of failure.

The QTRA Risk Score methodology is probabilistic and the lower the value the higher the risk. The risk score is presented as a numeric value however it is properly expressed as a fraction e.g., Risk Score = 1,440 indicates that the predicted event has a 1/1,440 chance of occurrence. 1/1 indicates that an event is certain to occur and 1/10,000,000 indicates that it is extraordinarily unlikely.

QTRA Version 5 uses Monte Carlo simulations to arrive at a mean value for the risk score values. In short, Monte Carlo simulations mean QTRA calculators work out the 'most likely' Risk of Harm from 10,000 possible outcomes for each combination of PF, FS and TO Range.

QTRA has a risk threshold which has also been described for each tree. The incremental rise between categories increases by orders of magnitude as the risk assessment operates on an exponential scale (Table 7).

An accepted threshold of risk is generally in the order of 1/10,000 and any tree that scores less than 10,000 would be expected to be remedied within the next twelve months.

Table 7: QTRA Advisory Risk Thresholds

Risk Thresholds	Description	Actions
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 tree has exceptional value • Review the risk
1/1,000,000	Tolerable (when imposed on others) Risks are tolerable if ALARP (As Low As Reasonably Practical)	• 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
	Broadly Acceptable Risk is already ALARP	• No action currently required to control risk • Review the risk

The wide verge in which the Avenue trees are planted, the significant setback from the road (for the majority of trees), and the virtual absence of pedestrian movement along this section of road means that most of the trees have a very low target occupancy, and subsequently represent a very low risk of harm to people and property. That is, even a tree with a high probability of failure of a large branch will not, in most instances, pose a substantial risk as the branch is very unlikely to hit any target of value.

Figure 17: The trees are planted in a wide road verge and the majority are set back from the road. There are no pedestrian paths on the verge.

Of the 286 trees in the Kingston Avenue of Honour:

- 279 trees are considered to have a broadly acceptable level of risk, and purely from a risk management perspective, would not require works.
- Six trees are considered to have a tolerable level of risk – when imposed on others. From a risk management perspective, the costs and benefits of risk control should be assessed, and the risk controlled only where a significant benefit might be achieved at a reasonable cost.
- One tree (W82) is considered to represent an unacceptable risk and requires action to reduce risk to an acceptable level. The tree has codominant stems that are poorly attached to one another, adjacent to and within falling distance of High Voltage powerlines (Figure 18 and Figure 19).

Table 8: Assessment of risk (using QTRA) in the AoH

Risk Rating	Description	No. of Trees	% of total
1/50,000,000,000 - 1/4,000,000	Broadly Acceptable	279	97.6
1/1,000,000 - 1/400,000	Tolerable	6	2.1
1/3,000	Unacceptable	1	0.3
Total		**286**	

Figure 18: Tree W82 – codominant stems with deep bark inclusion adjacent to HV lines

Figure 19: Tree W82 – the poor attachment due to included bark between the stems can be seen

6. Recommended Works

Risk is not the only driver for undertaking works on significant trees. Avenues in particular rely on the uniformity of the individual trees to create the desired effect and pruning may be required to maintain consistent form among trees.

Works to ensure the successful establishment of trees are essential, from cultivation and planting, to intensive early management including watering, mulching, weed control and formative pruning, although the young trees effectively pose no risk.

Works to extend the lifespan of specific trees, which may not otherwise be justified if not to mitigate risk, are reconsidered in the context of the value of the Avenue of Honour and of the historic, cultural and aesthetic importance of each individual tree.

Remedial works such as cabling may be required to reduce the imminent likelihood of significant tree failure in trees with severe structural defect, thus allowing the mature tree to remain a landscape feature and to contribute to the mature avenue effect, at least for the short term.

Pruning to remove storm damaged limbs may be required to ensure large tearout wounds are removed and the area of wood exposed to decay causing organisms is minimised. Reduction of the remaining crown may be required to reduce the exposure of over-extended limbs to wind forces they are now subject to and reduce the likelihood of additional canopy failures. Removal of large hanging branches can also reduce the likelihood of further canopy damage as the branches eventually fall.

Removal of dead and decayed branches may be required to control pest populations of beetles that feed on the matter and chemical controls required to control insect foliage feeders.

6.1 Priority Timeframes

Works have been given a priority timeframe to assist with risk management, budgets and work scheduling.

A recommended timeframe for completion of works is set out in Table 9.

Table 9: Priority timeframes for recommended works

Works Priority	Completion Timeframe
Urgent	Recommended works should be undertaken ASAP
High	Recommended works should be undertaken within 12 months
Moderate	Recommended works should be undertaken within 3 years
Low	Recommended works should be undertaken within 5 years

Of the 286 trees in the Kingston Avenue of Honour:

- One tree is recommended for Urgent priority work.
  - Tree W82 requires a cable system to be installed to reduce the risk of stem failure onto HV wires.
- Seven trees are recommended for High priority works.
  - Trees E11 (young), E50 (mature), and W13 (young) are dead or near dead and are recommended for removal and replacement within the next 12 months.
  - Trees W103 and W104 require an aerial inspection of existing cables to ensure they are still secure and operational. Additional works may be required depending on the findings.
  - Trees E71 and E109 require a cable system to be installed to prevent significant canopy failure and to extend the ULE of the tree.
- 52 trees are recommended for Moderate priority works.
  - Trees W58, W81 and W89 are recommended for removal and replacement within the next 3 years. All have sustained significant storm damage and are considered beyond remedial pruning.
  - Other moderate priority works include reduction of extended limbs in the canopy, removal of broken, hanging and damaged branches, formative pruning of young trees and mulching to extend ULE.
- 46 trees are recommended for Low priority works.
  - Trees E51, E52, E53, E54, E55, E103, E106, E107, E108, W16 and W94 are recommended for removal and replacement within the next 5 years. All are in advanced decline.
  - Other low priority works include reduction of extended limbs in the canopy, removal of broken, hanging and damaged branches.
- 180 trees did not require any works at the time of inspection.

General Recommendations:

- Pruning works are undertaken by qualified arborists (minimum AQF Level 5) with demonstrated experience in the management of large, high value trees.
- All pruning should conform to the Australian Standard 4373: *Pruning Amenity Trees* (Standards Australia 2007).

- At least one fully qualified arborist must be present on site at all times during pruning or removal operations.
- Pruning should be undertaken in late Winter or early Spring, when there is no moisture stress, combined with good carbohydrate reserves. Avoid cutting after flushes of Spring growth as the tree has used up food reserves for flushing and these are only replenished after leaves heave matured.
- Pruning tools are disinfected between trees to minimise the spread of bacterial wetwood.
- Tree removal and replacement is undertaken in consultation with the community, and other relevant stakeholders.
- The trees are reassessed every 2 years to inspect condition, ensure the trees are maintained at an acceptable level of risk and to determine any further work requirements.

For work definitions and a list of recommended works see Appendix 3 & Appendix 4.

6.2 Additional Works

6.2.1 Young Tree Establishment

Elms are able to tolerate a wide range of environmental conditions providing they are properly established and maintained. Nursery stock selection, site preparation, planting, and ongoing maintenance are essential.

Elms can be prone to development of codominant leaders and formative pruning of young trees is essential to establish a well-balanced and sound canopy. Elms require large amounts of water, particularly in early spring in their most active growth phase. Supplementary watering is required during dry periods and mulching is required around young trees to supress weed growth and retain soil moisture (Spencer, Hawker and Lumley 1991).

6.2.2 Elm Sucker Management

Both Dutch and English Elm readily sucker from an extensive root system (Spencer, Hawker and Lumley 1991). Suckers are present along over half of the length of the Avenue, growing along private property fences on both sides. The suckers range from young clusters to dense thickets containing semi-mature trees, some as tall as the Avenue trees themselves. Some suckers are so tall that they have begun to fail during high winds in storm events (Figure 20).

Suckers have been previously removed in sections of the Avenue, with the intention of reducing competition with and improving the health of trees in the Avenue. Sucker removal is generally recommended as a control measure for Elm bark beetle, as suckers are potential breeding sites for adult beetles, and for Elm leaf beetle, as suckers are a food source for over-wintering adults, egg laying sites, and a food source for larvae (Spencer, Hawker and Lumley 1991).

At the time of inspection there was no clear obvious correlation between tree health and the presence or absence of fenceline suckers in the Avenue. Suckers were periodically inspected for evidence of beetles, but timing was not ideal, and it is undetermined if the suckers are increasing pest populations.

In areas with semi-mature and mature sucker thickets, it is probable that the suckers are providing substantial shelter to Avenue trees, buffering the canopies from wind. Removal of these suckers, aside from being difficult and expensive, is likely to accelerate the decline of many of the mature trees, particularly the taller trees on the eastern side of the Avenue, such as either side of E70, which are highly exposed to wind forces as evidenced by significant storm damage.

In order to determine if sucker removal is required and the benefits warrant the effort and expense, trials would need to be conducted adjacent to mature trees.

It is recommended that areas currently free of suckers are maintained as such, and that where possible, suckers are removed adjacent to new plantings so as to reduce shading of young trees.

Extreme care is required if using herbicides for sucker control, as root grafting may have occurred (Spencer, Hawker and Lumley 1991) and poison could impact Avenue trees, leading to injury or death. Herbicide control of suckers will require a permit under the Heritage Listing for the Avenue.

Figure 20: In some areas, suckers are as tall as the mature Avenue trees

6.2.3 Grass and Weed Control using Mulch

Grass, weeds and basal trunk suckers need to be controlled around the trees. Grass and weeds compete with the trees for water and mineral nutrients, and for light and space in the case of young trees.

Mowing to control grass, weeds or suckers close to the trunk has the potential to scalp and mechanically damage woody surface and buttress roots and/or the base of the trunk, providing an entry point for decay causing organisms. Brushcutters can also cause significant damage if they come into contact with the tree.

Herbicides can be used to remove grass and weeds close to the trunk so that mowers do not have to cut so close to trees, but herbicide applied to basal suckers or wounded roots has the potential to be translocated throughout the tree.

Application of organic mulch helps retain moisture in the soil, moderates soil temperature and is beneficial to maintaining the soil microflora. In time it helps improve soil structure and promote the existence of worms and other soil organisms and promote root growth (Bastian 2009).

Mulch application has been specifically recommended for trees that are showing visible signs of stress, with the intent to improve site conditions and try and retain these trees in the landscape for as long as possible.

In addition, it is recommended that *all* trees are mulched at the base to reduce competition with grass and weeds, supress growth of suckers, avoiding the need for mowers and brushcutters to work close to the trunk and ultimately improve tree health and extend ULE.

At a minimum, each tree should be mulched in a circle 3m from the trunk. Over time, the area of mulch should be increased, with the eventual aim of having all trees mulched to 1m beyond the drip line.

Mulch should be applied to a depth of 100-150mm. The mulch used should be anything organic that is well-composted, for example wood chips that contain a blend of leaves, bark and wood. Mulch should be applied so that it is not piled up against the trunk and the root crown is exposed.

Figure 21: Grass, weed and sucker control is required around the base of trees

Figure 22: Mowing or brush cutting next to the trunk often leads to mechanical damage

6.2.4 Names Plaques and Tree Labels

Trees bear individual name plaques, containing the names of individual servicemen and women, with an additional Maltese cross signifying those who died at war. The original plaques were composed of iron and were originally fixed to tree guards and later mounted metal stakes at the base of the trees. Many of these original plaques were damaged, lost or buried over time. In 2000, those that were still in good condition were recovered and restored, and those that were missing or badly damaged were replaced with aluminium plaques. All were sandblasted and powder coated black, with a yellow border and yellow

lettering, and were mounted to the trunks of mature trees using galvanised screws. Remnants of some of the original iron plaques and metal stakes still remain at the base of trees.

In the more recent past, trees have also been labelled with tree numbers using a couple of different systems. It was observed that the majority of trees are now missing these labels due to weathering. Name plaques are also now presented with some variations, and these are summarised below.

Table 10: Current tree labelling systems

Label Type	Material	Appearance	Pros	Cons	Maintenance
Name of Serviceman/ woman	Metal plate on tree trunk	Black plate with yellow or white text, affixed to trunk with two screws	Durable plaque	Affected by slime flux Affixed to mature trees only	Cleaning (lichen), periodic repainting (weathering and slime flux), adjust bolts
Name of Serviceman/ woman	Metal plate on wooden stake	Black with yellow or white text, affixed to wooden stake at base of tree	Durable plaque	Tree stake will rot over time Possible mowing impediment	Cleaning (lichen), periodic repainting (weather), replacement of decayed stakes until plaque is affixed to mature trunk, grass and weed control
Name of Serviceman/ woman	Metal plate on concrete block	Black with white text and border affixed to concrete block at base of tree	Durable plaque and base	Block will need to be moved as tree grows Possible mowing impediment	Cleaning (lichen), periodic repainting (weather), moving block as tree grows, grass and weed control
Tree Number	MDF cutout	Red painted MDF poppy, black painted label, affixed to plaque screw with wire	Relatively inexpensive, but probably labour intensive	Not durable - material, paint, wire hanger	Semi regular repainting and replacement when water damaged
Tree Number	Cattle tag	Yellow cattle tag, black Texta label, affixed to trunk with screw	Inexpensive	Not durable - material, paint, enveloped by tree over time	Semi regular cleaning, relabelling, repositioning, replacement when brittle

Under the Heritage Listing, minor repairs and maintenance to memorial monuments may be undertaken without a permit providing they are undertaken (or overseen) by a qualified conservator in a manner which preserves the cultural heritage significance of the place.

The following recommendations are provided for consideration:

- Collect remnants of original plaques and stakes. These have historic values, but also have the potential to be lost (buried), or embedded in the tree, posing a hazard to mowers and/or tree/stump removal contractors.
- Audit the plaques on a regular schedule (e.g., every 5 years) and identify those that require maintenance or replacement.
- Adjust bolts in mature trunks. A rubber stopper or spring can be installed between the plate and the tree to allow tree growth without damaging the plaques and causing damage to the tree.

- Use consistent colouring and presentation for all plates (e.g., black base, yellow text, border painted or unpainted).
- Use a consistent and durable mounting system for young and semi-mature trees, where the plaque cannot yet be affixed to the trunk. Ensure it does not impede mowing, and will not damage the growing tree.
- Ensure replacement plates accurately represent the serviceman or woman – e.g., initials, spelling, Maltese cross where applicable. (It is noted for example, that the original plaque for F.G. Drury – Tree W11 - includes the Maltese cross, while the replacement plaque does not.)

The current tree number labels are not durable. Many are missing and many of those still present require replacement. It is recommended that a new system is developed, and all current labels are removed and replaced.

The tree number label should be durable, reasonably inexpensive, discrete yet visible, have a means of attaching to the tree, and be easy to replicate if replacement is required. One simple option may be laser engraved stainless steel pet tags. An appropriate method to affix these to trees or plaques would need to be determined.

7. Ongoing Management of the Avenue

7.1 Integrity of the Avenue

The Kingston Avenue of Honour is largely intact, and the uniformity of the individual trees, their size and stature create an impressive vista. The Avenue is an iconic and dominant feature of the local landscape and prized asset of the council and community.

Overall, the Kingston Avenue of Honour is in fair condition.

Figure 23: The Avenue is in Fair condition overall, and is largely intact as a landscape unit

7.2 Threats to the Avenue

7.2.1 Age and Declining Vigour

The oldest of the trees in the Avenue of Honour are now 104 years old. The majority of trees are at or just past their peak aesthetic value and are nearing or entering the over maturity phase. Some trees are actively in decline.

Trees have a finite lifespan and all trees go through a natural life-cycle of establishment, growth, maturity, over maturity and decline.

Senescence is the process of decline that a tree experiences following maturity. This process often takes a number of years and produces symptoms including:

- the shedding of small and large limbs
- a reduction of foliage density
- an increased volume of deadwood throughout the canopy
- the discolouration of foliage
- a reduced ability to cope with disease and insect infestation
- a reduced ability to cope with decay (Van Gelderen and Van Hoey Smith 1996).

As previously stated, in Australia a healthy lifespan of 100-150 years may be possible for elms, provided the trees are well maintained (Spencer, Hawker and Lumley 1991). The biological lifespan of any species however invariably far exceeds its Useful Life Expectancy, that is, the period of time over which the species can satisfy the aesthetic or functional roles for which they were originally selected (Hitchmough 1994).

As trees grow and mature, the benefits they provide continue to increase while they remain healthy and vigorous. Conversely, the benefits derived from vegetation, be they functional or visual, typically decrease during the over maturity/decline phase. This is concurrent with a steep rise in management costs as aging trees tend to require increasing arboricultural inputs to maintain them in a safe, attractive condition (Hannah and Yau 1993).

While some works can be undertaken to extend the ULE of individual trees, it must be recognised that the trees will not live forever and succession planning is required to ensure the Avenue continues to be a living memorial.

7.2.2 Pest and Disease

Elm trees are susceptible to a wide array of diseases and stresses, and a stressed tree is more vulnerable to disease than a healthy tree (Spencer, Hawker and Lumley 1991).

7.2.2.1 Elm Leaf Beetle

The Elm Leaf Beetle (*Xanthogaleruca luteola*) skeletonises the foliage of elm trees, with Ulmus procera and Ulmus glabra most seriously affected. In Spring, the over-wintering adults fly to elm trees - especially suckers - where they eat holes in the leaves and lay lemon shaped eggs in double rows on the underside of the leaf.

Emergent larvae feed on the lower leaf surfaces, destroying mesophyll cells and desiccating the leaves which turn brown and drop. The beetle is a serious pest, causing defoliation and loss of amenity, and repeated infestations will weaken the Elms and make them prone to branch dieback as well as other insect and fungal problems. Severe frequent attacks may lead to the premature death of the tree.

Total eradication of the elm leaf beetle is extremely difficult, and the primary goal of management is generally to maintain beetle numbers (and damage) to an acceptable level. Elm leaf beetle populations can be managed through trunk or soil injection of pesticides.

Sanitation is also important in reducing beetle numbers, elm litter, deadwood, diseased limbs and overwintering sites should be removed. Sucker growth is the preferred food source for emergent beetles and should be carefully inspected for damage.

7.2.2.2 Elm Bark Beetle

The Elm Bark Beetle (*Scolytus multistriatus*) is the principal vector for Dutch Elm Disease. The beetle feeds on the inner bark of trees and attacks all species of Elm.

Overmature and stressed elms and those containing deadwood are very susceptible to attack. Initial symptoms are general weakening of the tree, yellowing and absence of leaves on small branches. Branch dieback can occur with branches near the top of the tree girdled by the beetle and a heavy infestation can girdle the trunk, causing serious damage or death.

Bark of infected trees will have 'shot holes' 1-2mm wide and frass will accumulate on branches and on the ground. Removing bark will reveal symmetric fan shaped galleries where the beetles have tunnelled under the bark.

The most effective method of elm bark beetle control is detection and sanitation. Regular inspection of diseased and damaged branches and deadwood should be undertaken to monitor and record the presence of the beetle, the severity of impact, and remove infected branches where required. Pruning should not occur during beetle emergence in Spring and Summer as they will be attracted to fresh pruning cuts.

Figure 24: Defoliation may be a combination of insect and possum grazing

Figure 25: Bark was removed from dead tree E50 – no signs of Elm bark beetle visible

7.2.2.3 Dutch Elm Disease

Dutch Elm Disease is widespread throughout the northern hemisphere and has caused the death of most of the major elm plantings. The disease has not yet reached Australia but was discovered in New Zealand in 1990.

The disease is caused by the vascular wilt fungus *Ophioostoma ulmi*, which moves from tree to tree internally through root grafts or externally as spores adhering to the beetle vector. The presence of Elm Bark Beetle in Australia, the favourable climate and the dense planting of susceptible elm species would result in the rapid spread of the disease.

Wilting leaves are the first symptom to appear, usually on one branch and gradually spreading to the whole crown. The fungus spreads through woody tissue and secretes toxins that stimulate the production of calluses and gums, blocking the flow of water in infected branches. The blockages cause sudden yellowing, wilting and leaf death, with symptoms occurring within a few weeks of infection and tree death within one growing season.

There is no known cure for Dutch Elm Disease and the most important control measures currently in place are strict quarantine laws preventing infected elm logs to be imported in Australia.

7.2.2.4 Elm Tree Leafhopper

The Elm Leaf Treehopper (*Ribautiana ulmi*) feeds on the leaf mesophyll cells, causing cell death and giving the leaf a silvery appearance, but causes no other damage. The insect infests elms throughout Victoria every Summer but the long-term damage of the infestations is unknown. There are no recommended control measures for the leafhopper.

7.2.2.5 Bacterial Wetwood

Bacterial wetwood is common in elms and was observed in many of the trees throughout the Avenue. Wetwood is caused by a number of species of bacteria that enter the tree through wounds. Gases and liquid are produced in infected trees from the fermentation action of the bacteria. Wetwood is found in the roots, trunk and branches and is characterised by a 'slime flux', when the gases within the trunk cause a build-up of pressure that forces the liquid to seep out of the tree, frequently at tree crotches, cracks in the bark, or pruning. The liquid is colourless or pale while inside of the tree, but darkens when exposed to air and appears as a dark brown to black water-soaked area in the wood. When the liquid dries, it leaves a pale grey to white crust on the bark.

While bacterial wetwood is generally not a serious disease, there are no control methods and it is important that is not spread between trees. Measures to minimise spread include ensuring all pruning is undertaken as per AS 4373-2007 *Pruning Amenity Trees* and tools are disinfected between trees.

7.2.3 Overhead and underground services and infrastructure

Trees within close proximity to powerlines have the potential to grow into the clearance zone, presenting an unacceptable risk to power supply and/or electrical safety. Pruning for powerline clearance can be seen in the larger trees on the Western side of the Avenue, adjacent to High and Low voltage powerlines.

The powerline clearance pruning has altered the natural tree form in many cases, resulting in an asymmetrical canopy and vigorous epicormic growth, requiring regular removal to maintain clearances. Trees expend significant energy producing this flush of growth, to the detriment of other biological processes and continued removal of branches for powerline clearing has the potential to impact mature trees with lower energy reserves.

Any maintenance of underground services in proximity to the trees, and infrastructures such as roads and driveways, has the potential to impact the mature trees. Any works within the Tree Protection Zone radius of the trees should be conducted under the direct supervision of a Project Arborist to ensure root damage is avoided, minimised and/or mitigated.

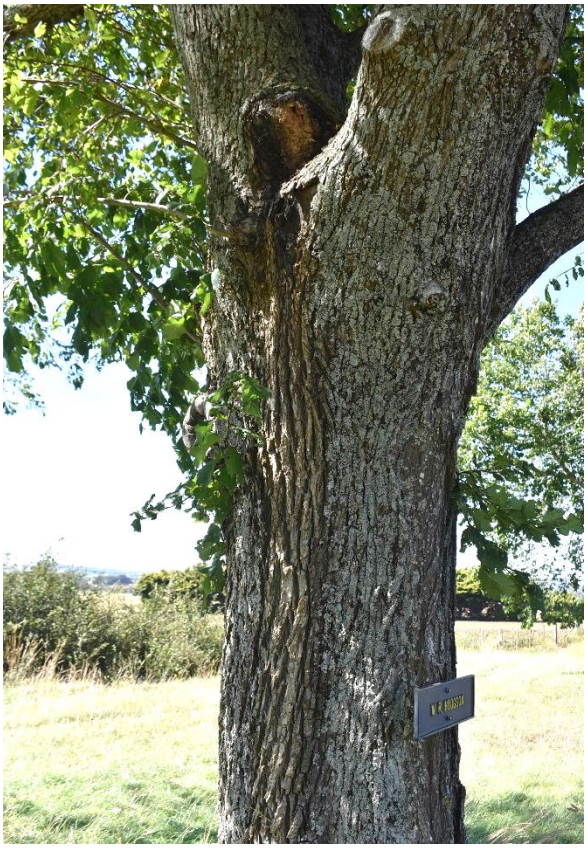

Figure 26: Wetwood in the union of a mature tree, with staining down the trunk

Figure 27: Dried wetwood from an old pruning wound, with staining down the trunk

Figure 28: Powerline clearance pruning on the western side of the Avenue

Figure 29: Sign indicating underground cables on the eastern side of the Avenue

8. Future Management of the Avenue

While the Kingston AoH is currently in fair condition, it is expected to decline over the coming decades as the trees continue to age and progress through over maturity and senescence.

A remedial works program and tree removal and replacement recommendations have been made for the next 5 years, and while these will address immediate and short-term tree issues, consideration must also be given to the future prospects and longevity of the Avenue of trees as a homogenous landscape unit and living memorial.

Thus far, the tree removal and replacement strategy for the Avenue has been to 'infill' – that is, to reactively remove and replace individual trees as they die or suffer significant structural failure. The spacing between trees allows this method to be employed and providing young trees are appropriately managed, they generally have the room to successfully establish and mature, and will eventually contribute to the visual aesthetic of the Avenue.

A total of 17 trees are recommended for removal and replacement within the next 5 years. Given the current condition of the Avenue, the infill strategy is considered to be appropriate for the next 15-20 years. After this time, more and more trees will be in the over maturity and senescence phase and infill replacement will be inefficient and ineffective. For this reason, it is now time to start considering and exploring alternative removal and replacement strategies with a view to implementation in the near future.

8.1 Tree Removal and Replacement Strategies

8.1.1 Useful Life Expectancy Plans

Plans depicting the Useful Life Expectancy of the Kingston Avenue of Honour trees are shown in Figure 30 and Figure 31. These maps are a visual representation of the overall condition of the trees and depict trees recommended for removal in the short term (ULE <5 years) and the life expectancy of the trees to be retained.

The maps are a useful tool in the decision-making process and can provide information on the likely efficacy and practicality of the removal and replacement strategies.

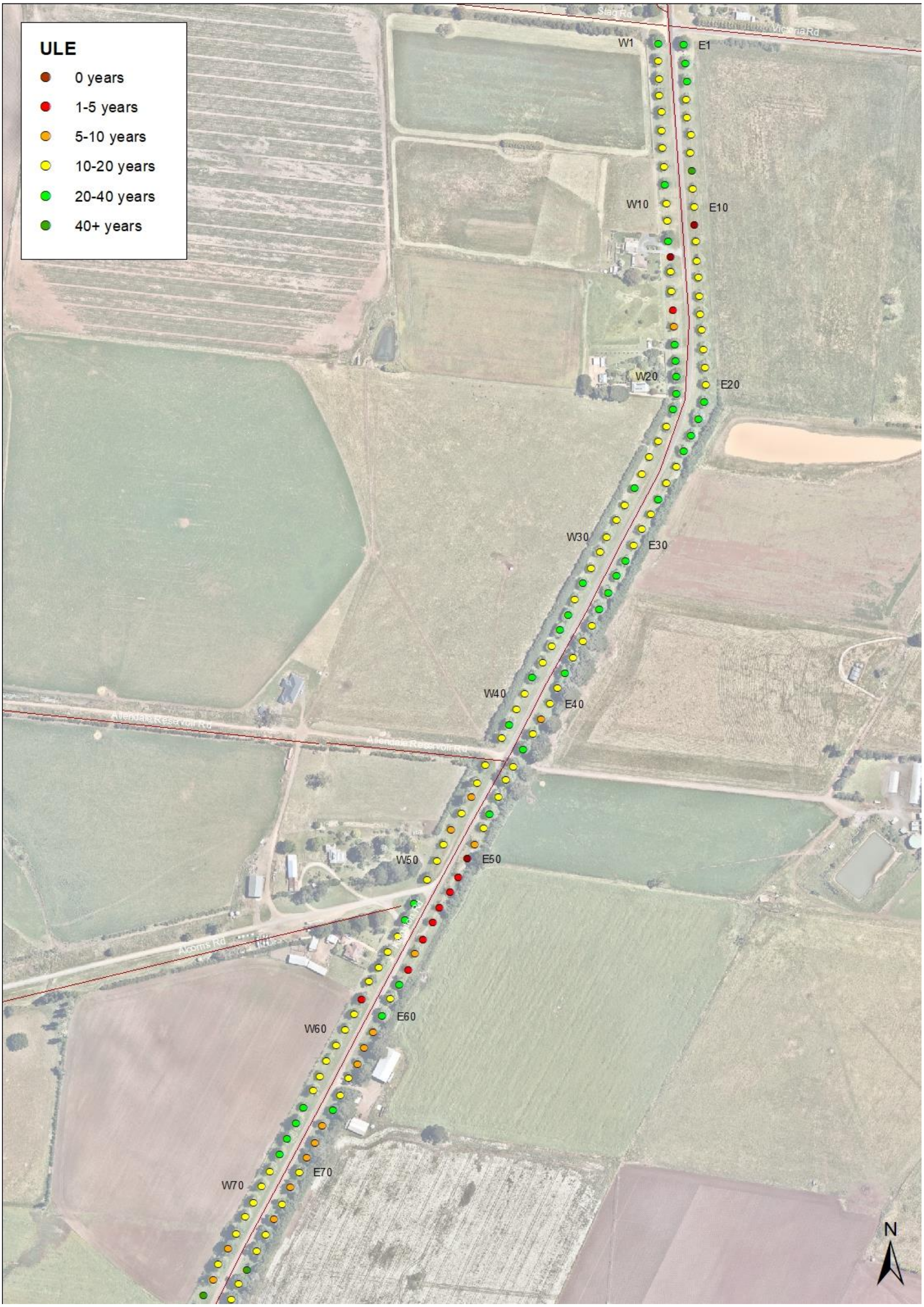

Figure 30: Useful Life Expectancy Plan for the northern half of the Avenue of Honour – Trees W1/E1 to W77/E78

Figure 31: Useful Life Expectancy Plan for the southern half of the Avenue of Honour – Trees W73/E74 to W142/E144

8.1.2 Infill

In the short term, removing and replacing only those trees that have died or require removal for safety reasons is a convenient option, allowing difficult decisions regarding tree removal to be deferred. It can be a relatively inexpensive option and can avoid a certain level of public dissatisfaction regarding the large-scale removal of trees and disruption of landscape (Hitchmough 1994).

These benefits are offset by the increasing costs of maintaining over-mature and declining trees and by the difficulty in establishing young trees among groups of mature trees.

The replacement of each tree as it dies can be ineffective as the fundamental characteristics of an avenue - conformity in size and age - are not retained. It draws out the time frame for replacement of an avenue and requires an ongoing regular program of tree inspections. There is also little opportunity to provide economies of scale.

8.1.3 Block

Dividing the rows of trees into 'blocks' and staging the removal and replacement of blocks of trees over stages allows sections of an avenue to be retained while other sections are replaced.

The intact sections are actively managed until replacement specimens are of a substantial size. Once the replacement specimens are contributing to the landscape the remaining blocks of the avenue are removed and replaced.

Block removal and replacement significantly reduces the issues associated with establishing young trees next to mature ones. It also allows for economy of scale and for expenditure to be spread across multiple budget periods.

At the moment, small groups of trees are beginning to appear as potential blocks for replacement – for example – Trees E49-E57 are candidates for removal and replacement at the same time, rather than individually as each tree finally requires replacement. Similarly, Trees E100 - E110 could be considered for removal and replacement at the same time, in order to achieve economies of scale and produce homogenous sections within the Avenue.

In the future however, if a block replacement strategy is employed, the aim would generally be to split the Avenue into larger blocks and undertake an entire Avenue replacement over a maximum of 15-20 years, ensuring the Avenue can be close to uniform in size and age at maturity.

8.1.4 Total

Removal and replacement of the entire group of trees in one event results in an abrupt and substantial loss of amenity and is likely to meet with considerable public opposition. This method does however eliminate the difficulties in trying to establish young trees next to mature trees (Hitchmough 1994) and ultimately results in an even-aged avenue.

This strategy can be effective for smaller avenues but at the scale of the Kingston Avenue of Honour would have a drastic impact on the local landscape and is unlikely to be acceptable to the stakeholders and the public. Total removal and replacement is also extremely costly in the short term, with all expenditure incurred in one budget period.

Table 11: Replacement strategies comparison

Replacement strategy	Pros	Cons
Infill	• Minimal impact on the landscape	• Can be difficult to establish replacement trees • Retained trees require ongoing management and maintenance. Management becomes increasingly intensive and difficult as trees age and decline • Replacement avenue will have an unbalanced appearance because of the varying ages of the replacement trees • Renewal program takes an extended period of time and requires a significant and ongoing input of resources by the tree manager
Block	• Renewal of the landscape can generally take place within a 5-20 year timeframe • Costs for renewal are split into stages • Landscape impact can be reduced by planting advanced tree stock	• Significant impact on the landscape in the area where tree removal occurs • Retained trees require ongoing management and maintenance. Management becomes increasingly intensive and difficult as the trees age and decline • The replacement avenue will have a multi-tiered appearance until all the trees reach maturity
Total	• Replacement takes place within a very short period of time • Economies of scale can be achieved with the cost of operations (Tree removal, tree planting and tree maintenance) • The replacement avenue grows with an even appearance	• Drastic impact on the landscape • Significant short-term cost for tree removal, replacement and maintenance

The strategy, or combination of strategies ultimately employed will depend on a number of additional factors including:

- Condition of the trees in the next 10, 15, 20 years etc.
- Available budgets;
- Location of the trees that need to be removed in the short term;
- Spacing between the retained trees;
- Time frame to achieve the change over;
- Ability to commit to and maintain the strategy in the future; and
- Community and stakeholder desires.

9. Conclusion and Recommendations

Arboricultural works have been recommended for the Kingston Avenue of Honour trees, to be undertaken over the next 5 years.

The current infill removal and replacement strategy is considered to be appropriate for the next 15-20 years, but now is the time to start considering and exploring alternative removal and replacement strategies with a view to implementation in the future.

The following is recommended:

- Tree removal and pruning works identified herein are undertaken within the prescribed timeframes
- Pruning works are undertaken by qualified arborists (minimum AQF Level 5) with demonstrated experience in the management of large, high value trees.
- All pruning should conform to the Australian Standard 4373: *Pruning Amenity Trees* (Standards Australia 2007).
- At least one fully qualified arborist must be present on site at all times during pruning or removal operations.
- Pruning should be undertaken in late Winter or early Spring, when there is no moisture stress, combined with good carbohydrate reserves. Avoid cutting after flushes of Spring growth as the tree has used up food reserves for flushing and these are only replenished after leaves heave matured.
- Pruning tools are disinfected between trees to minimise the spread of bacterial wetwood.
- Tree pruning and removal works are undertaken in consultation with the relevant stakeholders including the community.
- The trees are reassessed every 2 years to inspect condition, ensure the trees are maintained at an acceptable level of risk and to determine any further work requirements.
- The Avenue Management Plan is reviewed and updated every 5 years.

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Appendix 1. Data Collection Descriptors and Definitions

Tree assessments are based on the assessor's experience and opinion of the tree.

1.1 Botanical name

The scientific name identifying the genus and species of the tree. Each species has only one scientific name.

1.2 Common Name

The colloquial name for a tree species, usually in plain English. Common names for a species are often local or regional and each species can have multiple common names.

1.3 Tree dimensions

Tree height and canopy width in metres (estimated unless stated otherwise).

1.4 DBH

Diameter of the trunk at breast height (1.4m above ground level) measured using a diameter tape. Used to calculate the Tree Protection Zone radius.

1.5 Health

Category	Description
Good	The tree is demonstrating good or exceptional growth. The tree exhibits a full canopy of foliage, and has only minor pest or diseases problems.
Fair	The tree is in reasonable condition and growing well. The tree exhibits an adequate canopy of foliage. There may be some deadwood present in the crown. Some grazing by insects or possums may be evident.
Poor	The tree is not growing to its full capacity; extension growth of the laterals is minimal. The canopy may be thinning or sparse. Large amounts of deadwood may be evident throughout the crown. Significant pest and disease problems may be evident or there may be symptoms of stress indicating tree decline.
Very Poor	The tree appears to be in a state of decline. The tree is not growing to its full capacity. The canopy may be very thin and sparse. A significant volume of deadwood may be present in the canopy or pest and disease problems may be causing a severe decline in tree health.
Dead	The tree is dead.

1.6 Structure

Category	Description
Good	The tree has a well-defined and balanced crown. Branch unions appear to be sound, with no significant defects evident in the trunk or the branches. Major limbs are well defined. The tree is considered a good example of the species.
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.
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.
Very Poor	The tree has a poorly structured crown. The crown is unbalanced or exhibits large gaps with possibly large sections of deadwood. 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. Branches may exhibit large cracks that are likely to fail in the future. The tree may have suffered major root damage.
Has Failed	A section of the tree has failed or is in imminent danger of failure and the tree is no longer a viable specimen.

1.7 Age Class

Category	Description
Mature	Tree has reached the expected size for the species at the site.
Semi-mature	Established tree that has not yet reach the expected size for the species at the site.
Young	Recently planted tree or juvenile self-sown tree (generally less than 5 years old).

1.8 Useful Life Expectancy (ULE)

Category	Description
40+ years	The tree is in excellent condition and under normal conditions and with appropriate management is expected to continue as a viable landscape component in excess of 40 years.
20 - 40 years	The tree is in good condition and under normal conditions and with appropriate management is expected to continue as a viable landscape component for 20-40 years.
10 - 20 years	The tree is in fair condition and under normal conditions and with appropriate management is expected to continue as a viable landscape component for 10-20 years.
5 - 10 years	The tree is in fair to poor condition or it is not a long lived species. Removal and replacement may be required within the next 10 years.
1 - 5 years	The tree is in poor condition due to advanced decline or structural defect. Removal and replacement may be required within the next 5 years.
0 years	The tree is dead, or is considered hazardous in the location. Removal may be required.

1.9 Tree Origin

Category	Description
Exotic	The species originates in a country other than Australia.
Australian Native	The species originates within Australia.
Indigenous	The species originates within the local environs.

Appendix 2. QTRA – Risk Assessment

2.1 Risk Score Overview

Many organisations now require an assessment of the potential risk or hazard that each tree presents. Risk scores, generated as part of the data collection methodology, often link to digital photography.

Risk scores and data collection methodology methods are not standardised and can vary. The Quantified Tree Risk Assessment (QTRA) (Ellison 2015) method has been adopted here and has the following elements:

QTRA methodology is probabilistic - the lower the value the higher the risk. The risk score is presented as a numeric value however it is properly expressed as a fraction. For example, a risk score of 344 indicates that the predicted event has a 1/344 chance of occurrence, 1/1 indicates that an event is certain to occur and 1/10 000 000 000 indicates that it is extraordinarily unlikely.

An accepted threshold for the Tolerable Region of risk scores as defined by the Tolerability of Risk Framework (ToR) (HSE 2001) is a 1/10 000 chance of occurrence. Any tree that incurs a risk score lower than 10 000 would be expected to be worked upon within the next twelve months.

2.2 Target Presence (Occupancy)

The target presence is attributed to the object that is most likely to be hit / injured / damaged in the event of failure.

For example: If a tree is overhanging a road it is unlikely that the road will become damaged in the event of tree failure, passing vehicles are more likely to be affected.

Therefore the target range would be attributed according to the volume and frequency of vehicles on that road as shown in Table 12.

Table 12: QTRA Target Ranges

Target Range	Property (repair or replacement cost)	Pedestrian frequency	Vehicular frequency (number per day)	Probability Ratio
1	>$240,000	Occupation: Constant - 2.5 hours/day Pedestrians & cyclists: 720/hour - 73/hour	28,000 – 2,900 vehicles @ 100km/h 32,000 – 3,300 vehicles @ 80km/h 42,000 – 4,300 vehicles @ 60km/h 47,000 – 4,800 vehicles @ 50km/h	1/1 - >1/10
2	>$24,000 - $240,000	Occupation: 2.4 hours/day - 15 min/day Pedestrians & cyclists: 72/hour - 8/hour	2,800 - 290 vehicles @ 100km/h 3,200 - 330 vehicles @ 80km/h 4,200 - 430 vehicles @ 60km/h 4,700 - 480 vehicles @ 50km/h	1/10 - >1/100
3	>$2,400 - $24,000	Occupation: 14 min/day - 2 min/day Pedestrians & cyclists: 7/hour - 2/hour	280 - 29 vehicles @ 100km/h 320 - 33 vehicles @ 80km/h 420 - 43 vehicles @ 60km/h 470 - 48 vehicles @ 50km/h	1/100 - >1/1,000
4	>$240 - $2,400	Occupation: 1 min/day - 2 min/week Pedestrians & cyclists: 1/hour - 3/day	28 - 4 vehicles @ 100km/h 32 - 4 vehicles @ 80km/h 42 - 5 vehicles @ 60km/h 47 - 6 vehicles @ 50km/h	1/1,000 - >1/10,000

Target Range	Property (repair or replacement cost)	Pedestrian frequency	Vehicular frequency (number per day)	Probability Ratio
5	>$24 - $240	Occupation: 1 min/week - 1 min/month Pedestrians & cyclists: 2/day - 2/week	3 - 1 vehicles @ 100km/h 3 - 1 vehicles @ 80km/h 4 - 1 vehicles @ 60km/h 5 - 1 vehicles @ 50km/h	1/10,000 - >1/100,000
6	≤$24	Occupation: <1 min/month - 0.5 min/year Pedestrians & cyclists: 1/week - 6/year	None	1/100,000 - 1/1,000,000

Where a tree exists over several layers of human traffic frequency it is important to consider the probable failure that is likely to occur from the tree in question in determining the appropriate occupation statistic to identify a target range.

For example a tree may exist within an open park zone for which the human traffic may be in target range 4 (>3 pedestrians per day but <1/hour) attracting a relatively low probability ratio, however, it may also be adjacent to an arterial path with associated human traffic for categorisation in target range 2 (8-72 pedestrians/hour).

If the likely failure from the tree is away from the path then a target range of 4 would be appropriate. However if the likely failure is toward the path then the appropriate target range would be 2.

If the likely failure is of dead wood which is evenly distributed throughout the canopy then the higher range would be used.

If there are several possible types of failure with different failure sizes over different zones of human occupation around a tree then each should be assessed and the values that will produce the highest risk score should be used.

If there is no obvious potential for failure then the higher human occupation range should be used.

2.3 Probability of failure

The probability of failure rating is attributed to the tree part that is most likely to fail under normal conditions within the next three – five years. Strictly speaking this methodology is only concerned with the next twelve months but a greater time frame must be considered because very few trees are actually inspected every twelve months.

Probability of failure is very closely related to the structure of the tree. If a tree has good structure it should generally not be attributed a relatively high probability of failure range value for significant tree parts. However if the part most likely to fail is dead wood then it may be appropriate for the probability of failure range value to be relatively high.

Failure potential is attributed to the tree *prior to works being completed*.

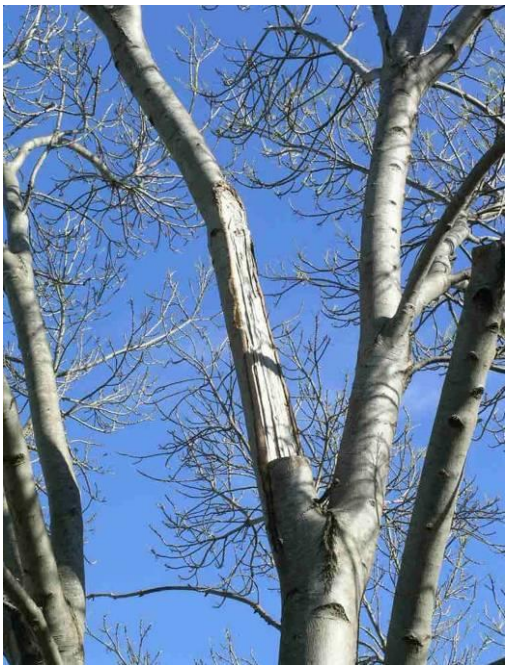

Figure 32. High failure potential

Following the completion of works, the probability of failure requires reassessing to ensure that the probability range is updated.

Table 13: QTRA Probability of Failure Ranges

Probability of Failure Range	Probability of Failure Ratio	Probability of Failure Percentage	Description
1 (Severe)	1/1 - >1/10	>10% - 100%	The structure of the specimen has large and very significant faults and defects. Active failure is often present and branch or trunk failure is imminent. Failure within the next twelve months would appear certain. The probability of failure over the next twelve months is 10 - 100%.
2 (High)	1/10 - >1/100	>1% - 10%	The structure of the specimen has large and significant faults and defects. Branch or trunk failure within the next twelve months would appear likely. The probability of failure over the next twelve months is 1 - 10%.
3 (Moderate)	1/100 - >1/1,000	>0.1% - 1%	The structure of the specimen has significant faults and defects. Branch or trunk failure within the next twelve months would appear possible. The probability of failure over the next twelve months is 0.1 - 1%.
4 (Low)	1/1,000 - >1/10,000	>0.01% - 0.1%	The structure of the specimen has some faults that may result in failure but failure is unlikely. The probability of failure over the next twelve months is 0.01 to 0.1%.
5 (Very Low)	1/10,000 - >1/100,000	>0.001% - 0.01%	The structure of the specimen has some minor faults that may result in failure but failure is very unlikely. The probability of failure over the next twelve months is less than 0.01%.
6 (Negligible)	1/100,000 - >1/1,000,000	>0.0001% - 0.001%	The probability of failure is highly unlikely, between 0.01 to 0.001%.
7 (None)	1/1,000,000 - - >1/10,000,000	>0.00001% - 0.0001%	The probability of failure can be considered none, less than 0.0001%.

2.4 Failure size

The failure size rating is attributed to the part of the tree that is most likely to cause the most damage under normal conditions over the next three to five years.

Table 14: QTRA Size Ranges

Size Range	Size of part most likely to fail (diameter likely to impact target)	Impact Potential
1	>450mm	1/1 - >1/2
2	260mm - 450mm	1/2 - >1/8.6
3	110mm - 250mm	1/8.6 - >1/82
4	25mm - 100mm	1/82 - >1/2,500

2.5 Examples

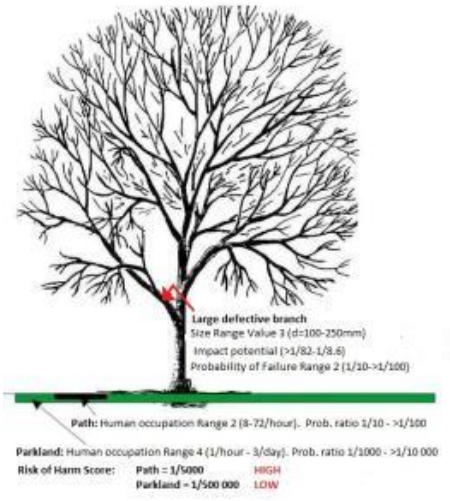

Figure 33. Risk Assessment Example 1

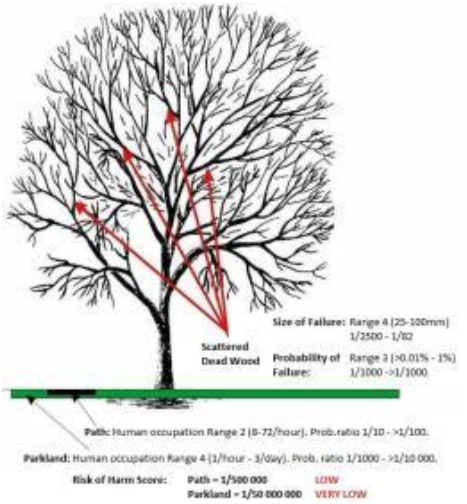

Figure 34. Risk Assessment Example 2

Appendix 3. Description of Recommended Works

3.1 Tree removal and Replacement

Trees should be removed to ground level and stumps ground out to 300mm depth below the existing grade. Topsoil should be placed back in the hole and a replacement tree established.

To retain the composition of the original Avenue, replacement trees should be of the same species as the removed trees, unless an approved Avenue management plan has determined otherwise, and a permit is received from Heritage Victoria.

Replacement trees may need to be offset slightly from the position of the removed tree to avoid conflicts with infrastructure (e.g., driveways) and to ensure the young tree can successfully establish in the landscape.

3.2 Limb Reduction Pruning

Extended branches were observed in many of the mature trees. The extended limbs are a direct response to light (phototropic growth) however in some cases this has been exacerbated by past pruning events.

Reducing overextended limbs can reduce the possibility of failure, improve tree structure and extend a tree's ULE. The aim is the selective pruning of long and extended branches starting in the 3rd order branching, back to a shorter, more compact growing point (Figure 35).

In some cases, it may be necessary to additionally remove 2nd order branching to achieve a particular outcome; however, cuts should be limited to a size of no greater than 30-100mm diameter where possible. Limb reduction pruning reduces the overall weight, length and leverage on the branch union. It should be noted that limb reduction pruning only reduces the chances of branch and trunk failure. It does not remove the potential for failure entirely. Lion's tail pruning must be avoided.

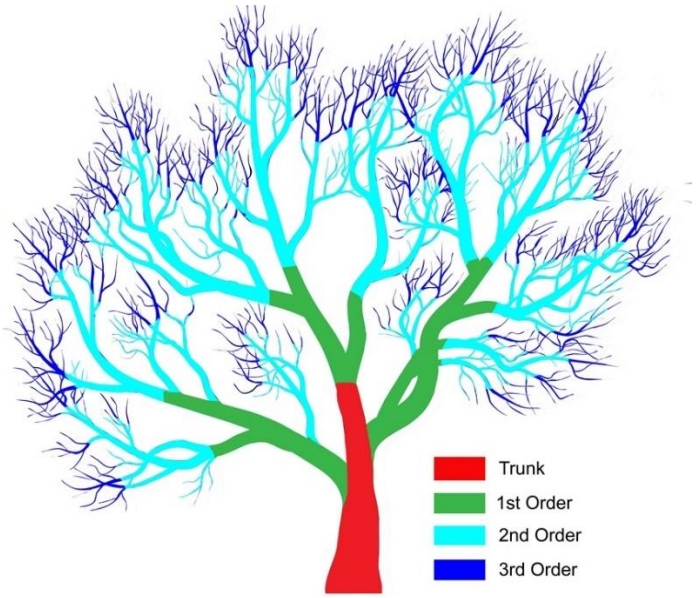

Figure 35: Tree structure representing multiple branching orders

'Lion's tailing' occurs when reduction pruning is undertaken, but rather than removing the smaller tip or terminal branches (3rd order), larger branches (2nd order) are stripped from along the major scaffold branches (1st order). This results in foliage being concentrated at the end of first order structural branches, leaving end-heavy and over extended branches.

Individual limbs that have been stripped of 2nd order branches along their length have an increased lever arm. The force of both gravity and wind is magnified by the length of the lever arm. Thus, a 'lion's tailed' limb can experience greater stress (Dunster *et al*, 2013), dramatically increasing the risk of branch failure. 'Lion's tailing' pruning also significantly reduces the viability of pruning options in the future.

Limb reduction pruning will require qualified and experienced arborists to complete and generally involves high climbing.

Three levels of risk reduction pruning have been recommended for the assessed trees:

3.2.1 Limb Reduction Pruning Level 1

Extended branches should be reduced in volume by approximately 10%. This should be achieved by removing branches up to 30mm in diameter.

3.2.2 Limb Reduction Pruning Level 2

Extended branches should be reduced in volume by approximately 20%. This should be achieved by removing branches up to 70mm in diameter.

3.2.3 Limb Reduction Pruning Level 3

When works of this level are recommended, the tree has an obvious, observable fault or defect and significant pruning is required. The particular branches/stems should be reduced in volume by approximately 30%. This should be achieved by removing branches up to 100mm in diameter.

3.3 Epicormic Management

Severe pruning in Elms results in an auxin hormone imbalance which encourages vigorous epicormic growth. The shoots arise from outer tissues and are therefore weakly attached to the existing tissues. As the length and weight of the shoots increases, so to do the potential for failure (Watson 2006). The tree expends significant energy producing this flush of growth, to the detriment of other biological processes.

In instances of poorly attached epicormic growth over high use areas or fixed targets, epicormics should be removed.

3.4 Rubbing/Crossing Branch Removal

Branches or stems that rub against one another can cause mechanical damage to the bark and cambium, creating an entry point for decay causing pathogens. Rubbing limbs should be pruned back to remove the rubbing/ damaged section.

3.5 Broken Branch Removal

Hanging branches can pose a substantial hazard. If a branch has snapped or cracked across the grain, any hanging or dead attached portion which could place people or property at risk should be removed. In the case of storm damaged limbs, the broken branch stubs should also be pruned as per AS 4373: 2007.

3.6 Deadwood Removal

While dead branches in live trees are relatively safe until they become decayed, it is difficult to determine from a ground survey when dead branches become decayed enough to fail. Therefore, in areas with targets, large dead branches should be removed (Harris, Clark and Matheny 1999). Where deadwood removal has been recommended it generally refers to deadwood greater than 50mm in diameter at risk of failure over a high use target area.

Deadwood removal may also be required as part of an integrated pest management program.

3.7 Aerial Inspection – Inspect Cables

An aerial inspection is recommended for to ensure cables are still functional and sound.

A qualified arborist should inspect all existing cable infrastructure every 2 years to undertake regular maintenance and determine the integrity of the hardware, cable, and the structural defect. Cables themselves can have a lifespan of 20-40 years, providing they are maintained as prescribed, but the trees themselves may have a shorter ULE depending on the severity of the defect. Growing trees may need new cables installed for better leverage in the future.

Additional works or recommendations may be required following the results of the inspection.

3.8 Cable Installation

Cable bracing can help to prevent the splitting apart of codominant stems when they reach a certain size. Cables can also be used to prevent the failure of branches which are weakly attached or subjected to excessive loading by their own weight (Lonsdale 1999.) Cabling helps support the tree by limiting the movement of branches and provides supplementary support for structurally weak areas of the tree. Cables are usually installed across a weak union to reduce the risk of the union failing or they can also be installed on over-extended branches to support the branch.

Cable bracing often needs to be combined with a reduction of crown height and canopy area, particularly if the fork consists of only two stems, and site conditions allow strong gusts of wind to blow between them.

Cable systems include anchors, cables and appropriate termination hardware for the connection to the anchor. Direct cabling consists of a single cable between two limbs, other forms of cabling include triangular (b), hub (c) and box (d). See Figure 36.

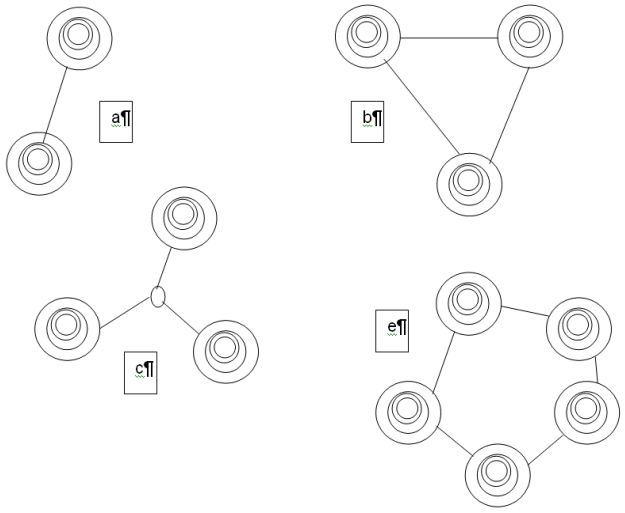

Figure 36: Examples of cabling, a – Direct, b – Triangular, c – Hub, d – Box

Cable installation in large trees with is an advanced technique and will require qualified and experienced arborists.

3.9 Formative pruning

Formative pruning is the pruning of young and semi-mature trees to assist with the development of crown form and shape and to develop strong structure. Crossed branches, branches with bark inclusions and codominant first order branches should all be corrected with early pruning.

3.10 Mulch Application

Application of organic mulch helps retain moisture in the soil, moderates soil temperature and is beneficial to maintaining the soil microflora. In time it helps improve soil structure and promote the existence of worms and other soil organisms and promote root growth (Bastian 2009).

Mulch application has been recommended for trees that are showing visible signs of stress, with the intent to improve site conditions and try and retain these trees in the landscape for as long as possible.

Mulch should be applied around the tree, to 1m beyond the canopy drip line, to a depth of 100-150mm. The mulch used should be anything organic that is well-composted, for example wood chips that contain a blend of leaves, bark and wood. Mulch should be applied so that it is not piled up against the trunk and the root crown is exposed.

Appendix 4. Recommended Works and Priority Table

Tree ID	Botanical Name	Common Name	Height & Width (m)	DBH (cm)	Age Class	Health	Structure	ULE (years)	Recommended Works	Priority
East 1	*Ulmus procera*	English Elm	16 x 17	102	Mature	Good	Fair	20-40	Broken branch removal	Low
East 2	*Ulmus X hollandica*	Dutch Elm	11 x 14	71	Mature	Fair	Good	20-40	Broken branch removal	Low
East 3	*Ulmus X hollandica*	Dutch Elm	11 x 13	73	Mature	Fair	Fair	20-40	Broken branch removal	Moderate
East 4	*Ulmus X hollandica*	Dutch Elm	11 x 12	69	Mature	Fair	Fair	10-20	Deadwood removal	Low
East 5	*Ulmus X hollandica*	Dutch Elm	11 x 11	62	Mature	Fair	Fair	10-20	No works	None
East 6	*Ulmus X hollandica*	Dutch Elm	11 x 13	62	Mature	Fair	Fair	10-20	No works	None
East 7	*Ulmus X hollandica*	Dutch Elm	10 x 11	54	Mature	Fair	Good	10-20	No works	None
East 8	*Ulmus X hollandica*	Dutch Elm	4 x 1	5	Young	Good	Good	40+	No works	None
East 9	*Ulmus X hollandica*	Dutch Elm	8 x 9	45	Mature	Fair	Fair	10-20	Broken branch removal, Deadwood removal	Low
East 10	*Ulmus X hollandica*	Dutch Elm	9 x 10	52	Mature	Fair	Fair	10-20	No works	None
East 11	*Ulmus X hollandica*	Dutch Elm	3 x 1	4	Young	Poor	Very Poor	0	Removal	High
East 12	*Ulmus X hollandica*	Dutch Elm	12 x 11	56	Mature	Fair	Good	10-20	No works	None
East 13	*Ulmus X hollandica*	Dutch Elm	12 x 12	53	Mature	Fair	Fair	10-20	No works	None
East 14	*Ulmus X hollandica*	Dutch Elm	12 x 12	58	Mature	Fair	Fair	10-20	No works	None
East 15	*Ulmus X hollandica*	Dutch Elm	11 x 13	68	Mature	Fair	Fair	10-20	No works	None
East 16	*Ulmus X hollandica*	Dutch Elm	11 x 14	71	Mature	Fair	Fair	10-20	No works	None
East 17	*Ulmus X hollandica*	Dutch Elm	12 x 13	76	Mature	Fair	Fair	10-20	Deadwood removal	Low
East 18	*Ulmus X hollandica*	Dutch Elm	11 x 14	72	Mature	Fair	Fair	10-20	Deadwood removal	Low
East 19	*Ulmus X hollandica*	Dutch Elm	13 x 15	83	Mature	Fair	Fair	10-20	No works	None
East 20	*Ulmus X hollandica*	Dutch Elm	13 x 15	75	Mature	Fair	Fair	10-20	No works	None
East 21	*Ulmus X hollandica*	Dutch Elm	13 x 17	73	Mature	Good	Fair	20-40	No works	None
East 22	*Ulmus X hollandica*	Dutch Elm	14 x 20	103	Mature	Good	Fair	20-40	Limb reduction 1	Moderate
East 23	*Ulmus X hollandica*	Dutch Elm	13 x 16	81	Mature	Fair	Fair	20-40	No works	None

Tree ID	Botanical Name	Common Name	Height & Width (m)	DBH (cm)	Age Class	Health	Structure	ULE (years)	Recommended Works	Priority
East 24	*Ulmus X hollandica*	Dutch Elm	13 x 15	81	Mature	Fair	Fair	20-40	No works	None
East 25	*Ulmus X hollandica*	Dutch Elm	9 x 9	66	Mature	Fair	Fair	10-20	No works	None
East 26	*Ulmus X hollandica*	Dutch Elm	9 x 10	56	Mature	Fair	Good	10-20	No works	None
East 27	*Ulmus X hollandica*	Dutch Elm	9 x 10	59	Mature	Fair	Fair	20-40	Crossing branch removal	Low
East 28	*Ulmus X hollandica*	Dutch Elm	10 x 10	61	Mature	Fair	Fair	10-20	No works	None
East 29	*Ulmus X hollandica*	Dutch Elm	11 x 12	76	Mature	Fair	Fair	10-20	No works	None
East 30	*Ulmus X hollandica*	Dutch Elm	10 x 14	70	Mature	Fair	Fair	10-20	No works	None
East 31	*Ulmus X hollandica*	Dutch Elm	10 x 13	66	Mature	Fair	Fair	20-40	No works	None
East 32	*Ulmus X hollandica*	Dutch Elm	11 x 13	72	Mature	Fair	Good	20-40	No works	None
East 33	*Ulmus X hollandica*	Dutch Elm	11 x 15	79	Mature	Good	Fair	20-40	No works	None
East 34	*Ulmus X hollandica*	Dutch Elm	12 x 18	83	Mature	Good	Fair	20-40	No works	None
East 35	*Fraxinus angustifolia*	Narrow Leaf Ash	14 x 17	73	Mature	Fair	Fair	10-20	No works	None
East 36	*Ulmus X hollandica*	Dutch Elm	18 x 18	96	Mature	Fair	Fair	10-20	No works	None
East 37	*Ulmus X hollandica*	Dutch Elm	18 x 20	92	Mature	Fair	Poor	10-20	Limb reduction 2, Broken branch removal	Moderate
East 38	*Ulmus X hollandica*	Dutch Elm	18 x 19	91	Mature	Good	Fair	20-40	No works	None
East 39	*Ulmus X hollandica*	Dutch Elm	14 x 16	79	Mature	Fair	Fair	10-20	Broken branch removal	Moderate
East 40	*Ulmus X hollandica*	Dutch Elm	10 x 9	70	Mature	Fair	Fair	10-20	No works	None
East 41	*Ulmus X hollandica*	Dutch Elm	12 x 11	84	Mature	Poor	Fair	5 to 10	No works	None
East 42	*Ulmus X hollandica*	Dutch Elm	14 x 17	8	Mature	Fair	Fair	10-20	Broken branch removal	Moderate
East 43	*Ulmus X hollandica*	Dutch Elm	17 x 17	90	Mature	Fair	Fair	20-40	Limb reduction 1, Broken branch removal	Moderate
East 44	*Ulmus X hollandica*	Dutch Elm	19 x 15	101	Mature	Fair	Fair	10-20	Limb reduction 1	Moderate
East 45	*Ulmus X hollandica*	Dutch Elm	19 x 22	110	Mature	Fair	Fair	10-20	Limb reduction 1, Broken branch removal	Moderate
East 46	*Ulmus X hollandica*	Dutch Elm	14 x 17	88	Mature	Fair	Fair	10-20	Mulch rootzone	Moderate
East 47	*Ulmus X hollandica*	Dutch Elm	13 x 20	76	Mature	Fair	Fair	20-40	Broken branch removal	Moderate
East 48	*Ulmus X hollandica*	Dutch Elm	9 x 12	65	Mature	Fair	Fair	10-20	Deadwood removal, Mulch rootzone	Moderate
East 49	*Ulmus X hollandica*	Dutch Elm	9 x 9	60	Mature	Poor	Fair	5 to 10	Mulch rootzone	Moderate
East 50	*Ulmus X hollandica*	Dutch Elm	8 x 8	48	Mature	Dead	Poor	0	Removal	High

Tree ID	Botanical Name	Common Name	Height & Width (m)	DBH (cm)	Age Class	Health	Structure	ULE (years)	Recommended Works	Priority
East 51	*Ulmus X hollandica*	Dutch Elm	10 x 8	68	Mature	Very poor	Poor	<5	Removal	Low
East 52	*Ulmus X hollandica*	Dutch Elm	11 x 11	74	Mature	Very poor	Poor	<5	Removal	Low
East 53	*Ulmus X hollandica*	Dutch Elm	12 x 12	77	Mature	Very poor	Poor	<5	Removal	Low
East 54	*Ulmus X hollandica*	Dutch Elm	13 x 13	79	Mature	Very poor	Poor	<5	Removal	Low
East 55	*Ulmus X hollandica*	Dutch Elm	12 x 12	76	Mature	Very poor	Poor	<5	Removal	Low
East 56	*Ulmus X hollandica*	Dutch Elm	11 x 15	71	Mature	Poor	Fair	5 to 10	Deadwood removal, Mulch rootzone	Moderate
East 57	*Ulmus X hollandica*	Dutch Elm	11 x 10	66	Mature	Poor	Poor	<5	Deadwood removal, Mulch rootzone	Low
East 58	*Ulmus X hollandica*	Dutch Elm	12 x 19	74	Mature	Good	Fair	20-40	No works	None
East 59	*Ulmus X hollandica*	Dutch Elm	13 x 17	86	Mature	Fair	Fair	10-20	No works	None
East 60	*Ulmus X hollandica*	Dutch Elm	12 x 16	79	Mature	Fair	Fair	20-40	No works	None
East 61	*Ulmus X hollandica*	Dutch Elm	11 x 11	59	Mature	Poor	Fair	5 to 10	No works	None
East 62	*Ulmus procera*	English Elm	8 x 9	56	Mature	Poor	Fair	5 to 10	No works	None
East 63	*Ulmus procera*	English Elm	9 x 9	64	Mature	Poor	Fair	5 to 10	No works	None
East 64	*Ulmus procera*	English Elm	9 x 15	70	Mature	Fair	Fair	10-20	Limb reduction 1	Low
East 65	*Ulmus procera*	English Elm	10 x 15	70	Mature	Fair	Fair	10-20	Limb reduction 1, Deadwood removal	Low
East 66	*Ulmus procera*	English Elm	13 x 17	70	Mature	Good	Fair	20-40	No works	None
East 67	*Ulmus procera*	English Elm	12 x 14	86	Mature	Fair	Poor	5 to 10	No works	None
East 68	*Ulmus procera*	English Elm	14 x 16	89	Mature	Fair	Poor	5 to 10	No works	None
East 69	*Ulmus procera*	English Elm	13 x 17	73	Mature	Fair	Poor	5 to 10	No works	None
East 70	*Ulmus procera*	English Elm	14 x 17	89	Mature	Fair	Fair	10-20	Broken branch removal	Low
East 71	*Ulmus procera*	English Elm	14 x 15	111	Mature	Fair	Poor	5 to 10	Cable Installation	High
East 72	*Ulmus procera*	English Elm	13 x 16	82	Mature	Fair	Fair	10-20	Crossing branch reduction	Moderate
East 73	*Ulmus procera*	English Elm	15 x 12	86	Mature	Fair	Poor	5 to 10	Limb reduction 2, Broken branch removal	Moderate
East 74	*Ulmus procera*	English Elm	13 x 15	87	Mature	Fair	Fair	10-20	Limb reduction 1	Low
East 75	*Ulmus procera*	English Elm	15 x 19	97	Mature	Fair	Fair	10-20	No works	None
East 76	*Ulmus X hollandica*	Dutch Elm	6 x 4	12	Semi mature	Good	Fair	40+	Formative pruning	Moderate
East 77	*Ulmus procera*	English Elm	17 x 19	105	Mature	Fair	Fair	10-20	Limb reduction 2, Broken branch removal	Moderate

Tree ID	Botanical Name	Common Name	Height & Width (m)	DBH (cm)	Age Class	Health	Structure	ULE (years)	Recommended Works	Priority
East 78	*Ulmus procera*	English Elm	15 x 15	93	Mature	Fair	Poor	10-20	No works	None
East 79	*Ulmus procera*	English Elm	15 x 14	81	Mature	Fair	Fair	10-20	No works	None
East 80	*Ulmus X hollandica*	Dutch Elm	3 x 1	4	Young	Good	Good	40+	No works	None
East 81	*Ulmus procera*	English Elm	15 x 16	99	Mature	Fair	Poor	10-20	Limb reduction 2	Moderate
East 82	*Ulmus procera*	English Elm	16 x 16	99	Mature	Fair	Poor	5 to 10	Broken branch removal - Remove remainder of storm damaged stem	Moderate
East 83	*Ulmus procera*	English Elm	16 x 19	110	Mature	Fair	Poor	10-20	Limb reduction 2, Broken branch removal	Moderate
East 84	*Ulmus procera*	English Elm	14 x 15	106	Mature	Fair	Poor	5 to 10	Limb reduction 1, Deadwood removal	Low
East 85	*Ulmus procera*	English Elm	15 x 19	106	Mature	Poor	Fair	5 to 10	Limb reduction 1, Broken branch removal, Deadwood removal	Moderate
East 86	*Ulmus X hollandica*	Dutch Elm	10 x 12	70	Mature	Fair	Fair	20-40	Broken branch removal	Low
East 87	*Ulmus X hollandica*	Dutch Elm	11 x 11	58	Mature	Fair	Good	20-40	No works	None
East 88	*Ulmus X hollandica*	Dutch Elm	11 x 11	63	Mature	Fair	Fair	10-20	No works	None
East 89	*Ulmus X hollandica*	Dutch Elm	12 x 12	84	Mature	Fair	Fair	10-20	No works	None
East 90	*Ulmus X hollandica*	Dutch Elm	12 x 14	82	Mature	Fair	Fair	10-20	No works	None
East 91	*Ulmus X hollandica*	Dutch Elm	12 x 17	76	Mature	Fair	Fair	20-40	No works	None
East 92	*Ulmus X hollandica*	Dutch Elm	12 x 15	84	Mature	Fair	Fair	20-40	No works	None
East 93	*Ulmus X hollandica*	Dutch Elm	15 x 15	97	Mature	Fair	Fair	20-40	No works	None
East 94	*Ulmus X hollandica*	Dutch Elm	14 x 17	92	Mature	Fair	Fair	10-20	No works	None
East 95	*Ulmus X hollandica*	Dutch Elm	14 x 13	102	Mature	Fair	Fair	10-20	No works	None
East 96	*Ulmus X hollandica*	Dutch Elm	14 x 19	84	Mature	Fair	Fair	20-40	No works	None
East 97	*Ulmus X hollandica*	Dutch Elm	14 x 16	89	Mature	Poor	Fair	5 to 10	Mulch rootzone	Moderate
East 98	*Ulmus procera*	English Elm	14 x 20	89	Mature	Fair	Fair	10-20	Mulch rootzone	Moderate
East 99	*Ulmus procera*	English Elm	12 x 12	90	Mature	Fair	Fair	10-20	Mulch rootzone	Moderate
East 100	*Ulmus procera*	English Elm	11 x 12	93	Mature	Poor	Fair	5 to 10	Mulch rootzone	Moderate
East 101	*Ulmus procera*	English Elm	12 x 13	89	Mature	Poor	Fair	5 to 10	Mulch rootzone	Moderate
East 102	*Ulmus procera*	English Elm	9 x 10	86	Mature	Fair	Poor	5 to 10	Mulch rootzone	Moderate

Tree ID	Botanical Name	Common Name	Height & Width (m)	DBH (cm)	Age Class	Health	Structure	ULE (years)	Recommended Works	Priority
East 103	*Ulmus procera*	English Elm	11 x 11	89	Mature	Poor	Poor	<5	Removal	Low
East 104	*Ulmus procera*	English Elm	12 x 16	83	Mature	Fair	Fair	10-20	Mulch rootzone	Moderate
East 105	*Ulmus procera*	English Elm	14 x 15	92	Mature	Poor	Poor	5 to 10	Deadwood removal, Mulch rootzone	Moderate
East 106	*Ulmus procera*	English Elm	15 x 19	88	Mature	Poor	Poor	<5	Removal	Low
East 107	*Ulmus procera*	English Elm	16 x 17	96	Mature	Poor	Poor	<5	Removal	Low
East 108	*Ulmus procera*	English Elm	16 x 18	107	Mature	Poor	Poor	<5	Removal	Low
East 109	*Ulmus procera*	English Elm	16 x 18	93	Mature	Fair	Poor	5 to 10	Cable Installation	High
East 110	*Ulmus procera*	English Elm	17 x 19	109	Mature	Poor	Fair	5 to 10	Limb reduction 1, Deadwood removal, Mulch rootzone	Moderate
East 111	*Ulmus X hollandica*	Dutch Elm	14 x 14	78	Mature	Fair	Fair	10-20	No works	None
East 112	*Ulmus procera*	English Elm	15 x 18	100	Mature	Fair	Fair	10-20	No works	None
East 113	*Ulmus X hollandica*	Dutch Elm	15 x 16	78	Mature	Fair	Fair	10-20	No works	None
East 114	*Ulmus X hollandica*	Dutch Elm	14 x 16	85	Mature	Fair	Fair	10-20	Crossing branch removal	Low
East 115	*Ulmus X hollandica*	Dutch Elm	15 x 16	82	Mature	Poor	Fair	5 to 10	Broken branch removal, Deadwood removal	Low
East 116	*Ulmus X hollandica*	Dutch Elm	15 x 18	89	Mature	Fair	Fair	20-40	No works	None
East 117	*Ulmus X hollandica*	Dutch Elm	15 x 15	84	Mature	Fair	Fair	20-40	No works	None
East 118	*Ulmus X hollandica*	Dutch Elm	15 x 15	84	Mature	Fair	Fair	10-20	No works	None
East 119	*Ulmus X hollandica*	Dutch Elm	15 x 18	89	Mature	Fair	Fair	20-40	No works	None
East 120	*Ulmus X hollandica*	Dutch Elm	15 x 16	91	Mature	Fair	Fair	10-20	No works	None
East 121	*Ulmus X hollandica*	Dutch Elm	14 x 14	68	Mature	Fair	Fair	10-20	No works	None
East 122	*Ulmus X hollandica*	Dutch Elm	15 x 17	79	Mature	Fair	Fair	20-40	No works	None
East 123	*Ulmus X hollandica*	Dutch Elm	15 x 18	93	Mature	Fair	Fair	10-20	No works	None
East 124	*Ulmus X hollandica*	Dutch Elm	16 x 19	97	Mature	Fair	Fair	10-20	No works	None
East 125	*Ulmus X hollandica*	Dutch Elm	17 x 19	106	Mature	Fair	Fair	20-40	No works	None
East 126	*Ulmus glabra*	Wych Elm	11 x 12	51	Mature	Fair	Fair	10-20	No works	None
East 127	*Ulmus glabra*	Wych Elm	11 x 12	53	Mature	Fair	Fair	10-20	No works	None
East 128	*Ulmus glabra*	Wych Elm	11 x 12	53	Mature	Fair	Fair	10-20	No works	None

Tree ID	Botanical Name	Common Name	Height & Width (m)	DBH (cm)	Age Class	Health	Structure	ULE (years)	Recommended Works	Priority
East 129	*Ulmus glabra*	Wych Elm	11 x 14	56	Mature	Good	Fair	20-40	No works	None
East 130	*Ulmus glabra*	Wych Elm	12 x 14	61	Mature	Good	Fair	20-40	No works	None
East 131	*Ulmus glabra*	Wych Elm	11 x 12	59	Mature	Good	Fair	20-40	No works	None
East 132	*Ulmus glabra*	Wych Elm	9 x 12	50	Mature	Good	Fair	20-40	No works	None
East 133	*Ulmus glabra*	Wych Elm	7 x 9	33	Mature	Fair	Fair	10-20	No works	None
East 134	*Ulmus glabra*	Wych Elm	7 x 8	31	Mature	Fair	Fair	10-20	No works	None
East 135	*Ulmus glabra*	Wych Elm	7 x 8	29	Mature	Fair	Fair	10-20	No works	None
East 136	*Ulmus glabra*	Wych Elm	7 x 9	32	Mature	Fair	Fair	20-40	No works	None
East 137	*Ulmus glabra*	Wych Elm	7 x 7	31	Mature	Fair	Fair	20-40	No works	None
East 138	*Ulmus glabra*	Wych Elm	8 x 7	34	Mature	Fair	Fair	10-20	No works	None
East 139	*Ulmus glabra*	Wych Elm	8 x 7	30	Mature	Fair	Fair	10-20	No works	None
East 140	*Ulmus glabra*	Wych Elm	8 x 8	35	Mature	Fair	Fair	20-40	No works	None
East 141	*Ulmus glabra*	Wych Elm	9 x 9	43	Mature	Fair	Fair	20-40	No works	None
East 142	*Ulmus X hollandica*	Dutch Elm	12 x 14	73	Mature	Fair	Fair	20-40	No works	None
East 143	*Ulmus X hollandica*	Dutch Elm	12 x 15	76	Mature	Fair	Fair	10-20	No works	None
East 144	*Ulmus X hollandica*	Dutch Elm	10 x 10	53	Mature	Good	Fair	20-40	No works	None
West 1	*Ulmus X hollandica*	Dutch Elm	13 x 16	80	Mature	Fair	Fair	20-40	No works	None
West 2	*Ulmus X hollandica*	Dutch Elm	12 x 14	74	Mature	Fair	Fair	10-20	Broken branch removal	Low
West 3	*Ulmus X hollandica*	Dutch Elm	11 x 16	74	Mature	Fair	Fair	10-20	No works	None
West 4	*Ulmus X hollandica*	Dutch Elm	11 x 12	69	Mature	Fair	Fair	10-20	No works	None
West 5	*Ulmus X hollandica*	Dutch Elm	11 x 13	77	Mature	Fair	Fair	10-20	Limb reduction 1, Broken branch removal	Moderate
West 6	*Ulmus X hollandica*	Dutch Elm	11 x 11	62	Mature	Fair	Fair	10-20	No works	None
West 7	*Ulmus X hollandica*	Dutch Elm	12 x 10	65	Mature	Fair	Fair	10-20	No works	None
West 8	*Ulmus X hollandica*	Dutch Elm	12 x 11	67	Mature	Fair	Fair	10-20	No works	None
West 9	*Ulmus X hollandica*	Dutch Elm	11 x 12	66	Mature	Fair	Fair	20-40	Limb reduction 2	Moderate
West 10	*Ulmus X hollandica*	Dutch Elm	9 x 8	46	Mature	Fair	Fair	10-20	No works	None
West 11	*Ulmus X hollandica*	Dutch Elm	7 x 7	42	Mature	Fair	Fair	10-20	Deadwood removal	Low

Tree ID	Botanical Name	Common Name	Height & Width (m)	DBH (cm)	Age Class	Health	Structure	ULE (years)	Recommended Works	Priority
West 12	*Ulmus X hollandica*	Dutch Elm	13 x 14	71	Mature	Fair	Fair	20-40	No works	None
West 13	*Ulmus X hollandica*	Dutch Elm	3 x 1	4	Young	Dead	Poor	0	Removal	High
West 14	*Ulmus X hollandica*	Dutch Elm	12 x 14	68	Mature	Fair	Fair	10-20	No works	None
West 15	*Ulmus X hollandica*	Dutch Elm	12 x 11	73	Mature	Fair	Fair	10-20	No works	None
West 16	*Ulmus X hollandica*	Dutch Elm	10 x 4	64	Mature	Very Poor	Poor	<5	Removal	Low
West 17	*Ulmus X hollandica*	Dutch Elm	11 x 11	72	Mature	Poor	Poor	5 to 10	Limb reduction 3, Deadwood removal	Moderate
West 18	*Ulmus X hollandica*	Dutch Elm	14 x 12	84	Mature	Good	Fair	20-40	Broken branch removal	Low
West 19	*Ulmus X hollandica*	Dutch Elm	12 x 11	71	Mature	Good	Fair	20-40	No works	None
West 20	*Ulmus X hollandica*	Dutch Elm	13 x 16	96	Mature	Good	Fair	20-40	No works	None
West 21	*Ulmus X hollandica*	Dutch Elm	13 x 15	95	Mature	Fair	Fair	20-40	No works	None
West 22	*Ulmus X hollandica*	Dutch Elm	12 x 15	86	Mature	Fair	Fair	20-40	No works	None
West 23	*Ulmus X hollandica*	Dutch Elm	9 x 10	62	Mature	Fair	Fair	10-20	No works	None
West 24	*Ulmus X hollandica*	Dutch Elm	9 x 11	55	Mature	Fair	Fair	10-20	No works	None
West 25	*Ulmus X hollandica*	Dutch Elm	9 x 9	49	Mature	Fair	Fair	10-20	No works	None
West 26	*Ulmus X hollandica*	Dutch Elm	9 x 7	61	Mature	Fair	Poor	10-20	Crossing branch removal	Low
West 27	*Ulmus X hollandica*	Dutch Elm	9 x 10	48	Mature	Fair	Good	20-40	No works	None
West 28	*Ulmus X hollandica*	Dutch Elm	10 x 11	54	Mature	Fair	Fair	10-20	No works	None
West 29	*Ulmus X hollandica*	Dutch Elm	10 x 13	83	Mature	Fair	Fair	10-20	No works	None
West 30	*Ulmus X hollandica*	Dutch Elm	11 x 14	83	Mature	Fair	Fair	10-20	No works	None
West 31	*Ulmus X hollandica*	Dutch Elm	11 x 15	82	Mature	Fair	Fair	10-20	Deadwood removal	Low
West 32	*Ulmus X hollandica*	Dutch Elm	11 x 12	69	Mature	Fair	Fair	10-20	No works	None
West 33	*Ulmus X hollandica*	Dutch Elm	12 x 14	78	Mature	Fair	Good	20-40	No works	None
West 34	*Ulmus X hollandica*	Dutch Elm	14 x 17	93	Mature	Fair	Fair	10-20	No works	None
West 35	*Ulmus X hollandica*	Dutch Elm	13 x 17	87	Mature	Fair	Fair	20-40	Limb reduction 1	Low
West 36	*Ulmus X hollandica*	Dutch Elm	15 x 20	89	Mature	Fair	Good	20-40	Limb reduction 1	Low
West 37	*Ulmus X hollandica*	Dutch Elm	14 x 14	86	Mature	Fair	Fair	10-20	No works	None
West 38	*Ulmus X hollandica*	Dutch Elm	13 x 15	89	Mature	Fair	Fair	10-20	No works	None

Tree ID	Botanical Name	Common Name	Height & Width (m)	DBH (cm)	Age Class	Health	Structure	ULE (years)	Recommended Works	Priority
West 39	*Ulmus X hollandica*	Dutch Elm	13 x 19	79	Mature	Fair	Fair	20-40	Broken branch removal	Low
West 40	*Ulmus X hollandica*	Dutch Elm	10 x 10	72	Mature	Fair	Poor	10-20	No works	None
West 41	*Ulmus X hollandica*	Dutch Elm	10 x 8	68	Mature	Poor	Fair	10-20	No works	None
West 42	*Ulmus X hollandica*	Dutch Elm	16 x 18	88	Mature	Fair	Good	20-40	No works	None
West 43	*Ulmus X hollandica*	Dutch Elm	16 x 15	91	Mature	Fair	Fair	10-20	Limb reduction 1	Low
West 44	*Ulmus X hollandica*	Dutch Elm	14 x 14	94	Mature	Fair	Fair	10-20	No works	None
West 45	*Ulmus X hollandica*	Dutch Elm	13 x 11	66	Mature	Fair	Fair	10-20	Manage epicormics, Prune competing Picea limbs	Low
West 46	*Ulmus X hollandica*	Dutch Elm	14 x 13	81	Mature	Poor	Fair	5 to 10	Limb reduction 2, Broken branch removal	Moderate
West 47	*Ulmus X hollandica*	Dutch Elm	14 x 14	77	Mature	Fair	Fair	10-20	No works	None
West 48	*Ulmus X hollandica*	Dutch Elm	9 x 10	46	Mature	Poor	Fair	5 to 10	No works	None
West 49	*Ulmus X hollandica*	Dutch Elm	11 x 13	62	Mature	Fair	Fair	10-20	No works	None
West 50	*Ulmus X hollandica*	Dutch Elm	11 x 9	58	Mature	Fair	Fair	10-20	No works	None
West 51	*Ulmus X hollandica*	Dutch Elm	16 x 14	80	Mature	Fair	Fair	10-20	No works	None
West 52	*Ulmus X hollandica*	Dutch Elm	16 x 18	90	Mature	Fair	Fair	20-40	Limb reduction 1, Manage epicormics	Moderate
West 53	*Ulmus X hollandica*	Dutch Elm	16 x 17	87	Mature	Fair	Fair	20-40	Limb reduction 1, Manage epicormics	Moderate
West 54	*Ulmus X hollandica*	Dutch Elm	14 x 15	74	Mature	Fair	Fair	10-20	No works	None
West 55	*Ulmus X hollandica*	Dutch Elm	14 x 16	75	Mature	Fair	Fair	10-20	Limb reduction 1	Low
West 56	*Ulmus X hollandica*	Dutch Elm	14 x 16	88	Mature	Fair	Fair	10-20	Limb reduction 1	Low
West 57	*Ulmus X hollandica*	Dutch Elm	13 x 14	74	Mature	Fair	Poor	10-20	No works	None
West 58	*Ulmus X hollandica*	Dutch Elm	14 x 13	99	Mature	Fair	Very poor	<5	Removal	Moderate
West 59	*Ulmus X hollandica*	Dutch Elm	13 x 14	88	Mature	Fair	Fair	10-20	No works	None
West 60	*Ulmus X hollandica*	Dutch Elm	12 x 12	65	Mature	Fair	Poor	10-20	Limb reduction 1, Broken branch removal	Low
West 61	*Ulmus X hollandica*	Dutch Elm	10 x 12	60	Mature	Fair	Fair	10-20	No works	None
West 62	*Ulmus X hollandica*	Dutch Elm	9 x 13	59	Mature	Fair	Fair	10-20	No works	None
West 63	*Ulmus glabra*	Wych Elm	8 x 9	43	Mature	Fair	Fair	10-20	No works	None
West 64	*Ulmus X hollandica*	Dutch Elm	12 x 14	79	Mature	Fair	Fair	10-20	No works	None

Tree ID	Botanical Name	Common Name	Height & Width (m)	DBH (cm)	Age Class	Health	Structure	ULE (years)	Recommended Works	Priority
West 65	*Ulmus glabra*	Wych Elm	9 x 11	48	Mature	Fair	Fair	20-40	No works	None
West 66	*Ulmus X hollandica*	Dutch Elm	15 x 20	100	Mature	Fair	Fair	20-40	No works	None
West 67	*Ulmus X hollandica*	Dutch Elm	15 x 19	89	Mature	Fair	Fair	20-40	No works	None
West 68	*Ulmus X hollandica*	Dutch Elm	14 x 18	89	Mature	Fair	Fair	20-40	No works	None
West 69	*Ulmus X hollandica*	Dutch Elm	13 x 16	78	Mature	Fair	Fair	10-20	No works	None
West 70	*Ulmus X hollandica*	Dutch Elm	14 x 15	77	Mature	Fair	Fair	10-20	No works	None
West 71	*Ulmus X hollandica*	Dutch Elm	14 x 15	78	Mature	Fair	Fair	10-20	No works	None
West 72	*Ulmus X hollandica*	Dutch Elm	14 x 16	76	Mature	Fair	Fair	10-20	No works	None
West 73	*Ulmus procera*	English Elm	16 x 18	108	Mature	Fair	Poor	10-20	Limb reduction 2, Broken branch removal	Low
West 74	*Ulmus procera*	English Elm	16 x 18	110	Mature	Fair	Poor	5 to 10	Limb reduction 3, Broken branch removal	Moderate
West 75	*Ulmus procera*	English Elm	16 x 18	108	Mature	Fair	Fair	10-20	No works	None
West 76	*Ulmus procera*	English Elm	17 x 16	106	Mature	Poor	Fair	5 to 10	No works	None
West 77	*Ulmus X hollandica*	Dutch Elm	4 x 3	10	Semi mature	Good	Fair	40+	Formative pruning	Moderate
West 78	*Ulmus procera*	English Elm	19 x 21	120	Mature	Poor	Poor	5 to 10	No works	None
West 79	*Ulmus procera*	English Elm	18 x 16	119	Mature	Fair	Fair	10-20	No works	None
West 80	*Ulmus X hollandica*	Dutch Elm	4 x 2	6	Semi mature	Good	Good	40+	No works	None
West 81	*Ulmus procera*	English Elm	16 x 20	118	Mature	Fair	Poor	<5	Removal	Moderate
West 82	*Ulmus procera*	English Elm	15 x 16	106	Mature	Fair	Very poor	5 to 10	Cable Installation	Urgent
West 83	*Ulmus procera*	English Elm	15 x 17	100	Mature	Fair	Fair	10-20	No works	None
West 84	*Ulmus procera*	English Elm	14 x 17	90	Mature	Fair	Fair	20-40	No works	None
West 85	*Ulmus procera*	English Elm	12 x 15	72	Mature	Fair	Fair	10-20	Broken branch removal	Low
West 86	*Ulmus procera*	English Elm	11 x 14	68	Mature	Fair	Fair	10-20	Broken branch removal, Deadwood removal	Low
West 87	*Ulmus X hollandica*	Dutch Elm	11 x 13	64	Mature	Fair	Fair	10-20	No works	None
West 88	*Ulmus X hollandica*	Dutch Elm	13 x 16	101	Mature	Fair	Poor	5 to 10	No works	None
West 89	*Ulmus X hollandica*	Dutch Elm	16 x 15	110	Mature	Fair	Poor	<5	Removal	Moderate
West 90	*Ulmus X hollandica*	Dutch Elm	4 x 2	8	Semi mature	Good	Good	40+	No works	None
West 91	*Ulmus procera*	English Elm	15 x 19	112	Mature	Fair	Fair	10-20	Limb reduction 2	Moderate

Tree ID	Botanical Name	Common Name	Height & Width (m)	DBH (cm)	Age Class	Health	Structure	ULE (years)	Recommended Works	Priority
West 92	*Ulmus procera*	English Elm	13 x 10	95	Mature	Fair	Poor	5 to 10	No works	None
West 93	*Ulmus procera*	English Elm	14 x 15	82	Mature	Fair	Fair	10-20	No works	None
West 94	*Ulmus procera*	English Elm	13 x 17	82	Mature	Poor	Poor	<5	Removal	Low
West 95	*Ulmus procera*	English Elm	15 x 21	95	Mature	Poor	Fair	5 to 10	Broken branch removal, Deadwood removal, Mulch rootzone	Moderate
West 96	*Ulmus procera*	English Elm	15 x 18	83	Mature	Poor	Fair	5 to 10	Deadwood removal, Mulch rootzone	Moderate
West 97	*Ulmus X hollandica*	Dutch Elm	13 x 14	71	Mature	Fair	Fair	10-20	No works	None
West 98	*Ulmus procera*	English Elm	13 x 17	79	Mature	Fair	Poor	5 to 10	Broken branch removal	Low
West 99	*Ulmus procera*	English Elm	13 x 14	85	Mature	Fair	Fair	10-20	No works	None
West 100	*Ulmus X hollandica*	Dutch Elm	13 x 14	86	Mature	Fair	Fair	10-20	No works	None
West 101	*Ulmus procera*	English Elm	16 x 19	94	Mature	Fair	Poor	5 to 10	No works	None
West 102	*Ulmus procera*	English Elm	16 x 19	107	Mature	Fair	Poor	5 to 10	Limb reduction 2, Broken branch removal	Moderate
West 103	*Ulmus procera*	English Elm	13 x 17	101	Mature	Fair	Very poor	<5	Aerial inspection - inspect cable	High
West 104	*Ulmus procera*	English Elm	16 x 15	106	Mature	Fair	Poor	5 to 10	Aerial inspection - inspect cable	High
West 105	*Ulmus procera*	English Elm	15 x 19	91	Mature	Fair	Fair	10-20	Broken branch removal	Moderate
West 106	*Ulmus procera*	English Elm	16 x 20	109	Mature	Fair	Fair	10-20	Limb reduction 2, Broken branch removal	Moderate
West 107	*Ulmus procera*	English Elm	16 x 18	94	Mature	Fair	Fair	10-20	No works	None
West 108	*Ulmus procera*	English Elm	16 x 19	107	Mature	Fair	Fair	10-20	Limb reduction 2, Broken branch removal	Moderate
West 109	*Ulmus procera*	English Elm	16 x 17	99	Mature	Fair	Fair	10-20	No works	None
West 110	*Ulmus procera*	English Elm	17 x 19	99	Mature	Fair	Poor	10-20	Limb reduction 2, Broken branch removal	Moderate
West 111	*Ulmus procera*	English Elm	20 x 17	110	Mature	Fair	Fair	20-40	No works	None
West 112	*Ulmus X hollandica*	Dutch Elm	15 x 19	88	Mature	Fair	Fair	20-40	No works	None
West 113	*Ulmus X hollandica*	Dutch Elm	16 x 14	83	Mature	Fair	Fair	20-40	No works	None
West 114	*Ulmus X hollandica*	Dutch Elm	15 x 16	81	Mature	Fair	Fair	20-40	No works	None
West 115	*Ulmus X hollandica*	Dutch Elm	14 x 16	80	Mature	Fair	Fair	20-40	No works	None
West 116	*Ulmus X hollandica*	Dutch Elm	13 x 13	65	Mature	Fair	Fair	20-40	No works	None
West 117	*Ulmus X hollandica*	Dutch Elm	13 x 14	67	Mature	Fair	Fair	20-40	No works	None

Tree ID	Botanical Name	Common Name	Height & Width (m)	DBH (cm)	Age Class	Health	Structure	ULE (years)	Recommended Works	Priority
West 118	*Ulmus X hollandica*	Dutch Elm	13 x 14	73	Mature	Fair	Fair	20-40	No works	None
West 119	*Ulmus X hollandica*	Dutch Elm	13 x 15	73	Mature	Fair	Fair	10-20	Limb reduction 1, Broken branch removal	Low
West 120	*Ulmus X hollandica*	Dutch Elm	15 x 15	67	Mature	Fair	Fair	20-40	No works	None
West 121	*Ulmus X hollandica*	Dutch Elm	14 x 16	76	Mature	Fair	Fair	20-40	No works	None
West 122	*Ulmus X hollandica*	Dutch Elm	16 x 15	75	Mature	Fair	Fair	10-20	Broken branch removal	Moderate
West 123	*Ulmus X hollandica*	Dutch Elm	16 x 16	80	Mature	Fair	Fair	20-40	Broken branch removal	Moderate
West 124	*Ulmus X hollandica*	Dutch Elm	17 x 20	102	Mature	Fair	Poor	10-20	No works	None
West 125	*Ulmus X hollandica*	Dutch Elm	17 x 18	116	Mature	Fair	Fair	20-40	No works	None
West 126	*Ulmus X hollandica*	Dutch Elm	16 x 15	91	Mature	Fair	Poor	10-20	Limb reduction 3	Low
West 127	*Ulmus X hollandica*	Dutch Elm	14 x 12	83	Mature	Fair	Poor	10-20	No works	None
West 128	*Ulmus glabra*	Wych Elm	9 x 10	46	Mature	Fair	Fair	10-20	No works	None
West 129	*Ulmus glabra*	Wych Elm	12 x 13	61	Mature	Good	Fair	20-40	No works	None
West 130	*Ulmus glabra*	Wych Elm	11 x 12	59	Mature	Good	Fair	20-40	No works	None
West 131	*Ulmus glabra*	Wych Elm	9 x 9	49	Mature	Fair	Fair	20-40	No works	None
West 132	*Ulmus glabra*	Wych Elm	9 x 8	41	Mature	Fair	Fair	20-40	No works	None
West 133	*Ulmus X hollandica*	Dutch Elm	3 x 2	8	Semi mature	Good	Fair	40+	Formative pruning	Moderate
West 134	*Ulmus glabra*	Wych Elm	8 x 8	39	Mature	Fair	Fair	20-40	No works	None
West 135	*Ulmus procera*	English Elm	13 x 14	74	Mature	Fair	Fair	10-20	No works	None
West 136	*Ulmus glabra*	Wych Elm	8 x 7	40	Mature	Fair	Fair	20-40	No works	None
West 137	*Ulmus procera*	English Elm	15 x 14	81	Mature	Fair	Fair	20-40	No works	None
West 138	*Ulmus glabra*	Wych Elm	7 x 8	38	Mature	Fair	Fair	20-40	No works	None
West 139	*Ulmus glabra*	Wych Elm	8 x 9	45	Mature	Fair	Fair	10-20	No works	None
West 140	*Ulmus glabra*	Wych Elm	8 x 9	48	Mature	Fair	Fair	20-40	No works	None
West 141	*Ulmus glabra*	Wych Elm	8 x 9	46	Mature	Fair	Fair	20-40	No works	None
West 142	*Ulmus glabra*	Wych Elm	8 x 8	45	Mature	Fair	Fair	20-40	No works	None