

**BEFORE INDEPENDENT HEARING COMMISSIONERS
IN CHRISTCHURCH**

TE MAHERE Ā-ROHE I TŪTOHUA MŌ TE TĀONE O ŌTAUTAHI

IN THE MATTER of the Resource Management Act 1991

AND

IN THE MATTER of the hearing of submissions on Plan Change 14 (Housing and Business Choice) to the Christchurch District Plan

**STATEMENT OF PRIMARY EVIDENCE OF MATTHEW HOWARD STOBART
ON BEHALF OF CHRISTCHURCH CITY COUNCIL**

QUALIFYING MATTER: HERITAGE (HERITAGE SITES)

Dated: 11 August 2023

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EXECUTIVE SUMMARY

1. My full name is **Matthew Howard Stobbart**. I am employed as a Senior Arboricultural Consultant at Treetech Specialist Treecare Ltd.
2. I have prepared this statement of evidence on behalf of the Christchurch City Council (the **Council**) in respect of matters arising from the submissions on Plan Change 14 to the Christchurch District Plan (the **District Plan; PC14**).
3. I have completed a preliminary assessment of the potential threats and opportunities associated with the intensification of the Papanui Memorial Avenues to the extent and duration of the canopy related benefits provided by trees in the designated road reserve.
4. The purpose of the assessment was to evaluate the potential for intensification within the 16 Papanui Memorial Avenues to adversely affect the extent and duration of the canopy related benefits and ecosystem services being provided by the trees in the designated road reserve.
5. A range of potential threats and opportunities were identified. The relative risk the threats pose to the extent and the duration of canopy related benefits was found to be variable and dependent on a range of inter-related factors with key considerations being the relative size and position of the trees within the road reserve.
6. The assessment concluded that in many of the locations, intensification would not significantly alter the existing factors influencing the extent and the duration of the canopy related benefits. In locations, where evaluated potential threats were identified, it was concluded that intensification could be achieved without adversely affecting the canopy related benefits, but this is subject to appropriate controls to manage the associated risks. In addition, the assessment also concluded that, rather than having detrimental effects, intensification actually has the potential for canopy related benefits and ecosystem services to be utilised and realised in more instances and by a greater number of people.

INTRODUCTION

7. My full legal name is **Matthew Howard Stobbart**. I am employed as a Senior Arboricultural Consultant with Treetech Specialist Treecare. I have held this position since 2017.
8. I was engaged by the Council to assess the potential threats and opportunities associated with the intensification of the Papanui Memorial Avenues to the extent and duration of the canopy related benefits provided by trees in the designated road reserve.
9. In preparing this evidence I have:
 - (a) Visited each of the 16 streets forming the Papanui War Memorial Avenues proposed heritage item.
 - (b) Evaluated the nature and characteristics of the tree population present within the designated road reserve in each location.
 - (c) Evaluated the current configuration of the designated road reserve in each location, with particular emphasis given to the relative position of trees within the road reserve.
 - (d) Evaluated a range of potential threats and opportunities to the extent and duration of canopy related to benefits based on international arboricultural best practice.
 - (e) Identified a range of potential opportunities for managing the threats to the extent and duration of canopy related benefits.
10. I am authorised to provide this evidence on behalf of the Council.

QUALIFICATIONS AND EXPERIENCE

11. I hold the qualifications of MSc in Urban Forestry & Arboriculture, MSc in Audit, Management & Consultancy & Quantified Tree Risk Assessment (**QTRA**).
12. I have worked in the fields of Urban Forestry & Arboriculture since 2003 and have held consultancy roles in New Zealand since 2013.
13. I am an advanced accredited Quantified Tree Risk Assessor.

CODE OF CONDUCT

14. While this is a Council hearing, I have read the Code of Conduct for Expert Witnesses (contained in the 2023 Practice Note) and agree to comply with it. Except where I state I rely on the evidence of another person, I confirm that the issues addressed in this statement of evidence are within my area of expertise, and I have not omitted to consider material facts known to me that might alter or detract from my expressed opinions.

SCOPE OF EVIDENCE

15. My statement of evidence addresses the following matters associated with the proposed rule changes to facilitate the intensification of the use of private land within the 16 Papanui Memorial Avenues. My assessment is based on the information available at the time of the assessment and considers:
- (a) The potential threat to the extent and duration of canopy related benefits associated with:
 - (i) the existing sanctioned vehicle parking;
 - (ii) the need to accommodate additional parking for vehicles;
 - (iii) the need for additional and/or wider vehicle crossings;
 - (iv) foundations for new builds;
 - (v) the need for increased canopy clearances to accommodate for new builds;
 - (vi) shading cast by new multi-storey buildings; and
 - (vii) future pressures for removal and/or detrimental pruning.
 - (b) Potential opportunities to manage the threats to the extent and duration of the canopy related benefits identified within the scope of the evidence.
16. I address each of these points in my evidence below.
17. I prepared a report titled 'Papanui Memorial Avenues: Preliminary assessment of the potential threats and opportunities associated with the intensification of the Papanui Memorial Avenues to the extent and duration of canopy related benefits provided by trees in the designated road reserve',

which is attached as **Appendix A**. My evidence is a summary of the matters set out in further detail in that report.

EXISTING SANCTIONED VEHICLE PARKING

18. With a limited number of exceptions, existing vehicle parking is restricted to formed surfaces that are outside usable soil volumes and as such, is considered to pose a negligible risk. Where exceptions exist, for example, in St James Avenue, the configuration of the road reserve has resulted in sub-optimal rooting conditions. Although sub-optimal conditions exist, in my opinion, this is something that the trees appear to have adapted to and continue to tolerate.
19. Any increased use of the existing sanctioned parking areas is, in my opinion, considered to pose a negligible risk and, in the scenarios, where sub-optimal conditions already exist is not anticipated to cause any significant risk to the extent and duration of the canopy related benefits in these locations.

ACCOMMODATING ADDITIONAL PARKING FOR VEHICLES

20. The risk posed by changes to the existing design and configuration of the road reserve to accommodate additional parking for vehicle is variable in nature and depends on a range of factors, influenced in the most part by the genotype, phenotype and relative position of the trees in each location. The risks associated with any proposed changes to the existing trees and the impact on future planting opportunities would need to be subject to an arboricultural impact assessment but, typically, this type of risk can be managed using engineered solutions and the use of tree sensitive designs.

ADDITIONAL AND/OR WIDER VEHICLE CROSSINGS

21. The risk posed by changes to the existing design and configuration of the road reserve to accommodate additional and/or wider vehicle crossings is variable in nature and depends on a range of factors, influenced in the most part by the genotype, phenotype and relative position of the trees in each location. The risks associated with any proposed changes to the existing trees and the impact on future planting opportunities would need to be subject to an arboricultural impact assessment but, typically, this type of risk can be managed using engineered solutions and the use of tree sensitive designs.

FOUNDATIONS FOR NEW BUILDS

22. The risk posed by excavations for new build foundations is variable in nature and depends on a range of factors, influenced in the most part by the genotype, phenotype and relative position of the trees in each location. The associated risks to existing trees would need to be subject to an Arboricultural Impact Assessment and may require design interventions to manage any significant risks identified.

INCREASED CANOPY CLEARANCES TO ACCOMMODATE FOR NEW BUILDS

23. The associated risks are variable and influenced by the genotype, phenotype and relative position of the trees in each location and would need to be subject to an Arboricultural Impact Assessment and may require to be managed through the design process to avoid the need for detrimental pruning.

SHADING CAST BY NEW MULTI-STOREY BUILDINGS

24. The extent of the shade pattern cast by buildings will vary on the relative position and height of the tree and the building. In general terms, and in my opinion, the maximum permitted heights for High and Medium Density Residential Zones are not considered to pose a significant risk to the extent and duration of canopy related benefits in the species present. This reflects the principle of positive phototropism which provides a way for trees to adapt their canopies to make the optimum use of the available light. In addition, typically, periods of peak energy production/physiological activity correspond with the periods when the sun is at its highest and means that the maximum permitted heights would not be expected to significantly alter the amount of direct overhead light reaching canopies during this time. In contrast, the periods when the sun is at its lowest, correspond with periods of dormancy in deciduous species or reduced physiological activity in evergreen species (which typically have species genotypes characterised by increased shade tolerances). This would mean that reduced light in winter would either have no effect on deciduous species or in the case of evergreen species, is a change that is likely to be adapted to and tolerated.

FUTURE PRESSURES FOR REMOVAL AND/OR DETRIMENTAL PRUNING

25. The potential for future pressures for tree removal and/or detrimental pruning are, in my opinion, considered to be variable in nature and are influenced, in the most part, by the genotype, phenotype and relative position of the trees in

each location, the relative preferences and tolerances of property owners/occupiers to issues , such as shading and seasonal nuisance associated with leaf fall and the extent to which these issues can and have been addressed in the design process.

POTENTIAL OPPORTUNITIES TO MANAGE THE THREATS TO THE EXTENT AND DURATION OF CANOPY-RELATED BENEFITS

26. A range of potential opportunities exist to manage scenarios where there is the potential for some of the threats to pose an increased risk to the extent and duration of canopy related benefits. A requirement to complete a timely, design and site-specific Arboricultural Impact Assessment (AIA) is considered to be a key control in terms of enabling potential threats to be systematically evaluated and where applicable, managed through tree sensitive designs. For example, a range of tree sensitive designs such as root bridging solutions, permeable materials and under-ground soil vaults already exist and provide opportunities to preserve and/or increase usable soil volumes, despite competing and potentially conflicting demands for space within the designated road reserve.

CONCLUSION

27. This conclusion is based on the overview of the potential threats and opportunities discussed in the appended assessment report. Although the intensification of the 16 locations poses a range of threats, a range of corresponding opportunities also exist. Overall, it is considered that, in my opinion, in many of the locations, intensification would not significantly alter the existing factors influencing the extent and the duration of the canopy related benefits. In locations, where evaluated potential threats were identified, it is considered that, in my opinion, intensification could be achieved without adversely affecting the extent and duration of canopy related benefits, but this is subject to appropriate controls to manage the associated risks. In addition, it is considered that, in my opinion, rather than having detrimental effects, intensification actually has the potential for canopy related benefits and ecosystem services to be utilised and realised in more instances and by a greater number of people.

Dated: 11 August 2023

Matthew Howard Stobbart

**APPENDIX A: PAPANUI MEMORIAL AVENUES: PRELIMINARY ASSESSMENT
OF THE POTENTIAL THREATS AND OPPORTUNITIES ASSOCIATED WITH
THE INTENSIFICATION OF THE PAPANUI MEMORIAL AVENUES TO THE
EXTENT AND DURATION OF CANOPY RELATED BENEFITS PROVIDED BY
TREES IN THE DESIGNATED ROAD RESERVE**

(Overleaf)

PAPANUI MEMORIAL AVENUES

Preliminary assessment of the potential threats and opportunities associated with the intensification of the Papanui Memorial Avenues to the extent and duration of canopy related benefits provided by trees in the designated road reserve.

Heritage Item # 1459.

Treetech Document Reference # 4251-2023

Assessment Report	
Title	Preliminary assessment of the potential threats and opportunities associated with the intensification of the Papanui Memorial Avenues to the extent and duration of canopy related benefits provided by trees in the designated road reserve (Heritage Item # 1459).
Client	Christchurch City Council (CCC).
Contact	Tony Armstrong, CCC Arborist – Street Trees
Email	Tony.armstrong@ccc.govt.nz
Location	Papanui Memorial Avenues
Author	Matt Stobbart (MSc Urban Forestry & Arboriculture)
Date	19th of July 2023
Version	Approved for issue to the Client

Executive Summary

The purpose of the assessment was to evaluate the potential for intensification within the 16 Papanui Memorial Avenues to adversely affect the extent and duration of the canopy related benefits and ecosystem services being provided by the trees in the designated road reserve.

A range of potential threats and opportunities were identified (Section Two). The relative risk the threats pose to the extent and the duration of canopy related benefits was found to be variable and dependent on a range of inter-related factors with key considerations being the relative size and position of the trees within the road reserve (Section Three).

The assessment concluded (Section Four) that in many of the locations, intensification would not significantly alter the existing factors influencing the extent and the duration of the canopy related benefits. In locations, where evaluated potential threats were identified, it was concluded that intensification could be achieved without adversely affecting the canopy related benefits, but this is subject to appropriate controls to manage the associated risks. In addition, the assessment also concluded that, rather than having detrimental effects, intensification actually has the potential for canopy related benefits and ecosystem services to be utilised and realised in more instances and by a greater number of people.

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Section One: Context

1.1 Purpose and Scope.

The purpose of the document is to set out the results of a preliminary assessment of the potential threats and opportunities, associated with the intensification of the Papanui Memorial Avenues on the extent and duration of canopy related benefits being provided by trees on public land (Heritage Item # 1459, Appendix 9.3.7.2).

The assessment covers the 16 identified locations on Aerial Map Reference 861 (Heritage Item # 1459) provided by Christchurch City Council (CCC).

The assessment was completed by a CCC approved Technician Arborist, and the results reflect the tree populations, and the street design configurations present in July 2023 and was completed using the methodology, concepts and considerations included in British Standard BS5837 (2012): Trees in relation to Design, Demolition & Construction-Recommendations.

The assessment is considered to be consistent with the internationally recognised importance of preserving existing and facilitating the development of extensive canopies in the urban environment and the stated objectives of CCC's Urban Forest Plan & Tree Policy.

1.2 Structure.

Section Two of the document sets out the potential threats and opportunities in general terms. Section Three of the document includes supplementary information for each of the 16 locations. This approach is considered to be consistent with the absence of any specific information about the proposed changes and the urgent nature of CCC's request to complete the assessment in time to meet submission timeframes for Plan Changes 13 & 14.

1.3 Limitations

The document is not designed to be a substitute for arboricultural impact assessments (see Table 1.4.1) to assess the risks specific designs/proposed changes pose to the extent and duration of canopy related benefits.

1.4 Terms and Definitions

The terms and definitions applicable to the assessment are shown in Table 1.4.1 (starting on the next page).

Table 1.4.1: Terms & Definitions applicable to the assessment.

Term	Definition/Comments
Age Class.	The relative stage of a tree in its development and lifecycle.
Arboricultural Impact Assessment (AIA).	<p>An Arboricultural Impact Assessment is a specialist design tool to evaluate the risks a proposed activity/design poses to the extent and duration of canopy related benefits.</p> <p>The extent and duration of existing and future canopy related benefits can be adversely affected by a wide range of factors but typically these factors can be broadly categorised into three main types of threats:</p> <ul style="list-style-type: none"> • threats to the extent, functionality and development potential of existing root systems. • threats to the canopy area associated with physical damage and detrimental pruning. • threats to future planting opportunities associated with competing and often conflicting design priorities.
Arboricultural Tree Protection Method Statements.	Arboricultural Method Statements are designed to preserve and protect the extent and duration of canopy related benefits by managing risks identified in the Arboricultural Impact Assessment.
Canopy related benefits.	<p>This term refers to all the tangible and intangible benefits provided by canopies including aesthetic values and benefits associated with defining landscape character and a 'sense of place'.</p> <p>Canopy related benefits can also be broadly categorised as being either proximal or background. Background benefits contribute the overall city, whilst in contrast, proximal benefits are location/site specific.</p> <p>Canopy related benefits can also be referred to as ecosystem services. This term categories the benefits based on the type of service being provided. Four categories of service are typically used (provisioning, regulatory, supporting and cultural).</p> <p>Examples of each type of service are the production of oxygen (Provisioning), the sequestration of carbon (Regulatory), shading of buildings and property (Supporting) & landscape character/sense of place (Cultural).</p>
Genotype.	The genetic blueprint of a tree species influencing a range of characteristics including those that directly affect the extent and duration of canopy related benefits in terms of the species' development potential, ultimate size and typical life expectancy.
Phenotype.	A set of observable characteristics resulting from the interaction of a species' genotype with the environment. In an urban setting given the often competing and conflicting design priorities the most significant deviation from a tree species 'genotype is typically caused by restricted usable soil volumes.
Pressures for removal and/or detrimental pruning.	Proximal benefits can, in some circumstances, become problematic, particularly if the owner/occupier tolerances and preferences are incompatible with the benefit (such as shading) and/or the management of factors such as seasonal nuisance from fruit/leaf fall. In these scenarios, this can lead to pressures for trees to be removed or pruned in a way that is detrimental and result in either the total or partial premature loss of the canopy related benefits being provided.

Continuation of Table 1.4.1: Terms & Definitions applicable to the assessment

Term	Definition/Comments
Rooting Patterns.	Depending on a range of factors and influences, root systems can develop with either an asymmetrical or symmetrical rooting pattern. Asymmetrical root systems are prevalent for trees positioned within the designated road reserve. An example of each type of these rooting patterns is shown in the supplementary images on the next page.
Rooting Patterns (Breakout Roots).	This term is typically used to describe a scenario when a tree that is positioned in the designated road reserve has developed part of its root system into an area of soil that is on adjacent private land. The concept can also apply in scenarios when trees on private land have developed an element of their root system into the soil on public land.
	The presence and significance of the so-called breakout roots is dependent on a range of inter-related factors and an evaluation of these factors forms part of an Arboricultural Impact Assessment. An example of a scenario when significant breakout roots are likely to be present is shown in the supplementary images on the next page.
Root Protection Area (also known as the Tree Protection Zone).	A design/evaluation tool indicating the minimum area around a tree where the preservation and protection of roots and soil structure needs to be treated as a priority.
Sanctioned Parking.	Parking that is a permitted activity in the New Zealand Road Users Code and CCC's Bylaws.
Soil Compaction.	The compression of soil that degrades soil structure and creates conditions that, depending in the extent and duration of the degradation can adversely affect the extent and functionality of tree roots and the soil food web.
Soil Food Web.	A complex co-dependent synergistic community of biological organisms within the soil that play a key role in the extent and functionality of root systems.
Threats.	In the context of this assessment, threats to the extent and duration of canopy related benefits can either be direct or indirect. Direct threats relate to activities that can directly affect root systems and canopies. Indirect threats relate to issues that can create future pressures for removal or detrimental pruning.
Urban Design Considerations.	This term refers to the relative position of the kerb and channel, footpaths, and the berm (if applicable) within the designated road reserve.
Usable Soil Volumes.	The amount of soil that can be utilised by roots and the soil food web.

Figure 1.4.1 – Supplementary Images showing the concept of asymmetrical, symmetrical rooting patterns and breakout roots.



The image (opposite left) shows an example of an asymmetrical rooting pattern commonly found in the designated road reserve. The kerb and channel, shown by the yellow arrow, is providing a 'hard boundary' to roots. The adjacent vehicle crossing, and footpath are providing a 'soft boundary' in as much as they are creating sub optimal conditions that still facilitate an element of root ingress and functionality. The green arrow is indicating a scenario where 'breakout roots' from the road reserve into private land are likely and in the event of excavations on the property boundary would pose an evaluated risk.

The image (opposite right) is taken from a CCC Park and has been included for comparative purposes to show a scenario where a symmetrical rooting pattern is anticipated.



Section Two: Overview of the potential threats and opportunities.

Table 2.1 .1 provides an overview of the potential threats (in general terms) associated with intensification. For the most part, potential threats are typically directly related to the extent and duration of the existing and future canopy related benefits but can include other issues that pose an indirect threat by creating pressures for removal or detrimental pruning.

Table 2.1.1: Overview of the Potential Threats

Potential Threat	Nature of the risk to the extent & duration of canopy related benefits
Additional sanctioned parking.	In the absence of appropriate controls, the creation of additional parking, has the potential to pose a risk to the extent, functionality and development potential of existing root systems, create additional pruning requirements and limit future planting opportunities within the designated road reserve.
Additional/wider vehicle crossings.	In the absence of appropriate controls, the creation of additional and/or wider vehicle crossings, has the potential to pose a risk to the extent, functionality and development potential of existing root systems, create additional pruning requirements and limit future planting opportunities within the designated road reserve.
Foundations for new builds.	In the absence of appropriate controls, excavations for new buildings have the potential to pose a risk to the extent, functionality and development potential of existing root systems.
Canopy clearances for new builds.	In the absence of appropriate controls, new builds can pose a risk by creating a requirement for pruning that is detrimental to a tree’s energy production and the provision of canopy related benefits.
Shading cast by multi-storey new builds.	Shading associated with multi-storey buildings, can depending on a range of factors, have the potential to change the amount of light reaching canopies and affect energy production by reducing photosynthesis.
Future pressures for removal/detrimental pruning.	In the absence of appropriate controls, intensification can pose a risk by increasing pressures for removal and/or detrimental pruning. Pressures, typically relate to the proximal benefits provided by trees which can, in some circumstances, become problematic, particularly if the owner or occupier’s preferences and tolerances are incompatible with the proximal benefit (such as shading) or the management of factors such as seasonal nuisance from fruit/leaf fall. In scenarios when tolerances/preferences are incompatible this can be a driver in terms of creating future pressures for trees to be removed or be pruned in a detrimental way.
Increased occupancy/exposure to tree/branch fall events	Although, overall, the risk of tree and branch fall to people and property is extremely low in the context of daily life, increased occupancy and increased usage of the land adjacent trees may expose CCC to increased reputational and/or liability risk associated with branch or tree fall events.

Table 2.1.2 provides an overview of the potential opportunities (in general terms) to manage the potential threats associated with intensification to the extent and duration of the existing and future canopy related benefits provided by trees in the designated road reserve.

Table 2.1.2: Overview of the potential opportunities associated with each potential threat.

Potential Threat	Potential Opportunities
Additional sanctioned parking.	The relative timing and delivery of Arboricultural Impact Assessments into the planning process plays a key role in managing this potential threat and its associated risks. Opportunities exist to review the planning process to ensure that arboricultural impact assessments are completed in the early stages of the design process.
	Opportunities also exist to utilise and integrate engineering solutions such as tree sensitive designs and the creation of additional soil volumes using solutions such as underground soil vaults into the design and configuration of the road reserve.
	It is also important to note that parking vehicles under canopies can provide a range of benefits and is not something to be avoided but encouraged. Benefits from the shade provided and cooler temperatures created can help the prevention of ozone associated with off gassing of fuel tanks and reduce ultraviolet degradation of vehicle interiors and exteriors.
Additional/wider vehicle crossings	The relative timing and delivery of Arboricultural Impact Assessments into the planning process plays a key role in managing this potential threat and its associated risks. Opportunities exist to review the planning process to ensure that arboricultural impact assessments are completed in the early stages of the design process.
	Opportunities also exist to develop a CCC approved design based on the concept of ‘root bridging’ for vehicle crossings. This type of design incorporates design features that facilitate the creation of voids and areas of uncompacted soil under the crossing to promote root development and functionality.
Foundations for new builds.	The relative timing and delivery of Arboricultural Impact Assessments into the planning process plays a key role in managing this potential threat and its associated risks. Opportunities exist to review the planning process to ensure that arboricultural impact assessments are completed in the early stages of the design process
	Opportunities also exist to manage the risk through the planning process to use designs that, where appropriate, ensure that areas adjacent to property boundaries become/or left as open ground/garden or are utilised for parking, using tree sensitive designs.
Canopy clearances for new builds.	The relative timing and delivery of Arboricultural Impact Assessments into the planning process plays a key role in managing this potential threat and its associated risks. Opportunities exist to review the planning process to ensure that arboricultural impact assessments are completed in the early stages of the design process so that designs that create the need for detrimental pruning are identified and managed.

Continuation of Table 2.1.2: Overview of the potential opportunities associated with each potential threat.

Potential Threat	Potential Opportunities
Shading cast by multi-storey new builds	Opportunities exist to manage the extent of this threat as part of the planning process by using shade mapping to determine the tolerability of any changes to the amount of light reaching canopies (taking into account relative shade tolerances of different species and the size and orientation of canopies).
	An opportunity also exists to manage the potential threat as part of CCC's on-going asset replacement and succession programme by selecting shade tolerance species in locations where multi-storied buildings become prevalent.
	Multi-storey buildings also create potential opportunities to extend the length of growing seasons by creating micro-climates associated with increased solar radiance (the release of heat absorbed by buildings during the day).
Future pressures for removal/detrimental pruning.	<p>Opportunities exist to manage future pressures for removal and detrimental pruning using the planning framework. Examples include:</p> <ul style="list-style-type: none"> • the use of shade mapping to assess the extent of existing shading/future shading and managing areas of potential conflict in the design. • the use of specific conditions of consent to acknowledge the baseline effects of existing trees. • the use of specific conditions of consent to include, where appropriate, the use of practical design features such as gutter guards and non-slip surfaces for footpaths to manage, in part seasonal leaf fall.
Increased occupancy/exposure to tree/branch fall events	Increased occupancy and increased usage of the land adjacent trees does not necessarily increase the risk the tree poses <i>per se</i> but does provide opportunities for canopy related benefits and ecosystem services in a location to be utilised and realised in more scenarios and by a greater number of people.

Section Three: Preliminary Arboricultural Impact Assessment (AIA) for each of locations highlighted in Aerial Map Reference # 861.

3.1 Context

Section Three of the assessment report includes an Arboricultural Impact Assessment for each of the 16 locations listed in Aerial Map # 861. The assessment is based on the tree population and the configuration of the designated road reserve present in July 2023. Comments are based on the information available at the time of the assessment and indicate the general nature and extent of each threat and highlight locations where there is considered to be an increased risk to the extent and duration of existing and future canopy related benefits.

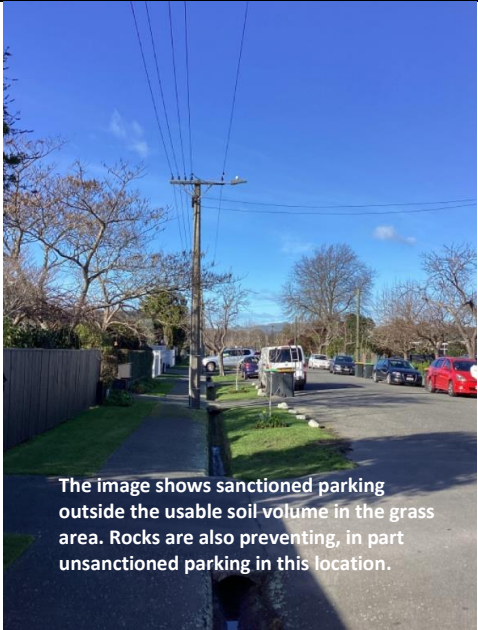

Table 3.1.1: Preliminary Arboricultural Impact Assessment Index


Assessment Reference #	Location	Page #
AIA 1	Alpha Avenue	12
AIA 2	Claremont Avenue	13
AIA 3	Condell Avenue	14
AIA 4	Dormer Street	15
AIA 5	Gambia Street	16
AIA 6	Halton Street	17
AIA 7	Hartley Avenue	18
AIA 8	Kenwyn Avenue	19
AIA 9	Lansbury Avenue	20
AIA 10	Norfolk Street	21
AIA 11	Perry Street	22
AIA 12	Scotston Avenue	23
AIA 13	St James Avenue	24 & 25
AIA 14	Tillman Avenue	26
AIA 15	Tomes Road	27
AIA 16	Windermere Road	28



Table 3.1.2: Summary of the potential threats assessed in each location.


Potential Threats assessed in each location
Additional sanctioned parking.
Additional parking.
Additional/wider vehicle crossings.
Foundations for new builds.
Canopy clearances for new builds.
Shading cast by multi-storey buildings.
Future pressures for removal/detrimental pruning.
Notes
The potential threat associated with multi-storey buildings changing the amount of light reaching canopies has not been subject to a detailed evaluation in each location and would need to be evaluated on a case-by-case basis to reflect specific designs. Refer to additional comments in Section Four.



3.2 Preliminary Arboricultural Impact Assessments


Assessment Reference & Location	AIA 1 (Alpha Avenue)	
Overview of the Tree Population		
<p>The composition and age class of the tree population is heterogeneous in nature (refer to the images below). Species present include Magnolia, Purple Leaf Cherry Plum, Crab Apple and Manna Ash. Planting records indicate the earliest planting date in the population is 1967 with the most recent being 2020. For the most part, the genotypes of the species present are characterised by relatively small canopies. Where a species genotype is capable of producing an extensive canopy (e.g., English Ash) the usable soil volume is considered to be a limiting factor in achieving the species' full development potential in this location and this is reflected in the phenotype.</p>		
Summary of the rooting environment		
Rooting Pattern	Asymmetrical with any symmetrical patterns associated with trees in the early stages of their lifecycle tending to an asymmetrical pattern over time.	
Road Reserve Design	The design includes areas of grass berm (refer to the image below).	
<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">  <p>The image shows sanctioned parking outside the usable soil volume in the grass area. Rocks are also preventing, in part unsanctioned parking in this location.</p> </div> <div style="text-align: center;">  <p>The image shows an example of the tree population when viewed from Normans Road.</p> </div> </div>		
Evaluation of the current and potential threats to existing and future canopy related benefits		
Nature of the threat	Risk to the extent and duration of canopy related benefits	
Existing sanctioned parking	This is restricted to formed surfaces that are outside usable soil volumes and as such, is considered to pose a negligible risk.	
Additional parking	Parking on the usable soil volumes was not observed and cannot be ruled out but is prevented in part by the placement of rocks along the edges of the grass closest to the road. Changes to create additional sanctioned parking are considered to be a potential threat to the existing trees and future planting opportunities and the risks associated with any proposed changes would need to be subject to an AIA.	
Additional/wider Vehicle Crossings	Subject to completing an AIA to evaluate any proposed changes, this threat, for the most part is considered to pose a negligible risk.	
Foundations for new builds	Based on the genotypes/phenotypes of the tree population, this is considered to pose a negligible risk.	
Canopy clearances for new builds	Based on the genotypes/phenotypes of the tree population this threat is considered to pose a negligible risk.	
Future pressures for removal/detrimental pruning	Based on the species genotypes/phenotypes, this threat, whilst still possible is considered to pose a negligible risk.	



Assessment Reference & Location		AIA 2 (Claremont Avenue)
Overview of the Tree Population		
The composition and age class of the tree population is homogenous (refer to the images below). The population is predominantly Crab Apple with a recorded planting date of 1940. For the most part, the genotypes of the species present are characterised by relatively small canopies.		
Summary of the rooting environment		
Rooting Pattern	Asymmetrical.	
Road Reserve Design	The image below shows the design of the road reserve in this location. Designs that surround trees with formed surfaces inevitably create sub optimal rooting conditions and unless underground soil vaults and above ground physical protection measures can be incorporated into the design, this scenario is not recommended for future tree populations.	
		<p>The image provides a street view of the homogeneous tree population and the sub optimal rooting conditions created by the design/configuration of the road reserve in this location.</p>
Evaluation of the current and potential threats to existing and future canopy related benefits		
Nature of the threat	Risk to the extent and duration of canopy related benefits	
Existing sanctioned parking	This activity is restricted to the formed surfaces surrounding the trees. Although the prevalence of formed surfaces is creating rooting conditions that are sub optimal, this is a long-standing feature and is something that the trees appear to have become adapted to and continue to tolerate in varying degrees.	
Additional parking	Changes to create additional sanctioned parking are considered to be a potential threat to the existing trees and future planting opportunities and the risk associated with any proposed changes, would need be subject to an AIA	
Additional/wider vehicle crossings	Subject to completing an AIA to evaluate any proposed changes, this threat, for the most part is considered to pose a negligible risk.	
Foundations for new builds	With a limited number of exceptions, this threat is considered to pose a negligible risk.	
Canopy clearances for new builds	Based on the genotypes/phenotypes of the tree population this threat is considered to pose a negligible risk.	
Future pressures for removal/detrimental pruning	Based on the species genotypes/phenotypes, this threat is considered to pose a negligible risk.	



Assessment Reference & Location		AIA 3 (Condell Avenue)	
Overview of the Tree Population			
<p>The composition and age class of the tree population is heterogeneous in nature (refer to the images below). Species present in the population include Birch, Manna Ash and Swamp Cypress. Planting records indicate the earliest planting date in the population is 1967 with the most recent being 2006. Genotypes of some species present are characterised by relatively small canopies. Species with a genotype that is capable of producing an extensive canopy (e.g., Silver Birch) have for the most part, achieved their development potential in this location.</p>			
Summary of the rooting environment			
Rooting Pattern	Asymmetrical with any symmetrical patterns associated with trees in the early stages of their lifecycle tending to asymmetrical over time.		
Road Reserve Design	Different configurations exist within the same location (refer to the images below).		
			
<p>The images show the heterogeneous nature of the tree population and the different configurations of the road reserve in Condell Avenue. In the image on the left, trees are planted in open pits in the road. In contrast, in the image on the right trees are planted in the grass berm.</p>			
Evaluation of the current and potential threats to existing and future canopy related benefits			
Nature of the threat	Risk to the extent and duration of canopy related benefits		
Existing sanctioned parking	In some locations this activity is restricted to formed surfaces that are outside usable soil volumes and as such is considered to pose a negligible risk. In other locations parking is on formed surfaces adjacent to open pits within the carriageway. The latter is creating rooting conditions that are sub optimal, but this is a long-standing feature and is something that the trees appear to have adapted to and continue to tolerate.		
Additional parking	Parking on the usable soil volumes was not observed but cannot be ruled out. Changes to create additional sanctioned parking are considered to be a potential threat to the existing trees and future planting opportunities and the risk associated with any proposed changes, would need to be subject to an AIA.		
Additional/wider vehicle crossings	Subject to completing an AIA to evaluate any proposed changes, this threat, for the most part is considered to pose a negligible risk.		
Foundations for new builds	For the most part, this threat is considered to pose a negligible risk but would need to be subject to an AIA.		
Canopy clearances for new builds	Based on the genotypes/phenotypes of the tree population this threat is considered to pose a negligible risk.		
Future pressures for removal/detrimental pruning	Based on the species genotypes/phenotypes, this threat, whilst still possible is considered to pose a negligible risk.		



Assessment Reference & Location	AIA 4 (Dormer Street)	
Overview of the Tree Population		
<p>The composition of the tree population is homogeneous in nature (refer to the images below) with heterogeneous age classes present. The species present in the population is exclusively Sweet Gum. Planting records indicate the earliest planting date in the population is 1946 with the most recent being 2002. The species genotype is capable of producing an extensive canopy and for the most part, this potential is evident in the developed and developing phenotypes.</p>		
Summary of the rooting environment		
Rooting Pattern	Asymmetrical with any symmetrical patterns associated with trees in the early stages of their lifecycle tending to an asymmetrical pattern over time.	
Road Reserve Design	The design includes areas of grass berm (refer to the image below).	
		
<p>The images above show the distinct age classes present within the homogenous tree population in Dormer Street.</p>		
Evaluation of the current and potential threats to existing and future canopy related benefits		
Nature of the threat	Risk to the extent and duration of canopy related benefits	
Existing sanctioned parking	This is restricted to formed surfaces that are outside usable soil volumes and as such, is considered to pose a negligible risk.	
Additional parking	Parking on the usable soil volumes was not observed but cannot be ruled out. Changes to create additional sanctioned parking are considered to be a potential threat to the existing trees and future planting opportunities and the risk associated with any proposed changes, would need be subject to an AIA.	
Additional/wider vehicle crossings	This is considered to be a potential threat and the risks associated with any proposed changes would need be subject to an AIA.	
Foundations for new builds	This is considered to be a potential threat and the risks associated with any proposed designs would need be subject to an AIA.	
Canopy clearances for new builds	This is considered to be a potential threat and the risks associated with any proposed designs would need be subject to an AIA.	
Future pressures for removal/detrimental pruning	Based on the species genotypes/phenotype, this threat is considered to pose an increased risk in this location.	



Assessment Reference & Location		AIA 5 (Gambia Street)
Overview of the Tree Population		
<p>The composition and age class of the tree population is heterogeneous in nature (refer to the images below). Species present in the population include Manna Ash, Lime, Totara, Kowhai and Kahikatea. Planting records indicate the earliest planting date in the population is 1972 with the most recent being 2007. Genotypes of some species present are characterised by relatively small canopies. Species with a genotype that is capable of producing an extensive canopy (e.g., Lime) for the most part have either achieved or are likely to achieve their development potential in this location.</p>		
Summary of the rooting environment		
Rooting Pattern	Asymmetrical with any symmetrical patterns associated with trees in the early stages of their lifecycle tending to asymmetrical over time.	
Road Reserve Design	Different configurations exist within the same location (refer to the images below).	
<div style="display: flex; justify-content: space-around;">   </div> <p>The images show the heterogeneous nature of the tree population and the different configurations of the road reserve in Gambia Street. Trees are either planted in beds or within the grass berm. The position of the berm varies and is adjacent to property boundaries in some locations and not in others.</p>		
Evaluation of the current and potential threats to existing and future canopy related benefits		
Nature of the threat	Risk to the extent and duration of canopy related benefits	
Existing sanctioned parking	This is restricted to formed surfaces that are outside usable soil volumes and as such, is considered to pose a negligible risk.	
Additional parking	Parking on the usable soil volumes was not observed but cannot be ruled out. Changes to create additional sanctioned parking are considered to be a potential threat to the existing trees and future planting opportunities and the risk associated with any proposed changes, would need to be subject to an AIA	
Additional/wider vehicle crossings	This is considered to be a potential threat and the risks associated with any proposed changes would need to be subject to an AIA.	
Foundations for new builds	For the most part, this threat is considered to pose a negligible risk, but the proposed design would need to be subject to an AIA.	
Canopy clearances for new builds	Based on the genotypes/phenotypes of the tree population this threat is considered to pose a negligible risk.	
Future pressures for removal/detrimental pruning	Based on the species genotypes/phenotypes, this threat, whilst still possible is considered to pose a negligible risk.	



Assessment Reference & Location	AIA 6 (Halton Street)	
Overview of the Tree Population		
The composition of the tree population is homogeneous in nature (refer to the images below) with heterogeneous age classes present. The species present in the population is exclusively Magnolia. Planting records indicate the earliest planting date in the population is 1947 with the most recent being 1987 (not all the trees have a recorded planted date, and it is likely that more recent planting has been completed). The species genotype is characterised by relatively small canopies.		
Summary of the rooting environment		
Rooting Pattern	Asymmetrical with any symmetrical patterns associated with trees in the early stages of their lifecycle tending to an asymmetrical pattern over time.	
Road Reserve Design	The design includes areas of grass berm (refer to the image below).	
		
The images above show the homogeneous nature of the tree population and examples of usable soil volumes within the berms.		
Evaluation of the current and potential threats to existing and future canopy related benefits		
Nature of the threat	Risk to the extent and duration of canopy related benefits	
Existing sanctioned parking	This is restricted to formed surfaces that are outside usable soil volumes and as such, is considered to pose a negligible risk.	
Additional parking	Parking on the usable soil volumes was not observed but cannot be ruled out. Changes to create additional sanctioned parking are, for the most part considered to be a negligible risk to the existing trees but would need to be subject to an AIA to assess the impact on future planting opportunities.	
Additional/wider vehicle crossings	Based on the genotypes/phenotypes of the tree population this threat is considered to pose a negligible risk.	
Foundations for new builds	Based on the genotypes/phenotypes of the tree population this threat is considered to pose a negligible risk.	
Canopy clearances for new builds	Based on the genotypes/phenotypes of the tree population this threat is considered to pose a negligible risk.	
Future pressures for removal/detrimental pruning	Based on the species genotypes/phenotypes, this threat, whilst still possible is considered to pose a negligible risk.	

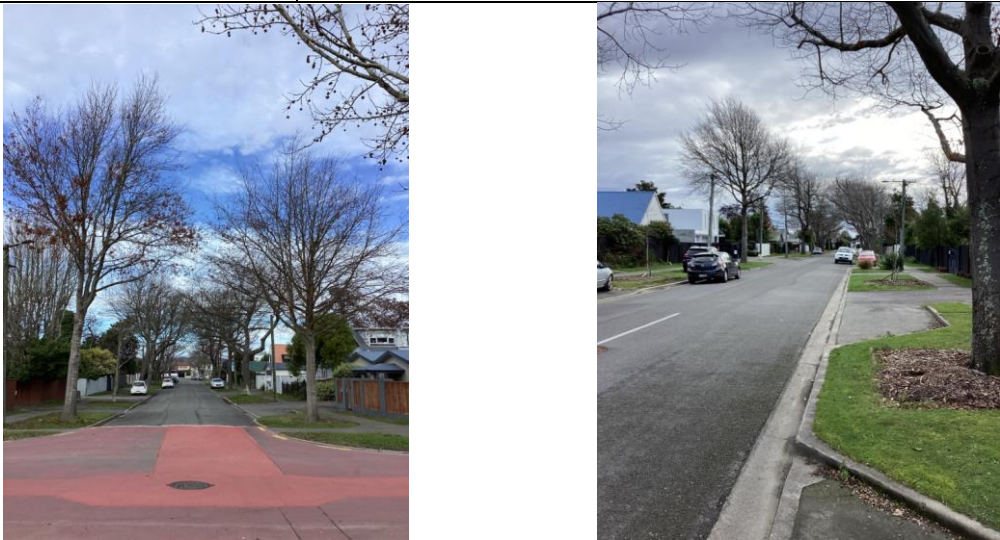
Assessment Reference & Location		AIA 7 (Hartley Avenue)	
Overview of the Tree Population			
The composition and age class of the tree population is heterogeneous in nature (refer to the images below). The species present in the population include Mana Ash, Crab Apple, and Magnolia. Planting records indicate the earliest planting date in the population is 1945 with the most recent being 1997. The species genotypes are all characterised by relatively small canopies.			
Summary of the rooting environment			
Rooting Pattern	Asymmetrical with any symmetrical patterns associated with trees in the early stages of their lifecycle tending to an asymmetrical pattern over time.		
Road Reserve Design	The design includes areas of grass berm (refer to the image below).		
			
The images above show the nature of the tree population and examples of usable soil volumes within the berms.			
Evaluation of the current and potential threats to existing and future canopy related benefits			
Nature of the threat	Risk to the extent and duration of canopy related benefits		
Existing sanctioned parking	This is restricted to formed surfaces that are outside usable soil volumes and as such, is considered to pose a negligible risk.		
Additional parking	Parking on the usable soil volumes was not observed but cannot be ruled out. Changes to create additional sanctioned parking are, for the most part considered to be a negligible risk in this location but would need be subject to an AIA to assess the impact of future planting opportunities.		
Additional/wider vehicle crossings	Based on the genotypes/phenotypes of the tree population this threat is considered to pose a negligible risk.		
Foundations for new builds	Based on the genotypes/phenotypes of the tree population this threat is considered to pose a negligible risk.		
Canopy clearances for new builds	Based on the genotypes/phenotypes of the tree population this threat is considered to pose a negligible risk.		
Future pressures for removal/detrimental pruning	Based on the species genotypes/phenotypes, this threat, whilst still possible is considered to pose a negligible risk.		

Assessment Reference & Location		AIA 8 (Kenwyn Avenue)
Overview of the Tree Population		
<p>The composition and age class of the tree population is heterogeneous in nature (refer to the images below) with two distinct sub populations present. One sub population is exclusively Scarlet Oak and the other is exclusively Camellia. Planting records indicate a planting date for the Oaks of 1949. The planting date for the Camellias is not recorded. The Camellias genotype is characterised by relatively small canopies. In contrast the Oaks have a genotype that is capable of producing an extensive canopies, with the development potential achieved in this location.</p>		
Summary of the rooting environment		
Rooting Pattern	Asymmetrical with any symmetrical patterns associated with trees in the early stages of their lifecycle tending to asymmetrical over time.	
Road Reserve Design	Different configurations exist within the same location (refer to the images below).	
		
<p>The images show the distinct sub-populations and the different configurations of the road reserve in this location.</p>		
Evaluation of the current and potential threats to existing and future canopy related benefits		
Nature of the threat	Risk to the extent and duration of canopy related benefits	
Existing sanctioned parking	This is restricted to formed surfaces that are outside usable soil volumes and as such, is considered to pose a negligible risk.	
Additional parking	Parking on the usable soil volumes was not observed but cannot be ruled out. Changes to create additional sanctioned parking are considered to be a potential threat to the existing Oaks and the risks associated with any proposed changes and the impact on future planting opportunities would need be subject to an AIA.	
Additional/wider vehicle crossings	This is considered to be a potential threat to the Oaks and the risks associated with any proposed changes would need be subject to an AIA.	
Foundations for new builds	This is considered to be a potential threat to the Oaks and the risks associated with any proposed designs would need be subject to an AIA.	
Canopy clearances for new builds	This is considered to be a potential threat to the Oaks and the risks associated with any proposed designs would need be subject to an AIA.	
Future pressures for removal/detrimental pruning	Based on the genotypes/phenotype, this threat is considered to pose an increased risk to the Oaks but not the Camellias in this location.	

Assessment Reference & Location	AIA 9 (Lansbury Avenue)	
Overview of the Tree Population		
<p>The composition of the tree population is homogeneous in nature (refer to the images below) with heterogeneous age classes present. The species present in the population is exclusively Flowering Cherry. Planting records indicate the earliest planting date in the population is 1949 with the most recent being 2017. The species genotype is characterised by relatively small canopies.</p>		
Summary of the rooting environment		
Rooting Pattern	Asymmetrical with any symmetrical patterns associated with trees in the early stages of their lifecycle tending to an asymmetrical pattern over time.	
Road Reserve Design	The design includes areas of grass berm (refer to the image below).	
<div style="display: flex; justify-content: space-around;">   </div> <p>The images above show the nature of the tree population and the configuration of the road reserve in this location.</p>		
Evaluation of the current and potential threats to existing and future canopy related benefits		
Nature of the threat	Risk to the extent and duration of canopy related benefits	
Existing sanctioned parking	This is restricted to formed surfaces that are outside usable soil volumes and as such, is considered to pose a negligible risk.	
Additional parking	Parking on the usable soil volumes was not observed but cannot be ruled out. Changes to create additional sanctioned parking are considered to be a potential threat and the risks associated with any proposed changes and the impact on future planting opportunities would need to be subject to an AIA.	
Additional/wider vehicle crossings	This is considered to be a potential threat and the risks associated with any proposed changes would need to be subject to an AIA.	
Foundations for new builds	Based on the genotypes/phenotypes of the tree population this threat is considered to pose a negligible risk.	
Canopy clearances for new builds	Based on the genotypes/phenotypes of the tree population this threat is considered to pose a negligible risk.	
Future pressures for removal/detrimental pruning	Based on the species genotypes/phenotypes, this threat, whilst still possible is considered to pose a negligible risk.	

Assessment Reference & Location	AIA 10 (Norfolk Street)
Overview of the Tree Population	
<p>The composition of the tree population is homogeneous in nature (refer to the images below) with heterogeneous age classes present. The species present in the population is exclusively Sweet Gum. Planting records indicate the earliest planting date in the population is 1943 with the most recent being 1993. The species genotype is capable of producing an extensive canopy and for the most part, this potential is evident in the developed and the developing phenotypes.</p>	
Summary of the rooting environment	
Rooting Pattern	Asymmetrical with any symmetrical patterns associated with trees in the early stages of their lifecycle tending to an asymmetrical pattern over time.
Road Reserve Design	The design includes areas of grass berm and inset parking bays (refer to the image below) which in the absence of a tree sensitive design can create sub optimal rooting conditions.
<div style="display: flex; justify-content: space-around;">   </div> <p style="text-align: center;">The images above show the nature of the tree population and the configuration of the road reserve in this location.</p>	
Evaluation of the current and potential threats to existing and future canopy related benefits	
Nature of the threat	Risk to the extent and duration of canopy related benefits
Existing sanctioned parking	This is restricted to formed surfaces that are either outside usable soil volumes or within parking bays inset into the berm. The use of inset parking bays in this location is considered to be creating sub optimal rooting conditions but is something that the trees appear to have adapted to and are continuing to tolerate.
Additional parking	Parking on the usable soil volumes was not observed but cannot be ruled out. Changes to create additional sanctioned parking are considered to be a potential threat and the risks associated with any proposed changes and the impact on future planting opportunities would need be subject to an AIA.
Additional/wider vehicle crossings	This is considered to be a potential threat and the risks associated with any proposed changes would need be subject to an AIA.
Foundations for new builds	This is considered to be a potential threat and the risks associated with any proposed designs would need be subject to an AIA.
Canopy clearances for new builds	Based on the species genotypes/phenotype, this threat is considered to pose an increased risk in this location.
Future pressures for removal/detrimental pruning	Based on the species genotypes/phenotype, this threat is considered to pose an increased risk in this location.

Assessment Reference & Location	AIA 11 (Perry Street)	
Overview of the Tree Population		
<p>The composition and age class of the tree population is heterogeneous in nature (refer to the images below). There are two distinct sub-population present comprising Ginkgo and Manna Ash. Planting records indicate the earliest planting date in the population is 1945 with the most recent being 2019. The species genotype for Manna Ash is characterised by relatively small canopies. In contrast the Ginkgos have a genotype that is capable of producing extensive canopies, which for the most part, this potential is evident in the developed and developing phenotypes.</p>		
Summary of the rooting environment		
Rooting Pattern	Asymmetrical with any symmetrical patterns associated with trees in the early stages of their lifecycle tending to an asymmetrical pattern over time.	
Road Reserve Design	The design includes areas of grass berm (refer to the image below).	
		<p>The images above show the nature of the distinct sub populations and the configuration of the road reserve in this location. The image on the left shows a Ginkgo and was taken in February 2023. Given that this is a deciduous species, the tree was completely defoliated in July 2023.</p>
Evaluation of the current and potential threats to existing and future canopy related benefits		
Nature of the threat	Risk to the extent and duration of canopy related benefits	
Existing sanctioned parking	This is restricted to formed surfaces that are outside usable soil volumes and as such, is considered to pose a negligible risk.	
Additional parking	Parking on the usable soil volumes was not observed but cannot be ruled out. Changes to create additional sanctioned parking are considered to be a potential threat and the risks associated with any proposed changes and the impact on future planting opportunities would need be subject to an AIA.	
Additional/wider vehicle crossings	This is considered to be a potential threat and the risks associated with any proposed changes would need be subject to an AIA.	
Foundations for new builds	Based on the genotypes/phenotypes of the tree population this threat is considered to pose an increased risk for the some of the Ginkgos and any proposed designs would need to be subject to an AIA.	
Canopy clearances for new builds	Based on the genotypes/phenotypes of the tree population this threat is considered to pose a negligible risk.	
Future pressures for removal/detrimental pruning	Based on the species genotypes/phenotypes, this threat, whilst still possible is considered to pose a negligible risk.	

Assessment Reference & Location	AIA 12 (Scotson Avenue)	
Overview of the Tree Population		
<p>The composition of the tree population is homogeneous in nature (refer to the images below) with heterogeneous age classes present. The species present in the population is exclusively Scarlet Oak. Planting records indicate the earliest planting date in the population is 1945 with the most recent being 1990. The species genotype is capable of producing an extensive canopy and for the most part, this potential is evident in the developed and the developing phenotypes.</p>		
Summary of the rooting environment		
Rooting Pattern	Asymmetrical with any symmetrical patterns associated with trees in the early stages of their lifecycle tending to an asymmetrical pattern over time.	
Road Reserve Design	The design includes areas of grass berm and inset parking bays (refer to the image below) which in the absence of a tree sensitive can create sub optimal rooting conditions.	
		
<p>The images above show the nature of the tree population and the configuration of the road reserve in this location.</p>		
Evaluation of the current and potential threats to existing and future canopy related benefits		
Nature of the threat	Risk to the extent and duration of canopy related benefits	
Existing sanctioned parking	This is restricted to formed surfaces that are either outside usable soil volumes or within parking bays inset into the berm. The use of inset parking bays in this location is considered to be creating sub optimal rooting conditions but this is something that the trees appear to have adapted to and continue to tolerate.	
Additional parking	Parking on the usable soil volumes was not observed but cannot be ruled out. Changes to create additional sanctioned parking are considered to be a potential threat and the risks associated with any proposed changes and the impact on future planting opportunities would need be subject to an AIA.	
Additional/wider vehicle crossings	This is considered to be a potential threat and the risks associated with any proposed changes would need be subject to an AIA.	
Foundations for new builds	This is considered to be a potential threat and the risks associated with any proposed designs would need be subject to an AIA.	
Canopy clearances for new builds	Based on the species genotypes/phenotype, this threat is considered to pose an increased risk in this location.	
Future pressures for removal/detrimental pruning	Based on the species genotypes/phenotype, this threat is considered to pose an increased risk in this location.	

Assessment Reference & Location	AIA 13 (St James Avenue)
Overview of the Tree Population	
The composition of the tree population is homogenous (refer to the images below) and with a limited exception is all Oak Species. The age class of the population is heterogeneous in nature. Planting records indicate the earliest planting date in the population is 1945 with the most recent being 2002. The species genotype is capable of producing an extensive canopy and for the most part, this potential is evident to varying degrees in the developed and the developing phenotypes.	
Summary of the rooting environment	
Rooting Pattern	Asymmetrical with any symmetrical patterns associated with trees in the early stages of their lifecycle tending to an asymmetrical pattern over time.
Road Reserve Design	The images (over the page) show the different designs of the road reserve in this location. The configurations include trees planted in areas of grass in the berm, trees planted on the edge of the carriageway that are surrounded by formed surfaces and trees planted on the edge of the carriageway in areas of soil that are used for parking. Designs that facilitate sanctioned parking directly on top of usable soil volumes are not recommended. Unless underground soil vaults and above ground physical protection measures can be incorporated into the design, scenarios that create formed surfaces that surround a tree are also not recommended for future tree populations.
Evaluation of the current and potential threats to existing and future canopy related benefits	
Nature of the threat	Risk to the extent and duration of canopy related benefits
Existing sanctioned parking	In some locations this activity is restricted to areas outside usable soil volumes and as such, is considered to pose a negligible risk. In other locations the activity involves parking on either formed or unformed surfaces surrounding the trees. Although the latter scenarios are creating sub-optimal rooting conditions, these are long-standing feature and is something that the trees appear to have become adapted to and continue to tolerate in varying degrees.
Additional parking	Additional parking using the same configuration is not considered to significantly increase the risk to the existing trees. This reflects the nature of soil compaction which means that the majority of compaction occurs in the initial 4 to 5 times wheeled vehicles park or drive on the soil (with additional movements not resulting in any significant increase in the degradation of the soil structure). Changes to create additional sanctioned parking that differs from the existing configuration are considered to be a potential threat and the risks associated with any proposed changes and the impact on future planting opportunities would need be subject to an AIA.
Additional/wider vehicle crossings	This is considered to be a potential threat and the risks associated with any proposed changes would need be subject to an AIA.
Foundations for new builds	This is considered to be a potential threat and the risks associated with any proposed designs would need be subject to an AIA.
Canopy clearances for new builds	Based on the species genotypes/phenotype, this threat is considered to pose an increased risk in this location.
Future pressures for removal/detrimental pruning	Based on the species genotypes/phenotype, this threat is considered to pose an increased risk in this location.



**St James Avenue.
Supplementary Images.**







The images above show the heterogeneous nature of the age class in the tree population in St James Avenue.

The image (opposite right and bottom right) show examples of soil areas that are used for parking, which, in some cases involves parking vehicles on top of exposed roots. The image (below left) shows an example of a location where the tree is planted on the edge of the carriageway and is surrounded by formed surfaces.



Assessment Reference & Location		AIA 14 (Tillman Avenue)
Overview of the Tree Population		
The composition and age class of the tree population is homogenous (refer to the images below). The population is exclusively Scarlet Oaks with a recorded planting date of 1939 (with one exception of a relatively recent planting that does not have a recorded planting date). The species genotype is capable of producing an extensive canopy and for the most part, this potential is evident in the developed and the developing phenotypes		
Summary of the rooting environment		
Rooting Pattern	Asymmetrical.	
Road Reserve Design	The image below shows the design of the road reserve in this location. Designs that surround trees with formed surfaces inevitably create sub optimal rooting conditions and unless underground soil vaults and above ground physical protection measures can be incorporated into the design, this scenario is not recommended for future tree populations.	
		
The images provide a street view of the homogeneous tree population and the sub optimal rooting conditions created by the design/configuration of the road reserve in this location.		
Evaluation of the current and potential threats to existing and future canopy related benefits		
Nature of the threat	Risk to the extent and duration of canopy related benefits	
Existing sanctioned parking	This activity is restricted to the formed surfaces surrounding the trees. Although the prevalence of formed surfaces is creating rooting conditions that are sub optimal, this a long-standing feature and is something that the trees appear to have become adapted to and continue to tolerate.	
Additional parking	Changes to create additional sanctioned parking are considered to be a potential threat and the risk associated with any proposed changes, and the impact on future planting opportunities would need be subject to an AIA.	
Additional/wider vehicle crossings	This is considered to be a potential threat and the risks associated with any proposed changes would need be subject to an AIA.	
Foundations for new builds	This is considered to be a potential threat and the risks associated with any proposed designs would need be subject to an AIA.	
Canopy clearances for new builds	Based on the species genotypes/phenotype, this threat is considered to pose an increased risk in this location.	
Future pressures for removal/detrimental pruning	Based on the species genotypes/phenotype, this threat is considered to pose an increased risk in this location.	

Assessment Reference & Location	AIA 15 (Tomes Street)	
Overview of the Tree Population		
<p>The composition and age class of the tree population is homogenous (refer to the images below). The population is exclusively Sweet Gum with a recorded planting date of 1987 (with one exception of a relatively recent planting). The species genotype is capable of producing an extensive canopy and for the most part, this potential is evident in the developed and the developing phenotypes.</p>		
Summary of the rooting environment		
Rooting Pattern	Asymmetrical.	
Road Reserve Design	The design includes areas of grass berm (refer to the image below).	
<div style="display: flex; justify-content: space-around;">   </div> <p style="text-align: center;">The images provide a street view of the homogeneous tree population and the configuration of the road reserve in this location.</p>		
Evaluation of the current and potential threats to existing and future canopy related benefits		
Nature of the threat	Risk to the extent and duration of canopy related benefits	
Existing sanctioned parking	This is restricted to formed surfaces that are outside usable soil volumes and as such, is considered to pose a negligible risk.	
Additional parking	Changes to create additional sanctioned parking are considered to be a potential threat and the risk associated with any proposed changes, would and the impact on future planting opportunities would need be subject to an AIA.	
Additional/wider vehicle crossings	This is considered to be a potential threat and the risks associated with any proposed changes would need be subject to an AIA.	
Foundations for new builds	This is considered to be a potential threat and the risks associated with any proposed designs would need be subject to an AIA.	
Canopy clearances for new builds	Based on the species genotypes/phenotype, this threat is considered to pose an increased risk in this location.	
Future pressures for removal/detrimental pruning	Based on the species genotypes/phenotype, this threat is considered to pose an increased risk in this location.	

Assessment Reference & Location	AIA 16 (Windermere Road)	
Overview of the Tree Population		
The composition and age class of the tree population is heterogeneous (refer to the images below). The population is almost exclusively Manna Ash. Planting records indicate the earliest planting date in the population is 1942 with the most recent being 2008. The predominant species genotype is characterised by relatively small canopies.		
Summary of the rooting environment		
Rooting Pattern	Asymmetrical.	
Road Reserve Design	The design includes areas of grass berm (refer to the image below).	
<div style="display: flex; justify-content: space-around;">   </div> <p>The images provide a street view of the homogeneous tree population and the configuration of the road reserve in this location.</p>		
Evaluation of the current and potential threats to existing and future canopy related benefits		
Nature of the threat	Risk to the extent and duration of canopy related benefits	
Existing sanctioned parking	This is restricted to formed surfaces that are outside usable soil volumes and as such, is considered to pose a negligible risk.	
Additional parking	Changes to create additional sanctioned parking are considered to be a potential threat and the risk associated with any proposed changes and the impact on future planting opportunities would need be subject to an AIA.	
Additional/wider vehicle crossings	This is considered to be a potential threat and the risks associated with any proposed changes would need be subject to an AIA.	
Foundations for new builds	Based on the genotypes/phenotypes of the tree population this threat is considered to pose a negligible risk.	
Canopy clearances for new builds	Based on the genotypes/phenotypes of the tree population this threat is considered to pose a negligible risk.	
Future pressures for removal/detrimental pruning	Based on the species genotypes/phenotypes, this threat, whilst still possible is considered to pose a negligible risk.	

SECTION FOUR: CONCLUSIONS

Context

The conclusions are based on the overview of the potential threats and opportunities in Section Two and the preliminary Arboricultural Impact Assessments for each of the 16 locations evaluated in Section Three. Although the intensification of the 16 locations poses a range of threats, a range of opportunities also exist to manage scenarios where there is the potential for some of the threats to pose an increased risk to the extent and duration of canopy related benefits. A requirement to complete a timely design and site-specific Arboricultural Impact Assessment (AIA) is considered to be a key control in terms of enabling potential threats to be systematically evaluated and where applicable, managed through tree sensitive designs. For example, a range of tree sensitive designs such as root bridging solutions, permeable materials and under-ground soil vaults already exist and provide opportunities to preserve and/or increase usable soil volumes, despite competing and potentially conflicting demands for space within the designated road reserve.

Overall, it is considered that in many of the locations, intensification would not significantly alter the existing factors influencing the extent and the duration of the canopy related benefits. In locations, where evaluated potential threats were identified, it is considered that intensification could be achieved without adversely affecting the canopy related benefits, but this is subject to appropriate controls to manage the associated risks. In addition, it is considered that rather than having detrimental effects, intensification actually has the potential for canopy related benefits and ecosystem services to be utilised and realised in more instances and by a greater number of people.

Table 4.1.1 summaries the current and potential threats to the extent and duration of canopy related benefits being provided by the tree populations in the locations assessed.

Table 4.1.1: Summary of the current and potential threats to the extent and duration of canopy related benefits being provided by the tree populations in the locations assessed.

Evaluation of the current and potential threats to existing and future canopy related benefits	
Nature of the threat	Risk to the extent and duration of canopy related benefits
Use of the existing sanctioned parking.	With a limited number of exceptions, this activity is restricted to formed surfaces that are outside usable soil volumes and as such, is considered to pose a negligible risk. Where exceptions exist, for example, in St James Avenue, the configuration of the road reserve has resulted in sub-optimal rooting conditions. Although sub-optimal conditions exist, this is something that the trees appear to have adapted to and continue to tolerate. Any increased use of the existing sanctioned parking areas is considered to pose a negligible risk and, in the scenarios, where sub-optimal conditions already exist is not anticipated to cause any significant risk to the extent and duration of the canopy related benefits in these locations.
Changes to create additional parking & changes to the number and width of vehicle crossings.	The risk posed by changes to the existing design and configuration of the road reserve and to the existing vehicle crossings is variable in nature and depends on a range of factors, influenced in the most part by the genotype, phenotype and relative position of the trees in each location. The risks associated with any proposed changes to the existing trees and the impact on future planting opportunities would need to be subject to an Arboricultural Impact Assessment and may require the use of engineered solutions and the use of tree sensitive designs.
Foundations for new builds.	The risk posed by excavations for new build foundations is variable in nature and depends on a range of factors, influenced in the most part by the genotype, phenotype and relative position of the trees in each location. The associated risks to existing trees would need to be subject to an Arboricultural Impact Assessment and may require design interventions to manage any significant risks identified.

Evaluation of the current and potential threats to existing and future canopy related benefits	
Nature of the threat	Risk to the extent and duration of canopy related benefits
Canopy clearances for new builds.	The associated risks are variable and influenced by the genotype, phenotype and relative position of the trees in each location and would need to be subject to an Arboricultural Impact Assessment and may require to be managed through the design process to avoid the need for detrimental pruning.
Shading cast by multi-storey new builds.	The extent of the shade pattern cast by buildings will vary on the relative position and height of the tree and the building. In general terms, the maximum permitted heights for High and Medium Density Residential Zones are not considered to pose a significant risk to the extent and duration of canopy related benefits in the species present. This reflects the principle of positive phototropism which provides a way for trees to adapt their canopies to make the optimum use of the available light. In addition, typically, periods of peak energy production/physiological activity correspond with the periods when the sun is at its highest and means that the maximum permitted heights would not be expected to significantly alter the amount of direct overhead light reaching canopies during this time. In contrast, the periods when the sun is at its lowest, correspond with periods of dormancy in deciduous species or reduced physiological activity in evergreen species (which typically have species genotypes characterised by increased shade tolerances). This would mean that reduced light in winter would either have no effect on deciduous species or in the case of evergreen species, is a change that is likely to be adapted to and tolerated.
Future pressures for removal/detrimental pruning	The associated risks are variable and influenced in the most part by the genotype, phenotype and relative position of the trees in each location, the relative tolerances of owners/occupiers to issues associated with proximal benefits and the extent these factors are addressed in the design process.

Appendix One: Examples of a design intervention that can partially manage the risk of parking in close proximity to existing trees.



The images (above top) show examples of tree parking 'bumper strips' being used in Poulton Avenue to protect an area of open mulched ground around the base of a developing and a developed tree. The yellow dashed lines in the images (above bottom) show how the same design feature could be used to create a partial solution/improvement in locations where existing parking is on formed/unformed surfaces in close proximity to trees whilst still enabling the parking area to be used (the locations shown are in St James Avenue).

End of the document.