Plan Change 14

Section 32: Appendix 24

Significant Trees Qualifying Matters Technical Report

Christchurch City Council

Technical Report

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Version: Final
Author: Hilary Riordan (Resource & Landscape Planner) & Toby Chapman (City Arborist)

Peer reviewed: Jennifer Dray (Team Leader - Parks and Landscape Team)

DISCLAIMER:

Christchurch City Council has taken every care to ensure the correctness of all the information contained in this report. All information has been obtained by what are considered to be reliable sources, and Christchurch City Council has no reason to doubt its accuracy. It is however the responsibility of all parties acting on information contained in this report to make their own enquiries to verify correctness.

1 Introduction and Purpose

1. Christchurch City Council (The Council) is in the process of implementing the National Policy Statement – Urban Development (NPS-UD) and the Resource Management (Enabling Housing Supply and Other Matters) Act 2021 (the Act) which will enable higher density developments across the city as a permitted activity. The Council is proposing a plan change to its District Plan to address the amendments.

2. The Christchurch District Plan's Appendix 9.47.1 Schedule of Significant Trees currently protects these privately owned trees under the Resource Management Act. However, the Resource Management (Enabling Housing Supply and Other Matters) Act 2021 introduces new thresholds on where the Council can limit the implementation of Medium Density Residential Standards (MDRS). Thresholds for Historic Heritage and Qualifying Matters have been considered in this report.

3. This report is a combined report undertaken in collaboration with Hilary Riordan (CCC Resource and Landscape Planner) and Toby Chapman (CCC City Arborist). Additional contributions were provided by John Thornton (CCC Arborist Environmental Consents), Jennifer Dray (CCC Team Leader - Parks and Landscape Team), and independent Arborists; Liz Warner, Chris Loughborough, Martin Andrews, and Craig Taylor.

4. The purpose of this report is to provide advice on Christchurch District Plan's Appendix 9.47.1 Schedule of Significant Trees in relation the MDRS. The report covers:

- The Act as it is relevant to protecting Significant Trees within the Christchurch District;
- A description of the importance of Significant Trees on private land within Christchurch's Urban Landscapes;
- Methodology used for the assessment of Scheduled Trees, in particular those that meet Historic Heritage status in relation the MDRS Plan Change;
- Justification for the thresholds for inclusion/exclusion of Significant Trees as Qualifying Matters in relation the MDRS Plan Change. This includes consideration of:
    - Arborists technical assessment, CTEM methodology, (established in 2015 for assessing individual trees and tree groups);
    - Landscape contributions assessment

1.1 Resource Management (Enabling Housing Supply and Other Matters) Act 2021

5. 77J Requirements in relation to evaluation report

(1) This section applies if a territorial authority is amending its district plan (as provided for in section 77G).
(2) The evaluation report from the specified territorial authority referred to in section 32 must, in addition to the matters in that section, consider the matters in subsections (3) and (4).
(3) The evaluation report must, in relation to the proposed amendment to accommodate a qualifying matter,—
(a) demonstrate why the territorial authority considers—
(i) that the area is subject to a qualifying matter; and
(ii) that the qualifying matter is incompatible with the level of development permitted by the MDRS (as specified in Schedule 3A) or as provided for by policy 3 for that area; and
(b) assess the impact that limiting development capacity, building height, or density (as relevant) will have on the provision of development capacity; and
(c) assess the costs and broader impacts of imposing those limits.
(4) The evaluation report must include, in relation to the provisions implementing the MDRS,—
(a) a description of how the provisions of the district plan allow the same or a greater level of development than the MDRS:

(b) a description of how modifications to the MDRS as applied to the relevant residential zones are limited to only those modifications necessary to accommodate qualifying matters and, in particular, how they apply to any spatial layers relating to overlays, precincts, specific controls, and development areas, including—

(i) any operative district plan spatial layers; and

(ii) any new spatial layers proposed for the district plan.

(5) The requirements set out in subsection (3)(a) apply only in the area for which the territorial authority is proposing to make an allowance for a qualifying matter.

(6) The evaluation report may for the purposes of subsection (4) describe any modifications to the requirements of section 32 necessary to achieve the development objectives of the MDRS.

6. 77I Qualifying matters in applying Medium Density Residential standards and Policy 3 to relevant residential zones

A specified territorial authority may make the MDRS and the relevant building height or density requirements under policy 3 less enabling of development in relation to an area within a relevant residential zone only to the extent necessary to accommodate 1 or more of the following qualifying matters that are present:

(a) a matter of national importance that decision makers are required to recognise and provide for under section 6:

(j) any other matter that makes higher density, as provided for by the MDRS or policy 3, inappropriate in an area, but only if section 77L is satisfied.

7. 77L Further requirement about application of section 77I(j).

A matter is not a qualifying matter under section 77I(j) in relation to an area unless the evaluation report referred to in section 32 also—

(a) identifies the specific characteristic that makes the level of development provided by the MDRS (as specified in Schedule 3A or as provided for by policy 3) inappropriate in the area; and

(b) justifies why that characteristic makes that level of development inappropriate in light of the national significance of urban development and the objectives of the NPS-UD; and

(c) includes a site-specific analysis that—

(i) identifies the site to which the matter relates; and

(ii) evaluates the specific characteristic on a site-specific basis to determine the geographic area where intensification needs to be compatible with the specific matter; and

(iii) evaluates an appropriate range of options to achieve the greatest heights and densities permitted by the MDRS (as specified in Schedule 3A) or as provided for by policy 3 while managing the specific characteristics.

1.2 Resource Management Act 1991

8. Section 6 "Matters of National Importance" enables the protection of "Historic Heritage". Trees that exceed 100 years in age have been determined to be included within "Historic Heritage", therefore, meeting Section 6 of the RMA and Section 77I(a) of the Resource Management (Enabling Housing Supply and Other Matters) Act 2021.

6. Matters of national importance. In achieving the purpose of this Act, all persons exercising functions and powers under it, in relation to managing the use, development, and protection of natural and physical resources, shall recognise and provide for the following matters of national importance:

(f) the protection of historic heritage from inappropriate subdivision, use, and development:

9. Trees that are not a Section 6 matter under the RMA provisions, to enable the protection of trees on an individual or group level, are contained under Section 76 of the RMA.

10. Sections 76(4A) and 76(4B) of the RMA were inserted by the Resource Management (Simplifying and Streamlining) Amendment Act 2009 (RMAA09). They came into force on 1 January 2012.

11. Section 76(4A) was amended under the Resource Management Amendments Act 2013 (RMAA13) to align with its original policy intent – the prohibition of blanket tree protection rules in urban areas. Sections 76(4A), (4B), (4C), and (4D) now state:

> *(4A) A rule may prohibit or restrict the felling, trimming, damaging, or removal of a tree or trees on a single urban environment allotment only if, in a schedule to the plan,—*
> *(a) the tree or trees are described; and*
> *(b) the allotment is specifically identified by street address or legal description of the land, or both.*
> *(4B) A rule may prohibit or restrict the felling, trimming, damaging, or removal of trees on 2 or more urban environment allotments only if—*
> *(a) the allotments are adjacent to each other; and*
> *(b) the trees on the allotments together form a group of trees; and*
> *(c) in a schedule to the plan,*
> *(i) the group of trees is described; and*
> *(ii) the allotments are specifically identified by street address or legal description of the land, or both.*
> *(4C) In subsections (4A) and (4B),—*
> *group of trees means a cluster, grove, or line of trees*
> *urban environment allotment or allotment means an allotment within the meaning of section 218—*
> *(a) that is no greater than 4000m^2; and*
> *(b) that is connected to a reticulated water supply system and a reticulated sewerage system; and*
> *(c) on which there is a building used for industrial or commercial purposes or as a dwelling/house; and*
> *(d) that is not reserve (within the meaning of section 2(1) of the Reserves Act 1977) or subject to a conservation management plan or conservation/management strategy prepared in accordance with the Conservation Act 1987 or the Reserves Act 1977.*
> *(4D) To avoid doubt, subsections (4A) and (4B) apply—*
> *(a) regardless of whether the tree, trees, or group of trees is, or the allotment or allotments are, also identified on a map in the plan; and*
> *(b) regardless of whether the allotment or allotments are also clad with bush or other vegetation.*

12. Sections 76(4A)–76(4D) do not remove Councils' ability to protect trees on urban allotments, do not place any restrictions on the types of trees to be protected, and do not limit the methods a Council may use to assess the quality of a tree or group of trees. Rather, the Sections' require urban tree protection rules in District Plans to be applied in ways that provide certainty for landowners and District Plan users about what, if any, tree protection rules affect their properties.

13. This is achieved by requiring the trees to be protected to be described, and the allotment or allotments specifically identified by street address and/or legal description in a Schedule to the plan. Where a group of trees are to be protected, sections 76(4A)–76(4D) do not require every tree in a group to be individually described. Rather, the trees within that group can be described collectively, provided the description provides sufficient clarity to landowners and District Plan users about which trees are part of that group, and on which allotments they are located.

1.3 Importance of Significant Trees

14. Trees that are listed in the Schedule of Significant Trees have the highest legal protection afforded to trees in Christchurch. "Significant" as defined in the 2015 Significant Tree Technical Report, trees should be:

- *large enough to be noticed or have an effect : very important : having a special or hidden meaning* (Webster Miriam);
- *sufficiently great or important to be worthy of attention, noteworthy* (Oxford).

15. Large trees can provide substantial canopies[1] with a noticeable physical and visual impact to the landscape, while small trees with little to no canopy have a lesser impact. Existing large mature trees provide immediate mitigation effects to the surrounding urban development, compared with the planting of new trees. The scheduled significant trees should include Christchurch's most notable trees, which have positive impacts on their surrounding landscape and will be valuable landscape assets to retain and protect for the future urban landscape.

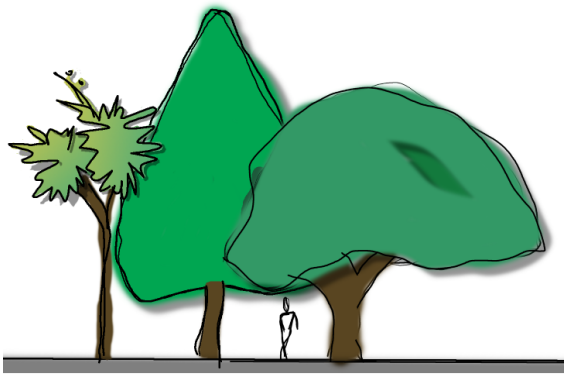

Figure 1: Large trees which exceed 5m in height in reference to human scale

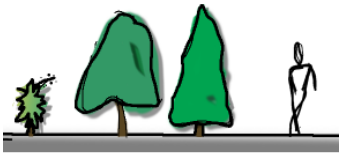

Figure 2: Small trees, approximately 1.5m-2m, in reference to human scale

16. Trees with the varying textures, colours and silhouettes[2] can impact positively on physical activities and be more visually appealing, providing interest and variety through time and seasons. Trees that provide a transition between private and public land encourages people to move through landscapes, enjoying the journey not just the destination. Trees associated with the streetscape, both street trees and private trees located on the street boundaries/front yard, provide shade and greenery to users. Street trees have been shown to encourage physical activity. The same studies have shown that lifestyles that are more active, combat obesity, improve cardiovascular health, and increase longevity (Dixon & Wolf, 2007). Streets with denser tree canopies are associated with road calming as they provide a sense of enclosure and road narrowing, thus reducing the speed of moving traffic (Harthoorn, 2017).

17. Varying forms, shapes and textures of trees contributes to the amenity values[3] of a place. By providing specific landmarks within an urban landscape, the physical feature of a tree can help identify a specific location. Through physical responses to the environment, trees can add micro-changes to an urban landscape, such as responses to the wind and shading effects. Through their own growth and seasonal change, trees allow people to mark change over time. Urban structures, in comparison, can be erected within months and then remain unchanging, providing only a very limited sense of change over time.

18. Trees are also valued as they connect with people's historical associations and memories. In addition, trees within the urban landscapes are easily accessible on a daily basis as they are located in proximity to where people live. In comparison, trees within the rural landscape are further afield and less accessible on a daily

[1] Canopy means the uppermost branches of the trees in a forest, forming a more or less continuous layer of foliage (Oxford Dictionary).
[2] Silhouette means the dark shape and outline of someone or something visible in restricted light against a brighter background (Oxford Dictionary).
[3] Amenity Values means those natural or physical qualities and characteristics of an area that contribute to people's appreciation of its pleasantness, aesthetic coherence, and cultural and recreational attributes (RMA).

basis. Trees are often planted for sentimental or cultural reasons. For Maori and many other cultures, it is cultural practice to bury the placenta to symbolise a baby's link to the earth. The location is often marked with a tree that is watched over and grows with the child. Public and private trees are also planted as markers, as physical links to sister Cities, or as records of notable events and memorials such as the Memorial Oak tree and plaque[4] in the Park of Remembrance, Christchurch. Over time, these trees become even more valuable to the community and provide a human connection with history.

2 Scheduled Trees Assessment Methodology

19. A review of the Christchurch District Plans Appendix 9.4.7.1 Schedules of Significant Trees (Christchurch City and Banks Peninsula) was undertaken between 11 April and 10 June 2022 in response to the implementing of the National Policy Statement – Urban Development (NPS-UD), and the Resource Management (Enabling Housing Supply and Other Matters) Act 2021 (the Act).

20. The existing Schedule of Significant Trees within the District Plan that are located on private land effected by the MDRS was assessed. Significant Trees within Public Open Spaces, and Private rural areas and the Banks Peninsula were excluded, as the MDRS will not apply to these areas.

21. Appendix 9.4.7.1 and the associated applicable District Plan rules will remain in effect for non-MDRS activities. The assessment of this Appendix has been made to bring forward, where appropriate, Significant Trees within Appendix 9.4.7.1, giving them protection during MDRS development.

22. Trees in Appendix 9.4.7.1 that were identified as being at or over 100 years in age have been determined to meet the criteria under s77I(a) as a RMA Section 6 matter.

23. Where trees were deemed to be less than 100 years in age, to be considered a Qualifying Matter they must be assessed on a site by site basis to ensure compliance with s77I(j) "other matters" meeting requirement of s77l.

24. To ensure that these trees were assessed on a site-by-site basis, the trees were evaluated by qualified Arborists using the Council's tree evaluation method, CTEM. In addition, where the trees passed the CTEM Evaluation, a Landscape Architect assessed them in terms of their landscape characteristics and contributions to the surrounding landscape.

25. Due to the limited time available to undertake the assessments, and difficulties accessing some properties, a number of trees (61) were not able to be assessed. Where possible, trees that were able to be viewed from the roadside were assessed without accessing the land owner's property. The remaining trees were assessed by appointment with the relevant land owner.

2.1 Historic Heritage Trees Assessment

26. Trees in Appendix 9.4.7.1 were reviewed by CCC's Arborist (Environmental Consents), John Thornton, with support from CCC City Arborist, Toby Chapman. Trees that were identified as being at or over 100 years in age have been determined to meet the criteria under s77I(a) as a RMA Section 6 Heritage matter.

[4] The oak was planted in 1924 and grew from an acorn sent back from Gallipoli in 1918 by Lieutenant Douglas Deans.

27. Mr Thornton has been working with the Council's significant trees for close to 25 years and has an in-depth understanding of the history of many of these trees. Mr Thornton was primarily responsible for assessing the list of trees within the Appendix9.4.7.1 to determine whether they were over 100 years of age.

28. The identification of trees that were over 100 years was determined through the use of the following material:

- 1994 evaluation data using the City Plan Matrix (commonly referred to as 'Walters Method'). In many cases the time period of 28 years since the 1994 evaluation was carried out provided staff with the assurance that the tree was over 100 years of age.
- 2014-2015 evaluation date using CTEM for the now operative District Plan
- Historic Aerial imagery going back in many cases to 1925 or 1940. The use of historic aerial imagery was used to determine whether or not a tree was present and how well established it was during that time period. This, with the evaluation data was used to confirm whether a tree was over 100 years of age.

29. Where it was not possible to accurately confirm whether the tree is over 100 years of age the tree was assessed by our Arborist surveyors to determine whether it should be carried through as a qualifying matter.

3 CTEM - Arborist Assessment

30. Christchurch City Council developed the CTEM assessment methodology, during the development of the now operative District Plan in 2015. The methodology was based on the Standard Tree Evaluation Method (STEM) which is the nationally recognised tree evaluation method endorsed by both the New Zealand Arboriculture Association and the Royal New Zealand Institute of Horticulture.

31. The evaluation method was originally named STEM+ to reflect is alignment with STEM before being changed to CTEM during the hearings process in 2015/16.

32. CTEM methodology was used for the first time to assess Scheduled Trees as part of the 2015 Christchurch District Plan Review and has been used again to re-assess the Schedule Trees to ensure they meet the CTEM standards.

33. During an Independent Hearings Panel review of the proposed changes in 2015/2016 a revised threshold was agreed for thee categories in CTEM. This was due to submissions from various groups and individuals objecting to the original CTEM thresholds. The categories involved were Shape, Structure and Health. The revised thresholds have been carried through for the purpose of this evaluation.

3.1 CTEM Criteria for Individual Trees

34. Exotic trees

- estimated service life in excess of 20 years (longevity in the landscape); and
- structure, health, to be assessed as either fair, good or very good; and
- shape to be assessed as poor or better; and
- not be causing a "safety" nuisance where there is no mitigation available; and
- a minimum of 15 metres height or an average of 10 metres width; and
- score a minimum total number of 770 evaluation points (including any points awarded under the "Exceptional" evaluation).

770 evaluation points was the lowest score for an exotic tree when the criteria in the first 4 bullet points were applied.

35. New Zealand native trees

- estimated service life in excess of 20 years (longevity in the landscape); and
- structure, health, to be assessed as either fair, good or very good; and
- shape to be assessed as poor or better; and
- not be causing a "safety" nuisance where there is no mitigation available; and
- a minimum of 10 metres height or an average of 8 metres width; and
- score a minimum total number of 690 evaluation points (including any points awarded under the "Exceptional" evaluation).

690 evaluation points was the lowest score for a native tree when the criteria in the first 4 bullet points were applied.

3.2 CTEM Criteria for Group Trees

36. Group of Trees means a cluster, grove, or line of trees (including the root systems) that may be the same or variable species, either planted or naturally occurring that:

- are located in close geographic proximity to each other and meet at least one of the following criteria:
- canopies are touching; or
- canopies are overlapping; or
- there is the potential to form a closed canopy; or
- are environmentally dependent upon each other where the loss of one or more of the trees would have a detrimental effect on all or part of the remaining trees; or
- have an obvious level of visual connectivity through having a similar or complimentary sense of scale or form or age or colour or texture; and
- must not be dispersed, dissected, interrupted, or traversed by a road (including unformed roads) or an empty allotment (that is, an allotment with no notable trees that form part of that group).

37. Similar criteria as those used for individual trees can be used for groups of trees, however the threshold for inclusion/exclusion will be higher than the threshold for individual trees as groups of trees are a larger entity than an individual tree and will therefore score higher overall. A group of trees can consist of two or more trees.

38. Exotic, or a mix of native and exotic trees

- structure and health to be assessed as either good or very good; and
- structure, health, to be assessed as either fair, good or very good; and
- shape to be assessed as poor or better; and
- not be causing a "safety" nuisance where there is no mitigation available; and
- a minimum of 15 metres height or an average of 10 metres width; and
- score a minimum total number of 910 evaluation points (including any points awarded under the "Exceptional" evaluation).

910 evaluation points was the lowest score for a group of trees when the criteria in the first 4 bullet points were applied.

39. New Zealand native trees

- estimated service life in excess of 20 years (longevity in the landscape); and

- structure, health, to be assessed as either fair, good or very good; and
- shape to be assessed as poor or better; and
- not be causing a "safety" nuisance where there is no mitigation available; and
- a minimum of 10 metres height or an average of 8 metres width; and
- score a minimum total number of 870 evaluation points (including any points awarded under the "Exceptional" evaluation).

870 evaluation points was the lowest score for a group of native trees when the criteria in the first four bullet points were applied.

3.3 Condition Evaluation

40. The "Condition Evaluation" in CTEM assesses tree health and tree safety and has separate criteria for the structural condition (safety) and health condition of the tree. There are quantifiable ranges for scoring.

41. Condition evaluation was assessed by an appropriately qualified and experienced arborist.

42. This assessment is to justify the inclusion of the tree(s) in the District Plan as significant trees or groups of trees and also to satisfy the requirement under Part 2 of the RMA that allows for consideration of the health and safety of the owners and occupiers of the properties affected by the scheduling of a tree(s).

43. The assessment was undertaken by visual means only and therefore did not apply scientific calculations or tests or other means when determining the scores for structure and health.

44. The details under "Description" (see tables in "Structure" and "Health") are an established process and currently used by the Council's arborists, including the tree services contractor, when assessing the condition of Council owned trees for the Council's asset management system. The percentages for health are to be marked conservatively. These details have been used by the Council since 2008 and were reviewed by the Council arborists and tree services contractor in 2012.

45. Groups of trees were averaged and not individually assessed.

Table 1: Condition Evaluation CTEM Score

Points	10	30	50	70	90	Score
Structure	Very Poor	Poor	Fair	Good	Very Good	
Health	Very Poor	Poor	Fair	Good	Very Good	

3.3.1 Structure

46. This is an assessment of the structural integrity of a tree's branches, trunk and roots. It considers defects such as cavities, cracks, presence of decay, bleeding/sap flow, wounding and previous failure (e.g. storm damage, mower damage), ground cracking, root plate slumping or heaving, girdling roots, included unions (e.g. branch bark ridges that are included (concave) are considerably weaker than those with a prominent ridge line (convex), trunk taper, excessive end weight, dead branches, loose/cracked bark.

Table 2: Structure Criteria

Points	Condition Rating	Description
10	Very poor	Tree dead or state of severe decline. Total loss of structural integrity of tree. Tree maintenance cannot improve the framework or the continued well-being of tree. Defects (including roots and trunk taper) result in loss of structural integrity, and cannot be rectified.
30	Poor	Tree maintenance unlikely to improve the framework or the continued well-being of tree. Defects (including roots and trunk taper) result in loss of structural integrity, and unlikely to be rectified.
50	Fair	Defects (including roots and trunk taper) present, but can be rectified in order to maintain the structural integrity and continued well-being of tree.
70	Good	Defects (including roots and trunk taper) do not affect structural integrity or continued well-being of tree.
90	Very Good	No structural defects or abnormalities.

3.3.2 Health

47. Tree health assesses both vigour and vitality.

48. Vigour is described as growth efficiency. Trees with higher growth efficiency are more likely to effectively resist strain from, and respond to, biotic and abiotic factors.

49. Vitality is described as the tree's ability to grow and survive in the position that it occupies.

50. When assessing a tree's health the following are assessed:

- leaf colour;
- leaf necrosis;
- shoot growth;
- fruit set;
- live crown ratio;
- foliage density;
- leaf size;
- wound wood;
- absence/presence of lichens on small diameter branching;
- dieback;
- pests and diseases.

Table 3: Health Criteria

Points	Condition Rating	Description
10	Very poor	Tree in more than approximately 70% state of decline.
30	Poor	Tree in approximately 31-70% state of decline.
50	Fair	Below average for species. Tree in approximately 21-30% state of decline.
70	Good	Representative of the species. Tree in approximately 6-20% state of decline.
90	Very Good	Above average for species. Tree in no more than approximately 5% state of decline.

3.4 4.3 Landscape Evaluation

51. "Landscape Evaluation" under the CTEM evaluation requires analysis of trees in relation to the following matters:

- assessment of a tree's shape;
- assessment of the tree's stature i.e. the height or width, whichever is the greater;
- assessment against criteria for the tree's canopy dimension (m^2);
- assessment of the tree's trunk diameter (DBH);
- assessment of the tree's age;
- assessment of the tree's service life (longevity in the landscape);
- assessment against criteria for the tree's visibility (how far it can be seen from);
- assessment against criteria for the tree's location (how many people can see the tree and how often the tree can be seen);
- assessment against criteria for the tree's role;
- assessment against criteria for the tree's suitability in the landscape.

52. The attributes for a Group of Trees will be assessed as a single entity and not for each individual tree itself, however the individual measurements for height, crown spread and DBH will be recorded for each tree.

Table 4: Landscape Evaluation CTEM Scoring

Points		10	30	50	70	90	Score
Shape		Very Poor	Poor	Fair	Good	Very Good	
Stature (m)		3 to 8	9 to 14	15 to 20	21 to 26	27+	
Canopy area (m^2)	Broad spreading	≤10	11 to 25	26 to 57	58 to 100	101+	
	Pyramidal	≤12	13 to 33	34 to64	65 to 100	100+	
	Rectangle	≤36	37 to 72	73 to 120	121 to 280	280 +	
Trunk Diameter (cm)		≤50	51 to 75	76 to 100	101 to 125	126+	
Age (yr)		≤10	10 to 20	21 to 35	35 to 50	50+	
Estimated Service Life		0 – 5	5 – 10	11 – 20	21 – 30	30 +	
Visibility (km)		Obscured	≤ 1	1 > ≤ 2	2 > ≤ 4	4 >	
Location		Location 1	Location 2	Location 3	Location 4	Location 5	
Role		20	40	60	80	100	
Suitability		Very Poor	Poor	Fair	Good	Very Good	

3.4.1 Shape

53. Shape is a measure of how the tree would naturally grow (i.e. "true to form"), undamaged by either natural or un-natural forces. With the exception of very large open spaces, there will be very few trees that grow "true to form" in an urbanised area as pressures from pedestrian and vehicular traffic, overhead services, presence of close by buildings, affect the ability of the tree to co-exist in an unaltered state.

54. "Missing, Modified or Misshapen" means both natural occurrences (e.g. storm damage, windswept, growth extending beyond the main canopy, shedding of branches through natural processes) as well as pruning (including clipping in to a particular shape) and mechanical damage.

55. Groups of trees with a mixture of species were not assessed for being "misshapen" as there is no natural shape for a group of trees and therefore true canopy shape is difficult to assess. Groups of trees with a mixture of species were only assessed for the percentage of canopy missing or modified.

Table 5: Shape Criteria

Points	Condition Rating	Description
10	Very poor	More than approximately 70% of canopy shape missing, modified or misshapen.
30	Poor	Approximately 31-70% of canopy shape missing, modified or misshapen.
50	Fair	Approximately 21-30% of canopy shape missing, modified or misshapen.
70	Good	Approximately 6-20% of canopy shape missing, modified or misshapen.
90	Very Good	No more than approximately 5% of overall canopy shape missing, modified or misshapen.

3.4.2 Stature

56. This criterion assesses either the height or width of the tree, whichever is the greater.

57. Where the entire crown of the tree was not accessible the accessible part was measured and the remainder estimated.

58. Groups of trees were assessed at their highest and widest points, not averaged.

3.4.3 Canopy Area

59. Canopy dimension is a measure of a tree's size as a visual feature in the landscape. It is measured in m^2 and is based on the following calculations[5] obtained from Council's transport and road engineers:

- Half circle –$1/2\pi r^2$;
- triangle – 1/2wh;
- rectangle - wh.

60. Tree shapes can broadly fit into three mathematical formulae:

- Broad spreading as a half circle;
- Conifers as a triangle;
- Palms and cabbage trees as a rectangle.

61. The measurement for the tree's canopy is the width or radius of the drip line plus the height of the canopy (i.e. from the bottom of the canopy to the top of the canopy, NOT the base of the trunk to the top of the canopy unless the canopy extends to the ground level).

62. Trees are dynamic beings, changing regularly through growth and shedding or pruning of limbs, as well as responding to environmental stimuli which also affect their shape. Where a tree does not neatly fall in to any particular formulae (i.e. how the species would naturally grow), the nearest formula to the tree's shape was used.

63. Where a tree has been severely disfigured so as to not fit within any of the shapes it may have been precluded from marking under this section. A digital photograph of the tree was taken to show the canopy disfiguration.

64. Groups of trees were assessed as an entity, with the dimension for width being the average of the north/south and east/west measurements and the dimension for height being the average of the collective heights.

3.4.4 Trunk Diameter

65. Trunk diameter is an internationally recognised measurement for indicating the size of the tree.

66. Trunk Diameter is measured at 1.4 metres from the ground level (Diameter at Breast Height or DBH).

[5] w = width, h = height, r = radius

67. For trees with multiple trunks, such as Pohutukawa, the diameter measurement is the collective measurement of all trunks with a diameter of 100mm or more.

68. For trees on slopes the measurement is taken at the highest point on the ground touching the trunk.

69. Where the entire trunk of the tree was not accessible the accessible part was measured and the remainder estimated.

70. Diameter measurements for Groups of Trees are an average of all trees within the group. Where a tree with multiple trunks is in a Group of Trees, the diameter measurement is the collective measurement of all trunks with a diameter of 100mm or more.

3.4.5 Age

71. The loss of mature trees leaves a gap in the environmental and amenity services that those trees provide to the community; therefore age is an important part of assessing a tree's merits.

72. Development and intensification are placing pressure on the ability to retain large mature trees on private land and it is becoming increasingly uncommon to see trees in excess of 50 years old in urbanised areas that are not on public land.

73. Points are awarded after the tree has been assessed by a qualified arborist who has working knowledge of trees and their respective growth rates in Canterbury.

74. Groups of trees were averaged.

3.4.6 Service Life

75. Service life is a measure of the tree's longevity in the landscape and means the tree's estimated remaining life span that the tree continues to provide environmental, economic, social and cultural services to the community with an acceptable level of tree safety.

76. As this is a subjective evaluation it:

- was undertaken by an appropriately qualified arborist; and
- is based on the tree's condition at the time of assessment; and
- is a conservative estimate.

77. This evaluation does not consider future unforeseen effects on the tree e.g. changing conditions, storm damage, inappropriate pruning, mechanical or other damage that causes internal decay.

Table 6: Estimated Service Life Criteria

Points	Estimated Service Life (Yrs)
10	0 - 5
30	5 - 10
50	11 - 20
70	21 - 30
90	30+

3.4.7 Visibility

78. Visibility is a measure of the prominence of the tree in the wider landscape (i.e. commercial, industrial, urban or rural areas). It is a measure of how far the tree can be seen from, and is different from "Location", which is a measure as to the frequency of viewing.

79. Distances were taken using a naked eye unassisted (with the exception of prescription glasses or contact lenses) and can be from vantage points on the flat (including a ship at sea) but cannot be viewed from an aircraft or balloon.

80. The tree may be viewed from a building or hill where it is reasonable to expect that people would ascend the building or hill in the normal course of business or leisure activities (i.e. you cannot climb the building or hill just to see the tree).

Table 7: Visibility Criteria

Points	Condition Rating	Description (km)
10	Very poor	Totally obscured by other trees or structures
30	Poor	≤ 1
50	Fair	1 > ≤ 2
70	Good	2 > ≤ 4
90	Very Good	4 >

3.4.8 Location

81. Location is a measure of how many people see the tree(s) and is based on site profile (e.g. road hierarchy or major sports stadium versus rural road or rural park).

82. The tree is assessed based on where it is located. e.g. if the tree is located in an urban park that borders an urban arterial road the location is that of urban park - Location 4. Where a tree is located in a private residence (or commercial property that is not listed below) the location is the road hierarchy that the private residence or commercial property is located on i.e. local rural road, local urban road etc. It is not assessed on how far the tree can be seen from as this is assessed under "Visibility".

- Educational facilities means universities, polytechnics, colleges, schools (not including pre-schools)
- Health facilities means public or private hospitals
- Cultural facilities means Maraes and community centres on private land
- Urban Park means Sports Park, Neighbourhood Park, Cemetery, Garden and Heritage Park, Regional Park.

Table 8: Location Criteria

Points	Location	Description
10	Location 1	Local rural road; or Urban private ROW;
30	Location 2	Local urban road; or Rural collector road; or
50	Location 3	Rural industrial estate; or Rural arterial road; or Urban collector road;
70	Location 4	Urban park; or Suburban centre; or Urban industrial estate; or Cultural facilities; or Places of religious worship;
90	Location 5	Urban arterial road or State Highway; or Public mall; or Educational facilities; or Health facilities; or Major sports stadium e.g. Eden Park, AMI Stadium, Westpac Trust Stadium; or Botanic Gardens; or City central business district;

3.4.9 Role

83. The visual and amenity contribution made by a tree in a location and assesses the following:

- Traffic calming;
- Visually screening (includes privacy as well as unsightly views/objects);
- Contribute to property values[6];
- Visually soften hard surfaces;
- Source of food for, or medicinal use by, humans.

84. "Association with tradition" and "reviving cultural images or serving commemorative purposes" are assessed under the "Exceptional" category. "Attractive to fauna" is assessed under the "Environmental and Ecological" category.

85. Role is scored out of a possible 100 points – i.e. each role is worth 20 points.

[6] **Dixon, K. K., and K. L. Wolf. 2007. Benefits and Risks of Urban Roadside Landscape: Finding a Livable, Balanced Response. Proceedings of the 3rd Urban Street Symposium (June 24-27, 2007; Seattle, WA). Washington D.C.: Transportation Research Board of the National Academies of Science.**
Anderson, L. M., & H. K. Cordell. 1988. Residential Property Values Improve by Landscaping With Trees. Southern Journal of Applied Forestry 9: pp. 162-166
Wolf, K. L. 2004. Trees, Parking and Green Law: Strategies for Sustainability. Stone Mountain, GA: Georgia Forestry Commission, Urban and Community Forestry
Ohio Dept of Natural Resources, Division of Forestry http://forestry.ohiodnr.gov/urban
South Carolina Forestry Commission, http://www.state.sc.us/forest/urbben.htm
University of Washington, http://depts.washington.edu/hhwb/Thm_Economics.html

Table 9: Role Criteria

Role	Points
Traffic Calming	20
Visual Screening	20
Contribute to Property Values	20
Visually Soften Hard Landscapes	20
Food Source or Medicinal Use by Humans	20
Total	100

3.4.10 Suitability in the Landscape

86. Suitability in the landscape is based on a tree's health and structural integrity as well as its visual appeal.

87. Visual appeal is measured by its shape, as shape of the tree is a direct correlation to its visual aesthetics.

88. It is also based on whether or not the tree is causing damage to buildings, property or infrastructure and the likelihood of effective mitigation measures.

89. Infrastructure means underground or overhead services (including ancillary equipment such as electrical connection boxes), kerb and channel, road and footpath surfaces.

90. Buildings means residential buildings or structures (including garages, swimming pools, tennis courts but excluding garden sheds, glass houses, pergolas etc) or places of business, education, social gathering, recreation (e.g. community halls, schools, churches, sports club rooms).

91. Property means private paths, driveways, fences, garden sheds, glass houses, pergolas etc.

92. Unhealthy or structurally unsound trees, badly misshapen trees or trees that are causing damage to buildings, property or infrastructure (where there is no likelihood of effective mitigation) are not considered as suitable in the landscape.

93. The lowest scoring descriptor is the defining attribute when scoring this section i.e. if a tree scores 50 for shape (i.e. "Fair) but the tree is causing damage to infrastructure or buildings where there is no possibility of an engineered, arboriculture or property maintenance solution, the tree defaults to a score of 10 and is rated as "Very Poor".

Table 10: Suitability in the Landscape Criteria

Points	Location	Description
10	Very Poor	Tree scores ≤50 for Condition; or Tree scores 10 for Structure, irrespective of any other score; or Tree scores 10 for Shape, irrespective of any other score; or Tree is currently causing damage to infrastructure or buildings where there is no possibility of an engineered, arboriculture or property maintenance solution, irrespective of any other score
30	Poor	Tree scores 50>≤110 for Condition, irrespective of score for Shape; or Tree scores 30 for Shape, irrespective of total score for Condition ; or Tree currently causing damage to infrastructure or buildings which can be rectified or mitigated through an engineered, arboriculture or property maintenance solution; or Trees listed in the Inappropriate Trees and Plants list in the Christchurch City Council's Infrastructure Design Standards for debris problems; or Sheds fruit that is fragrantly objectionable e.g. Female Gingko biloba;
50	Fair	Tree scores 50 for Shape; or Tree likely to cause damage to infrastructure or buildings which could not be rectified or mitigated an engineered, arboriculture or property maintenance solution; or Tree currently causing damage to property which could not be rectified or mitigated through an engineered, arboriculture or property maintenance solution; or Trees listed in the Inappropriate Trees and Plants list in the Christchurch City Council's Infrastructure Design Standards for pest and disease problems; or Sheds debris that hinders grounds maintenance e.g. mowing
70	Good	Tree scores 70 for Shape; or Tree currently causing damage to property which can be rectified or mitigated through an engineered, arboriculture or property maintenance solution; and Tree does not meet any of the other criteria for very poor, poor or fair.
90	Very Good	Tree scores 90 for Shape; and Tree does not meet any of the other criteria for very poor, poor, fair or good.

3.5 Environmental and Ecological

94. "Environmental and Ecological" under the CTEM evaluation is designed to evaluate a tree's environmental and ecological contribution and requires analysis of trees in relation to the following matters:

- assessment of the environmental and ecological services that the tree provides to the community;
- assessment against criteria for the tree's canopy volume (m^3);
- assessment against the occurrence of the tree species.

95. Groups of trees were scored as an entity.

Table 11: Environmental and Ecological CTEM Points

Points		10	30	50	70	90	Score
Services		10 to 19	20 to 39	40 to 59	60-79	80-100	
Stature (m)		3 to 8	9 to 14	15 to 20	21 to 26	27+	
Canopy Volume (m^3)	Broad spreading	≤133	134 to 448	449 to 1061	1062 to 2072	2073+	
	Pyramidal	<93	93 to 231	232 to 521	522 to 894	895+	
	Rectangle	<50	50 to 125	126 to 283	284 to 652	653 +	
Occurrence		Predominant	Common	Infrequent	Rare	Very Rare	

3.5.1 Services

96. Trees are multi functioning green infrastructure assets that provide essential environmental and ecological services which increase in quantity and quality as the tree(s) grows and decrease in quantity and quality as tree health declines.

97. "Services" is a measure of the number of Environmental and Ecological Services that the tree provides and is based on the environmental and ecological services that trees in general provide.

98. Overseas research has shown that the following are a broad range of Environmental and Ecological Services that trees provide:

- oxygen;
- improve air quality (carbon sequestration and removal of other gaseous and particulate pollution);
- manage and improve storm water run-off and quality (improving quality relates to removing phosphorous, nitrogen and some metals in trace amounts, filtering and buffering for waterways);
- recycling of mineral nutrients;
- soil stabilisation and erosion protection;
- wildlife corridor, refuge, shelter or food source;
- critical habitat for indigenous or endemic flora and fauna;
- noise amelioration;
- shade (includes climate change amelioration such as urban heat reduction by cooling hot surfaces, pedestrian and cyclist comfort and UV protection, shading of waterways, buildings, playgrounds etc);
- shelter (from wind, rain, also rain interception).

99. Without the appropriate software programmes it can be difficult to quantify how effective a tree is at delivering those services as effectiveness is directly related to tree health (e.g. Tree is a state-of-the-art software suite from the United States Department of Agriculture Forest Service that provides urban forestry analysis and benefits assessment tools that quantify the environmental services that trees provide).

100. It is, however, possible to quantify the number of services that each individual tree or group of trees is likely to be performing. All trees will provide basic services (e.g. providing oxygen) however not all trees will be providing services such as soil stabilisation and erosion protection, or be critical habitats for indigenous/endemic flora and fauna.

101. While it is also possible to rank each service in importance to each other and have a scoring system based on the importance of those services to the environment and community, attempts to do this identified that this, in itself, is an extremely subjective process. It was felt that a simpler, less subjective method of identifying and scoring tree services would be required.

102. "Services" is scored out of a possible 100 points – i.e. each service is worth 10 points.

Table 12: Environmental Services Criteria

Services	Points
Provide Oxygen	10
Improve Air Quality	10
Improve Water Quality	10
Recycling of Nutrients	10
Soil Stabilisation and Erosion Protection	10
Wildlife Corridor or Refuge/Shelter or Food Source for Wildlife	10
Critical Habitat for Indigenous/Endemic Flora and Fauna	10
Noise Amelioration	10
Shade	10
Shelter	10
Total	100

103. Once the total number of services is quantified (i.e. total out of a maximum of 100 points), they can then be directly linked to the health assessment score under the "Condition Evaluation" to indicate how effective the tree is at delivering those Environmental and Ecological Services i.e. the healthier the tree the more effective it will be at delivering environmental and ecological services to the environment and community.

104. Once assessed the tree can then be linked to the score received in Health as follows:

- Say the same fictitious tree that scored 60 points for "Services" also scored 70 points for Health;
- 70 points is the equivalent of 70%;
- 70% (the points score for Health when turned in to a percentage) of 60 (the points the fictitious tree scored for "Services") is 42.

Table 13: Environmental Services linked with Health Calculation Example

Service	Points	Factor	Score	Health	Total Score
Provide Oxygen	10	1	10		
Improve Air Quality	10	1	10		
Improve Water Quality	10	1	10		
Recycling of Nutrients	10	0			
Soil Stabilisation and Erosion Protection	10	0			
Wildlife Corridor or Refuge/Shelter or Food Source for Wildlife	10	1	10		
Critical Habitat for Indigenous/Endemic Flora and Fauna	10	0			
Noise Amelioration	10	0			
Shade	10	1	10		
Shelter	10	1	10		
Total	100		60	70%	42

Table 14: Environmental and Ecological Evaluation

Points	10	30	50	70	90	Score
Services	10 to 19	20 to 39	40 to 59	60 to 79	80 to 100	

105. In the assessment form 42 points is in the range for awarding 50 points, therefore the fictitious tree would be awarded 50 points for its overall contribution of Environmental and Ecological Services.

3.5.2 Canopy Volume

106. "The use of tree volume, as a measure of tree size, gives a realistic appraisal of the tree in the landscape."[7]

107. Canopy Volume (measured in m^3) measures a tree's bulk and indicates the extent of Environmental Services that it is likely to provide i.e. the larger the bulk of the canopy the greater extent of environmental services the tree provides.

108. Canopy Volume is based on the following calculations (from the CTEM manual):

- Broad spreading trees – $\frac{2}{3}\pi r^3$
- Pyramidal trees - $\frac{1}{3}\pi r^2 h$
- Palms - $\pi r^2 h$

109. Tree shapes can broadly fit into three mathematical formulae:

- Broad spreading as a hemisphere
- Conifers as cones
- Palms and cabbage trees as cylinders

110. The measurement for the tree's canopy is the width or radius of the drip line plus the height, measured from the bottom of the canopy to the top of the canopy. It is too difficult to estimate the size of the root plate as individual trees can be different to each other and trees planted in urban areas are not often given the opportunity to develop 360˚ root systems. This means that the actual size of the tree (canopy and roots) will not be measured, resulting in the full extent of environmental services provided by the tree being underestimated.

111. Trees are dynamic beings and change regularly through growth and shedding or pruning of limbs as well as responding to environmental stimuli which also affect their shape. Where a tree does not neatly fall in to any particular formulae (i.e. how the species would naturally grow), the nearest formulae to the tree's shape will be used. Groups of trees were assessed as an entity, with the dimension for width being the average of the north/south and east/west measurements and the dimension for height being the average of the collective heights.

3.5.3 Occurrence

112. Trees that can be considered as infrequent, rare or very rare have botanical significance. This criterion allows a greater recognition of native species due to their under representation in urban landscapes.

[7] McGarry P.J. and Moore G.M.Dr. The Burnley Method of Amenity Tree Evaluation. Victorian College of Agriculture and Horticulture. Australian Journal of Arboriculture. June 1987.

113. The range is based on the number of trees (or groups of trees of a particular species) within Christchurch and should be completed by experienced arborists with knowledge of Christchurch trees. As one of the largest land owners in Christchurch, a good guide to species occurrence may be found using the Council's asset data base.

3.6 Exceptional Evaluation

114. Due to the time restraints of the assessments; trees identified as Exceptional for Heritage and Botanical values in Appendix 9.4.7.1 Schedules of Significant Trees (Christchurch City and Banks Peninsula) have been proposed to have their status automatically carried forward. Where a tree available to be reviewed and was identified for Exceptional Landscape it was additionally reviewed by the Landscape Architect to ensure it still meet this exceptional status.

115. Trees that receive marks under this category are considered to have a higher level of significance (exceptional significance) by virtue of their landscape, historic, cultural or botanical qualities.

116. Where an individual or group of trees was considered for listing with "Exceptional Evaluation" criteria, specialists were used to verify the listing in terms of its contribution to matters such as landscape setting, historical association etc.

Table 15: Exceptional Evaluation CTEM Score

Recognition	Local	City	Regional	National	International	Score
Points	10	30	50	70	90	
Landscape						
Feature						
Shape						
Contributions to Heritage Setting						
Heritage						
Age 100+						
Association						
Cultural Significance						
Commemoration						
Relict						
Botanical						
Source						
Remnant						
Threatened						
Sub Total						

3.6.1 Landscape

117. Exceptional Landscape under the CTEM evaluation requires analysis of trees in relation to the following matters:

- **Feature;** Trees that have exceptionally large proportions (i.e. special visual interest due to their height, spread, trunk dimensions), unusual or sculptured form (i.e. either a manufactured shape or one caused by natural causes e.g. windswept) as assessed by a qualified landscape architect.

- **Shape;** Trees that are outstanding examples of the natural shape of the species when compared to others at a regional, national or international level as assessed by either a qualified arborist or qualified landscape architect.

- **Contribute to Heritage Setting;** Trees that are on sites currently listed in Appendix 9.3.7.2 Schedule of Significant Historic Heritage of the Christchurch District Plan.

3.6.2 Heritage

118. Exceptional Heritage under the CTEM evaluation requires analysis of trees in relation to the following matters:

- **Age**; Trees with either an authoritative (e.g. assessed by an appropriately qualified and experienced arborist with knowledge of Christchurch trees) or well documented age of 100 years (e.g. dated photograph, written planting records).

- **Association;** There is a recorded association with a major natural or planned event, or an eminent person (e.g. Riccarton House trees and the Deans family) by the presence of a plaque or other written record.

- **Cultural Significance;** Any tree, or species of tree, revered for traditional or cultural significance (including specific food or medicinal use e.g. native trees used by Maori, Gingko fruit by Chinese, cabbage trees as markers for early Maori). In 2015, Native trees were awarded points for regional significance in accordance with the Ngai Tahu Taonga Plant Species list[8] which were confirmed through input from Mahaanui Kurataiao Ltd.

- **Commemoration;** Well documented planting to commemorate an occasion or occasions of importance in New Zealand's history such as battles or treaties.

- **Relict;** A tree is considered as a relict when it is an individual tree that is the last of its kind in the setting.

3.6.3 Botanical

119. Exceptional "Botanical" under the CTEM evaluation requires analysis of trees in relation to the following matters:

- **Source;** Trees with exceptional species qualities or generic derivation and are being, or could be used as, a seed source because of these qualities.

- **Remnant;** Applies to a group of trees that was once wide spread and common but which is now the last of its kind in the setting.

    - native forest (e.g. Deans Bush); or
    - previous land use or activity (e.g. exotic tree plantations, shelter belts etc)
    - small leafed kowhais at Templeton golf course

[8] www.doc.govt.nz

- **Threatened:** This criterion was developed with the assistance of the Council's Botanist. Trees listed as threatened under the criteria developed by the International Union for the Conservation of Nature (IUCN) as:

    - CR - critical
    - EN - endangered
    - VU - vulnerable
    - Nt - near threatened

    Or as a threatened plant of New Zealand as:

    - Nationally critical;
    - Nationally endangered;
    - Nationally vulnerable;
    - Declining;
    - Locally uncommon.
    - Extinct (cannot have rating for extinct);
    - threatened;
    - at risk.

Table 16: Exceptional Botanical Criteria

Points	Description
10	Locally Uncommon, native plants at risk
30	IUCN Nt, Declining, native plants at risk
50	IUCN VU, Nationally vulnerable, native plants threatened
70	IUCN EN Nationally endangered, native plants threatened
90	IUCN CR, Nationally critical, native plants threatened

120. Trees that are on the IUCN list due to their status in their natural environment but are common in New Zealand have not received any marks e.g. *Pinus radiata,* Norfolk Island pine.

4 Landscape Contributions – Landscape Architect Assessment

121. For the purposes of this review, additional landscape contributions assessment have been undertaken to meet the following s77I requirements:

- justifies why that characteristic makes that level of development inappropriate in light of the national significance of urban development and the objectives of the NPS-UD; and
- includes a site-specific analysis that-
    - identifies the site to which the matter relates; and
    - evaluates the specific characteristic on a site-specific basis

122. With consideration as to the characteristics and contributions that Significant trees provide within the landscape, a landscape assessment has been made in relation to the site context, the tree's unique characteristics and its contributions within an urban landscape.

123. Google Streetview and Canterbury Maps were used along with the Arborist's photographs taken on site. The trees were then assessed using the Arborist CTEM "Landscape Evaluation" system.

124. The total "Landscape Evaluation" score under this CTEM assessment could result in a top score of 900 and an average score of 500. Trees or groups of trees that have a Landscape Evaluation score that exceeds 500 are above average and have been considered to generally have a good ideal shape, height and presence within the landscape, when applying the CTEM methodology.

Table 17: CTEM Landscape Evaluation Scoring

Points		10	30	50	70	90
Shape		Very Poor	Poor	Fair	Good	Very Good
Stature (m)		3 to 8	9 to 14	15 to 20	21 to 26	27+
Canopy Dimension (m^2)	**Broad spreading**	≤10	11 to 25	26 to 57	58 to 100	101+
	Pyramidal	≤12	13 to 33	34 to64	65 to 100	100+
	Rectangle	≤36	37 to 72	73 to 120	121 to 280	280 +
Trunk Diameter (cm)		≤50	51 to 75	76 to 100	101 to 125	126+
Age (yr)		≤10	10 to 20	21 to 35	35 to 50	50+
Estimated Service Life		0 – 5	5 – 10	11 – 20	21 – 30	30 +
Visibility (km)		Obscured	≤ 1	1 > ≤ 2	2 > ≤ 4	4 >
Location		Location 1	Location 2	Location 3	Location 4	Location 5
Role		20	40	60	80	100
Suitability		Very Poor	Poor	Fair	Good	Very Good

125. For the purposes of this review, the CTEM Landscape Evaluations scores were additionally rated as follows:

Table 18: Landscapes Contributions CTEM Landscape Evaluation Points Ranking

CTEM Landscape Evaluation Points	Rating
0 to 299	Very Poor
300 to 450	Poor
450 to 500	Poor to Fair
500 to 599	Fair
600 to 699	Fair-Good
700 to 799	Good
800 to 899	Good-Very Good
900	Very Good

126. Plan Change 14 has the purpose to intensify urban development which will result in changes the existing landscape the Significant Trees are located within. The existing context has been described, along with highlighting the Characteristics and Contributions of each tree or tree group, which has been assessed for the benefits it lends to an urban landscape. Again, for the purposes of this review, the Characteristics and Contributions of a tree or tree group were assessed on the following matters;

- **All year greenery;** Evergreen trees retain all or the majority of their foliage throughout the year. Evergreen trees supply an urban landscape with all year greenery as they do not have a significant seasonal loss of leaves. They provide consistency in the landscape and only result in physical change incrementally as they grow. Evergreen trees produce flowers or cones (e.g. Kahikatea, *Dacrycarpus dacrydioides*) as part of their reproductive cycles. These changes may sometimes be hardly noticeable, such as Totara (*Podocarpus totara*); or significantly noticeable, such as Pōhutukawa (*Metrosideros excelsa*) with its red flowers, small-leaved Kowhai (*Sophora microphylla*) with its yellow flowers and Southern Magnolia (*Magnolia grandiflora*) which holds most of its leaves and produces large cream flowers.

- **Seasonal Changes;** Tree species with deciduous growth habit tend to lose their foliage in autumn and winter. Deciduous trees change through the seasons (Figure 3). In autumn, they typically will change from green, to yellow (e.g. Maidenhair Tree, *Ginkgo biloba*), oranges (e.g. Oriental Plane, *Platanus orientalis*) or reds (e.g. Dawn Redwood, *Metasequoia glyptostroboides*). In winter, they will be bare of leaves; the branch formation is visible, creating an architectural form. In the spring, they produce flowers and new leaves. These trees encourage walking in the neighbourhood as walkers are able to experience a different sight. They often draw specific attention in the fall for their colour displays and fallen leaves (e.g. English Oak, *Quercus robur*) and in the spring for their flower displays (e.g. cherry blossoms).

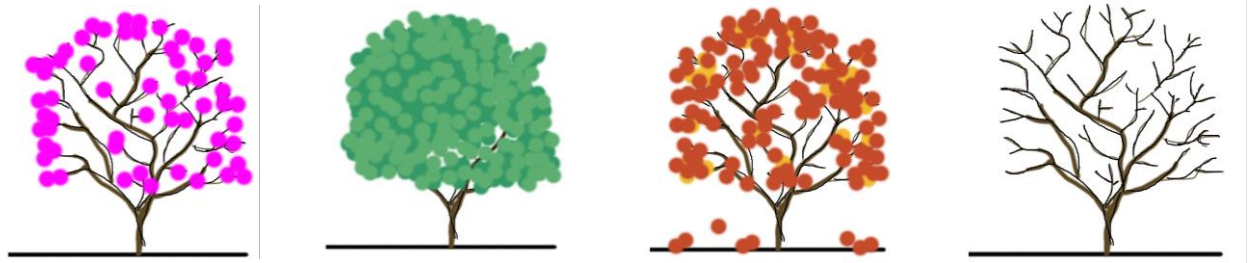

Figure 3: Seasonal changes of a typical deciduous tree from spring to winter

- **Visually soften hard surfaces**; Trees have a varying range of texture and habit, but are generally considered visually soft, fluid and flexible, in contrast to the built form. The texture and characteristics of a tree provide positive contributions to an urban landscape, which typical have solely solid, flat and bold textures.

  The texture of a tree refers to how coarse or fine the overall surface and individual leaves of the plant feel or look (perceived visual texture). Texture can be found in the foliage, flowers, blades, and bark of the plant, as well as in the plant's overall branching pattern. A tree can generally be described as having a coarse, medium, or fine texture. Like form, a variety of textures provides interest and contrast in the landscape.

  - Coarse (Figure 4); texture that is bold and is highly visible from a distance. Typically with large foliage, thick branches and ridged growth patterns. With their high contrast, coarse-textured plants attract the eye and tend to hold it because the light and dark contrasts of the shadows provide more interest. Each leaf of a coarse-textured plant breaks up the outline, giving the plant a looser form. Examples include Cabbage trees (*Cordyline australis*), Puka (*Meryta sinclairii*), and Kawakawa (*Marcopiper excelsum*).
  - Medium (Figure 5); have a mixture of both hard and soft textures within the trees form. They have foliage and branches that are neither overly large nor small and delicate; most plants fall in this category. The average-sized branches are not densely spaced nor widely spaced, and the overall form is typically rounded or mounding. They are characterized by medium-sized leaves with simple shapes and smooth edges. Medium-textured plants act as a background to link and unify

the coarse and fine-textured plants. They may have coarse branches with small leaves, such as Kowhai (*Sophora microphylla*) and Pohutakawa (*Metrosideros excelsa*).

- Fine (Figure 6); typically have a light or flowing form with soft small leaves. Characteristics that create fine texture include small, delicate foliage; thin, strappy leaves (grasses); tall, thin stems; small, fragile twigs with many branches; narrow trunks; long stems (vines); and small, delicate flowers. Fine-textured plants can sometimes have a stronger form because the small individual leaves are densely packed. Examples include, Black Matipo (*Pittosporum tenuifolium*) and Bhutan Cypress (*Cupressus torulosa*).

Figure 4: Coarse Texture

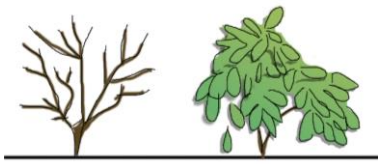

Figure 5: Medium Texture

Figure 6: Fine Texture

The way a tree grows is considered as its habit. Trees have a growth habit that can be grouped into three key habits. A tree is able to have a combination of these habits, where their branches may be vertical but their leaves have a weeping habit.

- Vertical (Figure 7); Where branches grow in an upwards direction. Examples include, Common Lime (*Tilia x europaea*) and Horse Chestnut (*Aesculus hippocastanum*).
- Lateral (Figure 8); Where main branches grow horizontal to the ground. This growth habit is typical of conifers and most trees that have a pyramidal shape. Examples include, Silver Fir (*Abies alba*) and Deodar Cedar (*Cedrus deodara*)
- Weeping (Figure 9); Where branches or leaves have a significant droop growing back towards the ground. Examples include, Camperdown Elm (*Ulmus glabra 'Camperdownii'*) and Japanese Maple (*Acer palmatum*).

Figure 7: Vertical Habit

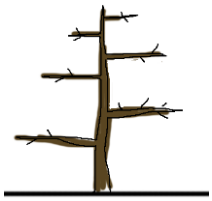

Figure 8: Lateral Habit

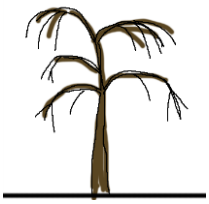

Figure 9: Weeping Habit

- **Visually screening**; trees are a vertical element and are able to provide varying levels of screening. Trees can be used to reduce visual pollution, screening unsightly and undesirable views. Trees contribute to providing privacy, and as well as being able to screen or break up unsightly views or urban forms. Screening can be solid with a dense canopy, and it can be partial with a loose canopy. The leafless branches of a tree bare of vegetation can also provide a filtered screening effect. Trees with wider diameter canopies provide a larger surface area of screening. Tall trees become even more important as urban environments become taller, as they are able to provide screening of these taller elements. Trees with raised canopies can provide screening of windows and overhead utilities and break up solid walls, while enabling the elements such as doors and fences to remain visible. Trees that have low canopies can additionally provide screening for lower items such as utility cabinets and doors, or ground floor windows. In an urban environment, mature trees with low canopies reaching the ground occur only infrequently.

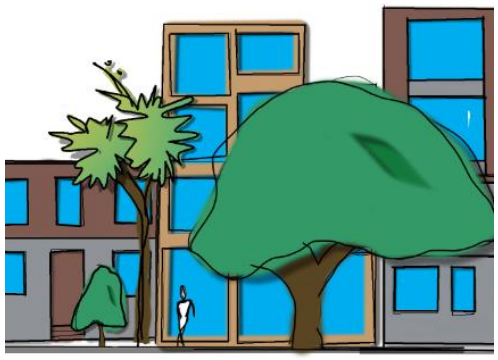

Figure 10: Example urban street with trees providing a range of screening

- **Streetscape;** Where trees overhang the private property boundary into the public streetscape. Trees that overhang into public space contribute shade, shelter, landscape character and provide human scale. Streets with denser tree canopies are associated with road/traffic calming, as they provide a sense of enclosure and road narrowing, thus reducing the speed of moving traffic (Harthoorn, 2017). Where significant Trees or Significant Tree Groups are located on a single road side, but where their canopy is expansive and stretches across part or the whole road reserve, they also may contribute to the streetscape and have a traffic calming effect.

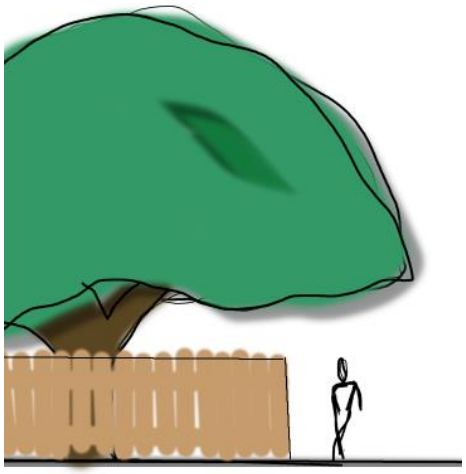

Figure 11: Example of a tree that contributes to the streetscape

Figure 12: Example of a tree that contributes to the streetscape and also contributes to traffic calming

- **Visual perspective:** Trees that are fully within private lots contribute to perceived visual amenity, visually breaking up building bulk. Large trees have the ability to easily extend above 2-3 storied urban development and can be visible to the public when looking through urban blocks. The trees create visual perspective and depth, breaking up and a softening urban form. Where private development exceeds the heights of adjacent trees, these trees still contribute to the local amenity by providing internal breaks to the built form, and by providing screening of the built form.

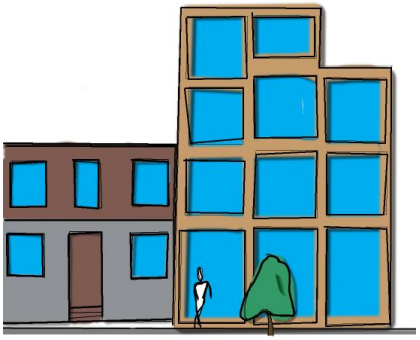

Figure 13: Example of properties with front yard

Figure 14: Example of a tree on private land in the backyard

- **Wayfinding marker;** is a visual point or object within a landscape that can help to guide people through a physical environment. They encompass all of the ways in which people (and animals) orient themselves in physical space and navigate from place to place. Wayfinding is particularly important in complex built environments. Trees, which are visible to the wider community can assist with public navigation through an urban landscape. For example, cabbage trees were traditionally used by Ngai Tahu to navigate Christchurch. Significant Trees have been considered a wayfinding marker where the tree may stand alone, or be located on or very close to an intersection corner, or where the tree marks a vehicle entrance or pedestrian entranceway.

- **Architectural Form;** Where a tree has unique qualities that often resemble a structure, typically these are strongly formed trees with a pyramidal shape. This can also be trees that have been modified in response to, or influenced by the urban landscape, and they have formed or been formed into a unique shape. The unique shapes of these trees can enhance features of the urban landscape. For example, heavily clipped trees or columnar trees are used to complement or create architectural features or to enhance and define features like doorways or riverbanks.

- **Heritage Setting;** Where a tree, or group of trees are located within a current Heritage Setting as per Appendix 9.3.7.2 of the Christchurch District Plan. Description or additional context information of the Heritage Setting was collected from the existing District Plan Heritage Statement associated with the Heritage Item.

127. Trees are also valued as they connect with people's historical associations and memories. In addition, trees within the urban landscapes are easily accessible on a daily basis as they are located in proximity to where people live. In comparison, trees within the rural landscape are further afield and less accessible on a daily basis. Trees are often planted for sentimental or cultural reasons. For Maori and many other cultures, it is cultural practice to bury the placenta to symbolise a baby's link to the earth. The location is often marked with a tree that is watched over and grows with the child. Public and private trees are also planted as markers, as physical links to sister Cities, or as records of notable events and memorials such as the Memorial Oak tree and plaque[9] in the Park of Remembrance, Christchurch. Over time, these trees become even more valuable to the community and provide a human connection with history, though they may not be yet listed as Heritage under the District Plan.

128. Recording these historical human connections becomes more important through time. These connections have been included, where known, for the purposes of this review, as they provide both context and rationale for the scoring methodology. Historical associations were also noted where the tree may be a

[9] The oak was planted in 1924 and grew from an acorn sent back from Gallipoli in 1918 by Lieutenant Douglas Deans.

remnant of a past heritage setting that has been since removed. In addition, records of conversations between the arborist and the landowner on their origins of the tree, or evidence of a plaque or other evidence of note was also included within this review.

4.1 CTEM Exceptional Landscape Evaluation

129. For the purposes of this review, where a Significant Tree is currently listed within the District Plan as Exceptional Landscape Feature, Shape or Contributions to Heritage Setting that tree was reviewed to verify that the tree retained good health and structure, to confirm that it should remain listed as Exceptional.

Table 19: Exceptional Evaluation CTEM Score

Recognition	Local	City	Regional	National	International	Score
Points	10	30	50	70	90	
Landscape						
Feature						
Shape						
Contributions to Heritage Setting						

130. Exceptional Landscape under the CTEM evaluation requires analysis of trees in relation to the following matters:

- **Feature;** Trees that have exceptionally large proportions (i.e. special visual interest due to their height, spread, trunk dimensions), unusual or sculptured form (i.e. either a manufactured shape or one caused by natural causes e.g. windswept) as assessed by a qualified landscape architect.
- **Shape;** Trees that are outstanding examples of the natural shape of the species when compared to others at a regional, national or international level as assessed by either a qualified arborist or qualified landscape architect.
- **Contribute to Heritage Setting;** Trees that are on sites currently listed in Appendix 9.3.7.2 Schedule of Significant Historic Heritage of the Christchurch District Plan.

5 Findings

131. Assessments were made between the 15th April till the 10th of June 2022 by:

- **Heritage Trees**: John Thornton, and Arborists listed below.
- **CTEM:** Liz Warner, Chris Loughborough, Martin Andrews, Craig Taylor, and Toby Chapman
- **Landscape Contributions:** Hilary Riordan and Jennifer Dray

132. Findings of trees and group trees listed in Appendix 9.4.7.1 is located in Attachment A.

133. Trees proposed to be a Qualifying Matter under MDRS, the Landscape Contribution Assessments are attached in Attachment B (Individual Trees) & Attachment C (Tree Groups).

134. In summary:

Table 20: Significant Trees Summary of Outcomes

	Out of scope*	≥100years	Inspection not undertaken	Fail	Pass		Grand Total
Group	2	20	17	35	23		97
Single	445	342	44	47	132		1010
Grand Total	**447**	**362**	**61**	**82**	**155**		**1107**

*Out of scope trees are those that are either located within the Banks Peninsula ward or non-residential areas.

135. Of the trees that passed CTEM, 9 Individual Trees[10] and 2 Tree Groups[11] have been identified to meet or possibly meet Exceptional Significance based on Landscape criteria.

6 Conclusion

136. Trees perform very important environmental, social and cultural services within current and future urban landscapes. Trees that are listed in the Schedule of Significant Trees have the highest legal protection afforded to trees in Christchurch. "Significant" trees should be:

- *large enough to be noticed or have an effect : very important : having a special or hidden meaning* (Webster Miriam);
- *sufficiently great or important to be worthy of attention, noteworthy* (Oxford).

137. Urban intensification under the MDRS will likely result in the loss of medium to large non-protected trees on private land. By providing Significant Trees protection as Section 6 Matters (trees that are ≥100years) or as Qualifying Matters (trees that pass CTEM and provide positive Characteristics and Contributions to the landscape), we are safeguarding these assets for the benefit and enjoyment of future generations.

138. To ensure that privately owned significant trees remain in situ and are not inappropriately removed or damaged, it is necessary to provide them with a high degree of legal protection.

139. Unfortunately, due to the short timelines for the implementation of the MDRS, new trees were not sought for inclusion as Qualifying Matters. The existing District Plan Appendix 9.4.7.1 will also remain in place for all other activities. The District Plan Appendix 9.4.7.1 should be reviewed in full, and it is recommended that there should be further opportunities for the inclusion of additional new trees or tree groups to be nominated by the public, for consideration for their inclusion in the Schedule of Significant Trees and additionally as Qualifying Matters. A continual review of the Significant Tree list is required to ensure the most Significant Trees within Christchurch are being protected.

[10] T15, T48, T57 (existing exceptional tree), T198 (site visit required), T497, T606, T668 & T939
[11] TG1 & TG21