

**BEFORE INDEPENDENT HEARING COMMISSIONERS  
AT CHRISTCHURCH**

**I MUA NGĀ KAIKŌMIHANA WHAKAWĀ MOTUHAKE  
KI ŌTAUTAHI**

**IN THE MATTER  
AND**

**of the Resource Management Act 1991**

**IN THE MATTER**

**of the hearing of submissions and further  
submissions on Plan Change 14 to the  
Operative Christchurch District Plan**

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**STATEMENT OF EVIDENCE OF SOPHIE STRACHAN ON BEHALF OF  
KĀINGA ORA – HOMES AND COMMUNITIES**

**LANDSCAPE**

**20 SEPTEMBER 2023**

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## 1. EXECUTIVE SUMMARY

1.1. My name is Sophie Strachan, and I am an Associate Landscape Architect at Beca Limited. I have been engaged by Kāinga Ora-Homes and Communities (**Kāinga Ora**) to provide landscape evidence in support of its primary submission (submitter #834) on Plan Change 14 (**PC14**) to the Operative Christchurch District Plan (**ODP**).

1.2. 6.1A Qualifying Matter – Pūtarikamotu Riccarton Bush Interface Zone:

(a) The key issue arising is the potential for negative effects of residential intensification on the landscape and heritage values of Riccarton Bush, specifically the visual prominence of Riccarton Bush when viewed from adjacent streets and properties.

(b) In my opinion the proposed 8m height limit will protect the landscape and heritage values of Riccarton Bush. The proposed additional controls have the potential to further limit future development opportunities through controls which are more prescriptive than both the current operative zoning and the proposed PC14 residential zones. (I understand that the legal submissions for Kāinga Ora will address the legality of PC14 proposing more stringent rules than in the ODP.)

1.3. 6.10A Tree Canopy Cover (**TCC**) Rules:

(a) The aspirations of 20% TCC for the city by 2070<sup>1</sup> are commendable. However, I do not think that this is best achieved by applying a 20% TCC requirement to only new residential development – particularly given the MDRS requirements to enable greater density. The application of controls needs to ensure the process is fit for purpose and is relevant to tree growth in the urban environment, with consideration for the constraints of an urban development site.

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<sup>1</sup> As specified in the Ōtautahi Christchurch Urban Forest Plan, which has been adopted by Christchurch City Council.

- (b) There is significantly more complexity in determining compliance with the proposed TCC rules than that of the existing ODP. Enforcement of the rules is also likely to be challenging. In my opinion the current ODP rules, resource consent and Urban Design panel processes, have collectively ensured a good outcome at the Kāinga Ora site examples. In their current form the proposed PC14 TCC rules will not reach the same standard, let alone achieve the 20% TCC aspirations.

## **2. INTRODUCTION**

- 2.1. My full name is Sophie Elizabeth Strachan.
- 2.2. I am an Associate Landscape Architect at Beca Limited.
- 2.3. I hold a Bachelor of Landscape Architecture and am a registered member of the New Zealand Institute of Landscape Architects.
- 2.4. I have thirteen years' experience in the field of landscape architecture, including design, contract administration, and landscape assessment work associated with resource consents and preparation of expert evidence for council hearings.
- 2.5. My career has been based in Christchurch and I have prepared landscape assessments and designs that meet the requirements of the ODP.

### **Code of Conduct**

- 2.6. Although this is a Council hearing, I confirm that I have read the Expert Witness Code of Conduct set out in the Environment Court's Practice Note 2023. I have complied with the Code of Conduct in preparing this evidence and agree to comply with it while giving evidence.
- 2.7. Except where I state that I am relying on the evidence of another person, this written evidence is within my area of expertise. I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed in this evidence.

## Scope of evidence

- 2.8. My evidence covers the following:
- (a) Riccarton Bush – 6.1A Qualifying Matters.
  - (b) 6.10A Tree Canopy Cover and Financial Contributions (TCC rules).
- 2.9. In preparing evidence on the proposed Riccarton Bush matter I undertook at site visit on 17<sup>th</sup> August 2023, and I have considered the following additional material:
- (a) Pūtaringamotu Riccarton Bush Heritage Landscape Review prepared by WSP (2022); (**WSP Report**)
  - (b) Council Submission on PC14, Appendix 1, Attachment 46 – Pūtaringamotu Riccarton Bush – Heritage Landscape Review Addendum prepared by WSP (26 April 2023) (**WSP Addendum**)
  - (c) Beca (2015), Christchurch Suburban Character Area Assessment prepared for Christchurch City Council, Character Area 7: Totara/Hinau/Puriri Assessment.
- 2.10. In preparing evidence on the proposed TCC rules I have considered the following material:
- (a) Section 32 Evaluation Part 7 and associated technical reports prepared by J Morgenroth (Appendix 1 - Ecosystem services), C Meurk (Appendix 2 – Biodiversity – Tree Values), Hilary Riordan and Jennifer Dray (Appendix 3 – Tree Canopy in Urban Landscapes)
  - (b) Section 42A reports prepared by Ms Anita Hansbury (planning), Mr Toby Chapman (Arboriculture), Dr Colin Meurk (Biodiversity), and Prof. Justin Morgenroth (Tree services);
  - (c) Evidence of Mr Jonathan Cleese (Planning), Mr Tim Joll (Planning) and Mr Fraser Colgrave (Economics) for Kāinga Ora;

- (d) Ōtautahi Christchurch Urban Forest Plan 2023 (**Urban Forest Plan**);
- (e) Tree Canopy Cover in Christchurch New Zealand 2016/17 and 2018/19, J Morgenroth (**Tree Report**);
- (f) Resource Management (Enabling Housing Supply and Other Matters) Amendment Act (**Enabling Act**);
- (g) National Policy Statement – Urban Development (**NPS-UD**);  
and
- (h) The Greater Christchurch Spatial Plan 2023 (**Spatial Plan**).

### **3. Riccarton Bush – 6.1A Qualifying Matters**

- 3.1. Riccarton Bush is recognised as an Outstanding Natural Feature (**ONF**) in the ODP<sup>2</sup>.
- 3.2. The proposed Riccarton Bush Qualifying Matter proposes to limit building height in the identified interface area to 8m. The purpose of my evidence is to assess views to the Pūtarikamotu Riccarton Bush and consider the effectiveness/extent of the proposed interface area and associated controls. The extent of the proposed Riccarton Bush Interface area is underpinned by reasoning outlined in the WSP Report. The WSP Report identifies Pūtarikamotu Riccarton Bush (Riccarton Bush) as a sensitive heritage site and setting, with high landscape, heritage and ecological values.
- 3.3. Mahaanui Kurataiao Ltd prepared a statement of manawhenua values for Pūtarikamotu in December 2022<sup>3</sup>. Support for the establishment of a qualifying matter which provides protection for Pūtarikamotu, as a tāonga with significant cultural landscape values, from the potential effects of urban development and intensification was expressed.
- 3.4. The key issue arising is the potential for residential intensification as a result of the requirements in the MDRS, and the negative impact such development might have on the landscape and heritage values of

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<sup>2</sup> ODP Appendix 9.2.9.2.1 Schedule of Outstanding natural features

<sup>3</sup> Mahaanui Kurataiao Ltd – Statement of manawhenua values: Pūtarikamotu. December 2022

Riccarton Bush (in particular, the potential effects of a 12m development height (ie MDRS) on the visual prominence of Riccarton Bush when viewed from adjacent streets and properties).

- 3.5. I agree with the WSP Report in that the landscape and heritage values of Riccarton Bush are worthy of protection. The encroachment of higher density urban development on this highly valued, urban forest remnant in ways that either impact its physical character or detract from its perceptual values, needs to be managed.
- 3.6. During my site visit I went to the representative viewpoint locations outlined in the WSP Report, as well as locations slightly further afield up to approximately 500m from the perimeter of Riccarton Bush. I both drove and walked, in order to understand the types of views (e.g. distance, duration, angle), likely viewing audience and overall importance of the views from the respective locations.
- 3.7. The key focus of the WSP Report's recommendations is to limit building height in the interface area. I agree that a height control in the order of 8m is likely to appropriately manage impacts of any future higher density development on the visual prominence of Riccarton Bush when viewed from adjacent streets.
- 3.8. The WSP Addendum further identifies residential accessways as viewshafts to Riccarton Bush between residential properties which require protection and outlines that, without further bulk and location controls, there is still potential for future development to obscure views of the bush, therefore negatively affecting the heritage and landscape values.
- 3.9. The WSP Addendum suggests further recommendations for additional controls within the built form standards applying to sites in the Riccarton Bush Interface Area. The purpose of these additional controls is to ensure that the proposed changes in PC14 will not detract from and obscure the values for which Pūtarikamotu is considered outstanding. These proposed additional controls include:
  - (a) limits to the number of residential units on a site to two units (ODP no limit for RMDZ);

- (b) 35% site coverage (ODP allows 40% for multi-unit residential complexes in the RSZ, and maximum 50% in RMDZ);
- (c) 4.5m road boundary setback for current Residential Suburban Zone areas (ODP 4.5m);
- (d) 2m road boundary setback for sites on Riccarton Road (ODP allows 4.5m for RSZ and 2m for RMDZ);
- (e) 3m internal side boundary setback (ODP allows 1m for RMDZ and RSZ);
- (f) 450m<sup>2</sup> minimum allotment size (consistent with ODP RSZ);
- (g) 8m Height control for Special Purpose School Zone (ODP allows 10 metres within 20 metres of an internal boundary, otherwise 14 metres).

3.10. These additions to PC14 proposed rules recommended by the WSP Addendum suggest an overall outcome which is more prescriptive than the current ODP controls. These measures further limit the opportunity for intensification and seek to 'retain the current grain of density'.

3.11. I agree that accessways and setback areas along internal boundaries may provide viewshafts toward Riccarton Bush. These may be particularly valuable where properties are located directly adjacent to Riccarton Bush. In most of these locations the bush is easily seen above buildings. Therefore, I find that protecting the setbacks is likely to be unnecessary where a proposed building height control is in place.

3.12. For properties located within larger residential blocks, further away from the bush, these views have less relevance as the viewshafts are often interrupted by trees or buildings on rear sections or are not aligned well for views of the Riccarton Bush. In my opinion, views of the tree canopies above rooflines are those which are of greater importance for protection.

3.13. In my opinion the proposed 8m height limit will protect the landscape and heritage values of Riccarton Bush. The proposed additional controls have the potential to further limit future development

opportunities through controls which are more prescriptive than both the current operative zoning and the proposed PC14 residential zones and are not necessary for the protection of views.

- 3.14. I understand and support Council's rationale for the extent of the proposed Riccarton Bush Interface area and proposed 8m height limit. However, I believe that the proposed additional controls are overly restrictive and would have limited ability to provide any further protection for the landscape values of Riccarton Bush.

#### **4. 6.10A Tree Canopy Cover and Financial Contributions**

- 4.1. I accept the vision and principles behind wanting to achieve greater Tree Canopy Cover for Christchurch as outlined in the Ōtautahi-Christchurch Urban Forest Plan<sup>4</sup> (**UFP**).

- 4.2. The purpose of this section of my evidence is to consider the proposed TCC rules and assess their practical application in the Christchurch urban environment, including:

- (a) What is tree canopy cover and how is it calculated?
- (b) How are the rules applied to individual sites?
- (c) Is 20% coverage a realistic/achievable figure for Residential zones, where intensification is being sought?
- (d) Are there practical limits to the way this is achieved (i.e. use of certain species)?
- (e) What are the landscape-related implications for residential character and suburban development as a result of the 20% requirement?

#### **Method**

- 4.3. To answer these questions, I assessed typical examples of Kāinga Ora developments that have been approved by Christchurch City Council

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<sup>4</sup> <https://ccc.govt.nz/environment/trees-and-vegetation/urbanforest>



(Council) through the Resource Consent process and/or Urban Design Panel, with a focus on the following:

- (a) What is required by the ODP and do existing Kāinga Ora site plans exceed these requirements?
- (b) What do the proposed tree canopy cover provisions look like at these sites and:
  - (i) do the selected sites 'PASS' the proposed rules TCC calculator for sufficient tree canopy cover;
  - (ii) what is the actual canopy coverage for each site likely to be;
  - (iii) do the sites meet the proposed soil area requirements;and
  - (iv) do the sites meet the minimum landscape area width requirements?

4.4. I assessed five multi-unit Kāinga Ora sites ranging in size from 617m<sup>2</sup> to 2140m<sup>2</sup>. All sites exceed the landscape area and tree requirements in the ODP, except for 26 Simeon St. A detailed summary of each site and the testing results is attached to my evidence

4.5. I also undertook a study of my own suburban property and immediate neighbours, located in Woolston, to gain further understanding of what tree canopy coverage 'looks like' for existing residential zones and to think about what obtaining 20% TCC might mean in these areas.

#### **What is tree canopy cover and how is it calculated?**

4.6. The UFP is underpinned by two broad scale Christchurch City canopy cover surveys using aerial imagery and LiDAR data. Tree canopy cover is the total area of tree crowns projected onto the ground, expressed as a percentage of total ground area<sup>5</sup>.

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<sup>5</sup> Morgenroth, J. (2022) 2018/19 Tree Canopy Cover in Christchurch, New Zealand. Prepared for the Christchurch City Council.

- 4.7. The UFP proposes a long-term goal of 20% TCC for Residential land Christchurch by 2070. The short-term goal for residential land is to reach 15% TCC by 2030.
- 4.8. The 20% tree canopy cover requirement proposed in PC14 seeks to achieve these targets but only applies these rules to new residential developments. The rules apply to all residential zones, regardless of density standards across the zones.
- 4.9. In comparison, the MDRS requires that 20% of the site area is set aside for all landscaping, and there are no requirements to retain or plant any trees on the development site.
- 4.10. The current ODP provisions require 20% of the site for landscape area (same as the MDRS) and that at least 50% of landscaping in multi-unit developments or medium density residential zone consists of trees and shrubs. Additionally, ODP rules require one tree per 250m<sup>2</sup> of site area.
- 4.11. The suggested process for determining whether a proposal complies with the 20% tree canopy coverage rules is outlined in section 6.10A.4.2.1. The process includes the following steps and included in further detail in the appendices<sup>6</sup>:
- (a) Determine the area (m<sup>2</sup>) required for TCC.
  - (b) Select trees from the Infrastructure Design Standard (**IDS**) planting list.
  - (c) Note the size class of each species as per the IDS determination.
  - (d) Determine the projected canopy size using the table<sup>7</sup>.
- 4.12. There are several limitations to this process and assumptions that must be made when undertaking compliance checks for individual sites:
- (a) The (IDS) Tree Planting Guide Species List includes the *height* of trees but has no data about tree canopy spread or area.

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<sup>6</sup> Appendix B: PC14 TCC Rule Implementation

<sup>7</sup> Appendix B: 6.10A.4.2.1 Table 1 – Tree size classes with their corresponding height and projected canopy sizes

There is no information (i.e. a formula or reasoning) about how the projected tree canopy cover at maturity is actually calculated from the height data shown. It is unclear when to seek advice on whether the calculation is representative of the tree selection.

- (b) There are many species not included on the IDS planting list, however I do note that application may be made to the Council arborist to have additional species included.
- (c) The tree size classes as per Table 1 include a range of tree heights, but no range of tree spread that would help indicate the form of the tree. When deciding whether a tree is appropriate for a space, it is standard practice to consider the spread of the tree.
- (d) If trees are located on the site in a position where their canopy overhangs the boundary, it is unclear how the portion of canopy outside the boundary should be considered. The full canopy provided by the proposed tree has been included in the testing of the Kāinga Ora development examples and so the results may overstate the TCC within the site boundaries.
- (e) During this process the canopy of an existing tree was calculated at its existing size, it is unclear whether this should be calculated at its mature size.

4.13. When using the method outlined at rule 6.10A.4.2.1 (and above at 4.11) all of the Kāinga Ora sites passed the TCC check. In fact, four of the five sites returned results indicating more than 100% tree canopy cover for the site. The TCC results were:

- (a) 4-10 Amyes Rd – 113%
- (b) 15 Boyne Ave – 26%
- (c) 36 Gilberthorpes Rd/13 Amuri St – 132%
- (d) 219-225 Riccarton Rd – 127%

- (e) 26 Simeon St – 119%
- 4.14. The TCC calculator does not account for:
- (a) Overlapping canopies.
  - (b) Canopies overhanging the site boundary.
- 4.15. Using the online calculator, I then conducted a 'Lower Limit Test' to see how few trees would be required to provide a sufficient tree canopy area and 'pass' the online calculator check. I found that using one or two 'Large' trees was the simplest way to reach the required canopy area, even for a large site.
- (a) 4-10 Amyes Rd – 1x medium, 2x Large
  - (b) 15 Boyne Ave – 1x Large
  - (c) 36 Gilberthorpes Rd/13 Amuri St – 2x Large
  - (d) 219-225 Riccarton Rd – 2x Large
  - (e) 26 Simeon St – 1x Large
- 4.16. In the CCC Infrastructure Design Standard Tree Species List, species such as *Plagianthus regius* are classified as 'Large'. So, for the 2140m<sup>2</sup> site at 4-10 Amyes Road for example, only two *P. regius* and one *Pittosporum tenuifolium* ('Medium') would be required to provide sufficient canopy cover according to the calculations. In my opinion, if this was the outcome for this site then it is unlikely that the goals of the UFP would be met.
- 4.17. The proposed rules including the process, calculator and classification of trees are not fit for purpose and do not produce metrics which are relevant to tree growth in the urban environment, with consideration for the constraints of an urban development site.
- 4.18. Given that TCC is generally expressed in square meters at a site level, I then calculated the potential actual canopy area using tree spread data. This resulted in a much more realistic representation of the potential tree canopy cover at each site, with none reaching the 20%

target. The site at 4-10 Amyes Road achieved 12% canopy cover when calculated by spread.

- 4.19. Spread information is generally sourced from nursery websites. Most websites only provide a height and width estimation for a 10-year timeframe and include a disclaimer that growth rates and final heights may differ due to natural variables. However, a 10-year timeframe provides a target which fits in context with the goals of the UFP. This data is also commonly used by landscape architects in the preparation planting plans and deciding on the appropriateness of a plant for a particular space.
- 4.20. The IDS plant list currently *overstates* the likely tree canopy coverage, and the tool is flawed based on the categorisation as small, medium or large trees. This is likely to have significant repercussions for tree values and landscape outcomes in general at a site level and will not help to meet the ultimate TCC goals.
- 4.21. For the remaining tests of the Kāinga Ora sites I utilised canopy spread data<sup>8</sup> to determine a more accurate representation of potential TCC.

**Is 20% coverage a realistic/achievable figure for Residential zones?**

- 4.22. When assessing my own property and neighbours in a Residential Suburban zone, I found a huge range of tree canopy cover, between 8% and 54% (approximately) across five different sites (refer to appendices).
- 4.23. Achieving 20% TCC on multi-unit development sites which meet the maximum site coverage is not realistic. After assessing the potential canopy cover of the Kāinga Ora sites, I explored whether each site was able to meet the 20% target using additional trees. The resulting plans showing proposed additional trees are included in the appendices to my evidence.
- 4.24. I was able to include additional trees and meet the 20% target for all except one site. However, I believe that the inclusion of these trees

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<sup>8</sup> Via species search: [www.southernwoods.co.nz](http://www.southernwoods.co.nz)

would potentially have negative effects on amenity, including shading/access to sunlight, reduction of access widths and additional maintenance costs. Trees have a greater likelihood of creating a nuisance due to their proximity to vehicles or buildings.

- 4.25. To include the larger canopy trees across the Kāinga Ora sites, this required replacing proposed smaller species which did not qualify for the canopy cover calculations as they were less than 3.5m high. This included the likes of lemon and feijoa trees. Some additional garden bed space would also need to be provided which may affect access areas and widths.

**Are there practical limits to the way the 20% canopy cover is achieved (i.e. use of certain species)?**

- 4.26. Large, broad spreading trees more easily achieve the required canopy cover and are likely to be used by developers as a smaller quantity of plants would be required with a lower up-front cost. These trees would most likely need to be planted adjacent to areas which are used for access and driveways given that this is the large available space free of buildings. This will also potentially result in large portions of tree canopy which overhang boundaries and lesser use of native species as there aren't many large, deciduous broad spreading natives. This outcome does not align with indigenous biodiversity goals in the UFP.
- 4.27. Trees with a columnar form are more practical on sites with a higher proportion of building area (i.e. higher density) or on multi-unit sites as they are less likely to conflict with activities in adjacent spaces. From a site coverage perspective, a large number of columnar trees would be required to meet the 20% coverage requirement, resulting in a higher initial outlay of cost.

**What are the landscape related implications for residential character and suburban development as a result of the 20% requirement?**

- 4.28. When looking at the Kāinga Ora sites which are consented and have been assessed internally by Kāinga Ora, by the Council and some by the CCC Urban Design Panel, I find that they achieved a balanced

outcome with regard to built form, landscape and amenity. They also do not provide 20% tree canopy cover (based on tree spread data).

- 4.29. Meeting the standards of the ODP as well as Kāinga Ora internal guidelines for multi-unit residential developments requires balancing a suite of specific standards<sup>9</sup>. Some of the Kāinga Ora sites provide a landscaping outcome which goes well beyond the minimum requirements of the ODP, such as the example at 219-255 Riccarton Road. If these well-planned, heavily scrutinised designs are not able to achieve the 20% TCC target then I believe this has the potential to make residential development prohibitive for the average developer.
- 4.30. The proposed TCC rules have the potential to alter residential character as development sites may need to forego open lawn areas and/or built form to achieve a 20% tree canopy cover. While the potential outcome may not be undesirable, it may result in a lower density of built form (contrary to MDRS goals) or affect how people use their outdoor living spaces, or design their homes, with a greater potential for shaded areas.

#### **Soil area and minimum landscape area dimensions**

- 4.31. The proposed rules calculate the area required for soil for tree roots from the canopy area of the proposed tree using the following formula:  $((\text{Canopy area} \div 0.092) \times 0.975) \div 27.55$ . Additionally, no more than 20% of the area may be impervious and the planting area must meet a minimum dimension requirement. If the trees do not meet these requirements, then they may not be counted towards the TCC calculation.
- 4.32. When testing each of the Kāinga Ora sites for their compliance with the proposed soil area rules, 25 of a possible 73 trees met the soil area requirements. Of these 25 trees, 21 met the minimum width requirements for their allocated size class and were therefore able to be included in the tree canopy cover area calculation.

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<sup>9</sup> <https://kaingaora.govt.nz/publications/build-partner-publications/design-guidelines/>

- 4.33. It was a relatively time-consuming process to work through each plan looking at each individual tree to determine firstly their tree canopy area, then 80% of the soil area, then the garden bed width.
- 4.34. If this TCC approach is pursued by Council, there will need to be additional information requirements for individuals or consultants preparing Resource Consent plans in order to make the assessment for compliance for the processing officer more straightforward.
- 4.35. As a separate test, I adjusted the soil area formula to use a Canopy area calculated using tree spread. The purpose of this is to better reflect tree growth potential within urban development constraints. This resulted in all except two medium sized trees meeting the minimum soil area requirements.
- 4.36. A discussion should be had around the appropriateness of the soil area requirement (as opposed total impervious area calculation, or specified size of tree at planting, for example) in the urban context of multi-unit developments and increasing density requirements.

#### **Financial contribution calculation**

- 4.37. To finalise the outcome for the Kāinga Ora sites I calculated the financial contribution which would be required for both trees and land area as per 6.10A.4.2.2. Land value estimates were provided for each site by Mr Fraser Colgrave in lieu of a council instructed valuation process.
- 4.38. Limitations to this process include:
- (a) Using an average tree canopy area (130m<sup>2</sup>) which as per previous discussion is calculated using averaged classification data
  - (b) Calculating an average land area based on the above average canopy area
- 4.39. Each of the Kāinga Ora sites would be required to provide a financial contribution, ranging between \$26,000 and \$100,300 additional to providing an outcome which exceeds the current ODP requirements.



## **5. CONCLUSION**

### **5.1. 6.1A Qualifying Matter – Pūtarikamotu Riccarton Bush Interface Zone**

5.1.1. Riccarton Bush is recognised as an Outstanding Natural Feature (ONF) and warrants protection from inappropriate subdivision, use, and development<sup>10</sup>

5.1.2. Mahaanui Kurataiao Ltd identify Pūtarikamotu as a taonga with significant cultural landscape values, which should be protected from the potential effects of urban development and intensification.

5.1.3. The key issue arising is the potential for negative effects of residential intensification on the landscape and heritage values of Riccarton Bush, specifically the visual prominence of Riccarton Bush when viewed from adjacent streets and properties.

5.1.4. I undertook an assessment of views and reviewed relevant background material as outlined in the body of my evidence. In my opinion the proposed 8m height limit will protect the landscape and heritage values of Riccarton Bush. The proposed WSP additional controls have the potential to further limit future development opportunities through controls which are more prescriptive than both the current operative zoning and the proposed PC14 residential zones.

### **5.2. 6.10A Tree Canopy Cover Rules**

5.2.1. I have considered the proposed TCC rules and assessed their practical application in the urban environment. The way TCC is calculated on an individual site has several limitations. These limitations result in ambiguity of compliance and may have detrimental outcomes for site amenity and costs to developers.

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<sup>10</sup> RMA Section 6 – Matters of National Importance

- 5.2.2. I found that 20% TCC and the related soil requirements is not a realistic figure for Residential zones particularly where intensification is being sought. There are a number of design parameters that multi-unit developments a required to meet, and the 20% TCC requirement in its current form is not compatible with the urban outcomes we currently achieve and increasing density that is sought in the future.
- 5.2.3. The aspirations with the UFP of 20% TCC for the city by 2070 are commendable. However, I do not think that this is best achieved by applying a 20% TCC requirement to only new residential development. The application of controls needs to ensure the process is fit for purpose and is relevant to tree growth in the urban environment, with consideration for the constraints of an urban development site.
- 5.2.4. There is significantly more complexity in determining compliance with the proposed TCC rules than that of the existing ODP. Enforcement of the rules is also likely to be challenging. In my opinion the ODP rules, resource consent and Urban Design panel processes have ensured a good outcome at the Kāinga Ora site examples. In their current form the proposed PC14 TCC rules will not reach the same standard, let alone achieving UFP aspirations.



**Sophie Strachan**

**20 September 2023**

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# APPENDIX A

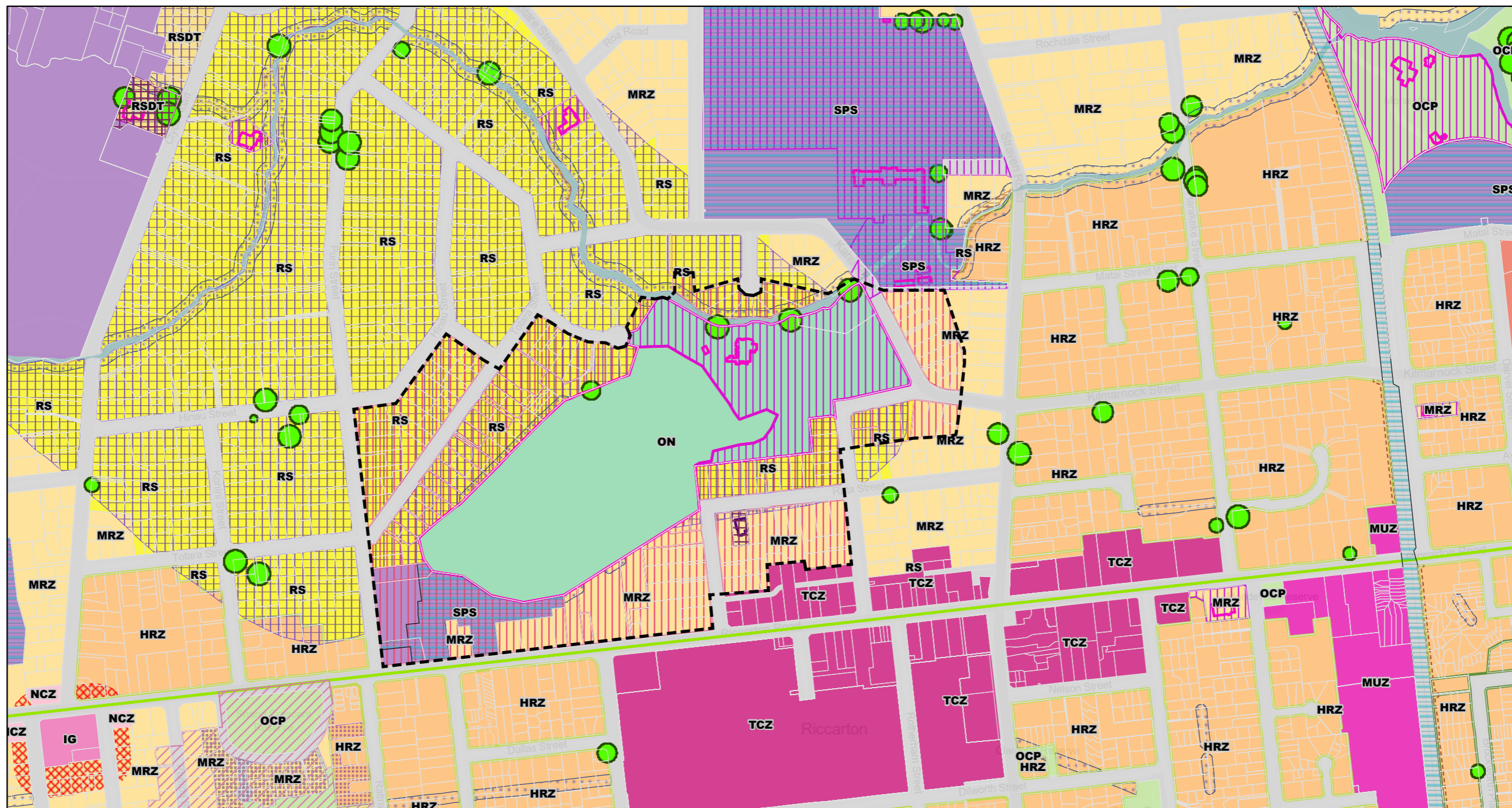
## 6.1A QUALIFYING MATTERS - PŪTARIKAMOTU RICCARTON BUSH

### CONTENTS

#### 1.0 PC14 PROPOSED RICCARTON BUSH INTERFACE AREA

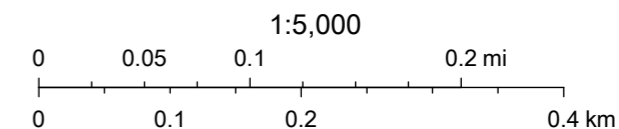
# 1.0 RICcarton BUSH INTERFACE AREA (OUTLINE ADDED)

## Christchurch Proposed District Plan Change 13 & 14



9/7/2023, 2:59:32 PM

- |   |   |  |  |  |
|---|---|--|--|--|
| <ul style="list-style-type: none"> <li> PropertyLayers - PropertyReport</li> <li> Designation</li> <li>Qualifying Matter <ul style="list-style-type: none"> <li> Airport Noise Influence Area</li> <li> Heritage Item</li> <li> Heritage Setting</li> <li> Outstanding Nature Features and Landscapes</li> <li> Railway Building Setback</li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li> Residential Character Area</li> <li> Residential Heritage Area</li> <li> Residential Heritage Area Interface</li> <li> Riccarton Bush Interface Area</li> <li> Significant and other Trees</li> <li> Sites of Cultural Significance</li> <li> Sites of Ecological Significance</li> </ul> | <ul style="list-style-type: none"> <li> Water body Setback</li> <li> Heritage Item Proposed</li> <li> Heritage Setting Proposed</li> <li> Industrial Interface</li> <li> City Spine Transport Corridor</li> <li>Precinct <ul style="list-style-type: none"> <li> Town Centre Intensification Precinct</li> <li> Residential High Density Precinct</li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>Zone <ul style="list-style-type: none"> <li> High density residential zone</li> <li> Medium density residential zone</li> <li> Mixed use zone</li> <li> Neighbourhood centre zone</li> <li> Town centre zone</li> <li> Transport</li> <li> Specific Purpose (School)</li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li> Specific Purpose (Tertiary Education)</li> <li> Industrial General</li> <li> Residential Guest Accommodation</li> <li> Residential Medium Density</li> <li> Residential Suburban</li> <li> Residential Suburban Density Transition</li> <li> Open Space Community Parks</li> </ul> |
|---|---|--|--|--|



Proposed District Plan Change 13 & 14 Online Viewer  
 Disclaimer: The provided descriptions are not part of the District Plan. Christchurch City Council accepts no liability for any error, omission, or inaccuracy of the information in this basic summary.

# APPENDIX B

## 6.10A TREE CANOPY COVER AND FINANCIAL CONTRIBUTIONS

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#### 1.0 URBAN FOREST PLAN - TREE CANOPY COVER

#### 2.0 CCC RULES

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- 2.2 PC14 SOIL AREA REQUIREMENTS
- 2.3 PC14 FORMULA TESTING
- 2.4 TEST TCC CALCULATION USING TREE SPREAD
- 2.5 PC14 TCC RULE IMPLEMENTATION

#### 3.0 KĀINGA ORA SITES - TEST SUMMARY

- 3.1 KO SITE DETAILS
- 3.2 TEST RESULTS AND RESULTING FINANCIAL CONTRIBUTION

#### 4.0 KĀINGA ORA SITES - TREE CANOPY COVER TEST

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- 4.2 15 BOYNE AVENUE
- 4.3 36 GILBERTHORPES ROAD/13 AMURI STREET
- 4.4 219-225 RICCARTON ROAD
- 4.5 26 SIMEON STREET

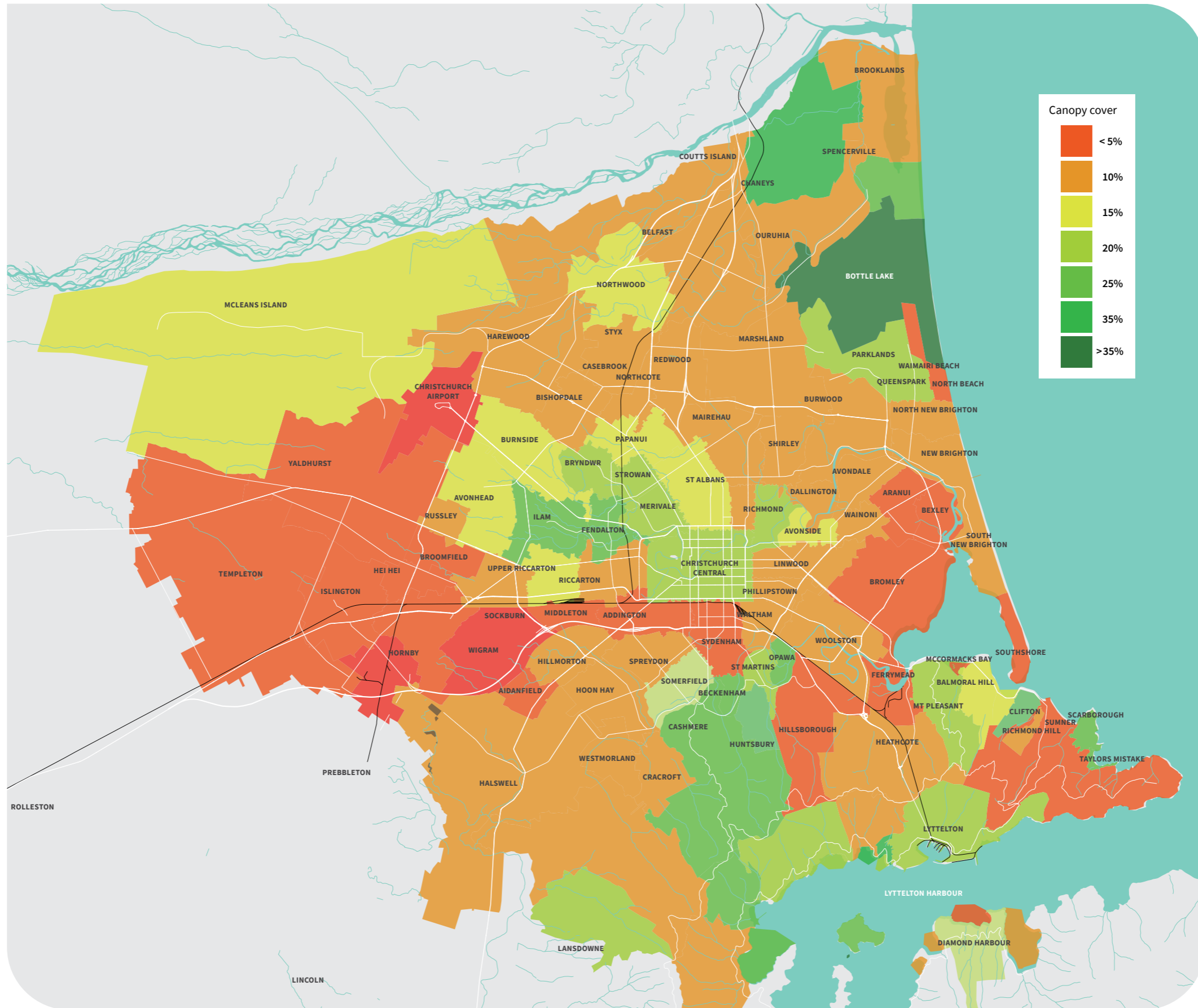
#### 5.0 KĀINGA ORA SITES - SOIL AREA TEST AND INDIV TREE CALCS

- 5.1 4-10 AMYES ROAD
- 5.2 15 BOYNE AVENUE
- 5.3 36 GILBERTHORPES ROAD/13 AMURI STREET
- 5.4 219-225 RICCARTON ROAD
- 5.5 26 SIMEON STREET

#### 6.0 RESIDENTIAL SUBURBAN TEST (WOOLSTON)

# 1.0 URBAN FOREST PLAN - TREE CANOPY COVER DISTRIBUTION 2018/2019

Distribution of canopy cover across the city at 2018/2019



## 2.0 PROPOSED PC14 - 6.10A RULES

### 2.1 PC14 TREE CANOPY REQUIREMENTS

Tree Canopy Requirements

Size classes	Height (m)	Projected canopy size (m <sup>2</sup> )	Soil area (m <sup>2</sup> ) and volume requirements (m <sup>3</sup> )	Minimum berm / planting area width
Small	0 to 6	10	3.8	1.5m
Medium	6 to 12	66.9	25.5	2m
Large	12 to 20	185.9	70.8	2.5m
Very large	20+	250.4	95.4	3m

### 2.2 PC14 SOIL AREA REQUIREMENTS

Soil Area Requirements

Tree Size classification	Land Area (m <sup>2</sup> ) required	80% impervious
Small	3.8	3.04
Medium	25.5	20.4
Large	70.8	56.64
Very Large	95.4	76.32
Average tree size	50	40

### 2.3 PC14 FORMULA TESTING

Tree Canopy Requirements

Size classes	Height (m)	Projected canopy size (m <sup>2</sup> )	Soil area (m <sup>2</sup> ) and volume requirements (m <sup>3</sup> )	Minimum berm / planting area width	Assumed radius " $=\sqrt{C3/PI()}$ "	Assumed average spread
Small	0 to 6	10	3.8	1.5m	1.8	3.6
Medium	6 to 12	66.9	25.5	2m	4.6	9.2
Large	12 to 20	185.9	70.8	2.5m	7.7	15.4
Very large	20+	250.4	95.4	3m	8.9	17.9

### 2.4 TEST TCC CALCULATION USING TREE SPREAD

Spread (m)	Canopy size (m <sup>2</sup> ) " $=PI()*((3/2)^2)$ "
1	0.8
2	3.1
3	7.1
4	12.6
5	19.6
6	28.3
7	38.5
8	50.3
9	63.6
10	78.5

### 2.5 PC14 TCC RULE IMPLEMENTATION

- Determine whether the project is subject to the Tree FC rule. In residential zones the Tree FC applies. For Commercial Mixed Use zones, or any brownfield regeneration project it is unclear. Clause 6.10A.4.2.1(a) states that the rule applies to a brownfield site subject to 'comprehensive residential development', which would potentially include sites in Industrial and Mixed Use Zones.
- Calculate the required tree canopy cover for the site<sup>1</sup>.
- Select the proposed tree species from Council's Infrastructure Design Standards list. The list is designed to guide planting in public open spaces rather than a purpose-made list of species that are appropriate to private medium density properties. For instance, it does not include any varieties of fruit tree<sup>2</sup>, or many other commonly planted garden trees. If the desired species is not on the list (such as a homeowner wishing to plant a lemon or apple tree as part of meeting the canopy requirement) then a separate application has to be made to the Council arborist. No process or timeframe given for such an application<sup>3</sup>.
- A calculation must then be undertaken of the future canopy size of the tree, based on its size class as set out in Table 1 of the rule<sup>4</sup>.
- As noted above, in addition to setting out canopy size, Table 1 also requires an assessment of the pervious land area necessary to support root health<sup>5</sup>. This limitation has significant implications in a medium density context.
- Compare proposed canopy cover to the required canopy cover and identify the size of any shortfall<sup>6</sup>;
- Undertake a calculation to determine Tree FC amount payable. Divide the shortfall in canopy cover by 130. This amount is \$2,037 (+gst) per tree<sup>7</sup>.
- In addition to a FC for the tree purchase and maintenance, the Tree FC also requires applicants to fund land acquisition for the land in which the tree will be planted. Applicants therefore need to calculate the amount of land area by multiplying the number of trees by 50m<sup>8</sup>. Whilst Ms Hansbury<sup>9</sup> alludes to this payment only being necessary if "there is no suitable Council land available nearby", there is no such exemption in the rule or any parameters as to what might qualify as both 'suitable' and 'nearby'.
- Applicants then have to request Council to instruct an independent registered valuer to assess the current market value of land in the area surrounding the development site. There is no time frame for this valuation exercise to be undertaken. Applicants are required to pay for the valuation prior to the valuation being undertaken<sup>10</sup>.
- Calculate the total cost of trees plus land to arrive at the Tree FC payable<sup>11</sup>.

1 Rule 6.10A.4.2.1(a)(i)  
 2 <https://www.ccc.govt.nz/environment/trees-and-vegetation/urbanforest/tree-planting-guide/>  
 3 Ibid, (a)(ii)  
 4 Ibid, (a)(iii)  
 5 Ibid (a)(viii)  
 6 Ibid, (a)(iv)  
 7 6.10A.4.2.2(a)(i)-(iii)  
 8 Ibid, (a)(iv)(A)  
 9 Anita Hansbury s42a, para 5.2.16  
 10 Ibid, (a)(iv)(B)  
 11 Ibid, (a)(iv)(C)



## 3.1 KĀINGA ORA SITE DETAILS

### 4-10 AMYES ROAD, HORNBY RMA/2022/1058

- Zoning – RSDT (ODP), HRZ (PC14)
- 10 Units 2,140m<sup>2</sup>
- 8 x 2-bedroom and 2 x 4-bedroom units
- Total landscaping required: (includes tree and shrub plantings and lawn space): 427.8m<sup>2</sup> or 20% site coverage
- Total Landscaping proposed: 656m<sup>2</sup> (30.5%)
- Tree and shrub plantings- 213.9m<sup>2</sup> or 50% of the total landscaping effort.
- Total tree and shrub planting proposed: 245m<sup>2</sup>
- Lawn areas - 213.9m<sup>2</sup> or 50% the total landscaping effort.
- Total lawn area proposed: 411m<sup>2</sup>
- A minimum of 9 new specimen trees required including 1 tree adjacent to the road boundary. 25 new specimen trees are proposed, including 6 adjacent to the road boundary.

### 15 BOYNE AVE, PAPANUI RMA/2022/241

- Zoning – RS (ODP), HRZ (PC14)
- 4 x one bedroom Units 799m<sup>2</sup>
- The consented landscaping achieves an approximate planting area of 162m<sup>2</sup> or 20% of soft landscaping.
- 3 tree minimum required, the consented planting includes a minimum of 3 new trees and the retention of an existing tree.

### 36 GILBERTHORPES ROAD/13 AMURI ST, HEI HEI RMA/2022/1009

- Zoning – RMD (ODP), MRZ (PC14)
- 5 units 1,424m<sup>2</sup>
- 3x 1 bedroom units and 2 x 4 bedroom units
- Based on a site area of 1,424m<sup>2</sup>, a total area of 284.8m<sup>2</sup> (20%) is required to be landscaped, of which at least 142.4m<sup>2</sup> (50%) of the landscaping efforts should be trees and shrubs.
- At least 1 tree is required to be planted at the adjacent to the street frontage (both Gilberthorpes and Amuri Road) and a minimum of 6 trees are required across the combined site.
- Total landscaping- 436m<sup>2</sup> (including lawn space) or 30.6% site coverage.
- Trees and shrubs- 301m<sup>2</sup> of the overall landscaping effort.
- One new specimen tree adjacent to the site's road frontage and a total of 7 specimen trees across the site.

### 219-225 RICCARTON ROAD, RICCARTON RMA/2020/2123

- Zoning – RSDT (ODP), MRZ (PC14)
- 20 x 1 bed units
- Example of three storey development so similar scale to anticipated by MDRS
- Total soft landscaped area of approximately 438m<sup>2</sup>, which equates to approximate 25% of the site, of which more than 50% will be trees and plantings.
- Planting includes a minimum of 18 trees across the site including at least 9 new trees adjacent to the street boundary.

### 26 SIMEON STREET, SPREYDON

- Zoning – RSDT (ODP), MRZ (PC14)
- 4 x 2 bed units 617m<sup>2</sup>
- Example of smaller development site typical in a medium density area. One section where a single house is removed to be replaced by multiple units
- Landscape area required – 20% min
- Landscape area consented – 17% with 100% trees and shrubs i.e. no lawn areas
- 11 trees provided (4 required)

### 3.2 KĀINGA ORA SITES - TEST SUMMARY SPREADSHEET

Sensitivity: General

	Spread (m)	Canopy size (m2)	Qty	Site area	TCC		Shortfall (m2)	OR Additional trees	
					(by rule)	(by spread)		Qty	m2
<b>4-10 Amyes Road</b>									
Hoheria angustifolia (L)	6	28.27	2		371.8	56.5		6	169.6
Plagiathus regius (L)	4	12.57	4		743.6	50.3			
Pit. tenuifolium (M)	3	7.07	5		334.5	35.3		1	7.1
Sophora microphylla (L)	3	7.07	5		929.5	35.3			
Malus 'Monty's Surprise' (S)	5	19.63	4		40	78.5			
<b>Total</b>			20	2140	<b>113%</b>	<b>12%</b>	172.0	7	176.7
<b>15 Boyne Ave</b>									
Magnolia 'LG' (S)	3	7.07	1		10	7.1		6	42.4
Prunus 'Thundercloud' (M)	4	12.57	3		200.7	37.7		6	75.4
<b>Total</b>			4	799	<b>26%</b>	<b>6%</b>	115.0	12	117.8
<b>36 Gilberthorpes Road/13 Amuri St</b>									
Pit.eugenoides (M)	3	7.07	3		200.7	21.2			0.0
Plagiathus regius (L)	4	12.57	3		557.7	37.7		3	37.7
Pse. crassifolius (L)	3	7.07	4		743.6	28.3		4	28.3
Sophora microphylla (L)	3	7.07	2		371.8	14.1			0.0
Pyrus 'Aristocrat' (L)	5	19.63	*added to test potential compliance					6	117.8
<b>Total</b>			12	1424	<b>132%</b>	<b>7%</b>	183.5	13	183.8
<b>219-225 Riccarton Rd</b>									
Acer davidii (M)	4	12.57	3		200.7	37.7			0.0
C. 'Eddies WW' (M)	4	12.57	7		468.3	88.0			0.0
Malus 'Braeburn' (S)	3	7.07	4		40	28.3			0.0
Plagiathus regius (L)	4	12.57	2		371.8	25.1		2	25.1
Pyrus 'Aristocrat' (L)	5	19.63	2		371.8	39.3		3	58.9
Pyrus 'Conference' (L)	3	7.07	2		371.8	14.1			0.0
Sophora fulvida (M)	3	7.07	6		401.4	42.4			0.0
<b>Total</b>			26	1752	<b>127%</b>	<b>16%</b>	75.5	5	84.0
<b>26 Simeon Street</b>									
Cercis c. 'Forest Pansy' (M)	5	19.63	2		133.8	39.3			0.0
Pse. Ferox (M)	2	3.14	9		602.1	28.3			0.0
<b>Total</b>			11	617	<b>119%</b>	<b>11%</b>	55.9	0	0.0

Soil area required (m2)	80% pervious	Min width of planting area	Qualifying m2	Shortfall m2	Financial Contribution	
					Land value/m2	
By avg rule	By avg rule	Req by rule			Trees	Land area
141.6	113.3	2.5m				
283.2	226.6	2.5m				
127.5	102.0	2m				
354	283.2	2.5m				
15.2	12.2	1.5m				
921.5	737.2		38.3	389.7	\$ 425.00	\$ 6,106.91 \$ 63,707.30
					\$	<b>69,814.21</b>
3.8	3.0	1.5m				
76.5	61.2	2m				
80.3	64.2		0.0	159.8	\$ 382.00	\$ 2,503.94 \$ 23,478.31
					\$	<b>25,982.25</b>
76.5	61.2	2m				
212.4	169.9	2.5m				
283.2	226.6	2.5m				
141.6	113.3	2.5m				
713.7	571.0		36.0	248.8	\$ 597.00	\$ 3,897.72 \$ 57,116.87
					\$	<b>61,014.60</b>
76.5	61.2	2m				
178.5	142.8	2m				
15.2	12.2	1.5m				
141.6	113.3	2.5m				
141.6	113.3	2.5m				
141.6	113.3	2.5m				
153	122.4	2m				
848.0	678.4		124.6	225.8	\$ 1,114.00	\$ 3,538.66 \$ 96,761.53
					\$	<b>100,300.18</b>
51	40.8	2m				
34.2	27.4	1.5m				
85.2	68.2		2.7	120.7	\$ 810.00	\$ 1,890.97 \$ 37,596.62
					\$	<b>39,487.59</b>

# 4.1 4-10 AMYES ROAD

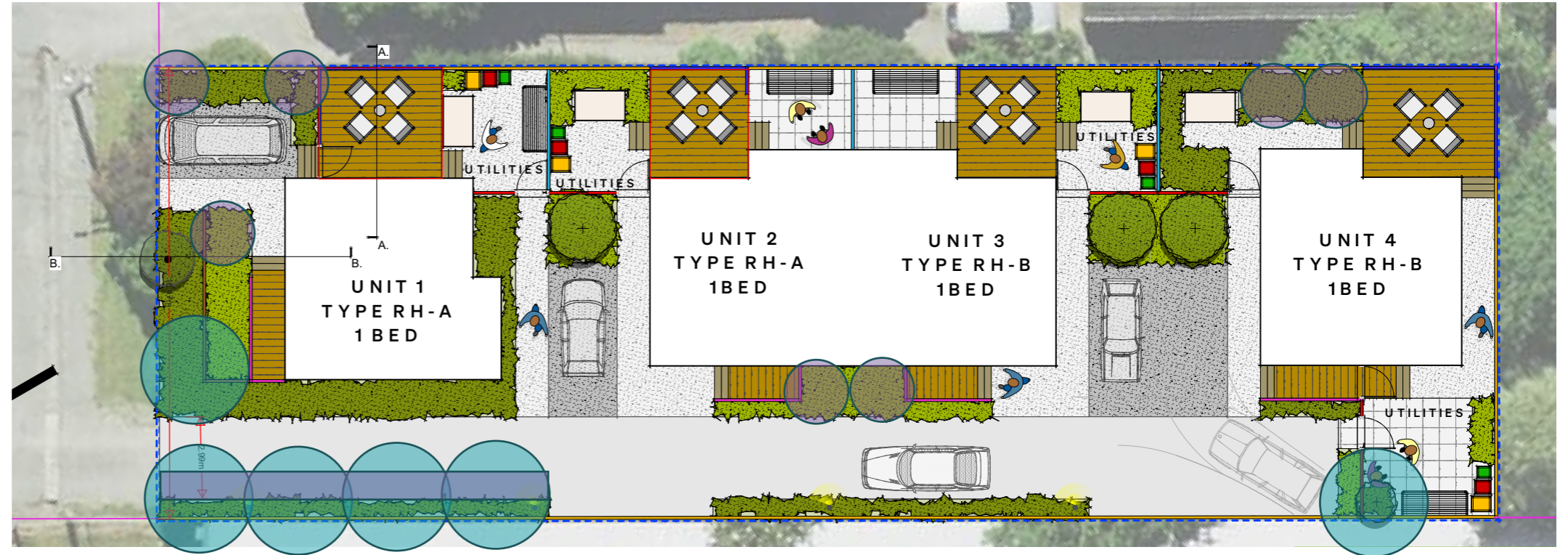
## KĀINGA ORA SITES - TREE CANOPY COVER TEST



4-10 Amyes Road	Spread (m)	Canopy size (m <sup>2</sup> )	Qty	TCC (m <sup>2</sup> )	Site area	TCC %	Shortfall (m <sup>2</sup> )	Financial Contribution	OR Additional trees	
									Qty	m <sup>2</sup>
Hoheria angustifolia (L)	6	28.27	2	56.5					6	169.6
Plagiathus regius (L)	4	12.57	4	50.3						
Pit. tenuifolium (M)	3	7.07	5	35.3					1	7.1
Sophora microphylla (L)	3	7.07	5	35.3						
Malus 'Monty's Surprise' (S)	5	19.63	4	78.5						
			20	256.0	2140	12%	172.0	\$2,694.48	7	176.7

## 4.2 15 BOYNE AVENUE

### KĀINGA ORA SITES - TREE CANOPY COVER TEST

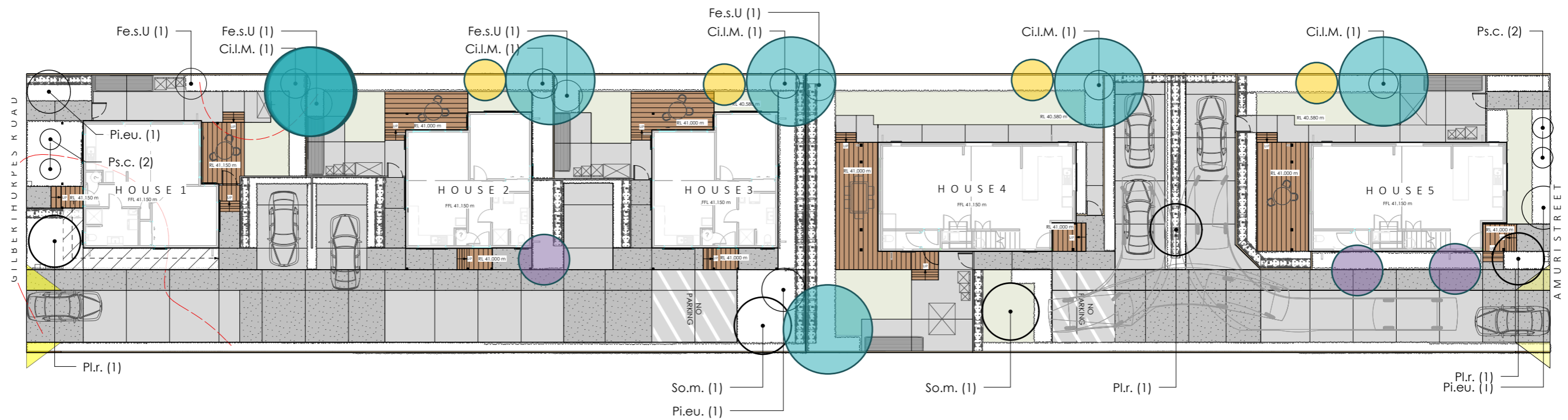


	Spread (m)	Canopy size (m <sup>2</sup> )	Qty	TCC (m <sup>2</sup> )	Site area	TCC %	Shortfall (m <sup>2</sup> )	Financial Contribution	OR Additional trees
15 Boyne Ave									
Magnolia 'LG' (S)	3	7.07	1	7.1					6 42.4
Prunus 'Thundercloud' (M)	4	12.57	3	37.7					6 75.4
<b>Total</b>			<b>4</b>	<b>44.8</b>	<b>799</b>	<b>6%</b>	<b>115.0</b>	<b>\$1,802.47</b>	<b>12 117.8</b>

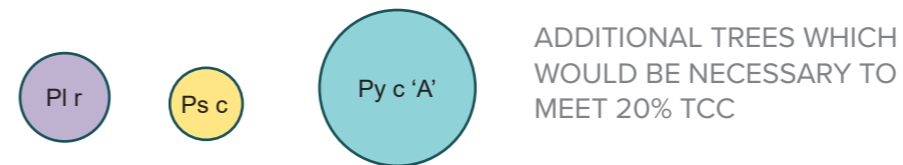
M 'LG'
 Pr 'T'
 ADDITIONAL TREES WHICH WOULD BE NECESSARY TO MEET 20% TCC

# 4.3 36 GILBERTHORPES ROAD/13 AMURI STREET

## KĀINGA ORA SITES - TREE CANOPY COVER TEST



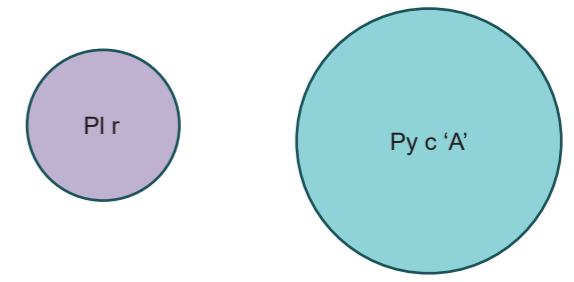
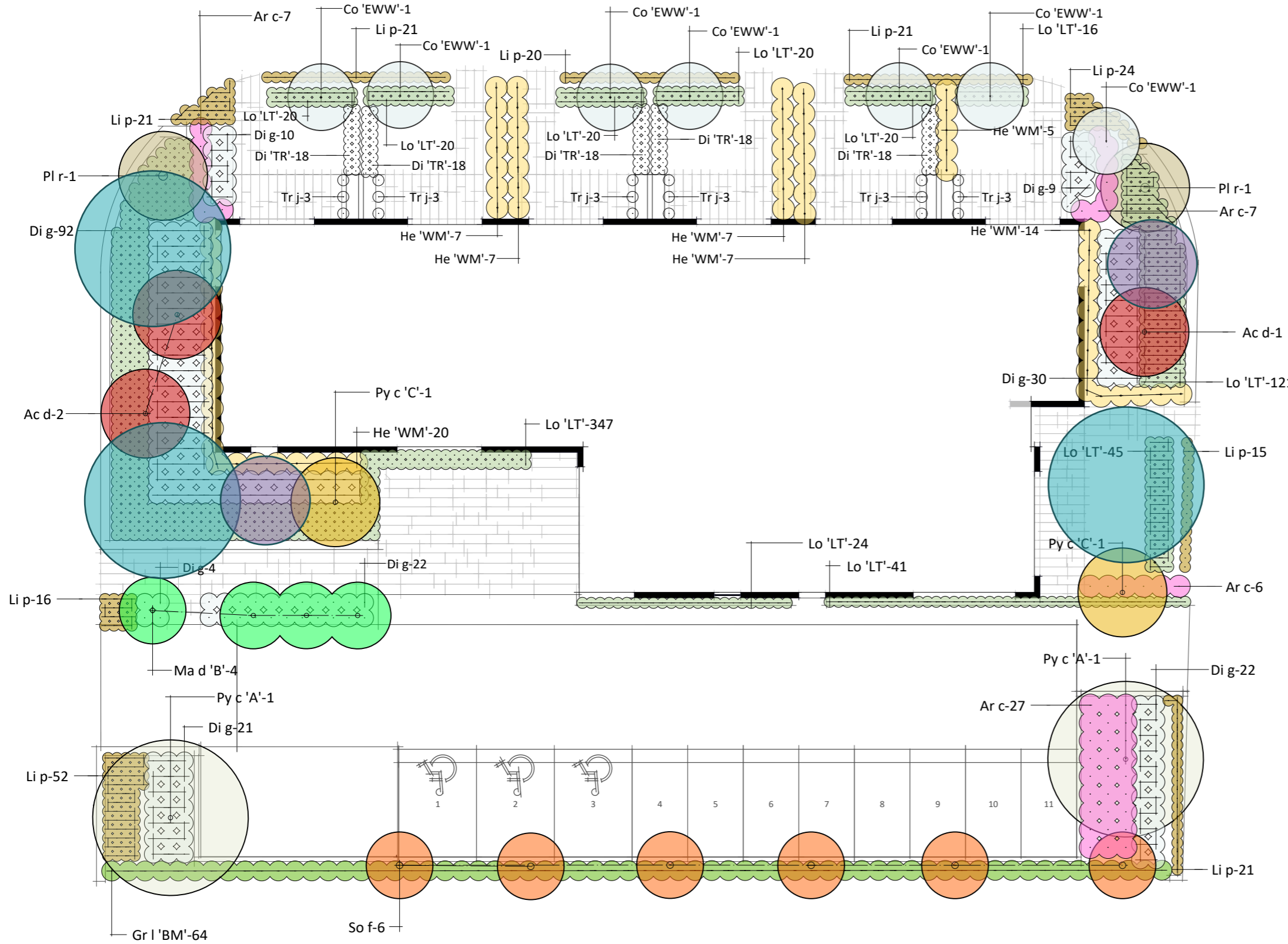
	Spread (m)	Canopy size (m2)	Qty	TCC (m2)	Site area	TCC %	Shortfall (m2)	Financial Contribution	OR Additional trees
36 Gilberthorpes Road/13 Amuri St									
Pit.eugenoides (M)	3	7.07	3	21.2					0.0
Plagiathus regius (L)	4	12.57	3	37.7					3
Pse. crassifolius (L)	3	7.07	4	28.3					4
Sophora microphylla (L)	3	7.07	2	14.1					0.0
Pyrus 'Aristocrat' (L)	5	19.63							6
<b>Total</b>			12	101.3	1424	7%	183.5	\$2,875.05	13



# 4.4 219-225 RICcarton ROAD

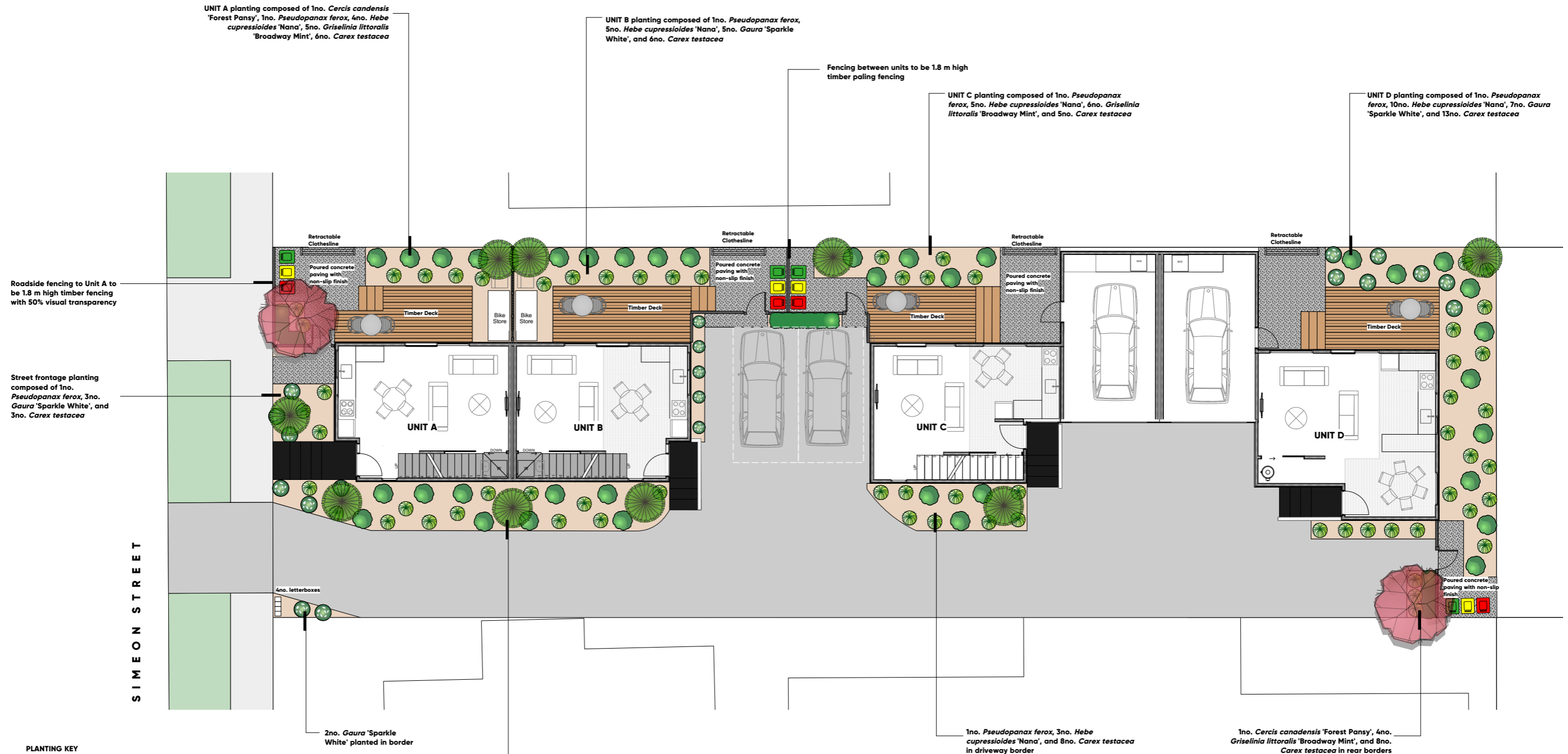
## KāINGA ORA SITES - TREE CANOPY COVER TEST

	Spread (m)	Canopy size (m <sup>2</sup> )	Qty	TCC (m <sup>2</sup> )	Site area	TCC %	Shortfall (m <sup>2</sup> )	Financial Contribution	OR Additional trees	
219-225 Riccarton Rd										
Acer davidii (M0)	4	12.57	3	37.7					0.0	
C. 'Eddies WW' (M)	4	12.57	7	88.0					0.0	
Malus 'Braeburn' (S)	3	7.07	4	28.3					0.0	
Plagiathus regius (L)	4	12.57	2	25.1					2	
Pyrus 'Aristocrat' (L)	5	19.63	2	39.3					3	
Pyrus 'Conference' (L)	3	7.07	2	14.1					0.0	
Sophora fulvida (M)	3	7.07	6	42.4					0.0	
<b>Total</b>			<b>26</b>	<b>274.9</b>	<b>1752</b>	<b>16%</b>	<b>75.5</b>	<b>\$1,183.19</b>	<b>5</b>	<b>84.0</b>



# 4.5 26 SIMEON STREET

## KĀINGA ORA SITES - TREE CANOPY COVER TEST



**PLANTING KEY**



*Cercis canadensis* 'Forest Pansy' (2no. total)

*Pseudopanax ferox* (9no. total)

PLANT SCHEDULE			
QTY	BOTANICAL NAME	GRADE / HEIGHT	MATURE HEIGHT
2	<i>Cercis canadensis</i> 'Forest Pansy'	1.5 m+	5 m
61	<i>Carex testacea</i>	0.5L Pot	0.6 m
36	<i>Hebe cupressioides</i> 'Nana'	2.5L Pot	0.7 m
20	<i>Gaura</i> 'Sparkle White'	1.5L Pot	0.6 m
15	<i>Griselinia littoralis</i> 'Broadway Mint'	3.0L Pot	Clipped to 2 m
9	<i>Pseudopanax ferox</i>	1.5 m+	4 m

SITE TOTAL - 617 m<sup>2</sup>  
 LANDSCAPING TOTAL - 106 m<sup>2</sup>  
 TREE / SHRUB PLANTING - 106 m<sup>2</sup>

RI: Major layout revisions  
 RD: Issued for Consent

NOTES:  
 1. ALL TREES SHALL BE NOT LESS THAN 1.5 METRES HIGH AT THE TIME OF PLANTING.  
 2. ALL TREES AND PLANTING SHALL BE MAINTAINED AND IF DEAD, DISEASED OR DAMAGED, SHALL BE REPLACED.

# 5.1 4-10 AMYES ROAD

## KĀINGA ORA SITES - SOIL AREA TEST AND INDIV TREE CALCULATIONS

	Qty	Spread (m)	Canopy size (m <sup>2</sup> )	Pervious soil area provided	Above 80%	Landscape area min width (m)	Width on plan	Qualifying m <sup>2</sup>
<b>4-10 Amyes Road</b>								
Hoheria angustifolia (L)	2	6	28.27	20.7	0.73	2.5		
		6	28.27	8.7	0.31	2.5		
Plagiathus regius (L)	4	4	12.57	11.6	0.92	2.5	5.96	11.61
		4	12.57	7.4	0.59	2.5		
		4	12.57	8.2	0.65	2.5		
		4	12.57	6.0	0.48	2.5		
Pit. tenuifolium (M)	5	3	7.07	5.2	0.74	2.0		
		3	7.07	5.0	0.71	2.0		
		3	7.07	5.2	0.73	2.0		
		3	7.07	5.2	0.73	2.0		
		3	7.07	6.6	0.93	2.0	5.42	6.56
Sophora microphylla (L)	5	3	7.07	6.6	0.93	2.5	8.68	6.57
		3	7.07	7.1	1.00	2.5	3.27	7.07
		3	7.07	4.8	0.68	2.5		
		3	7.07	6.5	0.91	2.5	2.77	6.46
		3	7.07	2.9	0.41	2.5		
Malus 'Monty's Surprise' (S)	4	5	19.63	11.0	0.56	1.5		
		5	19.63	13.0	0.66	1.5		
		5	19.63	8.4	0.43	1.5		
		5	19.63	6.2	0.32	1.5		
				128.5				38.26





## 5.2 15 BOYNE AVENUE

### KĀINGA ORA SITES - SOIL AREA TEST AND INDIV TREE CALCULATIONS

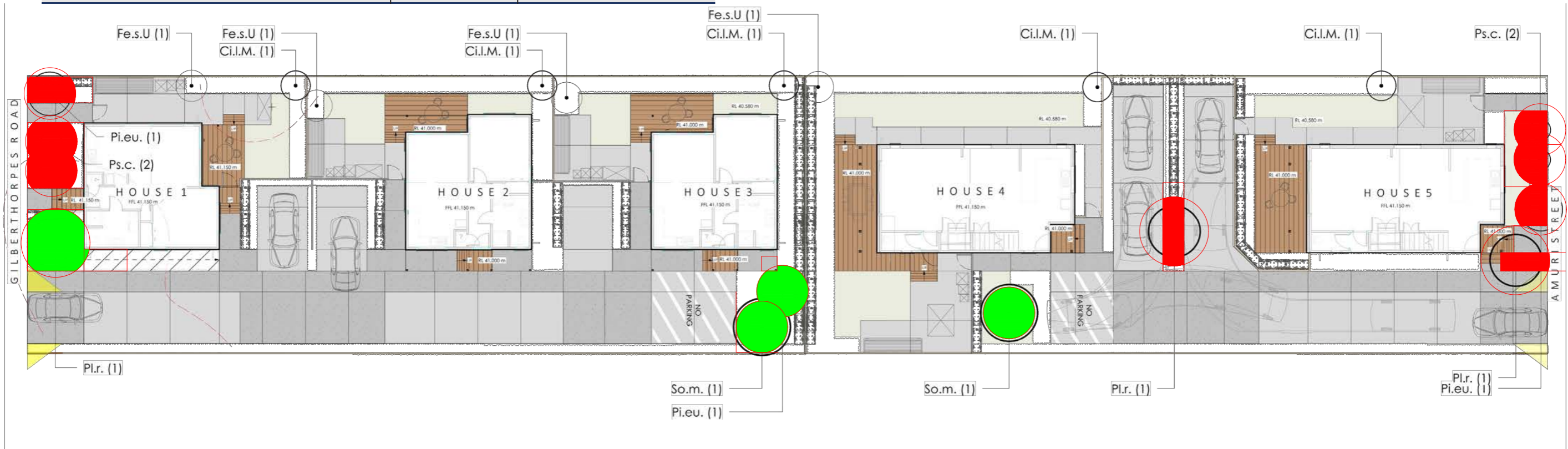
	Qty	Spread (m)	Canopy size (m2)	Pervious soil area provided	Above 80%	Landscape area min width (m)	Width on plan	Qualifying m2
<b>15 Boyne Ave</b>								
Magnolia 'LG' (S)	1	3	7.07	2.3	0.33	1.5		
Prunus 'Thundercloud' (M)	3	4	12.57	6.3	0.50	2.0		
		4	12.57	6.4	0.51	2.0		
		4	12.57	7.7	0.61	2.0		
<b>Total</b>				8.6				



# 5.3 36 GILBERTHORPES ROAD/13 AMURI STREET

## KĀINGA ORA SITES - SOIL AREA TEST AND INDIV TREE CALCULATIONS

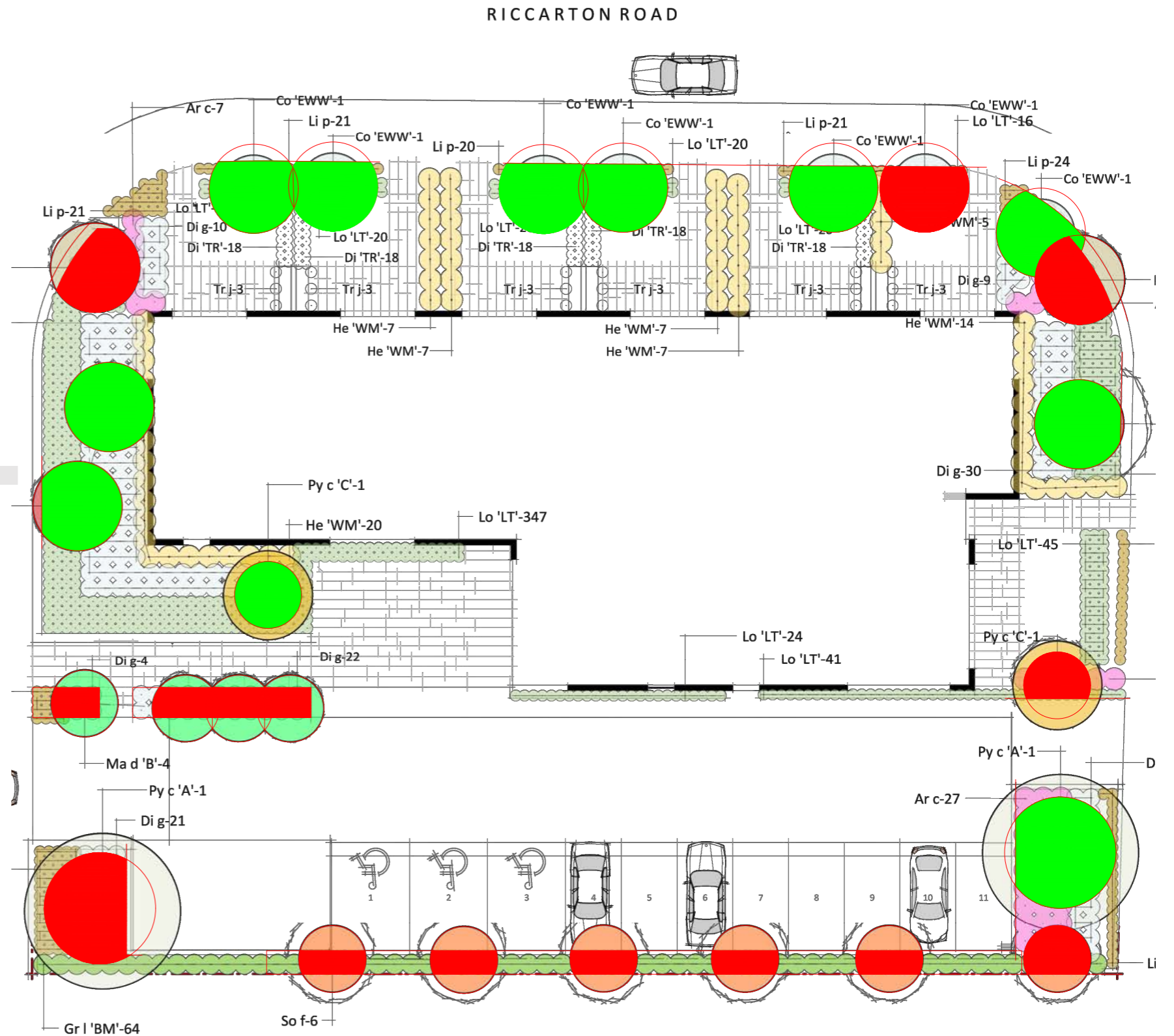
	Qty	Spread (m)	Canopy size (m <sup>2</sup> )	Pervious soil area provided	Above 80%	Landscape area min width (m)	Width on plan	Qualifying m <sup>2</sup>
<b>36 Gilberthorpes Road/13 Amuri St</b>								
Pit.Eugenoides (M)	3	3	7.07	4.0	0.57	2.0		
			7.07	11.0	1.55	2.0	4.80	10.97
			7.07	4.0	0.57	2.0		
Plagiathus regius (L)	3	4	12.57	11.0	0.87	2.5	3.28	10.96
			12.57	4.8	0.38	2.5		
			12.57	3.0	0.24	2.5		
Pse. crassifolius (L)	4	3	7.07	5.3	0.75	2.5		
			7.07	5.1	0.72	2.5		
			7.07	3.5	0.50	2.5		
			7.07	4.0	0.57	2.5		
Sophora microphylla (L)	2	3	7.07	7.1	1.00	2.5	4.72	7.06
			7.07	7.1	1.00	2.5	4.53	7.07
<b>Total</b>				62.7				36.05



# 5.4 219-225 RICCARTON ROAD

## KĀINGA ORA SITES - SOIL AREA TEST AND INDIV TREE CALCULATIONS

	Qty	Spread (m)	Canopy size (m <sup>2</sup> )	Pervious soil area provided	Above 80%	Landscape area min width (m)	Width on plan	Qualifying m <sup>2</sup>
<b>219-225 Riccarton Rd</b>								
Acer davidii (M)	3	4	12.57	12.6	1.00	2.0	5.03	12.57
		4	12.57	12.4	0.99	2.0	4.56	12.44
		4	12.57	11.9	0.95	2.0	4.75	11.92
C. 'Eddies WW' (M)	7	4	12.57	10.6	0.85	2.0	4.53	10.64
		4	12.57	10.3	0.82	2.0	4.53	10.26
		4	12.57	10.4	0.82	2.0	4.40	10.36
		4	12.57	10.0	0.80	2.0	4.39	10.04
		4	12.57	10.0	0.80	2.0	4.31	10.02
		4	12.57	9.9	0.79	2.0		
		4	12.57	10.6	0.85	2.0	3.78	10.62
Malus 'Braeburn' (S)	4	3	7.07	2.9	0.40	1.5		
		3	7.07	3.5	0.50	1.5		
		3	7.07	3.2	0.45	1.5		
		3	7.07	2.8	0.40	1.5		
Plagiathus regius (L)	2	4	12.57	9.9	0.79	2.5		
		4	12.57	9.1	0.72	2.5		
Pyrus 'Aristocrat' (L)	2	5	19.63	15.6	0.79	2.5	4.69	18.63
		5	19.63	18.6	0.95	2.5	3.98	7.07
Pyrus 'Conference' (L)	2	3	7.07	7.1	1.00	2.5		
		3	7.07	5.2	0.74	2.5		
Sophora fulvida (M)	6	3	7.07	3.1	0.44	2.0		
		3	7.07	3.1	0.44	2.0		
		3	7.07	3.1	0.44	2.0		
		3	7.07	3.1	0.44	2.0		
		3	7.07	3.1	0.44	2.0		
		3	7.07	5.5	0.78	2.0		
<b>Total</b>				<b>189.7</b>				<b>124.57</b>



# 5.5 26 SIMEON STREET

## KĀINGA ORA SITES - SOIL AREA TEST AND INDIV TREE CALCULATIONS

	Qty	Spread (m)	Canopy size (m2)	Pervious soil area provided	Above 80%	Landscape area min width (m)	Width on plan	Qualifying m2
<b>26 Simeon Street</b>								
Cercis c. 'Forest Pansy' (M)	2	5	19.63	2.2	0.11	2.0		
		5	19.63	2.1	0.11	2.0		
Pse. Ferox (M)	9	2	3.14	2.03	0.65	2.0		
	2	3.14	1.88	1.82	0.58	2.0		
	2	3.14	1.82	1.82	0.58	2.0		
	2	3.14	1.84	1.84	0.59	2.0		
	2	3.14	2.72	2.72	0.87	2.0	2.13	2.72
	2	3.14	2.73	2.73	0.87	2.0	1.57	
	2	3.14	3.01	3.01	0.96	2.0	1.81	
	2	3.14	2.81	2.81	0.89	2.0	1.77	
	2	3.14	2.88	2.88	0.92	2.0	1.74	
<b>Total</b>				26.0				2.72



# 6.0 RESIDENTIAL SUBURBAN TEST (WOOLSTON)

## Tree Canopy Cover Investigations - Woolston

Data source - Linz Christchurch aerial 2020-21 and cadastral boundaries

131 Clarendon Tce  
Existing tree coverage - 94.1m<sup>2</sup>  
(w/in bdy: 71.2m<sup>2</sup>)  
Total site area - 611.9m<sup>2</sup>  
TCC = 15.4%

123 Clarendon Tce  
Existing tree coverage - 145.4m<sup>2</sup>  
(w/in bdy: 102m<sup>2</sup>)  
Total site area - 612m<sup>2</sup>  
TCC = 23%

Pervious - 395m<sup>2</sup> (64.4% of site)  
Landscaped - 308m<sup>2</sup> (50% of site)  
of which:  
- lawn 146m<sup>2</sup>  
- trees and shrubs 162m<sup>2</sup> (%0%)

129 Clarendon Tce  
Existing tree coverage - 71.8m<sup>2</sup>  
(w/in bdy: 58m<sup>2</sup>)  
Total site area - 910m<sup>2</sup>  
TCC = 8%

125 Clarendon Tce  
Existing tree coverage - 210.4m<sup>2</sup>  
(W/in bdy 138.8m<sup>2</sup>)  
Total site area - 912.4m<sup>2</sup>  
TCC = 23%

127 Clarendon Tce  
Existing tree coverage - 489.38m<sup>2</sup>  
W/in bdy: 410m<sup>2</sup>  
Total site area - 906.4m<sup>2</sup>  
TCC = 54%

