BEFORE THE HEARING PANEL

IN THE MATTER of the Resource Management Act 1991

AND

IN THE MATTER of Proposed Plan Change 12 to the Operative Hamilton City District Plan

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STATEMENT OF EVIDENCE OF MICHAEL RICHARD GRAHAM

(URBAN LANDSCAPE/GREEN POLICIES)

Dated 26 June 2024

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BARRISTER

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INTRODUCTION

1. My full name is Michael Richard Graham.

2. I am a director at Mansergh Graham Landscape Architects (**MGLA**) and have been in this position since 2002. I hold the qualifications of a Bachelor of Science in Philosophy (from Canterbury University, Christchurch) completed in 1990, and a Bachelor of Landscape Architecture (from Lincoln University, Canterbury), completed in 1992. I am a qualified Landscape Architect and a registered member of the New Zealand Institute of Landscape Architects.

3. I have prepared several district-wide landscape studies and have provided advice to various councils on the preservation of landscape character, urban design, and growth strategies for both rural and urban areas. I am a current member of the Hamilton City Urban Design Panel and have been a sitting member since its inception in 2008.

4. I prepared guidance notes for *Tree Selection and Planting Guidance* (**Attachment 1**) as part of the supporting information to be provided as part of Plan Change 12 (**PC12**), I also reviewed and provided recommendations to Hamilton City Council (**HCC**) planners with respect to the submissions concerning landscape matters from a landscape architectural perspective, arising from the proposed PC12 to the Operative Hamilton District Plan (**ODP**). I am authorised to give this evidence on HCC's behalf to the PC12 hearings commissioners.

CODE OF CONDUCT

5. I have read the Environment Court Code of Conduct for expert witnesses contained in the Environment Court Practice Note 2023 and agree to comply with it. I confirm that the opinions expressed in this statement are within my area of expertise except where I state that I have relied on the

evidence of other persons. I have not omitted to consider materials or facts known to me that might alter or detract from the opinions I have expressed.

SCOPE OF EVIDENCE

6. I provide a precis of the guidance notes prepared in support and a summary of my responses to the submissions concerning landscape matters from a landscape architectural perspective, arising from the proposed PC12 to the ODP.

7. The guidance notes are a supporting document that provides general guidance for the planting of landscape areas, and how specimen tree planting affects deep soil areas. It includes a table of tree species categorised by their anticipated canopy size as the canopy coverage requirement is based on a percentage of the site area and zone. The potential canopy size then determines the deep soil area and volume requirements for a particular species. This assists with the interpretation of *Policies 4.2.5.3f, 4.3.4.3f, and 4.4.5.3e*. While the guidance note is not referenced in the draft ODP provisions, I consider that it nevertheless provides a useful framework to assist with plan interpretation and implementation.

EXECUTIVE SUMMARY

8. I have developed a guidance note to provide direction with respect to an approach for planting of landscape areas aligning with the PC12 provisions. This guidance note is set out at **Attachment 1** to my evidence. My evidence explains the rationale behind the guidance note. In addition, in this statement of evidence I provide a summary of matters raised in submissions in relation to landscape architectural matters.

9. The guidance note is not part of the PC12 provisions, and is intended to be a tool for ODP users to refer to if they wish. I would expect it to become a resource that the Council planning team might refer to when dealing with consent applicants.

10. With respect to *maintaining or increasing the extent of public greenspace as a part of the intensification,* while I agree with these submissions and consider that with residential intensification a greater need for and use of the public realm open space will result. It is my understanding that this matter is however out of scope for the plan change.

11. With regard to *Permeable Surface and Landscaping*, I am generally in support of these polices with some proposed additions. I make a recommendation regarding urban trees and their requirement based on site canopy coverage within development sites, and the potential for including overhanging canopies of trees on neighbouring sites.

12. Additionally, I recommend the inclusion of a *deep soil policy.* This would form part of the required *landscape area* and is intended to assist and compensate for the reduction of the urban soil area in higher density developments, while providing uncompromised areas capable of supporting substantive trees and their associated climate benefits and landscape amenity.

13. I also consider whether engineered permeable paving should be considered under the definition of permeable surfaces within the District Plan. In my opinion I do not consider engineered permeable paving to be interchangeable with landscape or deep soil areas as they do not provide water absorption which is directly accessible by planting. I do however consider that permeable paving may have benefit from a stormwater detention perspective and would support further investigation into this aspect.

14. These recommendations are reflected in the updated PC12 provisions which are presented in the evidence of Dr Reu Junquiera on this PC12 topic.

GUIDANCE NOTES

15. In November 2022 MGLA were engaged by HCC to undertake the preparation of a guidance document to assist applicants with identifying and responding to matters that are pertinent when establishing trees and other plant material within subdivision developments consistent with PC12.

16. The focus of this guidance is related to general requirements of plant material both in terms of soil, nutrient, moisture, and overall spatial extent, including canopy, at the time of planting, and at maturity. Guidance is also given with respect to potential site conditions and treatments that may require specialist consideration, the selection of specimen trees and some discussion regarding specimen tree attributes which could be used to provide climate amelioration within areas of building intensification.

17. A list of potential specimen trees, their relative size and canopy area is appended to the guidance to support the proposed canopy site cover approach proposed in response to increased development density. In addition, guidance is given to the integration of *deep soil areas* within a development and the potential for these areas to spatially overlap with landscape areas.

RESPONSE TO SUBMISSIONS

18. A number of submission sub-points regarding landscape aspects were received with respect to PC12. The submissions focussed on the following issues:

a) Maintaining or increasing the extent of public open space as a part of the intensification;

b) Consideration of established and proposed trees and landscape areas within development sites; and

c) Protection of permeable surfaces and urban soils.

19. My *consideration* of these issues and recommendations follows:

Maintaining or increasing the extent of public greenspace as a part of the intensification (Submission 126 .2; 134.6; 157.1)

20. A number of submissions made comment regarding the maintenance or increase of the extent of open space provision as a result of the proposed residential intensification.

21. The provision of open space is formulated within the Hamilton City *Open Space Provision Policy* (**OSPP**). Section 2 of the OSPP outlines guidelines for the provision of various open space typologies, their primary function, the typical or minimum size required for each type of open space and their provision target. Where open space provision is not driven by the specific qualities of an open space, such as riparian reserves, or the preservation of significant natural resources, it is allocated on either population or demand projections, such as for sport fields, or on a distribution basis such as for neighbourhood parks whereby a park shall be within 500m walking distance of all residential households.

22. Public open space is considered at the structure planning stage and, once allocated, informs the development of subdivision designs within the structure plan area. The design guidance within *Appendix 1.4.1.3 Design Element 4: Public Open Space,* reflects desired attributes of open space and forms part of the assessment criteria for subdivision applications outlined

in *Appendix 1 Section 1.3.3 of the ODP.* As such the extent of the current open space network within Hamilton City, with the exception of more recent greenfield developments, will have been developed in response to the densities anticipated at the time of development and not at the densities anticipated as a result of the *Resource Management (Enabling Housing Supply and Other Matters) Amendment Act 2021*.

23. This is pertinent particularly within existing developed areas of the city, as housing density increases and the extent of privately accessible open space reduces, reliance on available public realm open space increases. Greater usage and reliance on the public realm require, in turn, that it provides an appropriate level of facility and amenity. As such existing streetscapes, parks and reserves will need to be enhanced to provide a higher level of facility and amenity within areas that transition toward a higher density environment.

24. This is anticipated to include the provision of additional trees and other plantings within streets, parks and reserves, which would assist in offsetting the loss of mature trees within private property as a consequence of residential intensification. It is noted that with greater usage and improvements to the public realm environment comes an increase in ongoing maintenance and associated funding to meet the needs for appropriate enhancements and maintenance.

25. While I agree with the submissions received on this matter and consider that with residential intensification a greater need for and use of enhanced quality of public open space will result. It is my understanding that this matter is out of scope for PC12.

Retention of established trees and vegetation and proposed trees within development sites

26. This issue raised a number of submissions, both in support and opposition for the retention of established trees and vegetation, and the requirement for specimen trees within a development site.

27. With respect to concerns regarding the removal of trees, notwithstanding trees already afforded protection under the District Plan. It is well recognised that trees offer significant amenity and environmental benefits to an area, including reducing the effect of high rainfall and urban heat island effect, while providing mental health and habitat benefits which cannot be replicated within a short timeframe in the event of their removal.

28. Where intensification occurs in an area, typically established trees are removed to accommodate additional buildings resulting in a reduction in quality of that environment. In part this is due to the fact that future intensification is not factored into the placement of specimen trees within private residential environments. Consequently, while established trees may be considered for retention within an area transitioning to a higher density of development, they may not be compatible with that future environment due to their current or potential size, species selection, health or their location and competing spatial requirement within a development site. I consider therefore, that achieving a balance between encouraging retention where possible, while allowing removal of incompatible trees and requiring the planting of new specimen trees within developments is an appropriate response.

29. Where established trees are found to be suitable, encouragement for their retention can be found in Policy 4.2.5.3g. (*General Residential Zone* (**GRZ**)), 4.3.4.3g *(Medium Density Residential Zone* (**MDRZ**)) and 4.4.5.3f *(High Density Residential Zone* (**HDRZ**)) whereby the canopy area of an existing

tree can be offset against the site coverage for landscape area… *regardless of the ground treatment*).

30. While I am in general support of these policies, I recommend that Policy 4.2.5.3 e. and others be modified to limit the offset against the *landscape area;* and that for an existing tree canopy to be included in the calculation the trunk of the tree must be located within the development site, and only that portion of the canopy area contained within the development site is offset, as this reflects the extent of canopy that the owner has control over.

31. I also recommend that the overhanging canopy of a tree whose trunk is located on a neighbouring property may be considered. The canopy shall belong to a medium sized tree or larger and the extent of canopy cover overhang on the development site must equate to 20% or more of the subject tree's canopy. This is because, in some instances, the presence of existing overhanging canopy will prevent the establishment of another tree within that area. In this instance, as much of the viability of the tree and its canopy will be subject to conditions on the adjoining property, acceptance of such overhanging canopy extent would be subject to consultation with the adjacent property owners and their intention regarding the tree and consideration by HCC's Arborist.

32. While I anticipate there may be some variation in the nature of the existing ground treatment beneath the canopy of an established tree, if considered for retention then the root zone of the tree will still require an appropriate extent of *deep soil* to support its continued survival.

33. Guidance on the extent of the deep soil area for specimen trees and minimum dimensions has been given in Policies 4.1.2.5.3 c, d and f; 4.3.4.3 c, d and f; and 4.4.5.3 c, d and e. The shape of this area can be configured to suit the particular site, and ideally should reflect the shape of the dripline with the tree trunk centrally within the area. Different configurations are possible. The deep soil area in and around a specimen

tree can form part of the overall permeable landscape area, but the deep soil area around a specimen tree shall have a depth of 1 metre, increased from the typical 400mm depth for deep soil areas.

34. Further consideration of these areas may be required as building intensification will alter the availability of water within existing immediate surroundings of a retained tree. These areas may require the introduction of irrigation and/or drainage to maintain existing site conditions, as a lack of nutrients and water, or conversely waterlogged tree pit, is detrimental to a tree.

35. With respect to the requirement for retaining or planting of new trees, Policies 4.1.2.5.3 f; 4.3.4.3 f; and 4.4.5.3 e require as a minimum a specimen tree (or trees) canopy cover as part of any site development.

36. With respect to the implementation size of new trees, a minimum 80L tree size is proposed at time of planting, to provide some initial amenity. I consider this an appropriate minimum size and support this policy as it offsets some of the tree losses likely to occur as a result of intensification.

37. As an adjunct to this consideration, several submissions recommended the greater use of indigenous trees within the urban environment. While I support this approach in general and encourage the continued use of indigenous trees within gully system revegetation and open park settings, within streetscape setting and residential developments, the evergreen nature, mature size and growth habits of many native species limits the range of suitable specimens for these environments. I support their use, therefore, where practical and appropriate.

38. With respect to permitted residential developments, the *Tree Selection and Planting Guidance* notes include suggested alternative approaches, such as green roofs, green walls and climbers, or fully planted (not grass) landscape areas, to address potential noncompliance with the specimen tree requirements. These are intended to be considered on a case-by-case

basis, where the site configuration or other factors do not allow for compliance with the policy and not as a compliant alternative approach.

39. Consideration was also given to the suggestion of the removal of the landscape planting requirements for *front, corner and through sites required forward of the front building line*. I do not support this suggestion as the public/private boundary interface is a significant aspect of the perception of residential character and amenity. The presence of vegetation forming a separation and softening of the frontage of development along the boundary is an intrinsic component of the character of Hamilton's residential suburbs and I consider its removal would adversely affect the streetscape amenity and further reduce the opportunity for environmental amelioration through planting.

Protection of permeable surfaces and urban soils

40. Submissions were received concerning the reduction and fragmentation of permeable areas as a consequence of residential development intensification, and the resultant loss of adequate contiguous soil volume for specimen tree planting and stormwater infiltration.

41. Although two distinct functions, they are intrinsically linked as urban soils provide nutrient supply and a moisture reservoir to sustain specimen trees and other plants, as a part of their stormwater absorption capacity. As intensification results in more building coverage within an area the total extent of soil is reduced. The remaining areas of soil are typically smaller and peripheral to the building site, fragmented by other functions such as driveways, pathways, service trenches and foundations. This fragmentation and encroachment within soil areas compromises their ability to provide adequate nutrients and water for specimen trees and stormwater absorption capacity.

42. Recent weather events have highlighted the challenges of the built environment to adequately function within more extreme high rainfall events. While NIWA is predicting a shift away from the *La Nina* weather pattern which brought the increased rain events, to *El Nino* weather patterns this will potentially bring drought conditions to some areas, creating greater demand on retained moisture within areas of soil before the inevitable return to the *La Nina* weather pattern. Unless a change occurs in the approach to areas of soil within the built environment, a shift to increased density of housing will result in reduced resilience to rain and drought events within that environment.

43. In order to compensate for some of the reduction in permeable area and capacity it is recommended that a *deep soil provision* is introduced for lots greater than 200m^2. This policy would require the provision of an area that constitutes 50% of the landscape area of a site as a *deep soil area*, with a minimum dimension of 2m. This area would have a minimum soil depth of 400mm and be capable of accommodating additional depth for specimen trees. This area would form part of the required *landscape area* and is intended to provide more substantive amenity and stormwater infiltration.

44. It is preferable that the *deep soil area* be as large as possible and ideally form a single contiguous area, especially where the site area is 400m2 or less (equating to a 40m2 or less deep soil area). It is recognised however that this may not be possible in all situations and multiple deep soil areas may be required. It is noted however, that although the root ball area for a tree can be included as part of the deep soil area, the root ball area cannot be divided and must be comprised of a single area subject to the mature size of the tree.

45. Consideration was also given to the definition of *permeability* as contained within the District Plan, particularly with respect to the inclusion of permeable paving, engineered surfaces that provide stormwater infiltration. The present definition of *permeable* excludes areas that fall

within the definition of *site coverage* but includes any parts of the site that are *capable of absorbing water and* are *grassed or planted in tree and shrubs*. It excludes paved surfaces, *sealed, or formed to create a solid surface* and additionally *areas used for vehicle parking, manoeuvring or access.*

46. Engineered permeable paving surfaces are specifically designed to direct water through the paving matrix, or porous jointing material, to a subbase. And while I consider these surfaces provide a functional equivalent of one definition of permeability, in that they allow water to pass through the surface material, they do not provide for the definition of permeable as a medium for water absorption, and specifically that absorbed water within the media are directly accessed by plants.

47. I consider that permeable paving appears to offer a reduction of surface run off from a stormwater perspective, and there are likely to be some benefits in encouraging permeable paving that may provide a degree of absorption of water into adjacent landscape and deep soil areas. From a landscape perspective, however, permeable paving does not satisfy the concomitant of being able to absorb water and being directly associated with plant material to access the absorbed water. As such it is not a replacement for an area of *landscaping* or *deep soil*.

48. Permeable paving systems vary with the permeable component of the system formed by either the surface of the paving unit itself or alternately the surface of the jointing area between the paver units. Both of these areas are likely susceptible to silting up and as such some level of maintenance will be required to ensure that the permeability, and area of detention, remains functional over time. As a consequence, I consider that such surfaces may offer benefit as a stormwater detention device and would support there being given further consideration in this regard subject to obtaining appropriate engineering validation.

CONCLUSION

49. To the extent that they relate to my area of expertise, I am supportive of the objectives, policies and rules contained in PC12 as updated as at 27 May 2024.

Michael Richard Graham

26 June 2024

ATTACHMENT 1

TREE SELECTION AND PLANTING GUIDANCE

The following information is intended as preliminary guidance for the consideration of tree and plant selection and planting. It is not intended as a comprehensive guide and does not apply to areas within the public domain or transport corridor; but rather to identify matters that are generally considered relevant when establishing a landscape within private property. Due to the variety of environments and potential range of suitable species further research and investigation into any selection is encouraged.

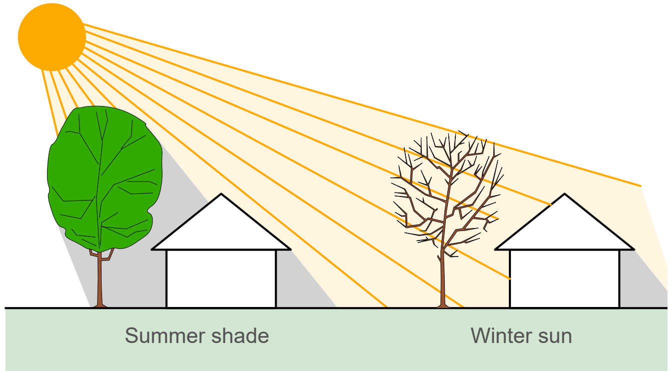


Figure 1. Deciduous trees loose their leaves in winter

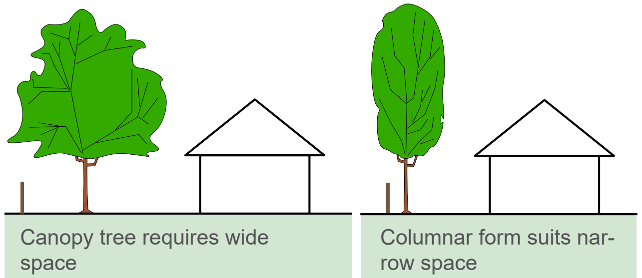


Figure 2. Selecting the right size and shape

TREE SELECTION

When considering the planting of specimen trees within a private property, several factors both within the site and in terms of the tree itself need to be considered. These reflect the function and mature form of the tree, as well as where it will be placed within the site. The function you intend the tree to perform within your landscape will determine what tree you choose. Consider whether the tree is intended to screen views into private space, or whether it is solely for amenity.

Evergreen/Deciduous

Evergreen and deciduous trees can perform different functions.
Plant deciduous trees where shade is required in the summer and sun/light is required during the winter months. Often deciduous trees provide autumn colour, but the leaves can collect in gutters and block drains. Consider the size of the leaf. Larger, thicker leaves take longer to decompose and are more prone to creating these problems.
Plant evergreen trees where you require permanent year-round screening and where blocking light is not detrimental to the residents. Evergreen trees provide a good windbreak. Because evergreen trees shed their leaves throughout the year, the seasonal impact on gutters and drains is lessened.

Size and shape

A tree's size and shape vary considerably between species. Match the tree size and shape with the space available and be aware that the mature size of trees will often be much larger than is specified in plant books/catalogues. Check multiple sources when choosing tree species to identify their mature size. Where there are space constraints, a more upright tree form should be selected. A number of species have now been cultivated to have a narrow columnar form which may be more suitable.

Quality of the Nursery Stock

Specimen trees shall be planted at a minimum size of 80L
Choose healthy, well-grown trees which have:

- A straight trunk with well-spaced branches that has a dominant shoot in the center of the tree.
- An exposed trunk free of wounds and damage
- Roots that grow straight out from the trunk not circling, or damaged.
- Free of pests and diseases

Low-quality trees may become more costly with increased maintenance and reduce the benefits the tree can provide.

SITE FACTORS

Not all trees are equally well-suited for every site. Identifying the site’s conditions and constraints and choosing a tree to fit the conditions is key to the tree’s survival.

Site Conditions

Choose a tree for the right site conditions. Consider the following

- Soil type
- Exposure to the sun and wind
- Drainage
- Ability to provide water during dry seasons i.e. if there is a low chance of being watered frequently during summer, choose a dry-tolerant tree species.

Height and Width Constraints

Consider how tall and wide your tree will grow. Do not plant large trees under overhead services or the eaves of a building. Choose trees with a low spreading form that when mature will not cause problems. Consider how wide your tree will grow. Ensure the tree will not impinge on the building at full maturity. It is a good idea to allow a 1 meter gap between your tree canopy at maturity and the building, to allow for maintenance and avoid potential damage to exterior cladding. Consider the screening on windows, whether that is desired, or will it obscure a view, or block light.

Site Boundaries

When planting close to boundaries, consider how far the tree will extend over the property boundary and potentially infringe on public accessways (driveways and footpaths) at full maturity. Your neighbour has the legal right to trim any planting that extends into their property.

Underground services

Where possible, plant trees away from any underground services within the property. Where this is not possible, install root barrier or root directors (available from most nursery suppliers) which will direct roots downward and away from the utilities.

Time of Planting

Ideally plant late Autumn or early Winter (after leaf fall) or early spring (before bud break) Do not plant when the soil is waterlogged, or in drought, frosty, or windy conditions.

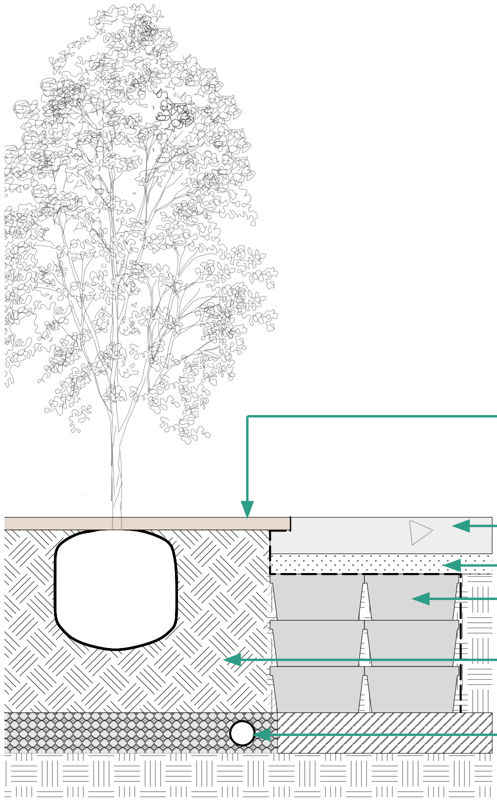


Figure 3. Tree planting adjacent to hardscape areas

Planting adjoining paving or concrete

In some instances it may be desirable to plant trees bordering paved areas (such as private pathways and driveways, and public footpaths within the transport corridor), it is important to install root directors/root barriers. They are designed to prevent tree roots from uplifting paved surfaces, encourage deep root growth, improve drought tolerance, and enhance overall tree stability.

If a tree is desired in an area within the property intended for vehicle movements, special additional consideration is required to support the soil around the tree. Vehicles should not be able to drive up to tree trunks without additional treatment as they compact the soil, reducing oxygen supply to the root system which extends to the edge of the tree canopy. If trees are required to be planted close to vehicular movement, install structural soil cell modules beneath the pavement (e.g. Citygreen StrataCell) to allow space for the healthy establishment of tree roots, while giving adequate support to the pavement. (This approach can also be used where vehicles occasionally park on lawn under trees.)

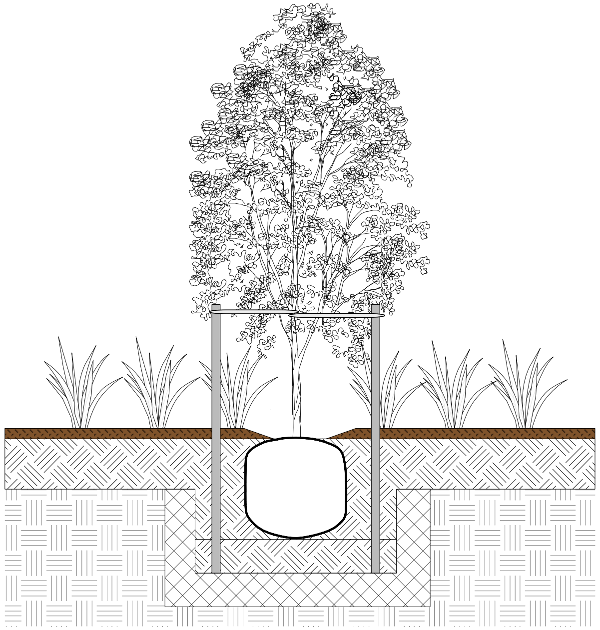


Figure 4. Plant the tree to the same depth as in the pot.

HOW TO PLANT A TREE

Tree Pit Preparation

Clear weeds and rubbish from the area to be planted prior to the excavation of the tree pit. Before digging, locate all underground utilities and consider the best placement for the tree(s). Excavate a separate pit for each tree.

Excavate each tree pit in accordance with the deep soil requirements of each tree, as specified in Table 1 on page 17. Break up any compacted subsoil to a minimum depth of 1m to ensure root penetration and free drainage.

Topsoil excavated from the tree pit should be set aside for reuse. Remove any excavated subsoil and do not mix with the topsoil.

Break up or roughen any sides of the tree pit that are glazed (smooth from the excavation). Cover the bottom of the pit with 50-75 mm topsoil.

Before planting, ensure the root ball is saturated. Remove the planter bag or plant pot with minimal root disturbance before planting. Inspect the tree root ball for circling roots, straighten, and trim off any broken roots.

Tree Planting

Plant trees upright in the centre of the pit and at the original soil depth. Plant the tree at the same level it was in the container. Planting too deep can be harmful to the tree.

Straighten the tree in the hole. Fill the hole gently but firmly. Pack soil around the base of the root ball to stabilize it. Fill the hole firmly, to eliminate air pockets. Further reduce air pockets by watering periodically while backfilling. Unless the soil is very wet, ensure trees are well watered to the depth of the root ball immediately after planting.

At the time of planting, remove any broken or dying branches, or any branches that are crossing and will rub against each other.

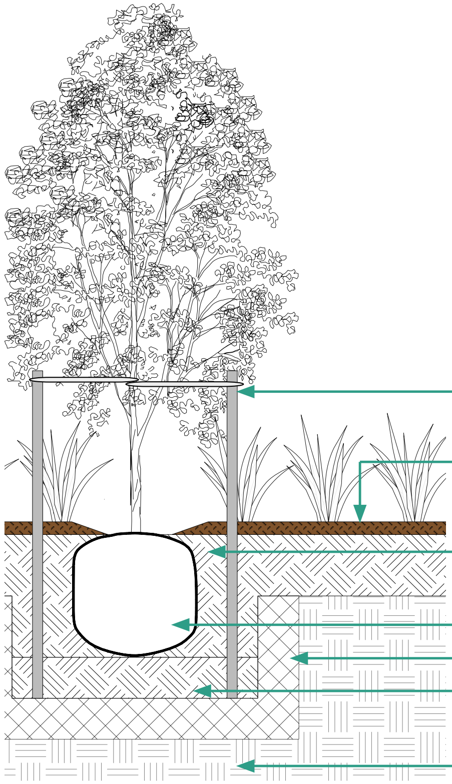


Figure 5. Tree pit standard detail

Fertiliser

Apply a general slow-release fertilizer or tree tablets to the backfill of each tree in accordance with the manufacturer's recommended rates. Mix the fertiliser with the soil, at the base of the prepared hole prior to placement of the root ball. Care should be taken to avoid the roots having direct contact with fertiliser.

Staking

Trees require staking to stabilize the root ball until the tree is established. Three stakes provide optimum support. Position the stakes immediately after planting to minimize root damage. Use wide ties that hold securely without chafing and ensure there is room for the trunk to increase in girth without constriction.

Mulching

Mulching is recommended to give the tree a higher chance of survival and quicker early growth. It retains moisture in the soil, controls soil temperature and reduces weed growth.

Organic Mulch – e.g. bark mulch, has the advantage that it decomposes into the soil adding nutrients and improving soil structure but will require replenishing annually.

Inorganic mulch- e.g. stones, do not decompose or need replenishing as often but does not improve soil structure or provide nutrients to the soil.

Apply the mulch to a depth of 75-100mm around each tree to the diameter of the tree pit. Retain the mulch on the soil surface and do not incorporate it into the soil.
Apply the mulch near, but not touching the tree trunk. A mulch-free area of 50mm wide at the base of the tree will reduce the chances of decay of the tree trunk.

SUGGESTED TREE LIST

Below are suggested small trees that may be used on sites with tight size constraints. A longer list of suggested trees and their size category can be found in Appendix 1

Botanical Name	Common Name	Height x Width (m)
Deciduous		
Acer japonicum 'Osakazuki	*Maple*	4 x3
Carpinus betulus 'Fastigata'	*Upright Hornbeam*	12 x 4
Cercis canadensis 'Forest Pansy'	*Eastern Redbud*	5 x 5
Cercis canadensis 'Hearts of Gold	*Eastern Redbud*	4.5 x 3.5
Cornus 'Eddies White Wonder'	*Dogwood*	4 x 4
Cornus florida 'Cherokee Chief'	*Dogwood*	6 x 3
Lagerstromeria indica	*Crepe Myrtle*	6 x 3
Michelia doltsopa		9 x 6
Robinia Mop Top	*Lollipop Tree*	3 x 3
Evergreen		
Alectryon excelsus	*Titoki*	10 x 4
Magnolia 'Little Gem'	*Evergreen Magnolia*	10 x 3
Pseudopanax crassifolius	*Lancewood (juvenile form)*	6 x 2
Pseudopanax ferox	*Lancewood (juvenile form)*	5 x 2

Small trees typically reach 0-5m in height at maturity
Medium trees typically reach 6-12m in height at maturity
Large trees typically reach 13-20m in height at maturity
Very large trees typically reach more than 20m in height at maturity

Tree pit sizes to align with table 1 on page 17

MAINTENANCE

Watering
Watering is important to tree establishment in the first spring and summer after planting. Water thoroughly during dry periods. Depending on tree species and location watering will be required for the first 1-4 years. The amount of water per plant will depend on the plant species, site location and soil type.
Water at least once per week (unless it has rained) and more frequently during hot, windy weather from November to April. Watering can be reduced during winter once temperatures drop.
The method of irrigation will depend on location, accessibility, and soil conditions. An irrigation system may be considered for trees planted in paved areas or in containers.

Fertiliser
Feed annually in spring, with a general slow-release fertiliser or tree tablets. Sprinkle evenly into the top 20-30mm of soil taking care not to damage surface roots.

Pruning
Pruning may be needed to control the growth and shape of the tree, or to enhance its performance or function.
Carry out any formative/corrective pruning in the tree's first late winter/ early spring before new growth begins. Continue formative pruning until the final shape of the tree is achieved.

Stakes
Check stakes and ties for chafing and constriction The stakes can be removed as soon as plants are strong enough to withstand winds without damage. This may vary with each tree species.

Weed Control
Keep the area around the tree weed free. Where mechanical trimmers and weed eaters are used, ensure that ringbarking of the trees does not occur.

Mulch
Bark mulch requires replenishing annually to maintain a minimum depth of 75mm.

Schefflera digitata
Seven-finger

Melicytus ramiflorus
Whiteywood

Figure 6. Replacing Seven-finger with Whiteywood is suitable as they are both shade trees of similar size, form and texture

Prunus 'Pink Perfection'
Flowering Cherry

Malus ioensis 'plena'
Prairie Crabapple

Figure 7. Replacing a flowering cherry with prairie crab apple is suitable as they are similar in size, form and provides the feature flowering season

Pests and Diseases

Pests and diseases can have debilitating effects on young plants. Check every season and carry out necessary control measures as soon as possible.

Replace any trees that are dead or unhealthy with the same species or if this is unavailable, with a tree species that have similar requirements and characteristics as the original tree.

Main characteristics to consider are:

- Form / shape of the tree (is it triangular, is it a canopy tree to provide shade?)
- Size (what height and width does it grow to? How important is it to fill the space?)
- Deciduous/Evergreen
- Colour (consider both leaf colour, flower colour and if there are particular seasonal variations that are important)
- Texture (are the leaves large, like maple leaves; or needles, like pine leaves?)

You may not be able to find an alternative species that meets all of the characteristics, in which case, decide which characteristics are more or less important depending on context. For example, in a row of trees, consistency of size and form will be the most important. For a feature tree in a garden, the fact that it is deciduous, and provides orange autumn colour to complement spring bulbs might be the most important characteristic.

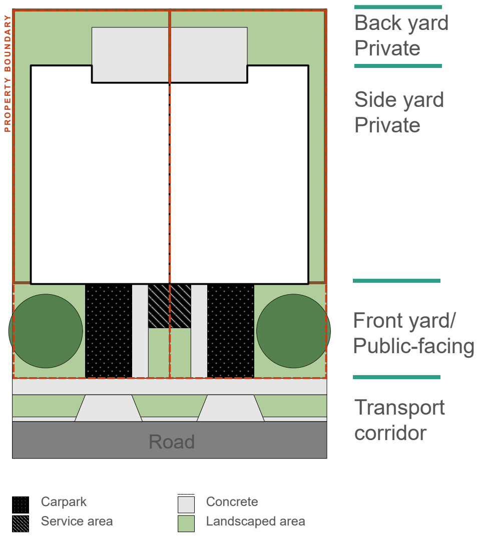


Figure 8. Outdoor living space located at the back. Fencing provides privacy. Front yard remains open

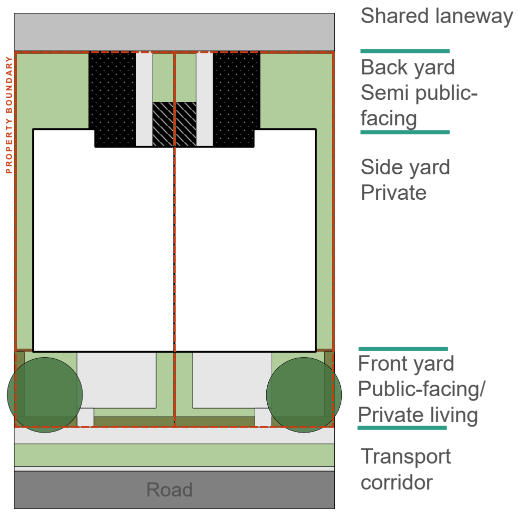


Figure 9. Where the front yard becomes the main outdoor living space, a balance is needed between privacy and street openness.

LANDSCAPE PLANTING

District Plan Landscape Requirements

The district plan requires minimum areas of landscaping per lot and unit. Refer to section 4.2.5.3 for general residential zone rules and 4.3.4.3 for medium density rules. Both zones require a ground floor unit to have a **landscaped area of a minimum of 20% of the total site;** within the property boundary and landscaped with grass or plants.

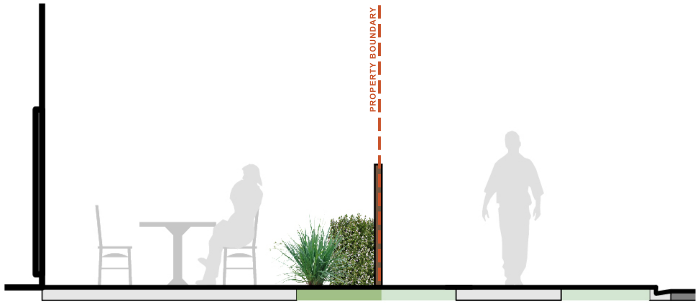
It is also required that on front, corner and through sites, landscaping planted in grass, shrubs and trees is required forward of the front building line (except sites within the Rotokauri North Residential Precinct)at the rates set out below:

i. Single residential unit and duplex residential units and apartment buildings	Minimum 50%
ii. Terrace housing with a residential unit frontage width 7.5m or greater	Minimum 40%
iii. Terrace housing with a residential unit frontage width of less than 7.5m	Minimum 30%

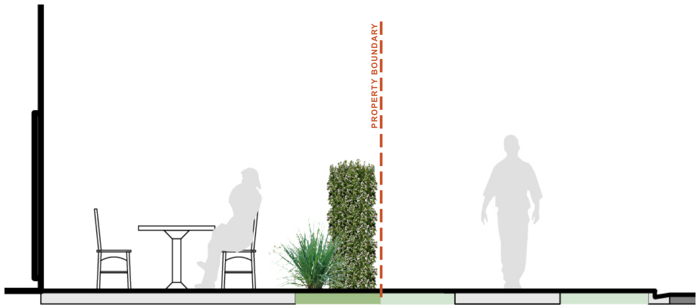
OUTDOOR LIVING SPACES - PRIVATE / PUBLIC

Outdoor living spaces which are generally considered either ‘public’ and ‘private’ areas. ‘Public’ areas are those visible from the street, they form the front yard and includes elements such as the front door, letterbox and driveway. ‘Private’ areas are created within side and rear yards, are screened from the street, and avoid overlooking the private outdoor space of adjacent lots. Generally, private outdoor living spaces are located at the rear of the lot directly accessed from the dwellings primary living area.

In some instances front yard private outdoor living space can provide an alternative. If located on the street frontage of the property, adequate screening and/or landscaping design is recommended to ensure there is still a level of privacy available to the outdoor living area. Utility items, like laundry lines and water tanks, should be screened from public view, located within a service court within the private side or rear yard.



Year 1/2



Year 3-5

Figure 10. Where the front yard becomes the main outdoor living area, a fence can provide immediate screening while hedges become established. The fence should have a degree of permeability and hedges planted on the public side of the fence

PLANTING

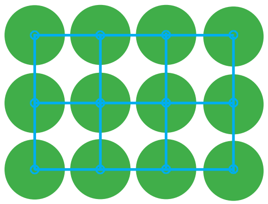
Planting can be used to define front boundaries, reinforce entrances, soften hard edges, provide privacy screening, and provide separation between lots. Where planting is required to be undertaken in the front yard, hedging planting is strongly recommended instead of fencing to promote an open and well-planted streetscape with good passive surveillance and activation. Additional planting can be undertaken on either side of hedging within the property boundary and provide greater interest.

BED PREPARATION

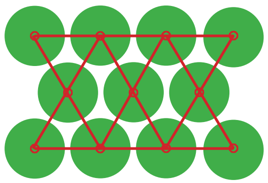
It is important to provide adequate soil volume for plants to thrive. Typically for garden beds 400mm depth of good quality topsoil is required. Ensure the soil is not over compacted and the bed is free draining. The soil should be free of contaminants and weeds. Consider access for maintenance of the garden. Where garden beds are narrow they can usually be maintained from one side, however wider beds may require access from both side or from within the bed itself.

PLANT SELECTION

Plant species selected should be appropriate for the climate and conditions, and not require excessive maintenance to enable the plant to establish and thrive in the long term. Planting should be predominantly evergreen to provide a vegetated presence year-round. The use of native plant species is encouraged. As with trees, different plant species have different requirements and growth habits. Consideration should be given to the plants mature size and height in both their selection and positioning, and what effect they will have on other plants within a bed.



Rectangular planting gives a formal effect to planting and should be used sparingly



Triangular planting is recommended in most situations. It gives a fuller, more natural appearance

Figure 11. An example of different planting layouts

PLANT LAYOUT

The layout of plants is constrained by the shape of the garden bed, it is good to vary the height and texture of plants to create interest in the planting scheme. Taller species should be planted at the rear of a garden bed with shorter species to the front. Ground covers can be used to infill the spaces at the front of a garden bed. Too many individual specimen's looks discordant while groupings of uneven numbers of plants of the same species (3, 5 or 7) look well together. Consider where the plants will be viewed from.

When planting a back or side yard, it can be beneficial to provide taller planting to break up the greater height of the fence line. Consider opportunities for trellises with climbers, hedges and trees within the design. Where space is limited, consider whether lawns are appropriate, ground covers may provide a higher amenity value and do not require a lawn mower.

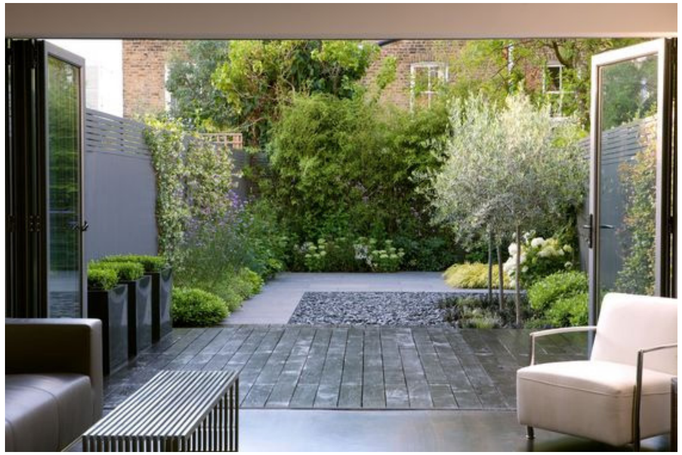


Figure 12. Despite only small areas avaliable for planting, using variety of heights and layers, including climbers and trees, makes this courtyard feel intimate and lush.

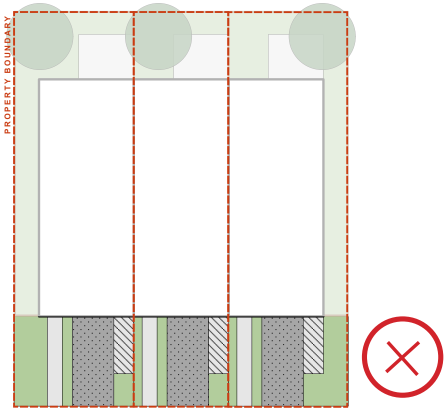


Figure 13. Planting is separated into small strips by the hardscape arrangement limiting potential for healthy plant growth.

Carpark
Service area
Concrete
Landscaped area

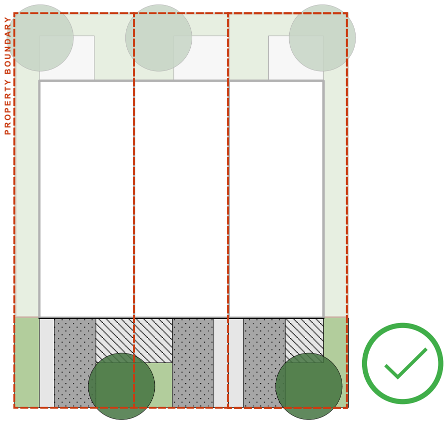


Figure 14. Grouping hardscape elements, and mirroring unit layout allows larger areas of uninterrupted landscaping and provides space for additional trees along the street frontage.

PLANTING BED LOCATION

It is better to group landscaped areas into one larger area than several small ones. In the case of attached housing, mirroring layouts may enable landscape areas to be beside each other, increasing the volume of soil area unbroken by hardscape. In these spaces, a restricted consistent palette of plants along terrace properties can provide visual continuity. This could include grass species, ground covers and small shrubs or clipped planting.

If carparking in included in the front yard, when considering plant selection consider non-woody hardy plants which will not be damaged by, or scratch a car door if it is opened onto them.

Single species plantings are recommended for hedges. Hedging in the front yard should be maintained at less than, or grow no higher than, 1200mm in height. Where the front yard is also to be the main living area, it is recommended that most plants remain under 1.2m high, with opportunity to use small areas of fencing and climbers or hedges to 1.5m that provide increased opportunity for privacy.

MAINTENANCE

Watering

Watering is important during establishment of plants and for the maintenance of the garden beds. Water thoroughly after planting, and at least once per week (unless it has rained). More frequent watering maybe required during hot, windy weather from November to April. Watering can be reduced during winter once temperatures drop.

The amount of water per plant will depend on the plant species, site location and soil type. The method of irrigation will depend on location, accessibility, and soil conditions. An irrigation system could be considered if the planting is extensive or planted in paved areas or in containers.

Fertiliser

Feed annually in spring, with a general slow-release fertiliser or an application of good quality compost. Apply evenly into the top 20-30mm of soil taking care not to damage surface roots.

Weed Control

Keep the garden bed weed free. The application of a bark mulch annually can assist with reducing weed infiltration, ease of weeding and moisture retention during hot weather. Bark mulch requires replenishing annually to maintain a minimum depth of 75mm.

Pests and Diseases

Pests and diseases can have debilitating effects on young plants. Check every season and carry out necessary control measures as soon as possible. Replace any plants that are dead or unhealthy with the same species.

SUGGESTED PLANT LIST

Suggested Plant species. This plant list is not exhaustive, and many other species may be suitable when considered appropriate with the overall intent of the planting approach.

Botanical Name	Common Name
Grasses Flaxes	
Carex secta	Puurei
Carex virgata	Puurei
Carex testacea	Golden tussock
Daniella nigra	Tuurutu
Lomandra 'Little Lime'	Dwarf Lomandra
Festuca glauca	Blue tussock
Arthropodium cirratum	Renga renga/Rock Lilly
Phormium cookianum	Wharaiki Flax
Phormium Green dwarf	Flax
Phormium tenax	Harakeke Flax
Poa Clta	Silver Tussock
Libertia peregrinans	NZ Golden Iris
Machaerina sinclairii	Pepepe
Ophiopogon japonicus	Mondo Grass
Ground Covers	
Aceana purpurea	Purple Bidbidi
Coprosma acerosa 'Hawera'	Groundcover coprosma
Lithodora diffusa 'Grace Ward'	Gromwell Graceward
Muehlenbeckia axillaris	Creeping wire vine
Pimelea prostrata	NZ Daphne
Pratia angulata	Panakenake

Shrubs	
Carmichaelia australis	NZ broom, Maakaka
Choisya ternata	Mexican orange Blossom
Coleonema pulchrum	Breath of Heaven
Coprosma Black Cloud	Black leaved coprosma
Coprosma propinqua	Mingimingi
Hebe Wiri Cloud	Hebe
Loropetalum Plum Delight	Loropetalum
Nandina domestica	Nandina
Pittosporum Golfball	Golfball
Veronica Stricta	Koromiko
Hedges	
Buxus 'Green Gem'	Dwarf box Hedeg
Corokia Blackberry & Lime	Green Corokia
Griselinia littoralis 'Broadway Mint'	Kapuka
Pittosporum 'Sumo'	Compact Pittosporum
Photinia 'Super Red'	Photinia
Climbers	
Clematis paniculata	Puawhananga
Ficus pumila	Creeping Fig
Muehlenbeckia complexa	Small leaved Pohuehue
Trachelospermum jasminoides	Start Jasmine

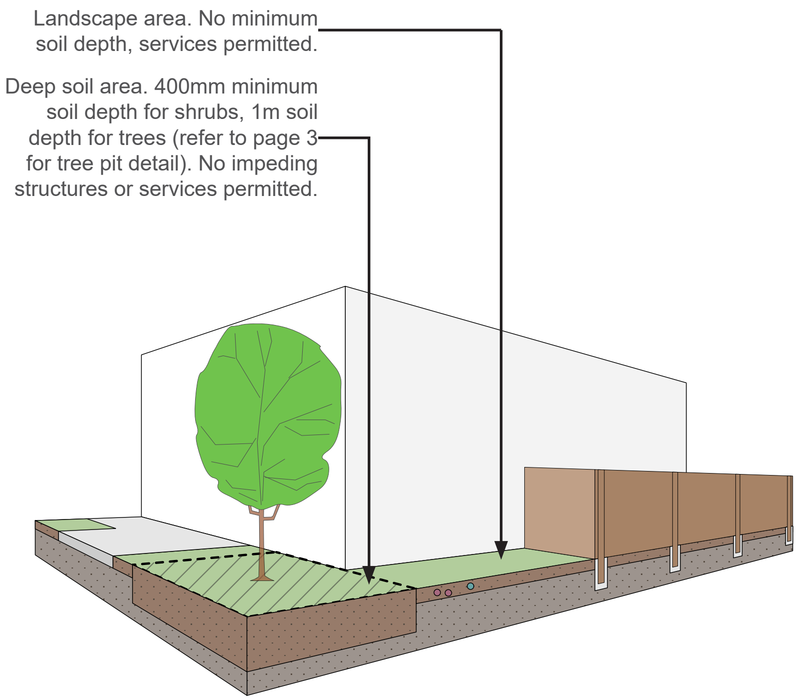


Figure 15. Additional soil depth and avoidance of structures and services in DSA's provide better conditions for tree development, and increased capacity for storm water infiltration.

DEEP SOIL POLICY

Deep soil areas (DSA) refer to an area within a lot that is capable of supporting growth of vegetation and trees, while providing capacity for stormwater infiltration. For any site greater than 200m2, at least half of the landscape area shall be provided as deep soil area.

District Plan Requirements

- 50% of the landscape area shall be provided as deep soil area.
- A single large contiguous area is preferable, as this provide greater resilience from climate extremes.
- Several discrete areas with a minimum area of 8m^2 and minimum dimensions of 2m may be used if required.
- Deep soil areas cannot contain any impeding building structure, features or services, above or below ground, including hard impervious surfaces such as concrete, asphalt or pavers.
- DSA must be open to the sky and cannot be on top of underground carparking or in planter boxes.
- A minimum soil depth of 400mm is required, with an increase in depth to 1m where trees are planted, to support tree growth to maturity. The total area and volume of deep soil required per tree is to align with table 1 on page 17
- The DSA can form part of the landscape area or outdoor living area requirements.
- Up to 20% of the DSA may be covered with decking, providing the deck is constructed such that no footing or foundations are encroaching into the DSA.
- DSA must be planted and cannot be lawn.

Council Strategies

Complimentary to the DSA and tree planting requirements that will enhance green cover in all residential zones, it is important to recognize the alignment of these policies to relevant council strategies such as:

- Nature in the City - which is to achieve 10% native vegetation cover in Hamilton by 2050.
- Our Climate Future - which encourages regeneration of our natural environment to reduce our climate risk exposure.

Table 1: Tree size with corresponding height and projected canopy size

Tree size	Tree height (at maturity)	Tree canopy size (at maturity)	Land area (m^2) required
Small	0-5	10	3.8
Medium	6-12	67	25.5
Large	13-20	186	70.8
Very Large	20+	250	95.4

Soil volume required for a tree/tree roots (m^3) equals the land area (m^2) x 1m depth

TREE CANOPY COVER

20% of the site area for general and medium density and 10% of the site area for high density must be tree canopy cover. Tree canopy cover is calculated as the combined total area of tree canopies on a property at time of maturity. Tree canopy cover can be provided by either maintaining existing trees or planting new trees as part of a new residential development. Sufficient soil volume, width and depth are also included as a requirement to support healthy tree growth, as specified in Table 1 (beside).

District Plan Requirements

Any site greater than 200m2 must provide an area of tree canopy cover that complies with the following;

- 20% of the site area for general and medium density, and 10% of the site area for high density.
- For each tree provided, a land area around the root ball must be provided that meets the requirements for each tree size, as shown in table 1, with a minimum dimension of 2m and 1m depth.
- Soil areas required for tree placement cannot contain any impeding building structure, features or services, above or below ground, including hard impervious surfaces such as concrete, asphalt or pavers.
- When planting a new tree, locate the tree so that the majority of the canopy at maturity is contained within the development property.

Where the canopy of an existing tree on a neighboring property, overhangs into the new development, the inclusion of the overhanging canopy cover will be considered on a case-by-case basis.

Generally, only trees of a medium or larger size shall be considered, and at least 20% of the total canopy area of the tree must be within your property boundary. The probability of the tree being maintained in the long term will also be considered as a factor.

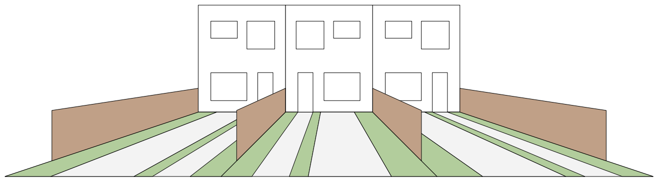


Figure 16. Thin strips of landscaping between hardscape doesn't support robust vegetation. Fences along property lines create harsh divisions

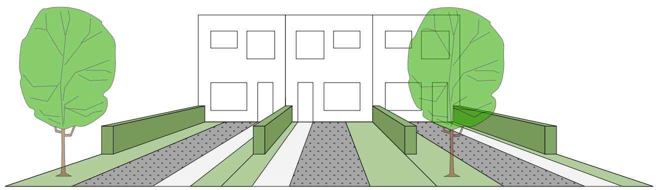


Figure 17. Grouping landscaping provides space for trees. Contrasting materials highlights driveway and pedestrian pathway. Low hedges set back from the property edge define boundaries more softly

DESIGN GUIDANCE FOR MULTI-UNIT DEVELOPMENTS

This section provides guidelines for developers who are building multi-unit developments within medium density areas. With larger flexibility, and control over the site as a whole, this guide will offer design solutions for landscape areas and tree placement including alternative solutions of where to locate trees within the wider development when space within single units is unavailable.

Public Frontage Planting

Public frontage of terrace housing benefit from a restricted pallet of plants used along the run of terrace properties for visual continuity. This could include grass species, ground covers and small clipped planting. If carparking in included in the front yard, selected plants should be non-rigid and hardy to accommodate the possibility of car doors being opened onto them.

Landscape areas should aim to have a minimum dimension of 400mm width and 400mm depth of soil uninterrupted by building foundations or other structures, in order to grow grasses or shrub vegetation.

When providing the required pedestrian access, it is best to differentiate between pedestrian and vehicle spaces through materiality rather than vegetation.

Front yard fencing

When the front yard is not the main living areas, it is best to avoid fencing forward of the building line to maintain openness within the wider site design. Where the front yard is also the main living area, permeable fencing can provide a sense of privacy while maintaining a degree of openness within the wider development.
When the front yard is providing a service area, such as rubbish storage, fencing should be utilised to screen these areas.
Any fencing can be softened using climbers or a strip of planting to the public side of the fence line. It may be beneficial to use species known for producing pleasant scents near rubbish areas, such as jasmine, Thyme, lavender etc.
If a clear edge is desired, an alternative to fencing is using a clipped hedge to provide a distinction of property lines.

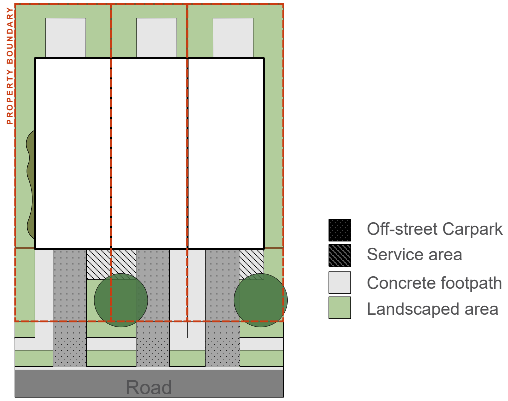


Figure 18. Example of alternative 1, climbers are provided on an end wall, with two trees planted within the front landscape area. Note the trees are off centre to be clearly owned and maintained by a single unit, while the tree roots still have access to the neighbouring units soil.

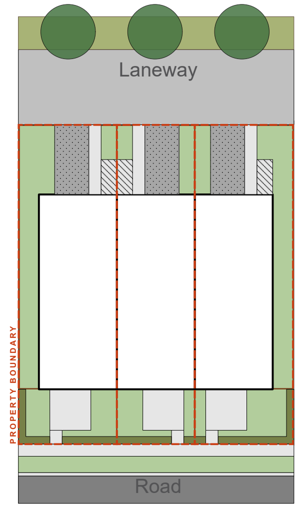


Figure 19. Trees are grouped within the wider development, such as a line of trees along the laneway

Tree Placement

Placing trees in the front yard adds to the public amenity while trees on back yards offer great amenity for private properties and residents, offering shade in the summer months and an attractive outlook from main living areas. Make sure there is sufficient space for the trees to grow to a mature size and select small species without impeding on vehicular and pedestrian access.

In multi-unit developments, the 20% canopy cover will be considered over the site as a whole, rather than as individual lots. This provides opportunity to group trees in public spaces, or provide a few large canopy trees rather than many small trees.

If there is no opportunity to meet the required coverage, the following solutions may be considered on a case by case basis. Other alternatives may also be considered.

- In the case of permitted multi-unit buildings (terrace, duplex and apartments) a reduction in tree cover may be considered if end units have climbers or green walls on the public facing boundary of the property. If climbers are used up a fence, the climber should be on the public facing side of the fenceline.

- In the case of permitted multi-unit buildings (terrace, duplex and apartments) a reduction in tree cover may be considered if the majority of landscaping space is planted and not lawn

- In all developments, green roofs may be utilized towards the landscape areas and permeability areas required. They will generally be considered at a rate of 1m2 of green roof = 0.5m2 of landscaped area at ground level.

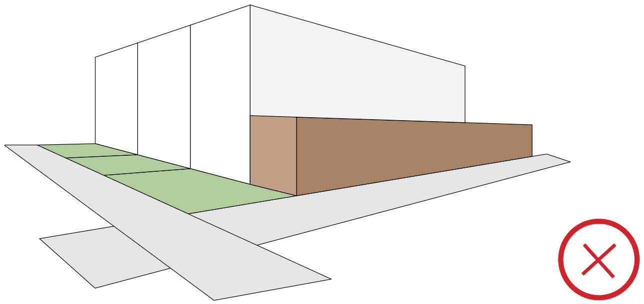


Figure 20. Tall fence creates unfriendly streetscape

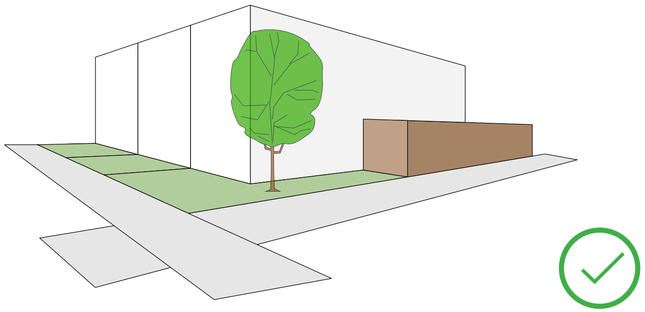


Figure 21. Set back fence softens corner and provides an openness to the street.

Corner lots

Best practice is to locate the fencing set back from the front of the building to provide a landscaped area on the 'public' side of the lot, allowing the building to address the street and provide passive surveillance.
The front yard treatment should continue around the corner. Try to plant at least one tree in the front yard of corner lots.

Notes

This guide is intended to assist the intention of development, but doesn't cover all situations. In some instances, not following each and every guidance may result in a better outcome. Each development will be considered for the environmental constraints it is being developed under.

APPENDIX 1: SUGGESTED TREE LIST

The following table lists suggested tree species for planting within private property, not including planting areas within the public transport corridor such as a berm. Any trees not shown in the table can be submitted to council for determination of what canopy size they belong to.

Botanical Name	Common Name	Height	Size	Native/Exotic	Evergreen/Deciduous
Abies concolor	White Fir	25	Very Large	Exotic	Evergreen
Abies koreana	Korean Fir	15	Large	Exotic	Evergreen
Acer griseum	Paperbark maple	12	Medium	Exotic	Deciduous
Acer platanoides Globosum	Norway Maple	5	Small	Exotic	Deciduous
Acer platanoides	Norway Maple	15	Large	Exotic	Deciduous
Aesculus hippocastanum	Common Horse Chestnut	30	Very Large	Exotic	Deciduous
Aesculus x carnea	Red Horse Chestnut	15	Large	Exotic	Deciduous
Agathis australis	Kauri	30	Very Large	Native	Evergreen
Alectryon excelsus	Titoki	10	Medium	Native	Evergreen
Alnus cordata	Italian Alder	20	Large	Exotic	Deciduous
Alnus rubra	Red Alder	25	Very Large	Exotic	Deciduous
Amelanchier canadensis	Shad Bush	7	Medium	Exotic	Deciduous
Aristotelia serrata	Wineberry	10	Medium	Native	Deciduous
Azara microphylla	Vanilla Tree	10	Medium	Exotic	Evergreen
Beilschmiedia tarairi	Taraire	22	Very Large	Native	Evergreen
Beilschmiedia tawa	Tawa	35	Very Large	Native	Evergreen
Betula pubescens	White Birch	25	Very Large	Exotic	Deciduous
Brachyglottis repanda	Rangiora	7	Medium	Native	Evergreen
Camellia sasanqua	Camellia	4	Small	Exotic	Evergreen
Carpinus betulus	European Hornbeam	20	Large	Exotic	Deciduous
Carpodetus serratus	Putaputaweta	10	Medium	Native	Evergreen
Catalpa bignonioides	Indian Bean Tree	15	Large	Exotic	Deciduous
Cedrus atlantica 'Glauca'	Atlas Cedar	8	Medium	Exotic	Evergreen
Cedrus deodara	Himalayan Cedar	25	Very Large	Exotic	Evergreen
Cercis canadensis	Eastern Redbud	8	Medium	Exotic	Deciduous
Citrus limon	Lemon Tree	3	Small	Exotic	Evergreen
Citrus sinensis	Navel Orange	5	Small	Exotic	Evergreen

Table 1: Tree size with corresponding height and projected canopy size

Tree size	Tree height (at maturity)	Tree canopy size (at maturity)	Land area (m^2) required
Small	0-5	10	3.8
Medium	6-12	67	25.5
Large	13-20	186	70.8
Very Large	20+	250	95.4

Soil volume required for a tree/tree roots (m^3) equals the land area (m^2) x 1m depth

Coprosma repens	Mirror Plant	8	Medium	Native	Evergreen
Coprosma rhamnoides	Twiggy Coprosma	3	~~Shrub~~ Small	Native	
Coprosma robusta	Glossy Karamu	6	Small	Native	Evergreen
Coprosma tenuicaulis	Hukihuki	3	Small	Native	
Cordyline australis	Cabbage Tree, Tii koouka	12	Medium	Native	
Cornus florida	Flowering Dogwood	6	Small	Exotic	Deciduous
Cornus nuttallii	Pacific Dogwood	8	Medium	Exotic	Deciduous
Corokia buddleioides	Korokio	3	Small	Native	Evergreen
Corokia cotoneaster	Korokio, Wire-netting bush	3	Small	Native	Evergreen
Corynocarpus laevigatus	Karaka	15	Large	Native	Evergreen
Cyathea dealbata	Ponga, Silver fern	8	Medium	Native	
Dacrycarpus dacrydiodes	Kahikatea	30 +	Very Large	Native	
Dicksonia squarrosa	Wheki	4	Small		
Eucalyptus cinerea	Silver Dollar Gum	24	Very Large	Exotic	Evergreen
Eucalyptus cordata	Heart leaved Silver Gum	20	Large	Exotic	Evergreen
Eucalyptus gunnii	Cider Gum	25	Very Large	Exotic	Evergreen
Fagus sylvatica	English Beach	30	Very Large	Exotic	Deciduous
Fraxinus oxycarpa Raywoodii	Claret Ash	10	Medium	Exotic	Deciduous
Ginkgo biloba	Maidenhair Tree	30	Very Large	Exotic	Deciduous
Gleditsia triacanthos Sunburst	Honey Locust	6	Medium	Exotic	Deciduous
Griselinia littoralis	Kapuka, Broadleaf	10	Medium	Native	Evergreen
Idesia polycarpa	Wonder Tree	18	Large	Exotic	Deciduous
Jacaranda mimosifolia	Brazilian Rosewood	12	Medium	Exotic	Semi Evergreen
Juglans regia	Common Walnut	20	Large	Exotic	Deciduous
Knightia excelsa	Rewarewa	30	Very Large	Native	Evergreen
Kunzea robusta	Kanuka	12	Medium	Native	Evergreen
Leptospermum scoparium	Manuka	8	Medium	Native	Evergreen
Liquidambar styraciflua	Sweetgum	20	Large	Exotic	Deciduous
Liriodendron tulipifera	Tulip Tree	25	Very Large	Exotic	Deciduous
Magnolia denudata	Yulan Magnolia	12	Medium	Exotic	Deciduous
Magnolia grandiflora	Southern Magnolia	20	Large	Exotic	Evergreen
Magnolia stellata	Star Magnolia	4	Small	Exotic	Deciduous
Melia azedarach	Persian Lilac	12	Medium	Exotic	Deciduous

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Very Large	20+	250	95.4

Soil volume required for a tree/tree roots (m^3) equals the land area (m^2) x 1m depth

Michelia doltsopa	Sweet Michelia	20	Large	Exotic	Evergreen
Michelia figo	Port Wine Magnolia	3	Small	Exotic	Evergreen
Myrsine australis	Red Mapou	7	Medium	Native	Evergreen
Olearia paniculata	Akiraho/Golden Akeake	6	Small	Native	Evergreen
Osmanthus fragrans	False Holly	4	Small	Exotic	Evergreen
Parrotia persica	Persian Ironwood	10	Medium	Exotic	Deciduous
Paulownia tomentosa	Empress Tree	10	Medium	Exotic	Deciduous
Pittosporum eugenioides	Lemonwood	12	Medium	Native	Evergreen
Pittosporum tenuifolium	Kohuhu	10	Medium	Native	Evergreen
Plagianthus betulinus	Manatu/Ribbonwood	12	Medium	Native	Evergreen
Plagianthus regius	Manatu/Ribbonwood	12	Medium	Native	Semi Deciduous
Platanus acerifolia	London Plane	40	Very Large	Exotic	Deciduous
Podocarpus totara	Totara	30	Very Large	Native	Evergreen
Prumnopitys ferruginea	Miro	25	Very Large	Native	Evergreen
Prumnopitys taxifolia	Matai	25	Very Large	Native	Evergreen
Prunus cerasifera 'Nigra'	Purple Leaf Cherry Plum	5	Small	Exotic	Deciduous
Prunus x yedoensis	Flowering Cherry	6	Small	Exotic	Deciduous
Pseudopanax crassifolius	Lancewood	12	Medium	Native	Evergreen
Pseudopanax ferox	Fierce Toothed Lancewood	5	Small	Native	Evergreen
Pseudowintera colorata	Horopito, Pepper Tree	4	Small	Native	Evergreen
Pyrus salicifolia 'Pendula'	Weeping Silver Pear	3	Small	Exotic	Deciduous
Quercus rubra	Red Oak	32	Very Large	Exotic	Deciduous
Sophora microphylla	Kowhai	10	Medium	Native	Semi Deciduous
Sophora tetraptera	Kowhai	12	Medium	Native	Semi Deciduous
Sorbus aria 'Lutescens'	Silver Whitebeam	4	Small	Exotic	Deciduous
Sorbus aria	Common Whitebeam	15	Medium	Exotic	Deciduous
Taxodium distichum	Swamp Cypress	25	Very Large	Exotic	Deciduous
Taxus baccata	English Yew	4	Small	Exotic	Evergreen
Tilia cordata	Small-leaved Linden/Lime	20	Large	Exotic	Evergreen
Tilia x europaea	Common Linden/Lime	35	Very Large	Exotic	Deciduous
Ulmus procera 'Loius van Houtte'	Golden Elm	15	Large	Exotic	Deciduous

Table 1: Tree size with corresponding height and projected canopy size

Tree size	Tree height (at maturity)	Tree canopy size (at maturity)	Land area (m^2) required
Small	0-5	10	3.8
Medium	6-12	67	25.5
Large	13-20	186	70.8
Very Large	20+	250	95.4

Soil volume required for a tree/tree roots (m^3) equals the land area (m^2) x 1m depth