Murchison Park

Forest restoration plan

April 2025

Christchurch City Council

Approvals Panel			
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Contents

Introduction

Vision

Murchison Park forest will be valued as an important community asset that people of all ages and backgrounds will be actively involved in creating and nurturing. People will visit the forest regularly for the enjoyment of nature, recreation, education, nature play, and for social interaction. The forest will be representative of formerly widespread lowland podocarp forests that once occurred in Canterbury and will be used by native birds and other forest fauna as an important feeding and breeding resource in a city-wide forest patch network.

Objectives

The objectives of establishing a native forest patch within Murchison Park are:

- ✓ Implement Waimairi District Council's original intent to establish the park as Murchison 'Forest' Park
- ✓ Help achieve multiple objectives of Ōtautahi-Christchurch's Urban Forest Plan
- ✓ Increase tree canopy cover in the Redwood area to help combat climate change
- ✓ Contribute to a target of 10% indigenous vegetation cover across the district[1]
- ✓ Provide important resources for native wildlife as part of a city-wide forest patch network
- ✓ Increase the presence of accessible native trees and forests in the urban landscape
- ✓ Provide manawhenua with opportunities to exercise Matauranga Māori and support mahinga kai
- ✓ Provide opportunities for people to experience and interact with urban wilderness
- ✓ Reduce ongoing operational costs and carbon emissions associated with managing mown turf
- ✓ Establish a significant and iconic landscape feature that contributes to community identity

[1] The National Policy Statement on Indigenous Biodiversity (2023) requires that all territorial local authorities (E.g., Christchurch City Council) achieve 10% indigenous cover across their urban and rural areas.

Context

In 2023, we adopted the **Urban Forest Plan for Ōtautahi Christchurch[2],** focused on growing and managing public and private trees to increase urban tree canopy cover over the next 50 years. This plan supports climate action, neighbourhood livability, improved wellbeing, and better protection and maintenance of our precious indigenous flora and fauna. Native forests within our urban environments play a significant role in helping us achieve these goals.

Ōtautahi-Christchurch, a biodiversity hotspot within the plains ecological region[3], contains many important biodiversity sites, some of national or international importance. However, over the past 700 years Canterbury has suffered enormous loss in both the extent and quality of its indigenous biodiversity, particularly forests, with Māori and European settlement. Pre-European fires meant that only a very small amount of native forest remained on the Canterbury Plains by the 1840s, and subsequent colonisation by European settlers in the 1850s brought further rapid habitat destruction to the Canterbury Plains and Port Hills.

The historic 'Black Maps' of Ōtautahi-Christchurch dating from the 19th Century show extensive areas of wetland with only limited areas of forest at Pūtagringamotu-Riccarton Bush (22 hectares) and Papanui Bush (30 hectares). Both patches of bush could be seen easily from the Bridle Path in a sea of tussock and toetoe. Unfortunately, Papanui Bush was completely felled by settlers within approximately five years, and Pūtagringamotu-Riccarton bush was reduced to around seven hectares.

Figure 1: Emergent kahikatea *(Dacrycarpus dacrydioides)* at Pūtaringamotu – Riccarton Bush (Photograph: A. Shadbolt, 2019)

But thanks to the foresight and visionary thinking of successive Councils and the community, the area of tree canopy cover in Ōtautahi-Christchurch is now almost a thousand times greater than it was in the mid 1800's when settlers had finished clearing the native forests. **However, less than 1% of this urban forest canopy cover is made up of native trees!**

While the other 99% of our urban forest is exotic trees numbering some 700 species, native forests have begun to have a renaissance in recent years, as have our native bush birds. Planted native forests in Ōtautahi-Christchurch now well-exceed the c.1840 extent but further restoration is essential for sustaining wildlife and providing high quality nature experiences for all.

[2] www. ccc.govt.nz/assets/Documents/Consultation/2023/02-February/CUS5882-Urban-Forest-Plan-A4-WEB.pdf
[3] www.doc.govt.nz/documents/science-and-technical/ecoregions4.pdf

Murchison Park in a network of forest patches

As well as the Urban Forest Plan, we are also developing the **Ōtautahi-Christchurch Native Forest Patch Network Plan**[4] to create a strategic network of native forests[5] across the city. This network aims to support viable populations of native bush birds and other wildlife, enhance ecosystem connectivity, and provide accessible natural areas aligning with the city's Biodiversity Strategy[6]. We hope it will also encourage community engagement in biodiversity conservation and foster a deeper understanding of ecological needs.

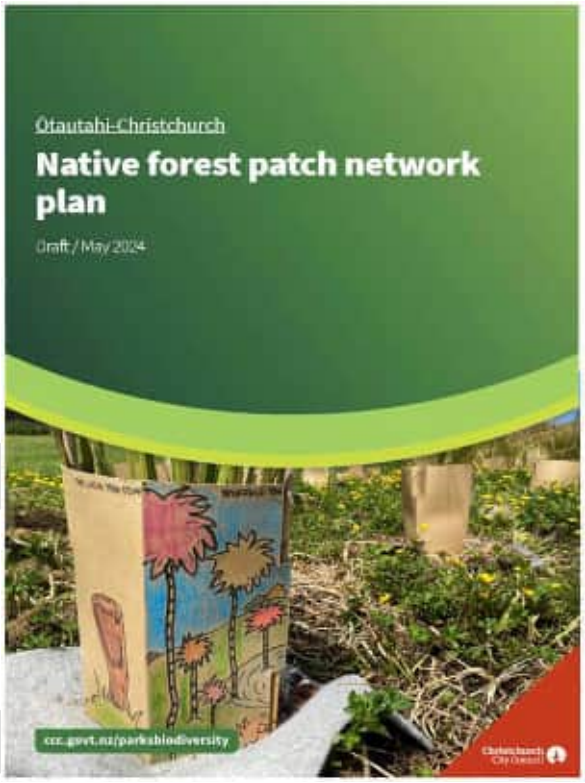

Figure 2: Ōtautahi-Christchurch Native Forest Patch Network Plan (In preparation)

Many of the native forest plantings established in Ōtautahi - Christchurch have been relatively small compared to the few large blocks that have begun to be established since the early 2000s. As well as not supporting viable populations of wildlife in their own right, small plantings inevitably suffer from 'edge effects' like wind, heat, noise, weeds, pest animals, and artificial light. Some of these edge effects penetrate further than 50 metres inside habitats!

Our plan envisions 135 native forest patches averaging around six hectares each. 42 of these will be larger patches (>6.25 ha) that will provide core wildlife breeding habitat, and 93 will be smaller patches (1.50 ha – 6.25 ha) that act as food sources and stepping stones for wildlife.

Around two-thirds of these patches, like Murchison Park, simply build on existing native forest plantings in parks and stormwater sites. This approach serves to maintain the general character of our public spaces, whilst allowing the plantings to be extended and enriched to provide more optimum habitat and wilderness experiences.

[4] CCC (2024a & 2024b)
[5] Meurk and Hall (2006)
[6] CCC (2008)

Murchison Park

Location

Murchison Park is an approximately 4.40 ha Sports Park located at 46 Lowry Avenue in the northern Christchurch suburb of Redwood. It has one major road frontage (Lowry Avenue) on the west side of the park, and two secondary access points: 1) via the greenspace between Pyatt Place & Solomon Avenue, and 2) via a narrow (18.0 m wide) section of reserve on Lowry Avenue on the park's north side (Figure 3).

Figure 3: Location map of Murchison Park

Brief history

Between 1984 and 1985, Waimairi District Council's landscape architect Mike Barthelmeh worked-up designs (Figure 5) for the newly acquired Murchison Park. Because use of the park was limited by poor drainage and wet conditions, the Council determined that the park area would be developed as a core native forest area – one of the first large scale forest restoration initiatives in the city. This proposal included the daylighting, recontouring, and naturalisation of the small spring-fed Murchison Drain, and the first community-led planting with nearby Redwood Primary School occurred in 1986 (Figure 6).

Following naturalisation of Murchison Drain and altered drainage patterns, the previously wet conditions of the wider park area became drier. With these drier conditions, the park was instead developed as a sports park, and very little of the envisioned planting was ever carried out (Refer Figure 4). Native forest planting was limited to a narrow planting along Murchison Drain, and a series of single-species woodlots that enclosed the central area of the park.

The 2011 Christchurch earthquake caused significant damage to the sports fields which became very uneven and poorly drained reverting to the original wet conditions. Because of this damage, the park is no longer being used for sport.

In the meantime, the Council was exploring a range of opportunities to not just increase tree canopy cover across the city, but also to find strategic locations to establish core native forest patches. Murchison Park is strategically located to provide connectivity between other forest patches, including an important link between the Pūharakekenui-Styx River Reserves, Cranford Basin and sites further to the south including the Otakaro-Avon River Corridor and beyond (Refer Appendix 1 & 2).

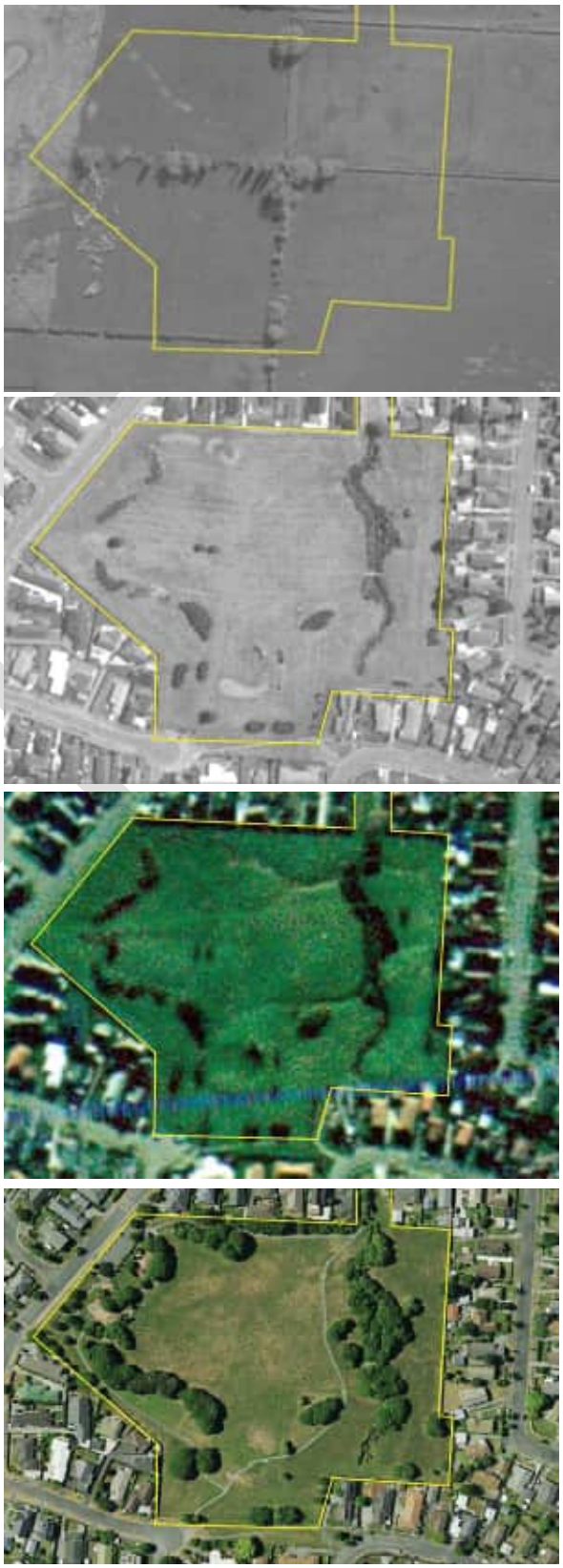

Figure 4: Historic aerial photographs of the Murchison Park area showing development of reserve and forest from farmland. Top to bottom: Early 1960s, early 1990s, late 1990s, and latest imagery. (Source: Canterbury Maps Historical Aerial Imagery).

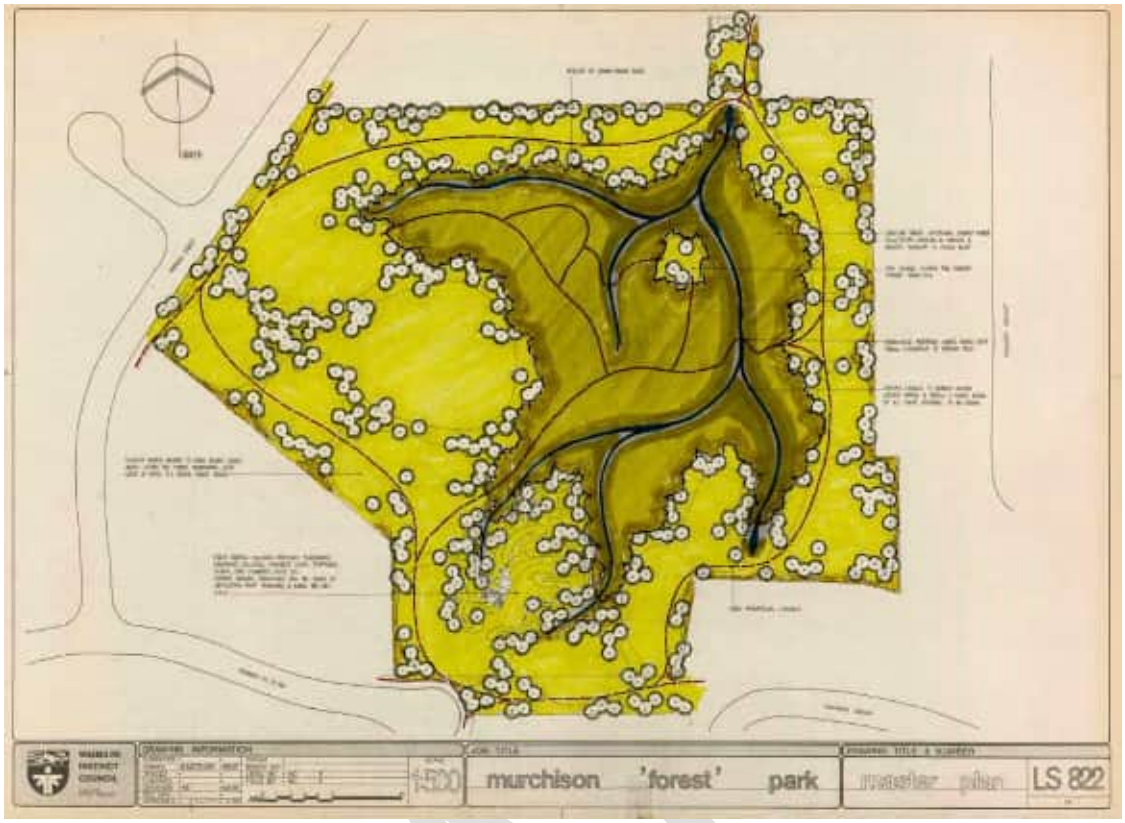

Figure 5: Original 1985 Waimairi District Council landscape concept plan for Murchison 'Forest' Park.

Figure 6 : Anne Greenup, Landscape Architect at Waimairi Council shows Redwood Primary School pupils how to plant a tree for Arbor Day, 1986, in Murchison Forest Park[7].

[7] https://canterburystories.nz/collections/archives/star/prints/1986/ccl-cs-8923

Landscape character

Murchison Park has two distinct landscape character types: 1) expansive open mown grass covering around three-hectares, and 2) areas of established native restoration plantings and woodlots that provide an element of natural character and wilderness experience within an otherwise typical urban park setting. Recently, the Council has established a wildflower trial around the periphery of the open grass areas.

Natural areas include the mature native forest restoration planting along Murchison drain, and a series of single-species stands of kanuka, lowland ribbonwood, or cabbage trees/ti-kouka that flank the open mown grass areas. Reserve boundaries are typically fenced with 1.80 m tall solid paling or corrugated iron fences, and very few properties appear visually well-connected to the park.

At the Lowry Avenue frontage of the park, a playground has been well integrated into a mix of native and exotic plantings and is serviced by a small off-street carpark and a public toilet. This area remains unchanged by the proposals in this restoration plan.

Figures 7, 8 & 9 illustrate the various landscape and natural character features of Murchison Park relevant to the restoration plan.

Figure 7: *Murchison Park landscape character (Clockwise from top left): 1) Approximately three-hectares of open mown grass; 2) Typical reserve boundary with 1.80 m solid paling or corrugated iron (rear ground) fences; 3) View of native forest canopy; and 4) Christchurch City Council's wildflower trial around the periphery of the open mown grass areas (Photographs: A. Shadbolt 2024).*

Figure 8: *Clockwise from top left: 1) Grassy corridor between stands of totara dominated forest along Murchison Dran; 2) Pukio sedge dominated riparian margin of the uppermost stretch of Murchison Drain; 3) Forest edge vegetation at the lower end of eth naturalised section of Murchison Drain; 4) open forest understorey of 1968 plantings along Murchison Drain; 5) Open understorey of kanuka stand on the south side of Murchison Park; and 6) View of west side of mature 1986 forest plantings (Photograph: A. Shadbolt 2024).*

Figure 9: *Naturalised section of Murchison Drain (Clockwise from top left): 1) Pukio sedge, harakeke and duckweed providing shade for aquatic life; 2) Harakeke growing near the upper end of Murchison Drain; 3) Boardwalk provides access across Murchison Drain and a degree of nature plan and exploration; 4) Clear spring water; 5) Original 1986 plantings now provide a good degree of waterway shade and an open understorey; and 6) Natural regeneration of kiokio fern amongst harakeke in eth native forest understorey (Photographs: A. Shadbolt 2024).*

Management issues

The two main management issues that are evident at Murchison Park are 1) the presence of established biodiversity pest plants, and 2) mowing turf which is costly, has high carbon emissions, is damaging native woodland plantings, and preventing natural regeneration.

Pest plants

Although the main forest area along Murchison Drain is mostly thriving under a low-level maintenance regime, exotic woody pest plants such as grey willow, sycamore, Chilean mayten, elderberry, *cherry,* and North Island lacebark are invading this area. Ivy is also becoming widespread in the forest understorey where it is limiting natural regeneration.

If left unchecked, these biodiversity pest plants will continue to dominate the established forest and spread into new planted areas where they will displace indigenous plant communities (both planted and naturally establishing) and the indigenous fauna those communities support. Luckily, many of these pest plant species are both relatively sparse and young and able to be controlled cost effectively compared to if they are left to establish further.

Table 1 (below) lists biodiversity pest plants that threaten ecological values and restoration success at Murchison Park.

Table 1: *Biodiversity pest plants occurring at Murchison Park and prioritised recommended control actions.*

Common name	Scientific name	Recommendation
Sycamore	*Acer pseudoplatanus*	Completely eradicate the existing small number of saplings from Murchison Park. Search for parent tree and remove if within reserve. **HIGH PRIORITY**
Ivy	*Hedera helix*	Achieve complete eradication of all ivy within Murchison Park as this is a significant pest plant species that will eventually smother the forest understorey preventing natural regeneration, and also climb into the forest canopy and fruit/seed prolifically. **HIGH PRIORITY**
North Island lacebark	*Hoheria sextylosa*	Several large trees mostly towards the north end of Murchison Drain that were possibly included in the original plantings. Completely eradicate from corridor and replace with species that will quickly fill gap (e.g. wineberry – *Aristotelia serrata*). **HIGH PRIORITY**.
Chilean mayten	*Maytenus boaria*	Completely eradicate the existing small number of saplings from Murchison Park. Search for parent tree and remove if within reserve. **HIGH PRIORITY**
Flowering cherry	*Prunus spp.*	Completely eradicate the existing small number of saplings from Murchison Park. Search for parent tree and remove if within reserve. **HIGH PRIORITY**
Grey willow	*Salix cinerea*	Completely eradicate from reserve and follow up control of new seedling growth. Trees can be controlled by drilling and poisoning or by basal bark spray and left to decompose without physical removal. **HIGH PRIORITY**
Elderberry	*Sambucus nigra*	Completely eradicate the existing small number of saplings from Murchison Park. Search for parent tree and remove if within reserve. **MEDIUM PRIORITY**

Mowing

Mown grass covers approximately three hectares of Murchison Park. This includes the expansive central grass areas of the park, a wide area of grass between Murchison Drain and the eastern property boundaries, and smaller areas between the native woodlots.

Depending on the mowing frequency of existing grass areas at Murchison Park, at $0.06/m2, annual costs for mowing could be anywhere between $45,000 for 25 visits and $57,600 for 32 visits.

Ride-on mowers and weed-eaters access the native woodland understorey where they have caused permanent damage to tree trunks of many native trees (Figure 10) which will eventually lead to their decline. Mowing and weed-eating beneath these areas is also preventing the natural regeneration of native plants in the woodland understories. Once proposed restoration has been completed, it is anticipated that mowers and weed-eaters will be excluded from these areas where they are causing damage.

Figure 10: *Mower damage (and/or weed-eater damage) to the base of lowland ribbonwood (top) and kanuka (bottom) at Murchison Park (Photographs: A. Shadbolt 2024).*

Ecological values

Murchison Park has few existing biodiversity values other than the small patch of planted native forest, native woodlands (E.g., Figure 11), and the naturalised spring-fed waterway. The site's ecological significance sits more with it's potential as part of the wider native forest patch network than the forest on its own. In the future, it can be expected to support small populations of common native bush birds such as fantail, grey warbler, and silvereye, and attract regular visits by larger bush birds like NZ wood pigeon, bellbirds, shining cuckoo and potentially tui.

Along with native bush birds, we also expect to see native invertebrate populations establish and increase. These populations may establish via natural recolonisations or through intentional reintroductions. Similarly, we can expect native lizard populations to establish around the forest margins.

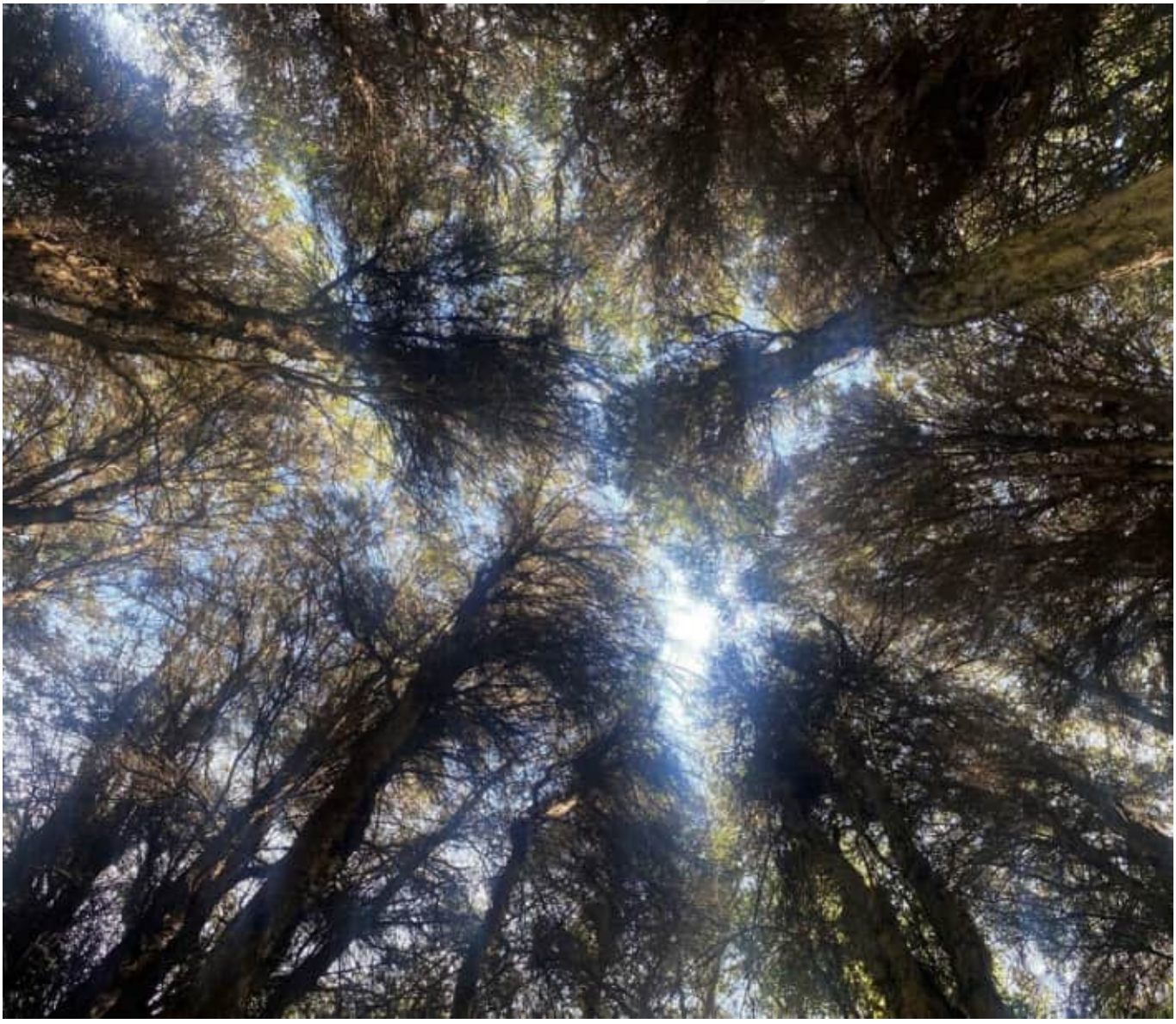

Figure 11: *Looing up into mature kanuka canopy in Murchison Park (Photograph: A. Shadbolt 2024).*

Proposal

Forest

We propose to replace large areas (approximately 18,000 m2) of mown grass with native forest which will expand and connect existing native forest and woodlot areas to create one large core forest habitat patch covering approximately 2.25 hectares (Figure 12). This will include low native shrubs and low trees around the periphery of the planting that are typical of natural forest edges but will not cause shading of private properties. These plantings will grade back into taller totara and kahikatea dominated forest towards the centre of the forest.

Species selection will be informed by the soil types, landforms, and the types of plant communities that would have once grown in the area prior to the arrival of humans. As well as the wider forest planting, this will include enrichment planting in the existing forest area with native climbers (such as clematis, native jasmines, and bush lawyers), understorey ferns, and other more sensitive species such as kawakawa and titoki that require sheltered planting conditions (see Table 6, Appendix 3).

Murchison Drain

We will work closely with the Council's 3-Waters ecologists to assess and further enhance Murchison Drain. This work may involve further daylighting and naturalisation of piped sections of the drain, creation of pools and rock riffles or other streambank enhancements.

Paths

We will retain all existing pathways in the park and create a series of informal nature loop trails through the native forest areas. A main route will be maintained through the proposed forest areas on the park's eastern side, with additional loop trails emerging naturally as the forest matures. These secondary loops will follow established desire lines or logical routes through natural clearings in the forest, creating the impression that the trails were organically integrated within the forest rather than the forest being shaped around them. This approach aims to enhance the sense of wilderness and natural character within the park.

We also propose constructing a new path along the western edge of the planned forest to create an open walking loop around the grass playing field. This path will offer an alternative route to the existing main path, which will eventually be surrounded by the mature forest.

Other features

Redwood Primary School has shown interest in building an ongoing connection with the park and its forest. In response, we propose collaborating with the school to create a small outdoor classroom beneath the existing mature forest canopy near Murchison Drain. As the new forest grows, we will also explore incorporating other park features such as interpretive elements and seating. The specific placement of these features will be decided later, based on the unique character and layout of various areas within the forest.

A large playing field sized area will be retained as mown open space at the western end of the reserve that links well with the playground, carpark, and public toilet.

Figure 12: *Concept plan for Murchison Park showing significant new native forest plantings covering approximately two hectares.*

With its blend of native plant communities and open recreational spaces, Murchison Park will be similar in size and character to Matawai Park[8] in Rangiora, which now has the status of 'Scenic Reserve' (Figure 13).

Figure 13: *Matawai Park in Rangiora was planted in the early 1970s and is now a 'Scenic Reserve' (Photograph: A. Shadbolt 2023).*

Crime prevention through environmental design (CPTED)

To maintain Crime prevention Through Environmental Design (CPTED) principles, we have considered a range of responses:

- ✓ Clear sightlines along main pathways will be maintained by ensuring only low groundcovers and limbed-up/clear-trunked trees will be planted within three metres of the path. This will eliminate concealment spots near the main paths.
- ✓ There will be multiple options for walking or cycling through and around the park. By creating loops and multiple entry and exit points to the paths, we will ensure there are no dead-ends or entrapment spots.
- ✓ Although the informal nature loop walks will be more secluded and with less passive surveillance and visibility, design cues at key entry points to these paths will give a clear indication of the environment people will be entering into if they choose to. Safer routes with better visibility will be immediately obvious to visitors.
- ✓ The proposed new path outside of the western edge of the forest will provide a further alternative route to the existing main path.

[8] www.bts.nzpcn.org.nz/site/assets/files/22592/cant_2003_37__15-20.pdf (See Henderson n/d).

Restoration method

Plant species selection

The Black Maps of 1856 (Figure 14) show the areas around Murchison Park as a complex mosaic of flax and raupo swamp, with areas of surface water, grassland, and fern. This 1856 vegetation cover had already been heavily modified by the first wave of human occupation in the Ōtautahi-Christchurch area. Prior to this time, we believe that the underlying soils and hydrology would also have supported forest and woodland ecosystems as evidenced by the discovery of buried totara logs and stumps at nearby sites (E.g., Te Waoku Kahikatea Reserve), and as suggested in Lucas and Associates Indigenous Ecosystems of Ōtautahi Christchurch maps (Figure 15).

The Lucas and Associates maps show Muchison Park being located on older plains moist and deep Kaiapoi soils ecosystems that would have supported totara and matai dominated forest. However, the site is also surrounded by nearby wet Taitapu soils that would have supported kahikatea dominated forest and bands of deep Waimakariri soils that also supported totara and matai. As a result, we assume that the Murchison Park site would naturally support a broad range of tree species contained in the various plant lists Lucas and Associates provide for the range of soil types.

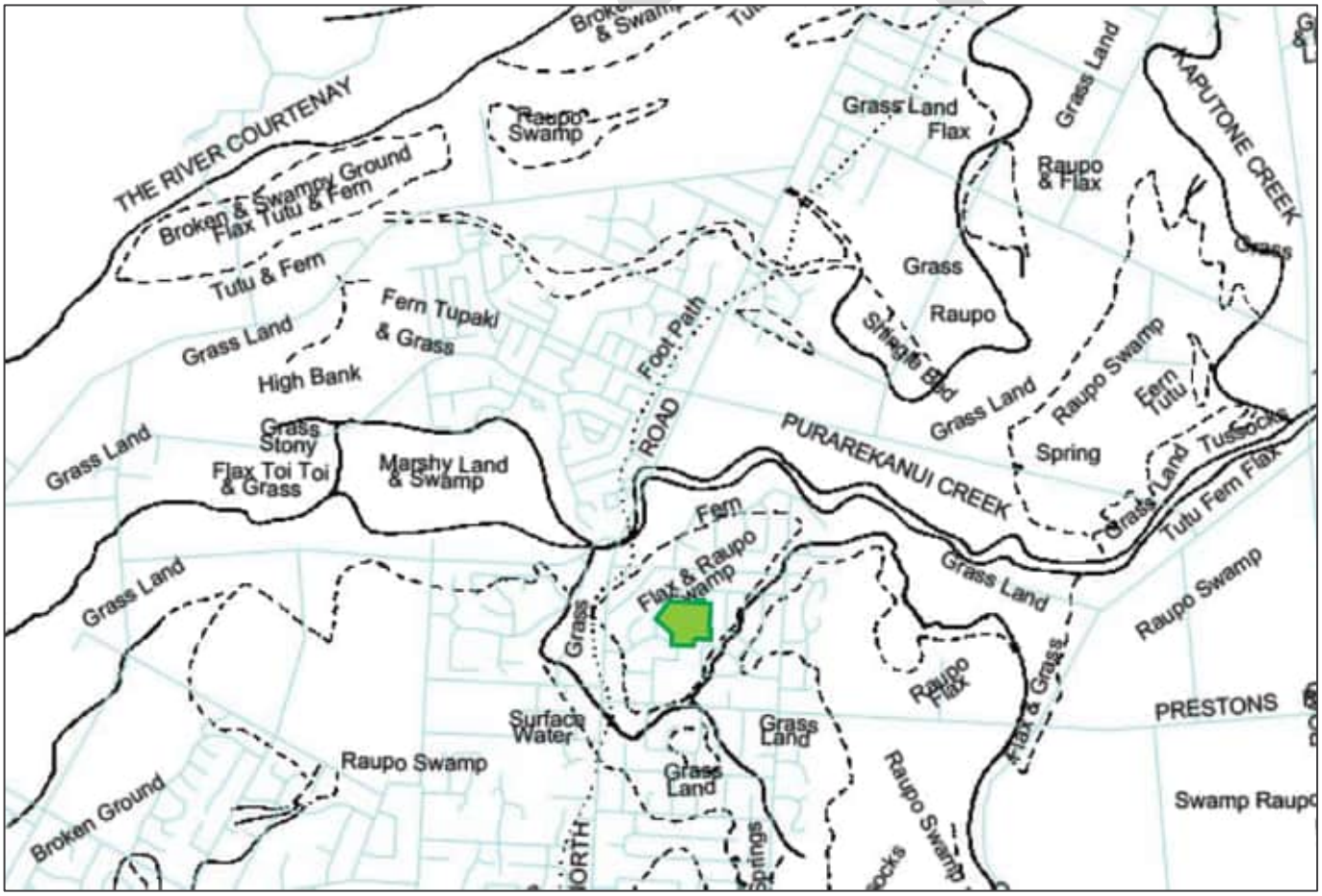

Figure 14: Black Maps from 1856 showing waterways, swamps and vegetation with Murchison Park shown as a green polygon.

Figure 15: Location of Murchison Park (yellow polygon) in relation to various ecosystem types based on underlying soils (Source: Lucas & Associates Indigenous Ecosystems of Ōtautahi Christchurch).

NOTE: All species used for forest restoration planting at Murchison Park shall be eco-sourced from naturally occurring vegetation remnants occurring in the Low Plains Ecological District or nearest appropriate location as approved by Council's parks ecologist.

Restoration zoning

To aid planning of the forest, the proposed planted area has been separated into six distinct zones (Figure 16). These zones are based on how they will support park use, maintain public safety, and how they integrate with neighboring properties (Refer also **Appendix 4**). These zones include:

1) **Core forest:** A large area of forest at the centre of Murchison Park allows for the planting of tall, dense trees.

2) **Forest edge:** Planting around the margins of the core forest area and approximately 4 m either side of the main pathway. Planting will be dominated by native sedges with limbed-up/clear trunked trees that provide good sightlines along the path to cater for CPTED (Crime Prevention Through Environmental Design) principles.

3) **Forest buffer:** A sheltered area east of the main pathway creates an effective buffer to the existing semi-mature forest planting and allows for the establishment of a broad variety of native trees and shrubs.

4) **East woodland:** Area between the existing forest and properties to the east to be planted as a mosaic of low shrubs and sedges that grade into taller woodland and forest towards the existing forest area.

5) **Murchison Drain:** A short section of Murchison Drain to be daylighted/naturalised and established with riparian planting. (NOTE: Daylighting of Murchison Drain will be a future project subject to funding).

6) **Forest understorey:** Woody weed species to be eradicated from the existing forest area, and native trees, shrubs, ferns, and climbers requiring shelter from wind, sun, and/or frost to be established.

Figure 16: Murchison Park restoration zoning map.

Tables provided in **Appendix 3** provide indicative species lists, numbers, and plant grades for the six planting zones, and **Appendix 4** gives further guidance on tree location of terms of proximity to property boundaries.

Site preparation

Herbicide application

- ✓ Spray all areas with a broad-spectrum herbicide to achieve total kill of all grass and broadleaved weeds.
- ✓ Contractor to follow all best-practice agrichemical application procedures and council guidelines for working in parks.
- ✓ Where possible, use a *'stale seedbed'* methodology whereby two applications of herbicide are done, consisting of 1) an initial application to achieve total kill of existing weeds, and 2) a second follow-up application (e.g. 6 – 8 weeks later) to kill any new weed-cover that has established resulting from seeds that have germinated following the first herbicide application.

Supply and spread mulch

- ✓ Where funding allows, arrange for the supply, delivery, and spreading of 100 mm compacted/settled depth of arbor mulch across the site. Mulch will help suppress further weed growth and help retain soil moisture.
- ✓ Where available budget will not allow for the entire site to be mulched, recommend limiting mulch to a 5 – 10 m wide band around the edges of the planted areas, and particularly along pathways. Mulching these areas will help the site look tidy and cared-for, making the restoration plantings more acceptable to the public.

Addition of woody debris

- ✓ Because natural forests have a high proportion of standing deadwood and downed woody debris in their understories, it is desirable to arrange for the importation of logs and stumps. Supply of this type of material can normally be easily arranged with local arboricultural contractors who are working in the area, as dropping it at convenient pre-arranged locations often helps them avoid transportation and disposal costs.

Planting

Plant collection and delivery

- ✓ Contractors, staff, and/or volunteers collecting plants from nurseries must contact the nursery ten working days prior to plant pick-up to allow for their planting stock to be sorted and weeded before dispatch.
- ✓ Where contractors, staff, or volunteers are concerned about the size of nursery plants being too small to establish well, they should contact Council's parks ecologist for advice.
- ✓ Ensure that only the number of plants that can be planted on the day are collected unless the contractor, staff, or volunteers have facilities to ensure plants are watered and remain in good health prior to planting.
- ✓ When transporting plants to the planting site, foliage should be covered with (e.g.) hessian or wind break material to reduce wind damage and transpiration/water loss.

Plant setout

- ✓ Contractor, staff and/or volunteers shall contact Council's parks ecologist to meet on site at time of planting to assist with set-out and/or provide plant set-out advice.
- ✓ All plants to be laid out in natural patterns, avoiding straight lines.
- ✓ Totara *(Podocarpus totara)* and matai *(Prumnopitys taxifolia)* shall be planted at (average) 5.0 m centres throughout their respective areas, noting that some may be much closer, and some much further apart.
- ✓ Similarly, kahikatea *(Dacrycarpus dacrydioides)* shall be planted at (average) 3.0 m centres throughout their respective areas, noting that some may be much closer, and some much further apart.
- ✓ Other tree species to be distributed randomly (either singularly or in same-species groups of 3 – 7 plants) throughout planting areas, noting the plant spacings designated for the six zones.
- ✓ Shrubs such as harakeke/NZ flax *(Phormium tenax),* small-leafed coprosmas *(Coprosma propinqua & C. rubra)*, toetoe *(Austroderia richardii),* koromiko *(Hebe salicifolia)* and manuka *(Leptospermum scoparium)* shall be planted towards the edges of new plantings to achieve a natural forest edge ecosystem.
- ✓ Ensure that harakeke/NZ flax is planted no closer than 3 m from the edge of any path to maintain sightlines and avoid tripping hazards from their long strappy leaves.
- ✓ Climbers and scramblers, including NZ jasmine *(Parsonsia spp.)*, bush lawyer/tataramoa *(Rubus spp.),* and clematis *(Clematis paniculata)* will require mature plants to support them and will therefore need to be planted at the bases of existing trees and large shrubs that can offer them structural support to eventually climb.

Planting

- ✓ Planting must follow industry best-practice for restoration plantings whereby holes are sufficiently wider than the plant container size, straight sided, deep enough and having broken through any sub-surface pans or compacted soils beneath the level of the pot.
- ✓ Where local schools with younger children under the age of 10 are involved with planting, recommend that holes are pre-dug by others prior to the planting event, and that follow-up planting checks are carried out and any issues rectified immediately.
- ✓ Ideally, all plants (with the exception of grasses) should have cardboard plant protectors installed, including bamboo stakes and wool mulch mats to assist their establishment and enable easier location, line-trimming, and/or follow-up herbicide application.
- ✓ Where plant guards are not used, each plant shall have a one-metre length bamboo cane installed to help contractors, staff, and/or volunteers find plants amongst weeds. Suggest that all stakes are installed on the same side of each plant to further aid in plant location amongst weeds.
- ✓ Note that adding fertilizer tabs is not considered necessary at Murchison Park as the ex-agricultural soils here likely have sufficient nutrients to sustain healthy and vigorous plant growth.

24-month establishment period

Weed control

- ✓ Contractors, staff, and/or volunteers shall ensure that weed growth at the site does not compromise native plant health and vigor, and that the site is maintained in a tidy state that is accepted by the community.
- ✓ Recommend site receives a minimum of four maintenance passes per year during the 24-month establishment period. This will involve locating and hand releasing plants where they have become overrun with weeds, and an application of an approved systemic herbicide to control weeds throughout the site.

Watering

- ✓ Given the low and damp nature of the reserve, and based on experience at nearby sites, watering is unlikely to be required in Murchison Park. Instead, plants have been selected based on their ability to withstand drier conditions.

Pruning

- ✓ Pruning shall not be carried out on any plantings during the 24-month maintenance period.

Pest animals

- ✓ Often restoration plantings are impacted by pest animals such as rabbits, hares, possums, and pūkeko. However given the urban nature of Murchison Park, which is surrounded on all sides by residential neighbourhoods, we do not expect issues with pest animals.

Rubbish removal

- ✓ In some situations, restoration plantings can trap rubbish (plastic bags, paper, plant guards etc.) that is discarded or blows through sites. Although we expect this to be minimal at Murchison Park, any rubbish or other debris encountered during routine maintenance shall be collected and disposed of off-site appropriately.

Ongoing management

Ongoing management of the site following the initial 24-month maintenance period shall largely be limited to the following activities.

- ✓ Removal and disposal off-site or re-use of plant guards.
- ✓ Control of grass and herbaceous weeds around the periphery of the forest areas, and particularly along pathways for aesthetic reasons.
- ✓ Control of woody weeds and vines throughout planted areas, e.g., grey willow, sycamore, Chilean mayten, cherry, North Island lacebark, old man's beard, ivy.
- ✓ Periodic removal and disposal off-site of rubbish and debris.
- ✓ Stripping of dead cabbage tree leaves from trees alongside paths to reduce risk of arson or wildfire. Cabbage tree leaves to be disposed of within plantings away from paths and high-use areas.
- ✓ Limbing or form pruning of trees planted within 4 m path buffer to maintain sightlines for CPTED purposes.
- ✓ Infilling of areas where plantings have failed.
- ✓ Introduction of species requiring more sheltered micro-climbers once a suitable forest structure has established (To be advised by Parks ecologists).
- ✓ Once habitat is well established and supporting native wildlife populations, consideration will be given to community-led predator control. However, it is likely to be some decades before Council could justify providing additional resources and would need to be prioritised against other high value sites.

Implementation plan

We intend to establish the native forest plantings at Murchison Park via both the Council's rolling programme of urban forest plantings (refer also **Appendix 4**) and in partnership with the Styx Living Laboratory Trust (SLLT). The SLLT received significant funding ($4.34M) from the Ministry for The Environment's (MfE) Freshwater Improvement Fund across five years. This funding included planting two hectares of native forest each year. The SLLT funding comes to an end on 30th June 2026. Therefore, to benefit from this partnership opportunity the Council's funding stream and prioritisation would need to be coordinated in a way that planting can commence as soon as possible.

The SLLT have also been in touch with Redwood Primary School who have expressed interest in being involved with caring for the Murchison Park forest on an ongoing basis.

Partnership options will need to be confirmed, but could involve variations of:

- ✓ The Council funds costs associated with planting of tree species only, while the SLLT funds costs associated with planting and establishing non-tree species like shrubs, sedges, groundcovers, ferns, and climbers, or
- ✓ The Council funds cost of all plants and site preparation, and the SLLT plants and maintains the site for a 12-month establishment period, or
- ✓ The SLLT funds and implements all work associated with planting, and the Council funds construction of new paths and/or other features in the park, or
- ✓ The SLLT funds and implements all work associated with planting and hands directly over to the Council for establishment, or
- ✓ The Council engages the SLLT as a paid contractor to undertake all planting work, or
- ✓ Other partnership arrangement.

Programme

Table 2 outlines an indicative implementation programme.

Table 2: *Indicative implementation programme for forest restoration at Murchison Park.*

Action	Timing
Confirm partnership arrangement between Council & Styx Living Laboratory Trust	Nov 2024
Confirm programming of Council funding	Nov 2024
Engagement/consultation on Murchison Park landscape plan	Nov 2024
Order plants for 2025 planting season	Jan 2025
Site preparation (1) – apply herbicide	Mar 2025
Site preparation (2) – apply herbicide, spread mulch and import woody debris	May 2025
Planting by Styx Living Laboratory Trust	May – Aug 2025
Styx Living laboratory Trust to maintain site for 12 months	Jul 2025 – July 2026
Hand over to Council's operational team for ongoing maintenance	June 2026
Begin to introduce secondary species that require shelter (ongoing)	2030
Begin reintroduction of invertebrates (ongoing)	2035

References

CCC (2005) *Christchurch City Council biodiversity strategy 2008 – 2035.* Christchurch City Council, Christchurch, New Zealand.

CCC (2023) *Our urban forest plan for Ōtautahi Christchurch.* Christchurch City Council, Christchurch, New Zealand.

CCC (2024a) *Ōtautahi-Christchurch (excluding Port Hills) native forest network.* Christchurch City Council, Christchurch, New Zealand

CCC (2024b) *Waipapa Papanui-Ionnes-Central community board native forest patch network.* Christchurch City Council, Christchurch, New Zealand

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Poulson, B., Hassan, H., Larsen, F., Sykes, A., and Maynard, I. (2023) *Pūharakekenui-Styx Living Laboratory Trust community tree planting scheme.* GEOG309: research for Resilient Environments and Communities. University of Canterbury, Christchurch, New Zealand.

Appendix 1: City wide forest patch network

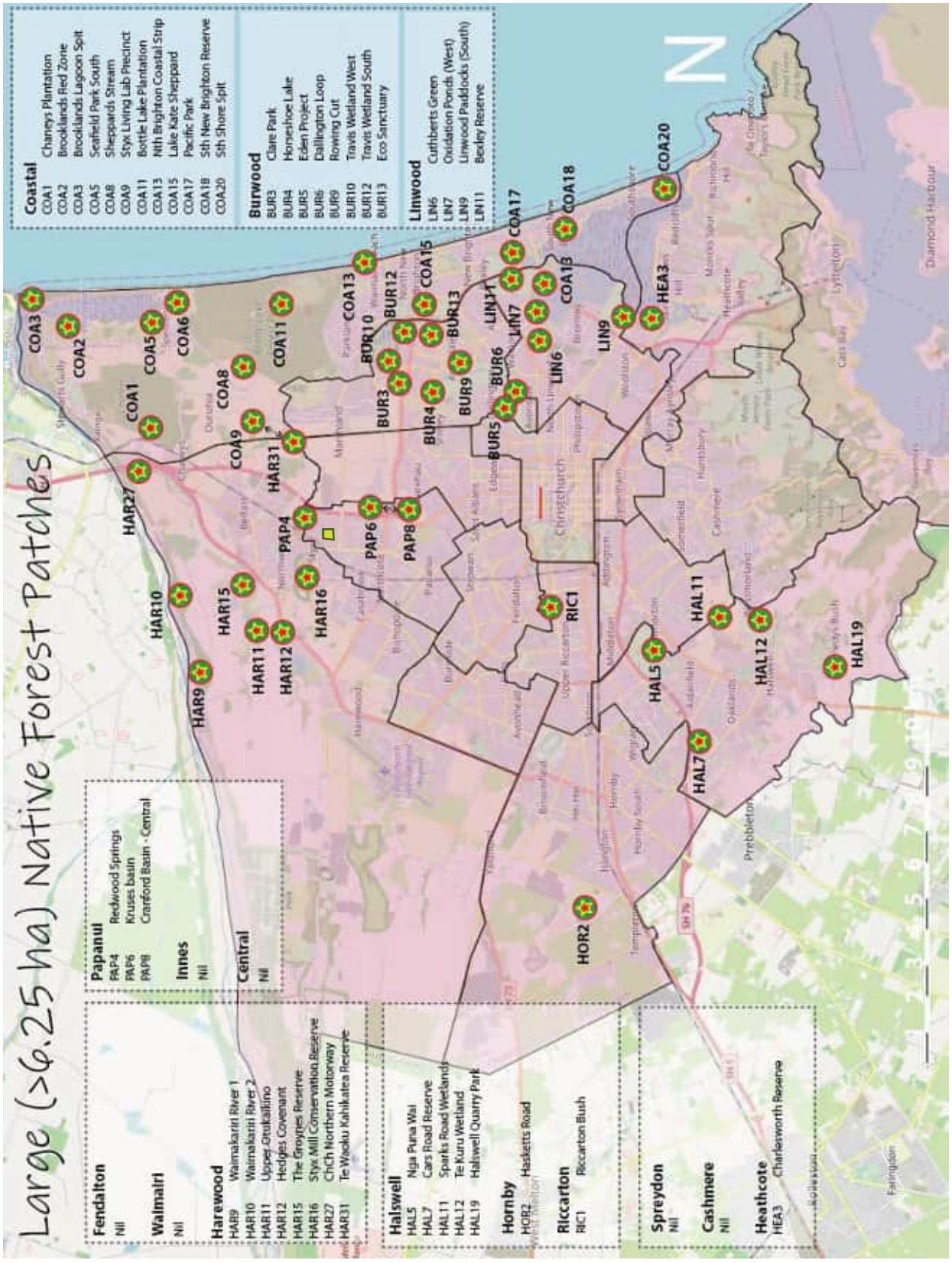


Figure 17: *Potential city-wide native forest patch network showing large (<6.25 ha) forest patches. Murchison Park is shown as small pale green square immediately southwest of PAP4 – Redwood Springs (Source: CCC 2024a & 2024b).*

Appendix 2: Papanui ward forest patch network

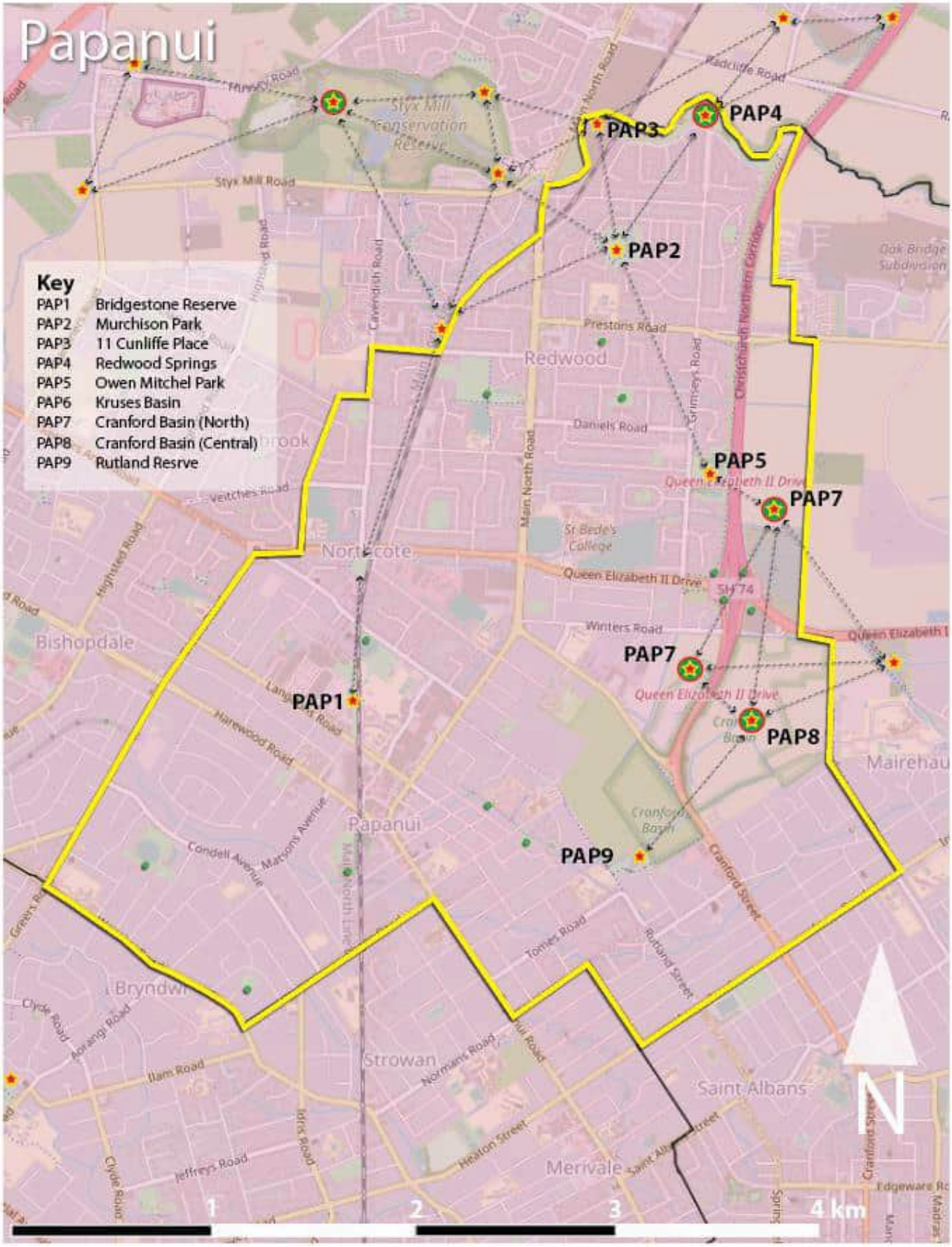


Figure 18: *Potential Papanui Ward forest patch network showing large (<6.25 ha) forest patches as red stars in green circles, and smaller patches (1.5 ha – 6.25 ha) as red stars. Murchison Park shown as PAP2. (Source: CCC 2024a & 2024b).*

Appendix 3: Species lists

Zone 1: Core forest

Table 3: Indicative species list for Zone 1 (core forest) to be planted at (average) 1.5 m centres.

Species	Common name	Number	Grade
Aristotelia serrata	makomako/wineberry	25	RT
Austroderia richardii	toetoe	100	RX90
Carpodetus serratus	putaputaweta/marbleleaf	50	2.5L
Coprosma propinqua	mikimiki	250	2.5L
Coproama robusta	karamu	250	RT
Cordyline australis	ti kouka/Cabbage tree	500	RT
Dacrycarpus dacrydioides	kahikatea	50	2.5L
Elaeocarpus dentatus	pokaka	100	2.5L
Elaeocarpus hookerianus	hinau	50	2.5L
Griselinea littoralis	kapuka/broadleaf	250	RX1L
Hebe salicifolia	koromiko	250	RX90
Hoheria angustifolia	houhere/South Island lacebark	100	RT
Kunzea serotina	kanuka	250	RT
Lophomyrtus obcordata	rohutu/New Zealand myrtle	50	2.5L
Leptospermum scoparium	manuka	100	RT
Pennantia corymbosa	kaikomako	50	2.5L
Phormium tenax	harakeke/New Zealand flax	100	RX1L
Pittosporum eugenioides	tarata/lemonwood	50	RT
Pittosporum tenuifolium	kohuhu/black matipo	50	RT
Plagianthus regius	manatu/lowland ribbonwood	200	RT
Pseudopanax arboreus	whauwhaupaku/fivevinger	50	RX1L
Pseudopanax crassifolius	horoeka/lancewood	50	2.5L
Podocarpus totara	totara	250	2.5L
Prumnopitys taxifolia	matai	25	2.5L
Sophora microphylla	South Island kowhai	100	2.5L
TOTAL		**3300**	

Zone 2: Forest edge

Table 4: Indicative species list for Zone 2 (forest edge) to be planted at (average) 1.0 m centres.

Species	Common name	Number	Grade
Austroderia richardii	toetoe	100	RX90
Carex secta	pukio sedge	2500	RX90
Coprosma propinqua	mikimiki	500	2.5L
Coprosma rubra	mikimiki/red-stemmed coprosma	100	2.5L
Dacrycarpus dacrydioides	kahikatea	100	2.5L
Hebe salicifolia	koromiko	100	RT
Kunzea serotina	kanuka	50	RT
Leptospermum scoparium	manuka	100	RT
Phormium tenax	harakeke/New Zealand flax	100	2.5L
Plagianthus regius	manatu/lowland ribbonwood	100	RT
Pseudopanax crassifolius	horoeka/lancewood	50	2.5L
Podocarpus totara	totara	100	2.5L
Sophora microphylla	South Island kowhai	100	2.5L
TOTAL		**4000**	

Zone 3: Forest buffer

Table 5: Indicative species list for Zone 3 (forest buffer) to be planted at (average) 1.2 m centres.

Species	Common name	Number	Grade
Alectryon excelsus	titoki	10	2.5L
Aristotelia serrata	makomako/wineberry	10	RT
Carpodetus serratus	putaputaweta/marbleleaf	10	2.5L
Coprosma propinqua	mikimiki	50	2.5L
Coproama robusta	karamu	25	RT
Cordyline australis	ti kouka/cabbage tree	25	RT
Dacrycarpus dacrydioides	kahikatea	100	2.5L
Elaeocarpus dentatus	pokaka	10	2.5L
Elaeocarpus hookerianus	hinau	10	2.5L
Fuchsia excorticata	kotukutuku/tree fuchsia	10	RX1L
Griselinea littoralis	kapuka/broadleaf	120	RX1L
Hebe salicifolia	koromiko	25	RX90
Kunzea serotina	kanuka	240	RT
Lophomyrtus obcordata	rohutu/New Zealand myrtle	10	2.5L
Leptospermum scoparium	manuka	50	RT
Melictrys ramiflorus	Mahoe/whiteywood	25	RX1L
Pennantia corymbosa	kaikomako	25	2.5L
Phormium tenax	harakeke/New Zealand flax	10	RX1L
Plagianthus regius	manatu/lowland ribbonwood	10	RT
Pseudopanax arboreus	whauwhaupaku/fivevinger	25	RX1L
Pseudopanax crassifolius	horoeka/lancewood	10	2.5L
Podocarpus totara	totara	20	2.5L
Prumnopitys ferruginea	miro	10	
Prumnopitys taxifolia	matai	10	2.5L
Sophora microphylla	South Island kowhai	50	2.5L
TOTAL		**900**	

Zone 4: East woodland

Table 6: Indicative species list for Zone 4 (east woodland) to be planted at (average) 1.2 m centres.

Species	Common name	Number	Grade
Aristotelia serrata	makomako/wineberry	25	RT
Astelia grandis	kakaha/giant bush flax	25	2.5L
Austroderia richardii	toetoe	100	RX90
Carex secta	pukio sedge	250	RXp0
Carpodetus serratus	putaputaweta/marbleleaf	10	2.5L
Coprosma propinqua	mikimiki	750	2.5L
Coprosma robusta	karamu	200	RT
Coprosma rubra	Mikimiki/red-stemmed coprosma	150	2.5L
Cordyline australis	ti kouka/Cabbage tree	250	RT
Dacrycarpus dacrydioides	kahikatea	25	2.5L
Elaeocarpus dentatus	pokaka	10	2.5L
Elaeocarpus hookerianus	hinau	10	2.5L
Griselinea littoralis	kapuka/broadleaf	500	RX1L
Hebe salicifolia	koromiko	250	RX90
Hoheria angustifolia	Houhere/South Island lacebark	10	RT
Kunzea serotina	kanuka	500	RT
Lophomyrtus obcordata	rohutu/New Zealand myrtle	25	2.5L
Leptospermum scoparium	manuka	100	RT
Pennantia corymbosa	kaikomako	25	2.5L
Phormium tenax	harakeke/New Zealand flax	300	RX1L
Pittosporum eugenioides	tarata/lemonwood	25	RT
Pittosporum tenuifolius	kohuhu/black matipo	25	RT
Plagianthus regius	manatu/lowland ribbonwood	25	RT
Pseudopanax arboreus	whauwhaupaku/fivevinger	100	RX1L
Pseudopanax crassifolius	horoeka/lancewood	25	2.5L
Podocarpus totara	totara	25	2.5L
Prumnopitys taxifolia	matai	10	2.5L
Sophora microphylla	South Island kowhai	250	2.5L
TOTAL		**4000**	

Zone 5: Murchison Drain

Table 7: Indicative species list for Zone 5 (Murchison Drain) to be planted at (average) 1.0 m centres.

Species	Common name	Number	Grade
Apodasmia similis	oioi/jointed wire rush	100	RX90
Astelia fragrans	kakaha/bush flax	25	2.5L
Astelia grandis	kakaha/giant bush flax	25	2.5L
Austroderia richardii	toetoe	10	RX90
Carex secta	pukio sedge	400	RX90
Carex virgata	pukio sedge	80	RX90
Coprosma propinqua	mikimiki	10	2.5L
Coprosma rubra	mikimiki/red-stemmed coprosma	10	2.5L
Cyperus ustulatus	upoko-tangata/umbrella sedge	100	RX90
Hebe salicifolia	koromiko	10	RT
Leptospermum scoparium	manuka	10	RT
Phormium tenax	harakeke/New Zealand flax	10	2.5L
Sophora microphylla	South Island kowhai	10	2.5L
TOTAL		**800**	

Zone 6: Forest understorey

Table 8: Indicative species list for Zone 6 (forest understorey) to be planted at (average) 3.0 m centres.

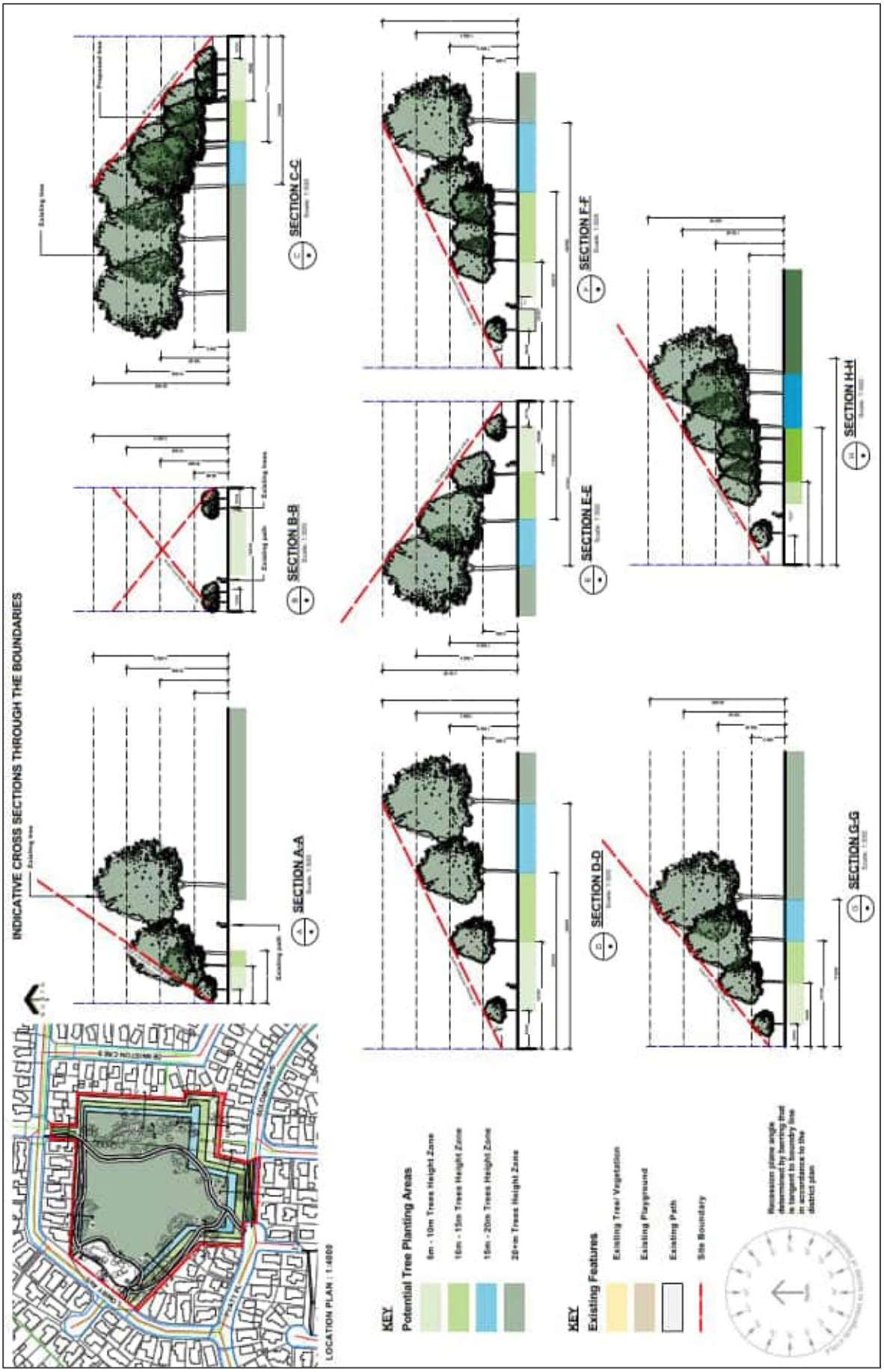
Species	Common name	Number	Grade
Alectryon excelsus	titoki	25	2.5L
Astelia grandis	kakaha/bush flax	25	RX1L
Blechnum minus	kiokio	25	RX1L
Cyathea dealbata	ponga/silver fern	10	2.5L
Cyathea smithii	katote/soft tree fern	10	2.5L
Clematis paniculata	pau wananga/bush clematis	25	2.5L
Dicksonia fibrosa	kuripaka/wheki ponga	10	2.5L
Dicksonia squarrosa	wheki ponga/rough tree fern	10	RX90
Fuchsia excorticata	kotukutuku/tree fuchsia	25	RX90
Hypolepis ambigua	rough pig fern	10	RX90
Macropiper excelsus	kawakawa	25	2.5L
Melicytus ramiflorus	mahoe/whiteywood	50	2.5L
Microlaena avenacea	bush rice grass	25	RX90
Parsonia capsularis	New Zealand jasmine	20	RX91
Parsonia heterophyllus	New Zealand jasmine	20	RX92
Prumnopitys ferruginea	miro	10	2.5L
Pseudowintera colorata	horopito/peppertree	10	2.5L
Rubus australis	tataramoa/bush lawyer	20	2.5L
Rubus cissoides	tataramoa/bush lawyer	10	2.5L
Rubus schmedelioides	tataramoa/bush lawyer	10	2.5L
Uncinia unciniata	watau/hook sedge	25	RX90
TOTAL		**400**	

Appendix 4: Urban forest plan consultation plans

Tree planting height zones

Christchurch City Council

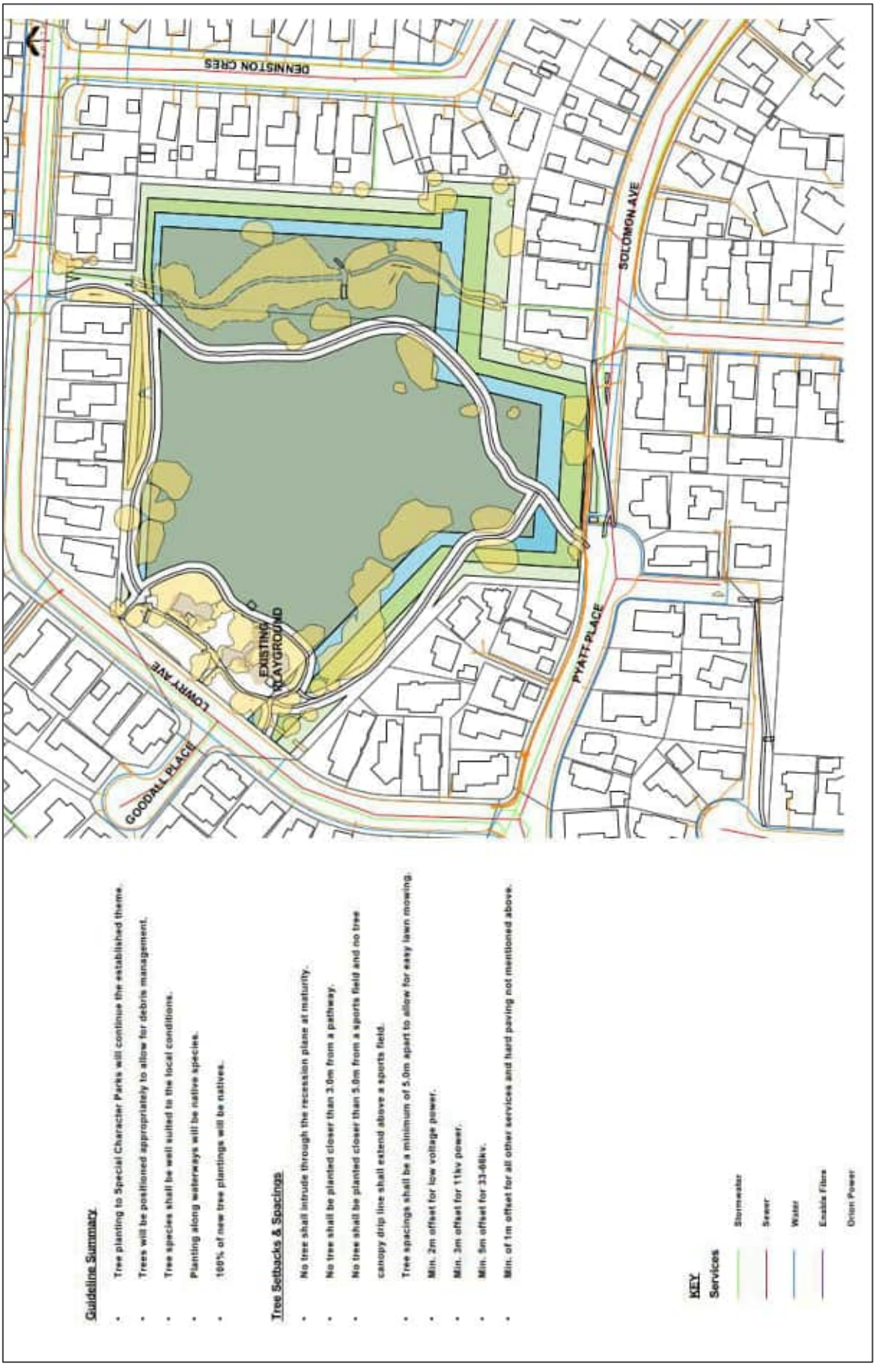
Lot boundary cross sections



Concept plan

Christchurch City Council

Tree planting guidelines



Appendix 5: Styx Living Laboratory Trust free trees project

In 2022, the Styx Living Laboratory Trust[9] was successful in securing funding from the Council's 'Sustainability Fund' to run a free trees giveaway project to households around the Murchison Park area. The key intentions of this project were to 1) increase tree canopy coverage in the local area, 2) increase the presence of native trees in the area, and 3) raise the profile and appreciation of the importance of native trees and forests – particularly in the urban environment. It also served to highlight the ongoing work of the Styx Living Laboratory Trust in the catchment.

A total of 1,020 trees were delivered to 1,020 households in the vicinity of Murchison Park during the early evening. Each household received one native tree, along with information about the species (such as its growth habits and special features), a voucher for a second free plant from Trees for Canterbury[10], and planting instructions. The package also included suggestions for those who did not want to keep the tree, such as giving it to a neighbour or friend, or bringing it to a community planting day at Murchison Park (see Figures 19, 20 & 21) where they could either return it or plant it alongside other trees provided by the trust for the event.

Figure 19: *Invitation to community planting day at Murchison Park in 18th N=June 2023 following the Styx Living Laboratory Trust's 'Free Trees' giveaway.*

[9] www.thestyx.org.nz/styx-living-laboratory-trust
[10] www.treesforcanterbury.org.nz

Figure 17: *Left to right: Jacquiline Howard (Community Coordinator) Bethany Naker (Conservation Project Coordinator) and Dan Grima (Education Officer) from the Styx Living Laboratory Trust with trees funded by Councils Sustainability Fund ready for delivery to 1020 households surrounding Murchison Park (Photograph: Styx Living Laboratory Trust 2023).*

Door-to-door surveys done by University of Canterbury Geography 309[11] students following the plant drop-off revealed that 49 of 81 recipients surveyed (61%) had planted the trees either on their own properties (35%), at a nearby friend or relatives (14%), or at the Murchison Park planting day (12%), while another 23% still had them but had not yet planted them (Table 9).

Table 9: *Geography 309 survey results for the fate of native trees delivered as part pf the Styx Living Laboratory Trust's 'Free Trees' project.*

What did you do with your tree?	Count	Percentage
Planted elsewhere	7	9%
Planted on the property of a friend, relation or neighbour in the area of Redwood north of Preston's Road?	11	14%
Have not planted the tree and no longer have it	6	7%
Have not planted the tree but still have it	19	23%
Planted at community planting day at Murchison Park	10	12%
Planted on own property	28	35%
TOTAL	**81**	**100%**

Overall, survey results showed that 69% of recipients saw the project as positive, 26% were neutral, while just 5% saw the initiative as negative. Poulsen *et al.* (2023) concluded that the Styx community tree planting scheme was a success as it met their threshold of 60% and the community's perspective of the scheme being generally positive and was mirrored by a relatively high success rate in trees being planted or still likely to be planted (Table 9).

[11] https://www.canterbury.ac.nz/study/academic-study/science/science-schools-and-departments/school-of-earth-and-environment/earth-and-environment-outreach/geography-community-engagement-repository

Figure 18: *Mike Barthelmeh - landscape architect and original 1984/85 designer of 'Murchison Forest Park' (refer Figure18) plants native trees in Murchison Park on 18th June 2023 as part of the Styx Living Laboratory Trust's 'Free Trees' project (Photograph: A. Shadbolt 2023).*

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