

Taiaotea and Rothesay Catchment Community Restoration Project

Restoration Plan



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Version 1.3



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1. Introduction

Recreation Solutions Ltd has developed a restoration plan as part of the Taiaotea and Rothesay Bay Catchment Community Restoration Project, with support and technical input from Restore Hibiscus & Bays.

The Taiaotea Valley is located in the suburbs of Browns Bay, Rothesay Bay and Northcross 20km north of Auckland's CBD. The project area has been defined as the natural drainage catchments feeding into the Taiaotea Stream and Rothesay Bay Stream. The project area includes residential, commercial, green and open space located between the boundary of East Coast Bays road to the west and down to Browns Bay beach and coastal cliffs to the east. Carlisle Road to Ridge Road provides the northern boundary and Browns Bay Road, Masteron Road, Korotaha Terrace and Sandown Road provides the southern boundary. The project area is outlined in figure 1 below. The purpose of this restoration plan is to outline the requirements for restoration and enhancement of the stream banks and surrounding reserves. This plan outlines a scheduled work programme for the removal and control of pest plants, rubbish removal, and planting that is required in the lead up to and following next years planting season in the winter of 2021 - 2026.

This report includes:

- A description of the wider ecological context of the project area, and the flora present
- Objectives for restoration of the valley
- Statutory context
- Discussion of the issues and threats relating to the valley
- Management recommendations to deal with the issues identified
- Wider opportunities for the restoration of the valley, to meet defined objectives

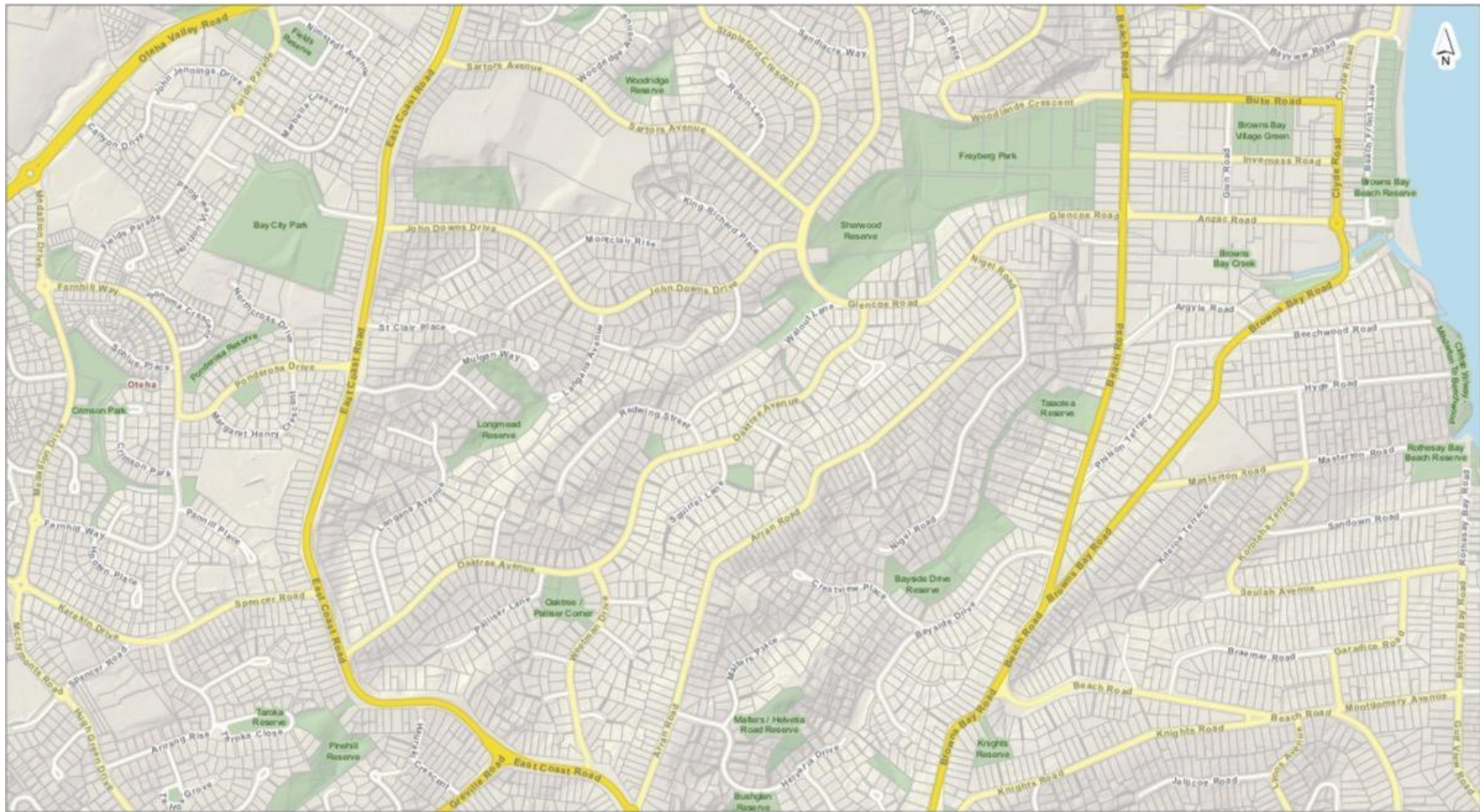


Figure 1: Project area covered by the restoration plan

2. Objectives

The purpose of this restoration plan is to outline the requirements for restoration and enhancement of the Taiaotea stream and Rothesay Bay stream banks and their tributaries and surrounding reserves.

The objectives of the restoration plan are outlined below:

- To support the enhancement of a resilient coastal forest and riparian ecosystem by:
 - Ensuring pest plant species no longer threaten the integrity of native plantings
 - Using plant release (and future native plantings) to support a land-to-stream sequence of native vegetation.
- To improve water quality of the Taiaotea stream and its tributaries by:
 - Stabilising the streambanks and reducing erosion
 - Enhancing the riparian margin that will filter overland flow to the stream.
- To encourage community stewardship of the Taiaotea valley by:
 - Participation in community volunteer weed control and planting days in the reserves.
 - Encouraging behaviours that discourage littering and help to clean up rubbish in the reserves and streams.

The objectives of the wider Taiaotea and Rothesay Bay Catchment Community Restoration Project are outlined below:

- Restoration/enhancement of the riparian margin of Taiaotea stream and its coastal forest supports the establishment of the North-West Wildlink.
- Active participation of the community, including adjacent landowners, will result in greater use of these under-utilised reserves.
- The community is empowered and has a greater sense of stewardship of the Taiaotea valley.
- Facilitates a relationship with local landowners and businesses who can then be engaged in Key Move 5 of the Draft Browns Bay Centre Plan. This plan identifies the need to engage with neighbouring landowners to develop a route and stream crossing to connect the Taiaotea stream to the estuary and beachfront.

3. Ecological Context

The project area is within the Tamaki Ecological District, which covers the Auckland City isthmus and the North Shore of the Auckland Region. The North Shore section of the Tamaki Ecological District contains 21% of the district and 49% of the indigenous forest and scrub cover of the district. The indigenous vegetation cover of the district has been significantly reduced, with only 6.9% of the total land cover of the ecological district now remaining in native vegetation cover¹.

The North Shore vegetation provides habitats for native bird and animal species such as kereru, tui and skinks and geckos. Remnants of forest in the Tamaki Ecological District play an important role within the region as corridors and 'stepping stones' for native wildlife and flora between Gulf Islands and larger habitats in the Waitakere and Hunua Ranges².

307ha of vegetation in the North Shore section of the Tamaki Ecological District contains a significant component of exotic species in the canopy, including pine, wattle, tree privet or gums. These pest plant species are therefore impacting on the indigenous biodiversity of the North Shore. Weed species are present within the large majority of vegetation sites identified through the North Shore City Ecological survey. At least two thirds of significant natural areas were found to be impacted to a moderate to high degree by weeds. It concluded that weeds and pests present the greatest of all threats to the indigenous biodiversity within this area³.

Auckland Council GIS Biodiversity information for the Proposed Auckland Unitary Plan shows that the main indigenous ecosystem types in the catchment include: coastal broadleaved forest ecosystem (WF4), including coastal forest in the lower reaches of the Taiaotea Stream linking to mature pohutukawa on the coastal cliffs surrounding both Browns Bay and Rothesay Bay adjacent to what was previously kauri, podocarp, broadleaved forest ecosystem (WF11). This area is also classified as a significant ecological area. Tawa, kohekohe, rewarewa, hīnau, podocarp forest (WF13) next to Northcross Intermediate School, pockets of kanuka scrub forest (VS2) in Bushglen Reserve and Maltes/Helvetia Reserve, and kahikatea, pukatea forest (WF8) in Bushglen Reserve. Both these areas are also classified as significant ecological areas

The Taiaotea catchment hosts one of the last examples of the 'threatened-nationally critical' mature *Syzygium maire* (swamp maire) within Bushglen Reserve, providing an extremely valuable seed source. Riparian zones continue down all the way to Browns Bay beach and in various parts of the Taiaotea stream, kokopu have been found as well as inanga spawning

¹ Myers et al. 2005. *North Shore City Ecological Survey – A Survey of Sites of Ecological Significance in Tamaki & Rodney Ecological Districts*, Piv

² Myers et al. 2005. *North Shore City Ecological Survey – A Survey of Sites of Ecological Significance in Tamaki & Rodney Ecological Districts*, Pv

³ Myers et al. 2005. *North Shore City Ecological Survey – A Survey of Sites of Ecological Significance in Tamaki & Rodney Ecological Districts*, Pix

sites in both Taiaotea and Rothesay Bay Streams. Behind the rows of shops on the northside of Bute Road, stands of fragmented mature pūriri trees are presently providing food sources for birds found in the area, including riroriro (grey warbler), tūī, kererū, ruru and kōtare. Kākā have also been sighted in and around Bushglen.

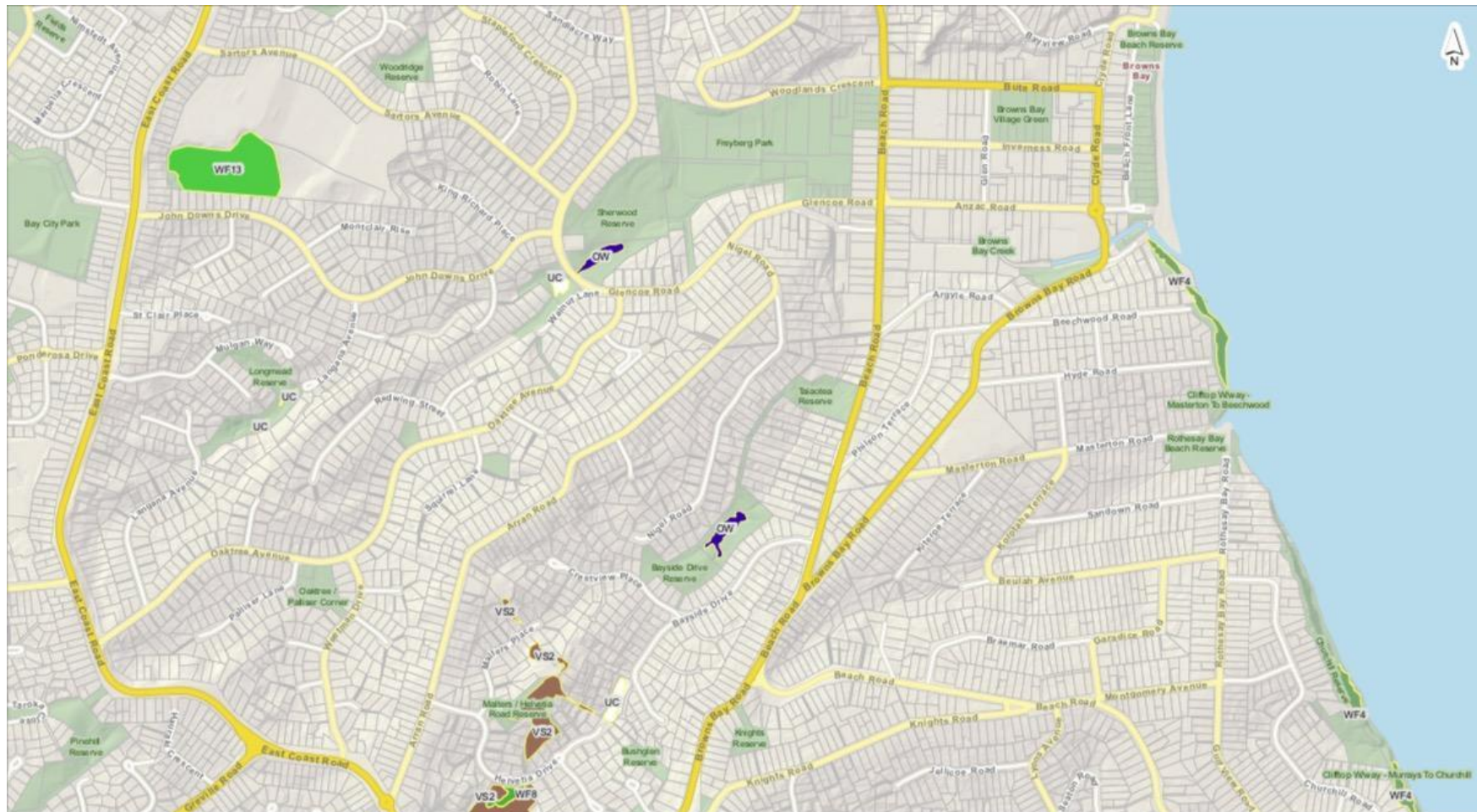


Figure 2: Auckland Council Geomaps Database – Ecological Areas

4. Planning Context Auckland Unitary Plan

The reserve areas outlined in this restoration plan are zoned as either Open Space – Informal Recreation or Open Space – Conservation Zone in the Auckland Unitary Plan (Operative in Part) (Figure 9).

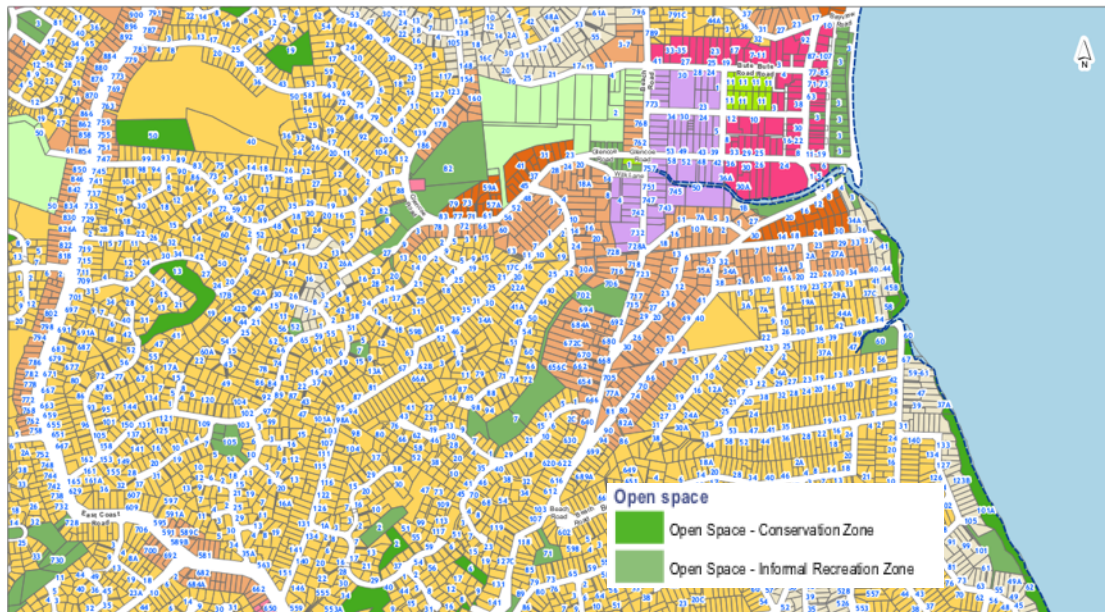


Figure 3: Open Space – Informal Recreation Zone (light green) & Conservation Zone (dark green) in the reserve areas.

The coastal forest on the cliffs between Browns Bay and Rothesay Bay cliffs, Helvetia/Bushglen Reserve and Northcross Reserve are designated as Significant Ecological Areas (SEA) (Figure 10). There are no trees within the project area listed as Notable trees in the Natural Heritage Notable Trees Overlay.

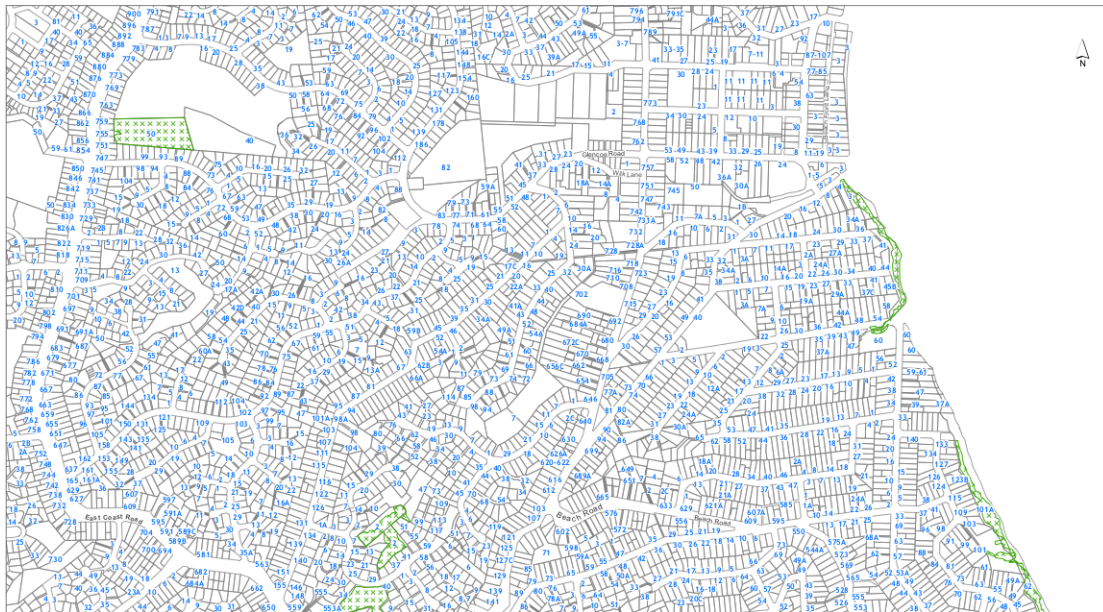


Figure 4: Significant Ecological Areas (SEA's) in the reserve areas

4.1 Consent Requirements

Rules relating to the management of terrestrial and coastal vegetation and biodiversity values outside of scheduled significant ecological areas are found in section E15 Vegetation Management and Biodiversity of the Auckland Unitary Plan (Operative in Part). The relevant rules include:

- Vegetation alteration or removal within 10m of urban streams is a restricted discretionary activity (*Table E15.4.1 (A19)*).

The reserves are located within the Open Space – Informal Recreation Zone & Conservation Zone and therefore E16 Trees in open space zones applies. The relevant rules that apply to trees within the open space zone are shown in figure 11 below:

Rule (E16.4.1) – Trees in open space zones	Activity status
(A1) Biosecurity tree works	PA
(A2) Dead wood removal	PA
(A3) Emergency tree works	PA
(A4) Pest plant removal of any tree less than 4m in height and less than 400mm in girth	PA
(A5) Tree trimming or alteration	PA
(A6) Tree trimming or alteration that does not comply with Standard E16.6.2	RD
(A7) Works within the protected root zone	PA

(A8) Works within the protected root zone that do not comply with Standard E16.6.3	RD
(A9) Tree removal of any tree less than 4m in height and less than 400mm in girth	PA
(A10) Tree removal of any tree greater than 4m in height or greater than 400mm in girth	RD

Figure 5: Activity table for trees in Open Space Zones.

4.2 Conclusion

In terms of consent requirements:

- All trees greater than 4 metres require resource consent for their removal.
- Trees (including pest trees) up to 4m in height or less than 400mm girth can be removed using hand operated tools.
- All earthworks and/or ground disturbance will trigger a resource consent.
- All vegetation alteration or removal within 10m of an urban stream will trigger a resource consent.
- Tree trimming is a permitted activity in accordance with the standards referenced above. However, where this tree trimming is undertaken in any contiguous area of indigenous vegetation, no greater than 25m² can be as a permitted activity.

It is understood that Auckland Council Local Parks have applied for a global consent to cover all Council sanctioned vegetation removal in Auckland Council Local Parks. The status of this resource consent is unknown at the time of writing this report.

5. Site Description

5.1 Overview

The project area contains three distinct zones – streamside vegetation, coastal forest and mown grass. The catchment area is approximately 4.93km².

5.2 Vegetation Types

Vegetation within the project area adjoining the Taiaotea and Rothesay Bay streams and tributaries can be divided into a number of main types:

- Planted vegetation (PL)
- Coastal broadleaved forest (WF4)
- Podocarp forest (WF13)
- Kahikatea, pukatea forest (WF8)
- Kanuka scrub/forest (VS2)

These vegetation types are described in more detail below:

5.2.1 Planted Vegetation (PL)

Some areas of vegetation along the Taiaotea stream edge and its tributaries comprises a mix of indigenous plantings of mainly cabbage tree and flax. Several pest plant species, including pampas, blue morning glory, nasturtium, arum lily and wooly knightshade are growing amongst these indigenous plantings. These areas are classified as PL because the weed biomass is less than 50%. However, as figures 6 and 7 show, these pest plants are climbing up trees and smothering them as well as forming a dense ground cover which is stopping the regeneration of indigenous plants.



Figure 63: Woolly knightshade and blue morning glory growing amongst cabbage trees

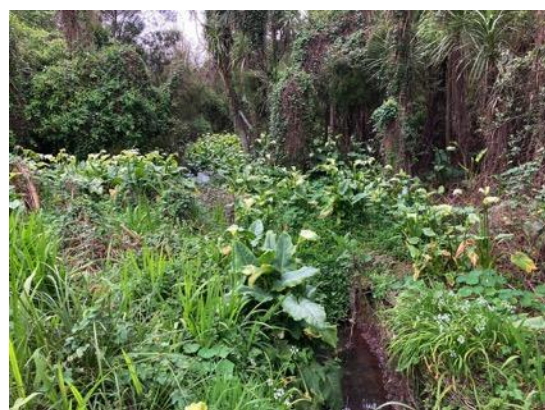


Figure 7: Arum lily and blue morning glory growing amongst cabbage trees

5.2.2 Coastal broadleaved forest (WF4)

The forest area on Browns Bay Creek Reserve in the lower reaches of the Taiaotea Stream consists of remnant indigenous canopy trees; mainly pohutukawa and kanuka but a single totara tree is also present. A discrete number of exotic canopy trees include a single sydney golden wattle, japanese cedar and a number of tree and chinese privet. Indigenous trees are dominant in the canopy.



Figure 8: Streamside planting, mown grass and coastal forest (left to right)



Figure 9: Coastal forest canopy

A robust understory exists beneath these canopy species; however as figures 10 and 11 show pest plants are also climbing up trees and smothering them as well as forming a dense ground cover which is stopping the regeneration of indigenous plants. This includes blue morning glory, english ivy, and wandering willie.



Figure 10: Blue morning glory growing towards the canopy species



Figure 11: Wandering willie dominating the understory

Due to greater than 50% of canopy cover being indigenous, a healthy understory and over 80% of canopy cover of trees and shrubs this coastal area is defined as a coastal broadleaved forest (WF4) dominated by pohutukawa. A contiguous area of WF4 has previously been

identified as close as the mouth of the Taiaota stream, which extends inland to include the coastal forest in the reserve area. WF4 can extend inland, 600 – 800m from shore.

4.2.3 Podocarp forest (WF13)

The forest area on Northcross Reserve consists of remnant indigenous canopy trees; a combination of totara, rimu, and puriri. A number of exotic canopy trees are also present including sydney golden wattle and a pinus radiata. Indigenous trees are dominant in the canopy.



Figure 12: Coastal forest canopy around forest clearing



Figure 13: Bamboo and wandering willie understory

A robust understory exists beneath these canopy species; including kawakawa in shaded areas and kumeraho in more exposed areas. Pest plants are also climbing up trees and smothering them as well as forming a dense ground cover which is stopping the regeneration of indigenous plants. This includes wooly knightshade, bamboo and wandering willie.

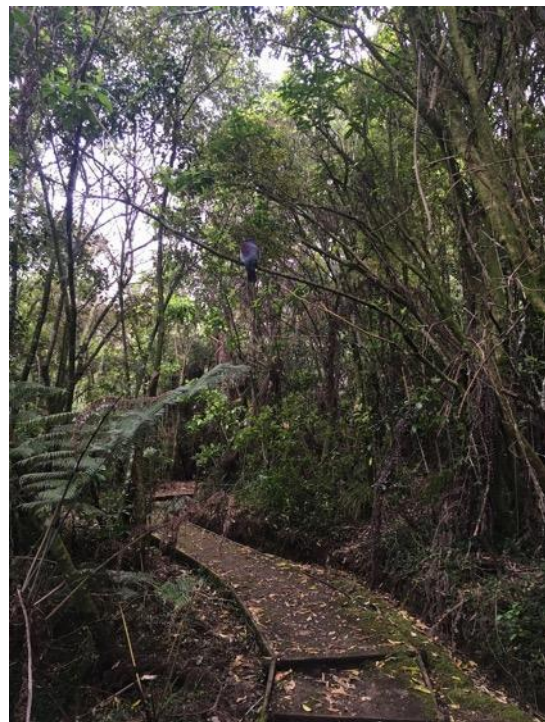


Figure 14: Kawakawa understory

Figure 15: Emerging understory (and kereru)

4.2.4 Kahikatea, pukatea forest (WF8)

The forest area in Bushglen Reserve consists of indigenous vegetation types typical of a swamp forest growing on soils with seasonally high water tables. This includes swamp maire, and māhoe and tītoki on areas of drier ground. Supplejack is also abundant, creating a dense structure and sub-canopy. This ecosystem type has “Critically Endangered” Regional IUCN threat status.



Figure 16: Swamp maire and rimu in canopy

**Figure 17: Wetter area surrounding
Taiāotea Stream tributary**

4.2.5 Kanuka scrub/forest (VS2)

The forest area in Maltes/Helvetia Reserve and parts of Bushglen Reserve consists of indigenous vegetation types typical of kanuka scrub/forest. This includes māhoe and five-finger. This predominated away from the wetter areas of the tributary to the Taiāotea Stream.



Figure 18: Swamp Maire in drier parts of the Reserve



Figure 19: Bushglen Reserve

5. Issues

5.1 Pest Plants

Pest plants are exotic plants that have the potential to threaten the ecological integrity of the streamside planting and coastal forest area outlined in this restoration plan. The main reasons for this are that pest plants are climbing up trees and shrubs and smothering them, and also forming a dense ground cover which is stopping the regeneration of native plants.

Of the pest plants species listed in the Auckland Regional Pest Management Strategy 2007 – 2012 (ARPMS), 15 species were recorded in the project area. 11 more pest plant species not listed in the ARPMS were identified in the project area. Control of these species is recommended, with control methods outlined in Appendix 1. The type, location and extent of pest plants are mapped in Figure 11 above.

There are three categories in the ARPMS 2007 – 2012 – (i) Total Control Pest Plants, (ii) Containment Pest Plants, and (iii) Surveillance Pest Plants. Pest plants not outlined in the ARPMS but that are found within the project area are also outlined.

Total Control

Total control pest plants are of limited distribution or density within the Auckland region, and are of high potential threat. No total control pest plants have been identified in the reserve area outlined in this restoration plan.

Containment

Containment pest plants are abundant in certain habitats or areas in the Auckland region, which landowners/occupiers are required to treat whenever they appear on their land.

There are two categories of containment that can be applied:

- removal – landowners/occupiers are required to completely remove containment (removal) pest plants from their property

- boundary control - landowners/occupiers are required to maintain clearance of containment (boundary control) pest plants to a specified distance from all property boundaries.

Containment pest plants identified in the project area and their control requirements are outlined below:

Woolly nightshade (<i>Solanum mauritianum</i>)	Boundary control
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Surveillance

Surveillance pest plants include species that have been identified as having significant impacts on the biosecurity values of the Auckland region. Landowners and occupiers are encouraged to protect the environment by removing these species from their properties. Community initiatives to control these pest plants are promoted and supported by Auckland Council.

Surveillance pest plants identified in the project area are outlined below:

- Agapanthus (*Agapanthus praecox*)
- Arum lily (*Zantedeschia aethiopica*)
- Blue Morning Glory (*Ipomoea indica*)
- Climbing asparagus (*Asparagus scandens*)
- Cotoneaster (*Cotoneaster glaucophyllus*)
- English Ivy (*Hedera helix*)
- Japanese Honeysuckle (*Lonicera japonica*)
- Monkey apple (*Syzygium smithii*)
- Palm grass (*Setaria palmifolia*)
- Pampas grass (*Cortaderia selloana*)
- Phoenix palm (*Phoenix canariensis*)
- Privet – Chinese (*Ligustrum sinensis*)
- Privet – Tree (*Ligustrum lucidum*)
- Wandering willie (*Tradescantia*)

Other

Other pest plants present within the project area that are not listed in the ARPMS are:

- Bear's Breeches (*Acanthus mollis*)
- Black Wattle (*Acacia mearnsii*)
- Cape Wattle (*Paraserianthes lophantha*)
- Cherry (*Prunus campanulata*)
- Gum (*Eucalyptus*)
- Japanese Cedar (*Cryptomeria*)
- Loquat (*Eryobotria japonica*)
- Nasturtium (*Tropaeolum majus*)

- Spider Plant (*Chlorophytum comosum*)
- Sydney Golden Wattle (*Acacia longifolia*)
- Watsonia (*Watsonia meriana*)

Control Methods

There are several methods to control pest plants, depending on the experience level of the participants, the type of pest plant being controlled, the extent of the infestation and environmental factors, such as proximity to water. These methods are outlined below:

Cut stump

This is one of the more common methods for volunteers as you are able to use the herbicide in gel form effectively without a [Growsafe](#) qualification. This method is best for a range of environmental weeds, including both vines and trees, whilst using the least amounts of herbicide. Cut the pest plant stem at the base closest to the roots. Take care when cutting not just for yourself but for others around you. Apply a thin film of [cut & paste](#) herbicide (MetGel, Bamboo Buster, Vigilant) directly to the cut stump or stem to prevent regrowth. Established pest plant sites with seed producing plants may need to be revisited for cut and paste maintenance every three months across a period of a year.

Hand remove

Hand removal is suitable for small young pest plants. Simply pull or gently dig out. However, hand removal is usually only suitable if the entire root system can be removed. Soil disturbance can lead to more weeds and erosion in some places (water courses and stream banks). This method is not recommended for resprouting species, such as wild ginger, as any remaining fragments of the root systems will regrow.

Ring barking

The ring barking method is suitable for small to large pest trees that provide canopy. Leaving a canopy intact reduces the chance of other pest plants reestablishing in the area. It can take years for the selected pest tree to gradually break down, creating habitat for a range of birds, lizards and insects. To start, cut two horizontal rings 15cm or more apart. The cuts should be just deeper than the bark on the tree. Cut a line from the top ring to the bottom ring and work your way around removing all of the bark between the two rings, leaving an exposed cambium layer. Once all of the bark is removed exposing a section of the tree, apply a thin film of herbicide to the exposed section.

Foliar spray

This is a common pest plant control method for ecocontractors or volunteers with a [Growsafe](#) qualification. Herbicide can be applied over the entire surface of plant foliage. This method is very effective for a variety of applications, including instances of dense ground cover such as periwinkle, climbing asparagus and japanese honeysuckle, as well as large pest grass species, such as pampas. Before spraying, please consider variables such as weather conditions. Spraying should not proceed in the wind or rain as this may have unintended effects on non-target organisms on site. It is also important to select the appropriate

herbicide for the sites, e.g. selective or nonselective, and to assess and check herbicide rates for the target plant type.

5.2 Pest Animals

In Hibiscus and Bays, there are multiple community volunteer groups that have been suppressing the numbers of predators for decades. In addition, some of the native bush remnants that have been classified as high value by Auckland Council are under a limited degree of predator control by professional eco-contractors.

A landscape scale eradication approach will be adopted, where in the absence of oceans to act as barriers to reinvasion by predators, it is intended to follow the natural divide of the landscape and pursue a catchment-based eradication approach. Catchments are an obvious scale within which to create a halo of safe habitat surrounding significant ecological areas and ecologically important riparian land, including areas undergoing habitat restoration efforts.

The first stage of the predator eradication programme is to suppress populations of rats, possums and mustelids to below 5%. The map shown below details approximate locations of control lines for rats, possums and mustelids across the two catchment networks, in order to give an indication of the numbers of traps and bait stations required for effective control (shown in brackets in the key). Specific trap and bait station locations will be determined by the programme coordinator working on the ground in close collaboration with the volunteers and community groups. Final trap lines will therefore vary from this map and incorporate any existing plans for predator control in reserves developed by community groups and those being executed through Council contractors (areas currently undergoing some predator control shaded in blue).



5.3 Rubbish

There are scattered items of rubbish through the reserves, particularly in the coastal forest understory adjacent to the walkway. This rubbish appears more likely to be single discarded items, rather than being dumped rubbish. Nevertheless these items significantly reduce the amenity of the coastal forest and reserve area.



Figure 20: Discarded rubbish in reserves

6. Management Units

6.1 Overview

The project area contains a number of reserves adjoining the Taiaotea and Rothesay Bay streams and their tributaries that require restoration work including pest plant control, pest animal control and planting. These reserves have been identified as management units (MU's) in Figure 21, with required weed and pest animal control and planting options outlined.

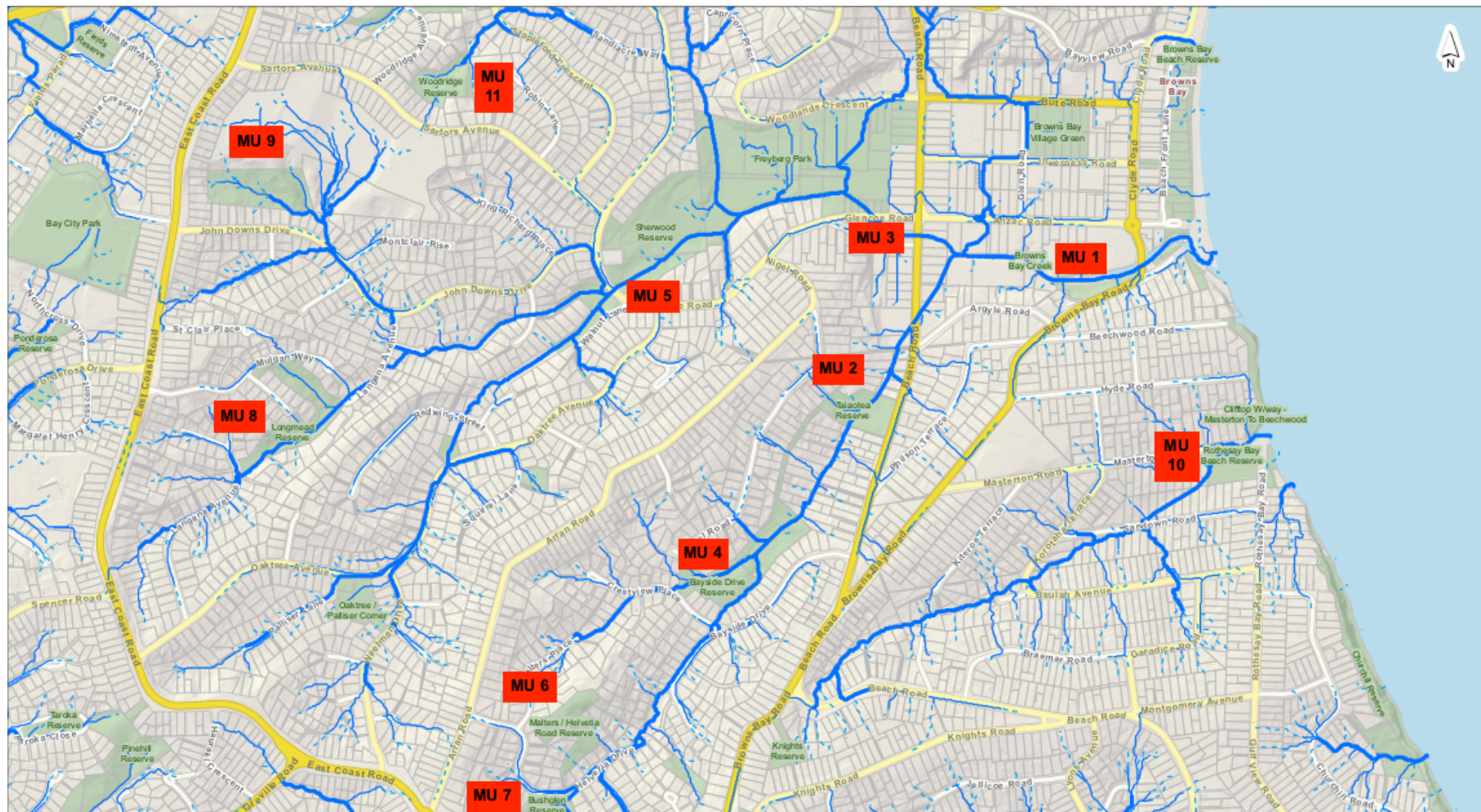


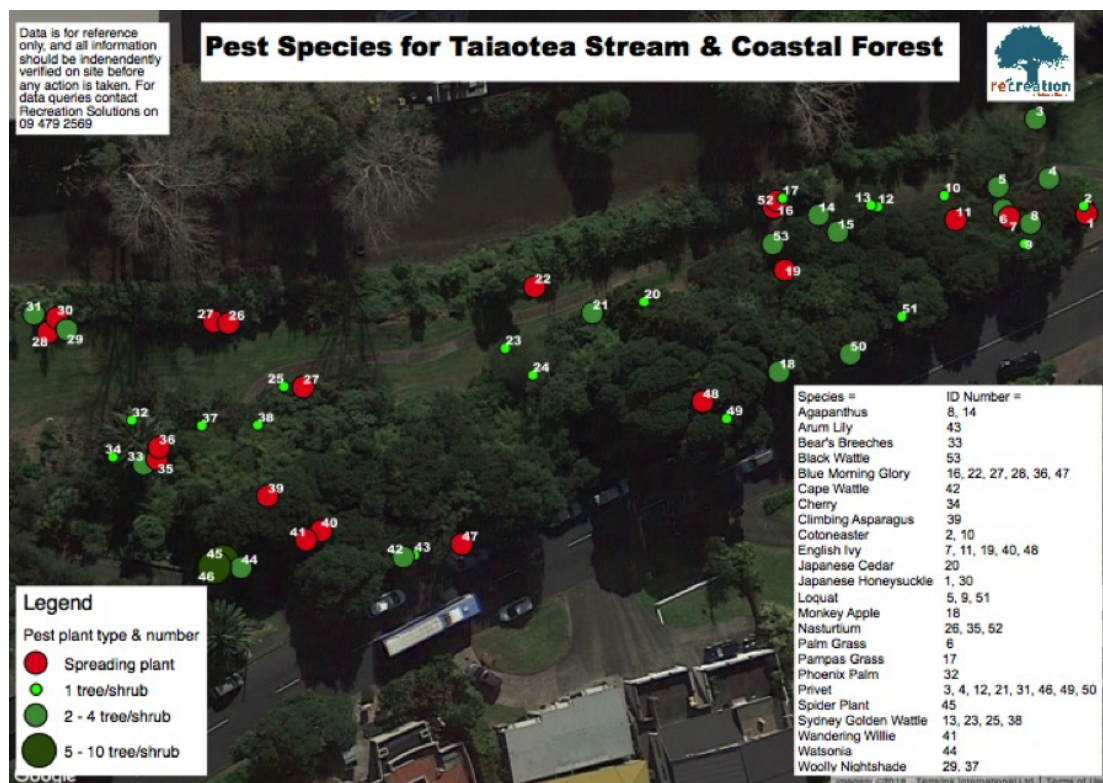
Figure 21: Management Units

6.2 Browns Bay Creek Reserve (Management Unit 1)

The reserve connects private property and the Taiāotea stream running from Sherwood Reserve and Freyburg Park to the lower parts of the catchment and the coast.

The forest area on the reserve consists of remnant indigenous canopy trees; mainly pohutukawa and kanuka but a single totara tree is also present. A discrete number of exotic canopy trees include a single sydney golden wattle, japanese cedar and a number of tree and chinese privet. Indigenous trees are dominant in the canopy. A robust understory exists beneath these canopy species; however pest plants are also climbing up trees and smothering them as well as forming a dense ground cover which is stopping the regeneration of indigenous plants. This includes blue morning glory, english ivy, and wandering willie.

There is generally a relatively high abundance of pest plant species throughout the reserve; both in the streamside vegetation and the coastal forest. In addition, there are infestations of pest plants on adjoining private land. This includes extensive amounts of blue morning glory on the front verge of properties on the opposite side of Browns Bay Road, and english ivy and wandering willie on the adjoining property at 25 Browns Bay Road.



6.2.1 Weed Method

Common name	Who	Method	Legend
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Woolly nightshade		CP/H/R
Agapanthus		FS/H
Arum lily	Volunteer working bee	CP
Blue Morning Glory	Volunteer small groups	H/FS
Climbing asparagus (<i>Asparagus scandens</i>)		FS
Cotoneaster		CP/R/H
English Ivy		FS
Japanese Honeysuckle	Volunteer small group (H)	H/FS/CP
Monkey apple	Eco- Contractor	R/F
Palm grass		FS
Pampas grass		FS/H
Phoenix palm		CP/DF
Privet – Chinese		CP
Privet – Tree	Eco- Contractor	CP/R/F
Wandering willie (<i>Tradescantia</i>)		FS
Bear's Breeches		FS

Black Wattle	Eco- Contractor	F
Cape Wattle	Eco- Contractor	F
Cherry	Eco- Contractor	F
Gum	Eco- Contractor	F
Japanese Cedar	Eco- Contractor	F
Loquat	Eco- Contractor	F
Nasturtium		FS/H
Spider Plant		CP/H
Sydney Golden Wattle (<i>longifolia</i>)	Eco- Contractor	F
Watsonia		FS

**Method code: FS = Foliar spray Cut paste (CP) = cut at base and apply herbicide
Hand (H) = pull or cut at chest height and place on ground R = Ringbark F = Fell DF
= Drill/Fill**

6.2.2 Indicative planting schedule for riparian margins

Common name	Species	Plant Grade	Spacing (m)
Oioi	<i>Apodasmia similis</i>	PB3	0.5
Swamp maire	<i>Syzygium maire</i>	PB3	1
Mahoe	<i>Melicytus ramiflorus</i>	PB3	1
Puriri	<i>Vitex lucens</i>	PB3	1

6.2.3 Indicative planting schedule for coastal forest understory

Common name	Species	Plant Grade	Spacing (m)
Rimu	<i>Dacrydium cupressinum</i>	PB3	1
Kahikatea	<i>Dacrycarpus dacrydioides</i>	PB3	1
Kawakawa	<i>Piper excelsum</i>	PB3	1
Large leaved Coprosma	<i>Coprosma grandifolia</i>	PB3	1
Mahoe	<i>Melicytus ramiflorus</i>	PB3	1
Puriri	<i>Vitex lucens</i>	PB3	1
Shining Coprosma	<i>Coprosma lucida</i>	PB3	1
Kohekohe	<i>Dysoxylum spectabile</i>	PB3	1

6.2.4 Volunteer Groups

- Weekly Tuesday morning volunteer group coordinated on an invite-basis
- Browns Bay Rotary
- Neighbours at 25 Browns Bay Reserve (Michele and Geoff)

6.3 Taiaotea Reserve (Management Unit 2)

The reserve connects private property and the stream running from Bushglen through Bayside reserve to the lower parts of the catchment.

The reserve is in a highly degraded ecological condition, however there is evidence of 15-20 year old Kahikatea plantings. Due to no maintenance infestations of Japanese honeysuckle have become established and are out-competing the remaining native plants in the area. Some of the other environmental weeds that are present on site include cape ivy, arum lily and blue morning glory. These infestations are preventing native forest regeneration and the

degradation of stream bank retention and therefore the ability of the ecosystem to cope with pressures of urbanisation including stormwater runoff, housing developments and erosion. There is also extensive arum lily and tradescantia in the stream section between the Taiāotea and Bayside Reserves.



Figure 22: Behind Scout Hall



Figure 23: Stream section between Taiāotea and Bayside Reserve

6.3.1 Weed Method

This site would benefit from the implementation of long term environmental weed control. This can be addressed in multiple ways from community engagement and workshops to eco contractors.

Common name	Who	Method	Legend
Japanese Honeysuckle	Volunteer small group (H)	H/FS/CP	Red
Arum lily	Volunteer working bee	CP	Yellow
Blue Morning Glory	Volunteer small groups	H/FS	Purple
Cape Ivy		FS/CP	Green
Wandering Willie		FS	

Method code: FS = Foliar spray Cut paste (CP) = cut at base and apply herbicide Hand (H) = cut at chest height and place on ground

6.3.2 Indicative planting schedule for riparian margins

After initial weed control and follow up application this site will be suitable for native plantings in particular the riparian zones. A basic plant list for the Taiatea reserve site that can be used for the lower initial focus area around the stream and stream banks.

Common name	Species	Plant Grade	Spacing (m)
Kahikatea	<i>Dacrycarpus dacrydioides</i>		
Kohekohe	<i>Dysoxylum spectabile</i>		
Puriri	<i>Vitex lucens</i>		
Rimu	<i>Dacrydium cupressinum</i>		
Harakeke	<i>Phormium tenax</i>		

Manuka	<i>Leptospermum scoparium</i>
Kanuka	<i>Kunzea ericoides</i>
Cabbage tree/ ti kouka	<i>Cordyline australis</i>
Swamp Maire	<i>Syzygium maire</i>

6.5.3 Volunteer Groups

- Taiaotea Cubs/Scouts?
- Bahai?

6.4 Freyburg Park (Management Unit 3)

The Taiaotea Stream section to the north of Glencoe Road connects Sherwood Reserve and Freyburg Park to the lower parts of the catchment and the coast. The section behind the tennis courts is significant as an inanga – whitebait spawning zone. There is also an extensive eel population in the stream.

The forest area on the streambank consists of planted indigenous canopy trees; mainly kanuka and puriri. An understory of wandering willie and bindweed exists beneath these canopy species, climbing up trees and smothering them as well as forming a dense ground cover which is stopping the regeneration of indigenous plants. Weed species have been



removed from the immediate whitebait spawning site, but are still extensive elsewhere under the canopy. There is also extensive wandering willie on the tributary of the Taiaotea Stream running north towards Woodlands Crescent.



Figure 24: Stream viewed from opposite bank at squash courts



Figure 25: Stream margin being planted

6.4.1 Weed Method

Common name	Who	Method	Legend
Bindweed	Volunteer small groups	H/FS	
Wandering willie	Volunteer small groups	FS	
Annual weeds	Volunteer small groups	H	

**Method code: FS = Foliar spray Cut paste (CP) = cut at base and apply herbicide
Hand (H) = cut at chest height and place on ground R = Ringbark F = Fell**

6.4.2 Indicative planting schedule for riparian margins

Common name	Species	Plant Grade	Spacing (m)
	<i>Cyperus ustulatus</i>	PB3	0.5
Carex	<i>Carex secta</i>	PB3	1
Carex	<i>Carex virgata</i>	PB3	1

6.4.3 Indicative planting schedule for coastal forest understory

Common name	Species	Plant Grade	Spacing (m)
Rimu	<i>Dacrydium cupressinum</i>	PB3	1
Kahikatea	<i>Dacrycarpus dacrydioides</i>	PB3	1
Kawakawa	<i>Piper excelsum</i>	PB3	1
Large leaved Coprosma	<i>Coprosma grandifolia</i>	PB3	1
Mahoe	<i>Melicytus ramiflorus</i>	PB3	1
Puriri	<i>Vitex lucens</i>	PB3	1
Shining Coprosma	<i>Coprosma lucida</i>	PB3	1
Kohekohe	<i>Dysoxylum spectabile</i>	PB3	1

6.4.4 Volunteer Groups

- Weekly Tuesday morning volunteer group coordinated on an invite-basis
- Browns Bay Rotary
- Neighbours at 25 Browns Bay Reserve (Michele and Geoff)

6.5 Bayside Drive Reserve (Management Unit 4)

The reserve connects private property and the stream running from Bushglen through Taiaotea reserve to the lower parts of the catchment.

The reserve is managed by Auckland Council Parks, and has a canopy forest of puriri, kanuka and cabbage trees. An ecology report indicates that in-stream life includes eel, kokopu, and koura. The stormwater retention pond has 2 rock gabion walls that are preventing fish passage to Bushglen Reserve (Management Unit 7). Some of the environmental weeds that

are present on site include moth plant, woolly nightshade, bindweed, wattle trees and celery parsley in the watercourse below the stormwater retention pond. The retention pond itself is mainly raupo, however the gabion walls are restricting water flow and is stagnant.



Figure 22: View of Reserve from 654 Beach Road



Figure 23: Stream section between Taiatea and Bayside Reserve

6.5.1 Weed Method

This site would benefit from the implementation of long term environmental weed control. This can be addressed in multiple ways from community engagement and workshops to eco contractors.

Common name	Who	Method	Legend
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6.6 Celina Place Reserve (Management Unit 5)

Celina Place Reserve located between Scarlock Avenue and Celina Place is a small access way reserve with a water course running through it from end to end.

The Reserve is in a highly modified state with the stream concreted on three sides, and the banks are mowed, There are only a few environmental weed instances including Jasmine infestations coming from the neighbouring properties as well as a localised chinese privet infestation next to the walking bridge.





Figure 24: From Scarlock Avenue end



Figure 25: Walkway and bridge from Celina Place

6.6.1 Weed Method

This site would benefit from the implementation of long term environmental weed control. This can be addressed in multiple ways from community engagement and workshops to eco contractors.

Common name	Who	Method	Legend
Arum lily	Volunteer working bee	CP	Red
Jasmine	Volunteer small groups	CP/FS	Yellow
Chinese privet		CP	Red

**Method code: FS = Foliar spray Cut paste (CP) = cut at base and apply herbicide
Hand (H) = cut at chest height and place on ground**

6.6.2 Indicative planting schedule for riparian margins

This site would benefit from native plantings along the banks of the water course. Over time these plantings could eventually replace the concrete stream bank as roots form stream bank retention and help regulate the flow of the stream while providing shade for native invertebrates, fish and eels.

This can be done in stages when plants are available as the site is mainly ready and requires little site preparation.

Common name	Species	Plant Grade	Spacing (m)
Kahikatea	<i>Dacrycarpus dacrydioides</i>		
Kohekohe	<i>Dysoxylum spectabile</i>		
Puriri	<i>Vitex lucens</i>		
Pukatea	<i>Laurelia novae-zelandiae</i>		
Harakeke	<i>Phormium tenax</i>		
Manuka	<i>Leptospermum scoparium</i>		
Kanuka	<i>Kunzea ericoides</i>		
Cabbage tree/ ti kouka	<i>Cordyline australis</i>		

6.6.3 Volunteer Groups

- Sherwood School?

6.7 Bushglen Reserve (Management Unit 7)

The reserve sits at the top of the catchment with a tributary that runs into Taiaotea stream adjacent to Freyburg Park (Management Unit 3).

The forest area on the reserve consists of indigenous vegetation types typical of a swamp forest growing on soils with seasonally high water tables. This includes swamp maire, and

māhoe and tītoki on areas of drier ground. Supplejack is also abundant, creating a dense structure and sub-canopy.

There are three distinct zones within the reserve, an upper stand of swamp maire where the watercourse has a short piped and rock riprap section. The swamp maire has a kawa kawa understory as well as pest plants including wandering willie, ginger and asparagus fern. The middle stand of swamp maire is drier underfoot but has a large variety of pest plants including arum lily, wandering willie, celery parsley, ginger, convolvulus and passionfruit vine. The main stand of swamp maire has up to 10 – 15 trees up to 100 years old. This area has a higher water table with an abundance of pest plants including arum lilly, wandering willie, celery parsley, honeysuckle and convolvulus.

Aerial roots of the swamp maire limits the ability to spray near their root systems.

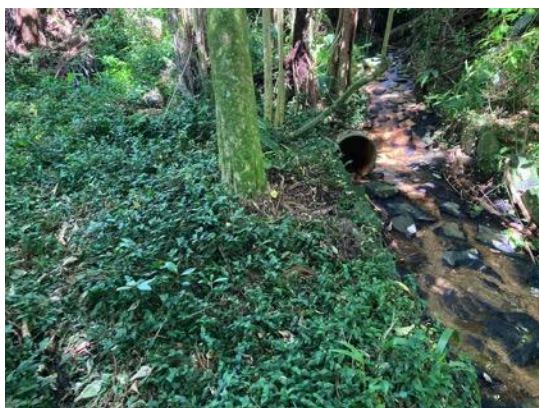


Figure 26: Upper stand

Figure 27: Main stand

6.7.1 Weed Method

Common name	Who	Method	Legend
Ginger	Volunteer	CP	
Queen of the Night	V	CP	
Arum lily	Volunteer working bee	CP	
Celery parlsey		FS	
Climbing asparagus <i>(Asparagus scandens)</i>		FS	
Bindweed		FS	
Passionfruit		FS	
Japanese Honeysuckle	Volunteer small group (H)	H/CP	
Wandering willie		H/FS	
Jasmine		FS/H	
Bangalow Palm		CP/H	
Pine		R/F	

Bamboo	CP/FS
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Method code: FS = Foliar spray Cut paste (CP) = cut at base and apply herbicide

Hand (H) = cut at chest height and place on ground R = Ringbark F = Fell

6.7.2 Indicative planting schedule

Common name	Species	Plant Grade	Spacing (m)

6.7.3 Volunteer Groups

- Friends of Bushglen

6.8 Longmead Reserve (Management Unit 8)

Longmead Reserve located between Langana Avenue and Mulgan Way is a small access way reserve with a water course running through it from end to end. It is at the top of the catchment, and is piped above the reserve area.

Longmead Reserve has good examples of regenerating kanuka manuka scrubland with emerging canopy trees such as Kahikatea , Puriri and Rimu, Mamaku Ponga and Wheki.

This site is under different pressures from urbanisation such as stormwater runoff, environmental weeds, erosion, deforestation and pollution.



Figure 28: Rock rap watercourse

Figure 29: Wetland area with emerging manuka kanuka canopy and arum lily within the raupo

6.8.1 Weed Method

The watercourse that runs through Longmead reserve would benefit greatly from the implementation of long term environmental weed control. This will promote native forest regeneration and eventually support a more self-sustained ecosystem. This can reduce erosion, flooding, and promote valuable habitat for native birds, invertebrates, lizards and freshwater species. This can be addressed in multiple ways from community engagement and workshops to eco contractors.

Common name	Who	Method	Legend
Banana passion fruit vine		FS	Purple
Wild ginger		CP	Red
Arum lily		CP	Yellow
Pampas		FS/H	Brown
Chinese privet		CP/H	Pink
Aristia grass		FS	Blue
Tradescantia		FS/H	Green

**Method code: FS = Foliar spray Cut paste (CP) = cut at base and apply herbicide
Hand (H) = cut at chest height and place on ground**

6.8.2 Indicative planting schedule

?

Common name	Species	Plant Grade	Spacing (m)

6.8.3 Volunteer Groups

- ?

6.9 Northcross Reserve (Management Unit 9)

The reserve sits at the top of the catchment with a tributary that runs into Taiaotea stream via culverted sections to Freyburg Park (Management Unit 3).

The forest area on Northcross Reserve consists of remnant indigenous canopy trees; a combination of totara, rimu, and puriri. A number of exotic canopy trees are also present including sydney golden wattle and a pinus radiata. Indigenous trees are dominant in the canopy.

A robust understory exists beneath these canopy species; including kawakawa in shaded areas and kumeraho in more exposed areas. Pest plants are also climbing up trees and smothering them as well as forming a dense ground cover which is stopping the regeneration of indigenous plants. This includes wooly nightshade, bamboo and wandering willie.

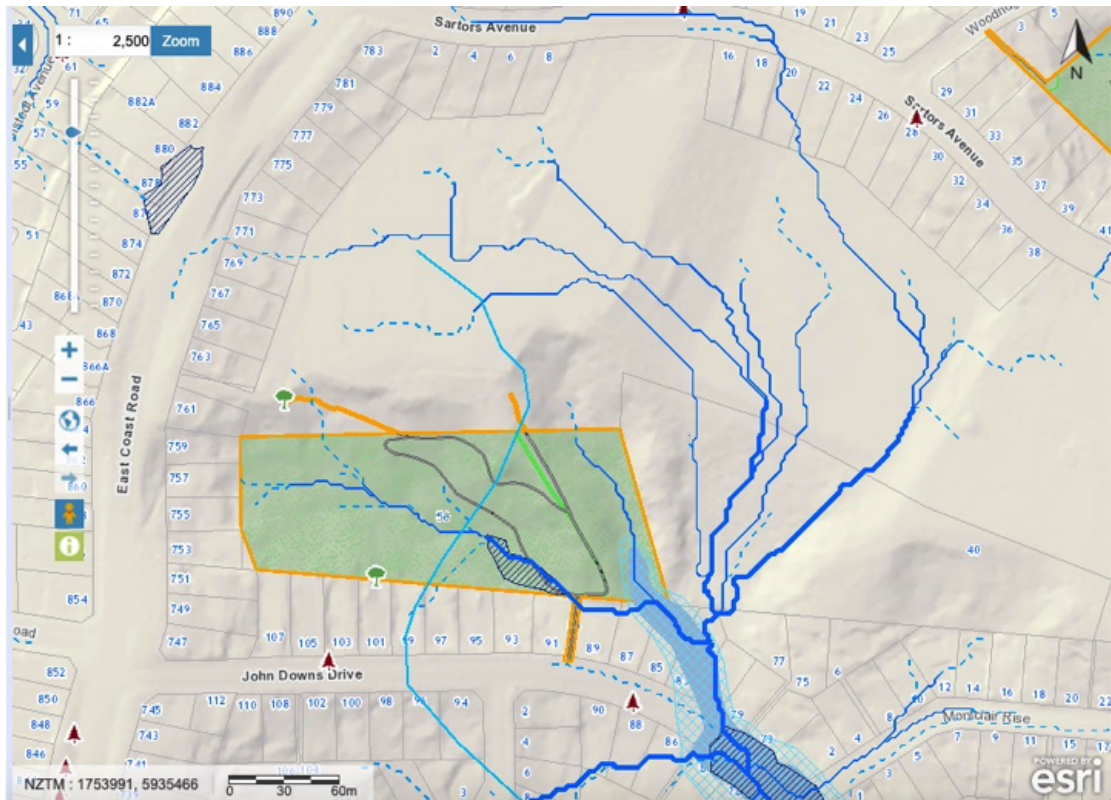


Figure 30: Ginger in understory



Figure 31: Stream tributary above culverts

6.9.1 Weed Method

Common name	Who	Method	Legend
Ginger		CP	
Arum lily	Volunteer working bee	CP	

Japanese Honeysuckle	Volunteer small group (H)	H/CP
Wandering willie		FS
Pine		R/F
Bamboo		CP/FS

Method code: FS = Foliar spray Cut paste (CP) = cut at base and apply herbicide
Hand (H) = cut at chest height and place on ground R = Ringbark F = Fell

6.9.2 Indicative planting schedule

Common name	Species	Plant Grade	Spacing (m)

6.9.3 Volunteer Groups

- Northcross Intermediate Year 7 Environment class
- Sherwood School

6.10 Rothesay Bay Reserve (Management Unit 10)

The Rothesay Bay Stream section to the south of Masterton Road connects Rothesay Bay Reserve to the lower parts of the catchment and the coast. The section immediately below the footbridge is significant as an inanga – whitebait spawning zone. There is also an extensive eel population in the stream.

The forest area on the streambank consists of planted indigenous canopy trees; mainly pohutukawa. An emerging native understory planted over the last 5 years by volunteers includes manuka, kanuka, karo, kawa kawa, hebe stricta, harakeke, muehlenbeckia, twiggycoprosma and others. Various carex and sedge have also been planted to enhance the inanga

whitebait spawning habitat. A small understory of wandering willie and bindweed exists beneath these canopy species, that is being actively managed by volunteers.



Figure 32: Reserve March 2015



Figure 33: Reserve July 2018

6.10.1 Weed Method

Common name	Who	Method	Legend
Bindweed	Volunteer small groups	H/FS	
Wandering willie	Volunteer small groups	FS/FS	
Annual weeds	Volunteer small groups	H	

Method code: FS = Foliar spray Cut paste (CP) = cut at base and apply herbicide
 Hand (H) = cut at chest height and place on ground R = Ringbark F = Fell

6.10.2 Indicative planting schedule for riparian margins

Common name	Species	Plant Grade	Spacing (m)
	<i>Cyperus ustulatus</i>	PB3	0.5
Carex	<i>Carex secta</i>	PB3	1
Carex	<i>Carex virgata</i>	PB3	1

6.4.4 Volunteer Groups

- Rothesay Bay Residents & Ratepayers

7. Prioritisation of Works

Outlined below is a set of criteria with which prioritise the allocation of fund for eco-contractors for weed control:

Criteria	Description	Score
1. Volunteers	<i>Existing volunteer group or interest exists</i>	10
2. Accessibility	<i>Steep terrain/level of infestation/technical input limits use of volunteers</i>	10
3. Pest Status	<i>Pest weeds include Total/Surveillance species and RPMP buffer species</i>	5
4. Diversity	<i>More than 2 pest weed species present</i>	5
5. Upper Catchment	<i>Management unit situated at the top of the catchment</i>	5
6. Threatened Status	<i>Management Unit has threatened (Regional IUCN) status or is a Significant Ecological Area (SEA)</i>	5
7. In-Stream Values	<i>Streams contain in-stream values (e.g. surveyed inanga, other native freshwater</i>	10
8. Co-Funding	<i>Land status makes it hard to fund through other means e.g. private land, MOE land</i>	10
TOTAL		70

On the basis of the above criteria, the prioritisation of works for the management units outlined in Section 6 above have been assessed as follows:



35 30 30 25 15 50 25 50 25

8. General Programme of Works

Outlined below is a generic annual programme of works that can be used to manage the restoration of the project area. Details are provided below:

	Spring			Summer			Autumn			Winter		
Task	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug
Pest Plant Control												
Planting												
Plant Release												

The scope of this restoration plan relates to the pest plant control and plant release workstreams required for the enhancement of the riparian margins and coastal forest areas. Timing of future planting is also scheduled.

8.1 Pest Plant Control

As outlined in Appendix 1 Weed List and Recommended Control Methodologies, pest plant control will be undertaken between October and April. This reflects the suitability of pest plant control in the summer and spring months.

8.2 Planting

Opportunities for planting of the riparian margin and coastal forest understory exist where pest plant control creates gaps. Planting would need to occur within the planting season, in this case between June and August.

Use of herbicides would need to be staged within the pest plant control period so that plants will not be affected by residual herbicide in the soil.

8.3 Plant Release

The aim is to ensure that a continuous indigenous understory exists beneath the existing coastal forest canopy, and that the riparian margin is comprised of indigenous species. Experience gained from the restoration of the Rothesay Bay Stream plantings indicated that followup plant release is required in subsequent years following pest plant control and replanting. This involves annual weeds being pulled back and hand removal of any invasive

weeds that have been previously present (e.g. english ivy and wandering willie in the forest understory).

8.4 Pest Animal Control

The aim is to

9. Conclusion

The purpose of this restoration plan is to outline the requirements for restoration and enhancement of the stream bank and surrounding coastal forest reserve. This outlines a scheduled work programme for the removal and control of pest plants, rubbish removal, and plant release that is required in the lead up to and following next year's planting season in the winter of 2021.

The following activities are recommended to implement this plan:

- Undertake pest plant control according to priorities outlined in Section 7 of this report.

Appendix 1 Weed List and Recommended Control Methodologies

Recommended Control Methodologies

Weed Species	Description
Agapanthus (<i>Agapanthus praecox</i>) 	2 plants on forested slope between Browns Bay Road and the reserve path. Extensive plantings at front of residential properties on the opposite side of road. Forms a dense ground cover, which stops regeneration of native plants. • Control Method(s): Dig out including roots (corms) and dispose off site at a refuse transfer station. OR Foliage spray (backpack). • Chemicals(s): Triclopyr (6ml/L) and penetrant (1ml/L) on to leaves. • Timing: Year round. • Contractor(s): N/A
Arum (<i>Zantedeschia aethiopica</i>) 	lily 1 plant on forested slope adjacent to the box steps leading up to Browns Bay Road. Forms a dense ground cover, which stops regeneration of native plants. • Control Method(s): Dig out including roots and dispose off site at a refuse transfer station. • Chemicals(s): N/A • Timing: Year round. • Contractor(s): N/A

Bear's Breeches
(*Acanthus mollis*)



2 plants on forested slope adjoining neighbouring properties at 25/27 Browns Bay Road. (Behind phoenix palm in photo)

Forms a dense ground cover, which stops regeneration of native plants.

- **Control Method(s):** Dig out including roots and dispose off site at a refuse transfer station.

OR

Fell/cut and paint stump. Place cut leaves over the top of painted stems to keep rain off.

- **Chemicals(s):** Metsulfuron gel (1-2 mm layer).
- **Timing:** October – March.
- **Contractor(s):** N/A

Black Wattle (*Acacia mearnsii*)



1 tree on forested slope between Browns Bay Road and the reserve path.

Sours soil preventing regrowth of many natives.

- **Control Method(s):** Ringbark and paint edges.
- **Chemicals(s):** Glyphosate gel (1-2 mm layer).
- **Timing:** October – April.
- **Contractor(s):** Yes. Undertake ringbark.

Blue Morning Glory
(*Ipomoea indica*)



Extensive vines amongst native vegetation on forested slope and streamside planting.

Climbs up trees and shrubs and smothers them.

- **Control Method(s):** Dig out including roots and dispose off site at a refuse transfer station.

OR

Fell/cut and paint stumps and leave vines in trees to die. Foliage spray (backpack) new growth and areas where no natives.

- **Chemicals(s):** Metsulfuron gel (1-2 mm layer); Metsulfuron (0.5g/L).
 - **Timing:** October - March.
-

-
- **Contractor(s):** Yes. Supervise herbicide treatment(s).

Cape Wattle
(*Paraserianthes lophantha*)



1 tree on forested slope between Browns Bay Road and the reserve path.

Sours soil preventing regrowth of many natives.

- **Control Method(s):** Dig out including roots and dispose off site at a refuse transfer station.

OR

Ringbark and paint edges.

- **Chemicals(s):** Glyphosate gel (1-2 mm layer).

- **Timing:** October – April.

- **Contractor(s):** Yes. Undertake ringbark.

Climbing asparagus
(*Asparagus scandens*)



Various plants on forested slope between Browns Bay Road and the reserve path.

Climbs up trees and shrubs and smothers them.

- **Control Method(s):** Dig out including roots and dispose off site at a refuse transfer station.

OR

Foliage spray (backpack).

- **Chemicals(s):** Glyphosate (20ml/L) and penetrant (1ml/L).

- **Timing:** Year round.

- **Contractor(s):** N/A.

Cotoneaster
(*Cotoneaster glaucophyllus*)



2 trees on forested slope between Browns Bay Road and the reserve path.

Seeds eaten by birds and dispersed a long distance into other gardens and bush areas.

- **Control Method(s):** Dig out including roots and dispose off site at a refuse transfer station.

OR

Fell/cut and paint stumps.

- **Chemicals(s):** Glyphosate gel (1-2 mm layer).

- **Timing:** October – April.
-

		Contractor(s): N/A.
English Ivy (<i>Hedera helix</i>)		Various plants on forested slope between Browns Bay Road and the reserve path. Climbs up trees and shrubs and smothers them. • Control Method(s): Dig out including roots and dispose off site at a refuse transfer station. OR Foliage spray (backpack). • Chemicals(s): Metsulfuron (0.5g/L) and penetrant (1ml/L). • Timing: December - April. • Contractor(s): Yes. Supervise herbicide treatment(s).
Japanese Honeysuckle (<i>Lonicera japonica</i>)		Extensive vines amongst native vegetation on forested slope and streamside planting. Climbs up trees and shrubs and smothers them. • Control Method(s): Dig out including roots and dispose off site at a refuse transfer station. OR Fell/cut and paint stumps and leave vines in trees to die. Foliage spray (backpack) new growth and areas where no natives. • Chemicals(s): Metsulfuron gel (1-2 mm layer); Metsulfuron (0.5g/L). • Timing: October - March. • Contractor(s): Yes. Supervise herbicide treatment(s).
Loquat (<i>Eryobotria japonica</i>)		3 trees on forested slope between Browns Bay Road and the reserve path. Seeds eaten by birds and dispersed a long distance into other gardens and bush areas. • Control Method(s): Dig out including roots and dispose off site at a refuse transfer station. OR Fell/cut and paint stumps. • Chemicals(s): Glyphosate gel (1-2 mm layer).

- **Timing:** October – April.

- **Contractor(s):** Yes. Supervise fell/cut and herbicide treatment(s).

Monkey apple
(*Syzygium smithii*)



Single tree on forested slope between Browns Bay Road and the reserve path.

Seeds eaten by birds and dispersed a long distance into other gardens and bush areas.

- **Control Method(s):** Fell/cut and cover stump with thick black polythene to exclude light, cover polythene and entire root zone with 150mm deep mulch for 12 months.

OR

Fell/cut and paint stumps.

- **Chemicals(s):** Glyphosate gel (1-2 mm layer).

- **Timing:** October – April.

- **Contractor(s):** Yes. Supervise fell/cut and herbicide treatment(s).

Nasturtium
(*Tropaeolum majus*)



Extensive vines amongst native vegetation on forested slope and streamside planting.

Climbs up trees and shrubs and smothers them.

- **Control Method(s):** Dig out including roots and dispose off site at a refuse transfer station.

OR

Fell/cut and paint stumps and leave vines in trees to die. Foliage spray (backpack) new growth and areas where no natives.

- **Chemicals(s):** Metsulfuron gel (1-2 mm layer); Metsulfuron (0.5g/L).

- **Timing:** November - March.

- **Contractor(s):** Yes. Supervise herbicide treatment(s).

Palm grass (*Setaria palmifolia*)

Single group of plants on forested slope between Browns Bay Road and the reserve path.

Forms a dense ground cover which stops regeneration of native plants.



- **Control Method(s):** Dig out including roots and dispose off site at a refuse transfer station. (CAUTION: leaf stalks covered in irritating hairs, wear protective clothing when handling plant.)

OR

Foliage spray (backpack).

- **Chemicals(s):** Glyphosate (20ml/L) and penetrant (1ml/L).

- **Timing:** December - April.

- **Contractor(s):** N/A.

Pampas grass
(*Cortaderia selloana*)



Plants amongst native vegetation in streamside planting.

Forms a dense ground cover which stops regeneration of native plants.

- **Control Method(s):** Dig out including roots and dispose off site at a refuse transfer station.

OR

Foliage spray (backpack).

- **Chemicals(s):** Haloxypop

- **Timing:** October - April.

- **Contractor(s):** Yes. Supervise herbicide treatment(s).

Phoenix palm
(*Phoenix canariensis*)



Single large tree on forested slope adjoining neighbouring properties at 25/27 Browns Bay Road.

Seeds eaten by birds and dispersed a long distance into other gardens and bush areas.

- **Control Method(s):** Fell/cut and cover stump with thick black polythene to exclude light, cover polythene and entire root zone with 150mm deep mulch for 12 months.

OR

Fell/cut and paint stumps. Foliage spray (backpack) new growth and areas where no natives.

- **Chemicals(s):** Glyphosate gel (1-2 mm layer); Glyphosate (20ml/L) and penetrant (1ml/L).
-

-
- **Timing:** October – April.

- **Contractor(s):** Yes. Supervise fell/cut and herbicide treatment(s).

Privet – Chinese
(*Ligustrum sinensis*)



Various trees on forested slope between Browns Bay Road and the reserve path and on forested slope adjoining neighbouring properties at 25/27 Browns Bay Road.

Seeds eaten by birds and dispersed a long distance into other gardens and bush areas.

- **Control Method(s):** Dig out seedlings including roots and dispose off site at a refuse transfer station; Fell/cut and cover stump with thick black polythene to exclude light, cover polythene and entire root zone with 150mm deep mulch for 12 months.

OR

Drill and inject.

- **Chemicals(s):** Metsulfuron gel (10g/L)
- **Timing:** October – April.
- **Contractor(s):** Yes. Supervise drill/inject herbicide treatment(s).

Privet – Tree
(*Ligustrum lucidum*)



Various trees on forested slope between Browns Bay Road and the reserve path and on forested slope adjoining neighbouring properties at 25/27 Browns Bay Road.

Seeds eaten by birds and dispersed a long distance into other gardens and bush areas.

- **Control Method(s):** Dig out seedlings including roots and dispose off site at a refuse transfer station; Fell/cut and cover stump with thick black polythene to exclude light, cover polythene and entire root zone with 150mm deep mulch for 12 months.

OR

Drill and inject.

- **Chemicals(s):** Metsulfuron gel (10g/L)
 - **Timing:** November – March.
 - **Contractor(s):** Yes. Supervise drill/inject herbicide treatment(s).
-

Sydney Golden Wattle
(*Acacia longifolia*)



Various trees on forested slope between Browns Bay Road and the reserve path.

Seeds eaten by birds and dispersed a long distance into other gardens and bush areas.

Sours soil preventing regrowth of many natives.

- **Control Method(s):** Dig out seedlings including roots and dispose off site at a refuse transfer station; Fell/cut – no need to paint stump if greater 100mm diameter.

OR

Drill and inject.

- **Chemicals(s):** Glyphosate (500ml/L).
- **Timing:** October – April.
- **Contractor(s):** Yes. Supervise drill/inject herbicide treatment(s).

Wandering willie
(*Tradescantia*)



Plants on forested slope between Browns Bay Road and the reserve path and on forested slope adjoining neighbouring properties at 25/27 Browns Bay Road.

Forms a dense ground cover, which stops regeneration of native plants. Will regrow from small fragments.

- **Control Method(s):** Dig out including roots and dispose off site at a refuse transfer station.

OR

Foliage spray (backpack).

- **Chemicals(s):** Triclopyr (6ml/L) and penetrant (1ml/L) on to leaves.
- **Timing:** November – March.
- **Contractor(s):** Yes. Supervise herbicide treatment(s).

Woolly nightshade
(*Solanum mauritianum*)

Plants amongst native vegetation on forested slope and streamside planting.

Health risk – e.g. injury from spines, breathing issues, allergies.

Seeds eaten by birds and dispersed a long distance into other gardens and bush areas.

Sours soil preventing regrowth of many natives.



- **Control Method(s):** Dig out including roots and dispose off site at a refuse transfer station.

OR

Scrape and paint stumps.

- **Chemicals(s):** Glyphosate gel (1-2 mm layer).
 - **Timing:** October – April.
 - **Contractor(s):** Yes. Supervise herbicide treatment(s).
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