

# ECOLOGICAL MANAGEMENT PLAN FOR PROPOSED PINE REMOVALS AT CHURCHILL PARK, GLENDOWIE

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# ECOLOGICAL MANAGEMENT PLAN FOR PROPOSED PINE REMOVALS AT CHURCHILL PARK, GLENDOWIE

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*Senescing pine trees at Churchill Park (Stand 2A).*

## **Contract Report No. 5797**

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**Reviewed and approved for release by:**




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## 1. INTRODUCTION

Auckland Council is seeking resource consent to remove approximately 200 mature pine trees (*Pinus* spp.) within five Stands at Churchill Park, Glendowie (Figure 1). The Park is c.43 hectares and located within the Tāmaki Ecological District on the eastern coast of central Auckland. The pines are estimated to be 80-100 years old with the majority senescing and becoming increasingly vulnerable to windfall; 10-20% of these Stands are falling per annum (D. Stejskal, pers. comms.).

Six areas have been identified for ecological restoration and infill planting following removal of the pines (Figure 1). Stands 3A and 3B are characterised by mature pines over a sub-canopy of regenerating and planted indigenous trees and shrubs; Stands 2A and B are characterised by mature pine treeland over grazed exotic grassland along two tributaries; and Stand 1 comprises a sparse stand of senescing pines over grazed exotic grassland. The final area was identified during a later site visit and comprises a planted indigenous wetland with a small buffer of mānuka (*Leptospermum scoparium*) scrub.

Auckland Council intends to restore the affected areas by undertaking pest plant control and indigenous planting based on the recommendations and methodologies provided in this report. The greater Ngahere Enhancement Plan for the Park includes areas of exotic planting, although this report focuses on indigenous planting areas only. The team managing the pine removal is aware that areas of higher ecological value may need to be avoided or protected.

This plan describes the actions required to manage pest plants and animals within the six management areas at the site. This includes specific methods for the control of the pest plant and animal species present at the site. Descriptions of the proposed indigenous revegetation and enhancement planting are also provided. The plant schedules include details of the species, grades, and numbers of plants to be planted and have informed the design of the overall planting plan for the site. Maps of the proposed Management Units and planting areas are also included.

## 2. PROJECT AIM AND OBJECTIVES

The overall aim of this EMP is to return exotic pine-dominated vegetation to floristically diverse 'kauri, podocarp, broadleaved forest' (WF11 as per Singers *et al.* 2017) that will provide locally important habitat for indigenous fauna as well as significantly enhance the ecological and amenity values of Churchill Park and surrounding areas. This EMP focuses on indigenous planting areas only.

The specific objectives of the EMP are to:

- Protect areas of high value indigenous vegetation during the pine-felling operation.
- Protect intermittent and permanent streams, and natural wetlands, during the pine-felling operation.
- Outline methods for the control of target pest plants within Churchill Park, including priority infestations of environmental pest plants, so no mature (flowering or fruiting) pest plants remain.

- Control target pest animals within Churchill Park to maintain low populations of these species.
- Undertake indigenous revegetation of indigenous species within Stands 2A and 2B, which will include planting to buffer existing watercourses and wetlands.
- Enhance established areas of indigenous vegetation in Stands 3A and 3B, and Management Unit 6, with appropriate species that are currently absent from, or rare within, the Park.

Achieving these objectives will significantly enhance the ecological values and integrity of the site by increasing the area of indigenous vegetation and improving habitat values for indigenous flora and fauna. There is also the opportunity to promote awareness amongst residents bordering the reserve of the impacts that pest plant species can have on the local ecology, particularly with regard to the dumping of garden waste along the reserve boundaries. Reinvasion of pest plant species will be significantly reduced if neighbours can be encouraged to dispose of their garden and household waste responsibly.

### 3. SITE DESCRIPTION

Churchill Park is surrounded by dense residential housing, and is located near the inner coast, with the Tāmaki River mouth located 250 metres to the east. Several tributaries intersect the Park, flowing west into a permanent stream which runs south, parallel to the western Park boundary and into a Significant Ecological Marine Area (in the Tāmaki River). The permanent stream is part of a larger catchment – an unnamed tributary of the Tāmaki River, which is piped for much of its western extent. The agricultural values of Churchill Park are of significance to the community and it is currently managed as a “countryside in the city”.

The vegetation is characterised by grazed exotic pasture on rolling hills, with woody vegetation largely confined to the lower slopes and gullies to the west. Exotic trees and hedgerows are scattered exotic trees throughout the Park. No vegetation within the Park has been identified as Significant Ecological Area under the Auckland Unitary Plan.

The 35-45+ metre tall canopy of pines in Stands 3A and B has progressively thinned over recent years. This in turn has allowed the development of a sub-canopy and understorey dominated by a mix of indigenous and exotic species. Karo (*Pittosporum crassifolium*) and karamū (*Coprosma robusta*) are the two dominant indigenous species in Stand 3B and make up most of the sub-canopy. Other indigenous species are locally common throughout Stands 3A and 3B and include māhoe (*Melicytus ramiflorus*), kawakawa (*Piper excelsum*), karaka (*Corynocarpus laevigatus*), kānuka (*Kunzea robusta*), and mānuka. Occasional tōtara (*Podocarpus totara* var. *totara*) seedlings and saplings are present and tī kōuka (*Cordyline australis*) is occasionally emergent above the sub-canopy.

A permanent stream flows along the western boundary of Stands 3A and 3B, where much of the immediate stream margins are dominated by kahili ginger (*Hedychium gardnerianum*). The lower floodplain is characterised by kahikatea (*Dacrycarpus dacrydioides*), pūriri (*Vitex lucens*), houhere (*Hoheria populnea*), and crack willow

(*Salix ×fragilis*). Exotic species and weeds are common throughout these Stands. Mature Phoenix palms (*Phoenix canariensis*) are locally common with many seedlings growing in the understorey. Other understorey pest plant species include agapanthus (*Agapanthus praecox*), onion weed (*Allium triquetrum*), arum lily (*Zantedeschia aethiopica*), moth plant (*Araujia hortorum*), and tradescantia (*Tradescantia fluminensis*).

Higher value vegetation occurs between Stands 3A and 3B, along the forest edge upslope of 3A and in a small planted area to the east of stand 3A. These areas are characterised by a diverse mix of indigenous species including wharangi (*Melicope ternata*), ngaio (*Myoporum laetum*), māpou (*Myrsine australis*), tarata (*Pittosporum eugenioides*), kōhūhū (*Pittosporum tenuifolium*), tōtara, karo, karamū, pūriri, māhoe, kānuka and mānuka.

The habitat below Stands 2A and B comprises exotic grassland characterised by kikuyu grass (*Cenchrus clandestinus*), narrow-leaved plantain (*Plantago lanceolata*), and locally common Australian sedge (*Carex longebrachiata*). Mercer grass (*Paspalum distichum*), creeping buttercup (*Ranunculus repens*) are frequent in damper areas close to the streams and wetlands.

Intermittent and ephemeral streams flow through both Stands, with a patch of wetland where the two streams meet and in the middle of Stand 2A. The upper reaches of the stream flowing through stand 2A support dense patches of arum lily while gorse (*Ulex europeus*) is frequent on the stream banks (Plate 1).

Stand 1 is dominated by mown grassland with scattered patches of wīwī (*Juncus edgariae*). There are only six pines in this stand and all are extremely slender. One had recently fallen and two had snapped at their mid points.

A small area in the north of the park (Management Unit 6) was identified after the initial site visit and comprises a small natural wetland characterised by co-dominant rautahi (*Carex lessoniana*)–harakeke (*Phormium tenax*) with a c.5-metre buffer of mānuka scrub.



Plate 1: The upper reach of the ephemeral stream in stand 2A contains dense patches of arum lily and gorse. 8 October 2021.

## 4. METHODS

### 4.1 General vegetation survey

A preliminary survey was undertaken by Wildland Consultants alongside Auckland Council representatives on 29 March 2021 to better understand ecological constraints and opportunities for the removal of senescing pines.

A full survey of the pine stands was undertaken on 8 October 2021, during which time all vegetation and habitat types within the affected areas were described and mapped. A later survey was undertaken on 9 September 2022 to inspect a small wetland in the north of the Park. The current ecological values of these vegetation and habitat types were also assessed. All vascular plant species observed were recorded and are presented in Appendix 1. Vegetation and habitat types were digitised onto aerial imagery using ArcGis10.7.

### 4.2 Environmental pest plant survey

A field survey for environmental pest plants was undertaken during the October 2021 and September 2022 site visits. Environmental pest plants are introduced species that threaten the ecological processes and values within the area where they are present. The field survey involved walking through the project area identifying and recording the location, distribution and density of all environmental pest plants encountered.

Environmental pest plant distributions and densities were mapped in the field onto hard copy prints of digital aerial photographs. The maps were then used for data input into ArcGIS 10.7. The locations and distributions of each environmental pest plant species were digitised. Environmental pest plant species were labelled with their common name and a brief description of the extent of the infestation, either as percentage cover or as the number of individuals, and overlaid on the aerial photograph.

Recommended control methodologies were prepared for each of pest plant species detected at the site. These recommendations were informed by the following factors:

- The classification of the species under the Auckland Regional Pest Management Plan (Auckland Council 2020).
- The ecological values of the site in which the infestation occurs.
- The relative vulnerability of the vegetation and habitats to the presence and reinvasion of pest plants.
- The level of threat posed by the environmental pest plant species.
- The size of the infestation.

#### 4.3 Priority areas for protection

A walk-through survey of the site was undertaken on 8 October 2021 to identify higher quality areas indigenous vegetation, based on criteria such as estimated age, size, diversity, gradient on which the vegetation occurs, and the presence of watercourses (see Section 5). A hand-held GPS unit was used to record the location of higher quality vegetation. Each area was briefly described and then digitally mapped using ArcGIS (Appendix 2). Representative site photographs were taken in the field.

#### 4.4 Pest animal presence

While a formal survey of pest animals was not undertaken, any sign of pest animal presence was recorded during the field survey. Pest animals that were not detected but are considered likely to be present were also considered. Suggested methods for pest animal control are presented in Section 9.6.

#### 4.5 Planting

Potential restoration planting sites and areas where planting would be advisable were identified during the field surveys. These areas include sites where environmental pest plant infestations will be an ongoing problem if planting is not undertaken, and areas of established indigenous vegetation that are either species-poor or lacking key indigenous plant species. Other restoration planting sites include the riparian zones and wetlands present within Stands 2A and B.

## 4.6 Indigenous fauna protection

While targeted formal surveys were not undertaken<sup>1</sup>, the suitability of the vegetation within Churchill Park to provide habitat for key indigenous fauna species was assessed during the site visit and all fauna species observed at the site were recorded.

## 5. PRIORITY AREAS FOR PROTECTION

### 5.1 Overview

Two Priority Areas for Protection (PAP) were identified during the October 2021 survey, covering a combined area of c.4,542 m<sup>2</sup>. The freshwater habitats within Stands 2A and 2B, and Stands 3A and B, including two wetlands, a large permanent stream and intermittent and ephemeral streams should also be priorities for protection. A brief description of each area is provided below.

### 5.2 Priority Area for Protection 1 (3,349 m<sup>2</sup>)

PAP 1 occurs in between Stands 3A and 3B and along the upslope edge of stand 3A. The area comprises a mixture of good quality naturally occurring vegetation, including specimens of tōtara, pūriri, māhoe, kānuka, pōhutukawa, and ngaio (Plate 2). Sub-canopy species include houpara (*Pseudopanax lessonii*), karamū, manuka and harakeke. This area is located in between the two pine Stands and along the upslope edge of Stand 3A.

### 5.3 Priority Area for Protection 2 (1,193 m<sup>2</sup>)

PAP2 occurs in a small planted patch to the east of Stand 3A, the vegetation is characterised by a diverse mix of planted indigenous species including pūriri, karamū, kōhūhū, and māpou.

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<sup>1</sup> Preliminary surveys for indigenous birds, bats and lizards will be undertaken prior to the commencement of tree removals.



Plate 2: Higher value vegetation in between Stands 3A and B. 8 October 2021.

#### 5.4 Freshwater habitats (Priority Areas for Protection 3 and 4)

A permanent stream flows through Stands 3A and B, which supports populations of indigenous fish species. All care should be taken to avoid any adverse effects on this stream, including direct damage and sedimentation. Intermittent and ephemeral streams also flow through Stands 2A and B, small natural wetlands occur within stand 2B and at the confluence of the streams flowing through the Stands. Pines should be felled upslope in both Stands, and sedimentation controls should be established to avoid these habitats. As the small northern wetland is located outside of any of the pine felling areas the area is not classified as a PAP. However, if felling of pines occurs along the property boundary with Churchill Park School, care should be taken to avoid the wetland.

## 6. STOCK EXCLUSION AND FENCING

All wetlands and areas of established indigenous vegetation should be fenced to exclude stock with at least a ten-metre setback from the stream or wetland edge. All established vegetation and planting areas should also be fenced with a stock-proof fence.

## 7. PEST PLANTS

### 7.1 Overview

Twenty-nine pest plant species were recorded that are listed in the Auckland Regional Pest Management Plan for this area (ARPMP; Auckland Council 2020). In addition to the control of pest plants, four exotic plant species were identified that are not considered to be pests, but for which removal is recommended prior to planting. A map

of the distribution and abundance of the species requiring control is provided in Figure 1.

The plant species for which control or removal is recommended have been assigned to one of the following categories:

- Site led control pest plants within parks and reserves throughout the Auckland Region as per the ARPMP.
- Sustained control pest plants throughout the Auckland Region as per the ARPMP.
- Pest plants subject to the ‘Good Neighbour Rule’ throughout the Auckland Region as per the ARPMP.
- Pest plants that are not currently included in the ARPMP.
- Exotic plant species which are not considered to be pests, but which should also be controlled.

Each of these categories is described in more detail below and a full list of the species to be controlled is provided in Appendix 3.

## 7.2 Pest plant categories

### 7.2.1 Site led control pest plants

Under the ARPMP some pest plant species have been highlighted as requiring site led control within parks and reserves. These species are all known to have negative effects on indigenous ecosystems and in some cases can cause canopy collapse (Auckland Council 2020).

Thirteen of the pest plants recorded at Churchill Park have been identified as Site led control species (Table 1). Some of these species are also subject to a ‘Good Neighbour Rule’ that required Auckland Council and/or the affected land occupiers to carry out control within a 500-metre-wide buffer zone around areas of parkland (Table 1).

Table 1: Site led pest plants observed at Churchill Park.

Common Name	Species Name	ARPMP Good Neighbour Rules and responsibilities
agapanthus	<i>Agapanthus praecox</i>	N/A
boneseed	<i>Chrysanthemoides monilifera</i>	N/A
bushy asparagus	<i>Asparagus aethiopicus</i>	Rule 7.5.2.2.1: All occupiers of any land that is located within the buffer area, of any park which is managed for bushy asparagus and where Auckland Council has undertaken initial destruction of bushy asparagus on that land, must undertake follow up destruction of all bushy asparagus on that land. Auckland council responsible for control Land occupier responsible preventing reestablishment

Common Name	Species Name	ARPMP Good Neighbour Rules and responsibilities
Chinese privet	<i>Ligustrum sinense</i>	N/A
climbing asparagus	<i>Asparagus scandens</i>	Rule 7.5.2.3.1: All occupiers of any land that is located within the buffer area of a park which is managed for climbing asparagus and where Auckland Council has undertaken initial destruction of climbing asparagus on that land, must undertake follow up destruction of all climbing asparagus on that land. Auckland council responsible for control Land occupier responsible preventing reestablishment
Japanese honeysuckle	<i>Lonicera japonica</i>	N/A
monkey apple / lillipilli	<i>Syzygium smithii</i>	N/A
moth plant	<i>Araujia hortorum</i>	Rule 7.5.2.8.1 All occupiers of any land that is located within the buffer area of a park which is managed for moth plant, must destroy all moth plant on that land. Land occupier responsible for control
pampas grass	<i>Cortaderia selloana</i>	N/A
Phoenix palm	<i>Phoenix canariensis</i>	N/A
tree privet	<i>Ligustrum lucidum</i>	N/A
wild ginger	<i>Hedychium gardnerianum</i>	7.5.2.10.1 All occupiers of any land that is located within the buffer area of a park which is managed for wild ginger, must destroy all wild ginger on that land. Land occupier responsible for control
woolly nightshade	<i>Solanum mauritianum</i>	N/A

## 7.2.2 Sustained control pest plants

Sustained Control Pest Plants include species that have been identified as having the potential to negatively impact environmental and economic values across the entire Auckland Region. Sixteen sustained control pest plants were recorded during the field survey and are listed in Table 2.

Under the ARPMP all Sustained Control Pest Plants are subject to the following rules:

- Rule 7.7.10.1.1: No person shall cause to breed any Sustained Control Pest Plant within the Auckland region.
- Rule 7.7.10.1.2: No person shall distribute or release (or cause to be released or distributed), any Sustained Control Pest Plant within the Auckland region.
- Rule 7.7.10.1.3: No person shall sell or offer for sale any Sustained Control Pest Plant within the Auckland.
- Rule 7.7.10.1.4: No person may plant or allow to be planted any Sustained Control Pest Plant (specified below) on or in any land within the Auckland region.
- Rule 7.7.10.1.5: Despite rule 7.7.10.1.4, a person may transfer or allow to be transferred an existing Sustained Control Pest Plant planted on their land from one location to another location within the boundaries of the same property. This

exception does not apply to the following freshwater pest plants: alligator weed (*Alternanthera philoxeroides*), bladderwort (*Utricularia* spp.), Chilean rhubarb (*Gunnera tinctoria*), eel grass (*Vallisneria australis*), egeria (*Egeria densa*), hornwort (*Ceratophyllum demersum*), giant reed (*Arundo donax*), lagarosiphon (*Lagarosiphon major*), parrot's feather (*Myriophyllum aquaticum*), reed sweetgrass (*Glyceria maxima*), and water primrose (*Ludwigia peploides*).

- Rule 7.7.10.1.6: All occupiers of land in the Auckland region must destroy any Sustained Control Pest Plant that has been planted on their land in breach of the RPMP, if directed to do so by an authorised person.

Table 2: Sustained Control pest plants observed at Churchill Park.

Common Name	Species Name	ARPMP Good Neighbour Rules and responsibilities
arum lily	<i>Zantedeschia aethiopica</i>	N/A
Australian sedge	<i>Carex longebrachiata</i>	N/A
blackberry (wild aggregates)	<i>Rubus fruticosus</i> agg.	N/A
grey sedge	<i>Carex divulsa</i>	N/A
cotoneaster	<i>Cotoneaster glaucophyllus</i>	N/A
crack willow	<i>Salix fragilis</i>	N/A
English ivy	<i>Hedera helix</i> subsp. <i>helix</i>	N/A
gorse	<i>Ulex</i> spp.	Land occupier responsible for control.
hawthorn	<i>Crataegus monogyna</i>	N/A
Japanese spindle tree	<i>Euonymus japonicus</i>	N/A
montbretia	<i>Crocasmia × crocosmiiflora</i>	N/A
palm grass	<i>Setaria palmifolia</i>	N/A
smilax	<i>Asparagus asparagoides</i>	N/A
sweet pea shrub	<i>Polygala myrtifolia</i>	N/A
tradescantia	<i>Tradescantia fluminensis</i>	N/A
tuber ladder fern	<i>Nephrolepis cordifolia</i>	N/A

### 7.2.3 Pest plants not within the ARPMP 2020-2030

Eight pest plant species were observed that are not identified in the ARPMP (Table 3). Although these species are not named in the ARPMP, they are considered to be having a detrimental impact on ecological values at the site and may spread further if not controlled.

Table 3: Pest plant not listed in the ARPMP observed at Churchill Park.

Common Name	Species Name
Bear's breeches	<i>Acanthus mollis</i>
Bindweed	<i>Calystegia</i> sp.
Fruit salad plant	<i>Monstera deliciosa</i>
garden nasturtium	<i>Tropaeolum majus</i>
macrocarpa	<i>Cupressus macrocarpa</i>
radiata pine	<i>Pinus radiata</i>
Tasmanian blackwood	<i>Acacia melanoxylon</i>
ti	<i>Cordyline fruticosa</i>

## 7.2.4 Other exotic plants

An additional eight exotic plant species were identified that should be removed from the revegetation areas of Churchill Park (Table 4). While these species are not considered to be adversely affecting the ecology of the site, they should be removed as they are not ecologically appropriate for the area.

Table 4: Exotic plant species that should be removed from the revegetation areas of Churchill Park.

Common Name	Species Name
rambler rose	<i>Rosa wichuraiana</i>
kikuyu grass	<i>Cenchrus clandestinus</i>
veldt grass	<i>Ehrharta erecta</i>
Yorkshire fog	<i>Holcus lanatus</i>
Mercer grass	<i>Paspalum distichum</i>
bush lily	<i>Clivia sp.</i>
lilac oxalis	<i>Oxalis incarnata</i>
creeping buttercup	<i>Ranunculus repens</i>

## 8. PROPOSED MANAGEMENT AREAS

### 8.1 Overview

All pest plants and exotic plant species identified above should be controlled within Churchill Park. Six management units were categorised at the site (Figure 1) based on vegetation types, locality, and abundance of pest plants.

### 8.2 Management Unit 1 (Stand 3B c.4,286 m<sup>2</sup>)

Management Unit 1 (MU1) encompasses karo and karamū forest under an emergent canopy of pines. The most abundant pest plants are large Phoenix palms, which bound the western edge of the management unit, while saplings are establishing in the understory. Locally common pest plant species include, tradescantia, woolly nightshade, gorse, agapanthus, monkey apple, and kahili ginger (Plate 3).

Trees that are over three metres in height, excluding the pines and Phoenix palms, should be controlled using the drill and inject method and left to break down in situ. The removal of the mature Phoenix palms is considered an intractable issue, so if they are left in situ juveniles and seedlings should be controlled indefinitely to ensure they do not spread further.

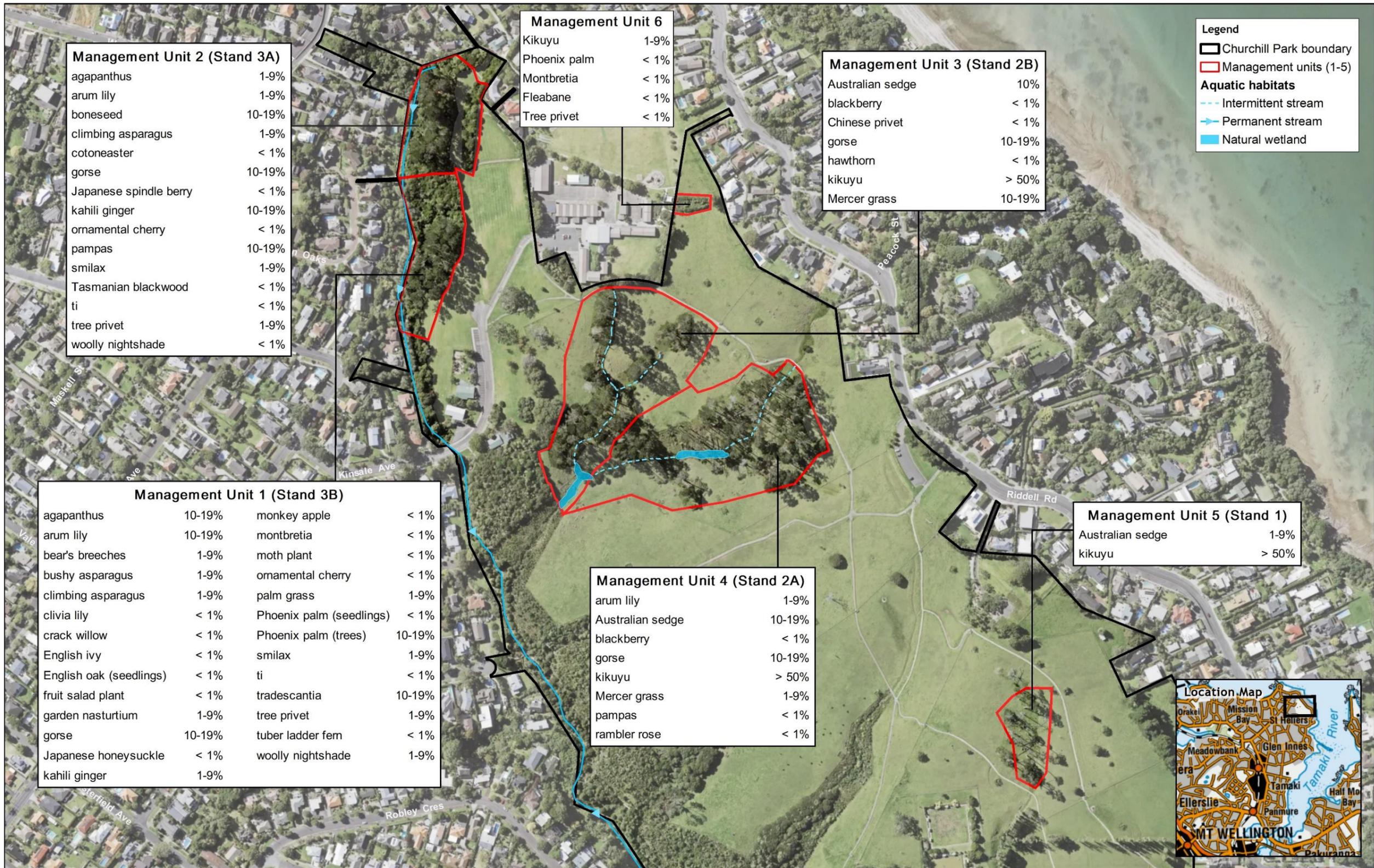


Figure 1. Pest Plant Management Units at Churchill Park, Glendowie

**Data Acknowledgment**  
 Map contains data sourced from LINZ  
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 Ref: 06 1804  
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 Figure\_MU\_22.mxd



**Wildlands**  
 www.wildlands.co.nz, 0508 WILDNZ

Scale: 1:3,500  
 Date: 12/09/2022  
 Cartographer: FM/LD  
 Format: A3R



Plate 3: Dense patches of kahili ginger, onion weed and arum lily are locally common in the lower floodplain of MU1. Mature phoenix palms are also common.  
8 October 2021.

#### 8.2.1 Management Unit 2 (Stand 3A, c.3,481 m<sup>2</sup>)

Management Unit 2 (MU2) is located to the north of MU1 and contains a sparser sub-canopy than MU1. The area is often bare, with patches of dense pine needles (Plate 4) and locally common gorse and boneseed in the understorey. At least one large Phoenix palm is present in this management unit.



Plate 4: Groundcover vegetation in MU2 is characterised by patches of dense pine needles. 8 October 2021.

#### 8.2.2 Management Unit 3 (Stand 2B, c.13,212 m<sup>2</sup>)

Management Unit 3 (MU3) is located in the centre of Churchill Park and encompasses exotic grassland with locally common Australian sedge. A spring-fed intermittent stream flows through the area into a wetland where MU3 and MU4 meet. The stream is partially overgrown by kikuyu, which will need to be managed before riparian planting is undertaken. Frequent to common pest plants include gorse, hawthorn, Chinese privet (*Ligustrum sinense*) and blackberry (*Rubus fruticosus* agg.) (Plate 5).



Plate 5: Localised patches of gorse, Chinese privet and hawthorn along the banks of the intermittent stream in MU3. 8 October 2021.

### 8.2.3 Management Unit 4 (Stand 2A, c.19,361m<sup>2</sup>)

Management Unit 4 (MU4) is located in the centre of the Park, south of MU3, and is characterised by exotic grassland with a natural wetland in the middle of the site where it is bounded by a semi-blocked culvert. The intermittent stream that flows through the site becomes a wetland in the middle and then flows through a culvert west to meet the stream from MU3, forming a second wetland. Dense patches of arum lily and gorse are present in the upper reaches of the stream where it becomes ephemeral (Plates 1 and 6).

All the wetlands within the site are currently degraded due cattle pugging and grazing. Wetland pest plants are in low abundance and include localised blackberry, arum lily, and gorse seedlings (Plate 6).



Plate 6: MU4 is characterised by exotic grassland with localised patches of wīwī and Australian sedge. A wetland (centre of image) contains a localised patch of arum lily. 8 October 2021.

#### 8.2.4 Management Unit 5 (Stand 1, c.3,029 m<sup>2</sup>)

Management Unit 5 (MU5) is located at the southern end of the Park and is characterised by mown exotic grassland with scattered patches of wīwī. There are few pest plant species of note in this area (Plate 7).



Plate 7: MU5 is predominantly grazed exotic grassland with few pines and pest plant species. 8 October 2021.

#### 8.2.5 Management Unit 6 (northern natural wetland c.500 m<sup>2</sup>)

Management Unit 6 (MU6) comprises a small area of indigenous wetland in the northern corner of the Park, near Churchill Park School (Plate 8). There are limited pest plants in the area, although kikuyu is spreading from the surrounding farmland into the buffer planting. A single Phoenix palm seedling, scattered montbretia, and a single young tree privet are also growing in the planted buffer. Scattered gorse and radiata pines are growing along the southern fenceline near the school.



Plate 8: View from interior of MU6 towards the buffer of mānuka scrub.

### 8.3 Planting site preparation

Site preparation work must be carried out in all areas where indigenous revegetation plantings are to be established (see Section 9 for details).

### 8.4 Pest plant control methods

Control methods for all pest plant species and problem exotic species recorded at the site are presented in Appendix 4. Repeated treatment rounds will be required to achieve full control of some species, particularly those with large tubers or bulbs (e.g., kahili ginger). The timing of treatment rounds is provided in Section 10.

### 8.5 Disposal of material

All environmental pest plant infestations can be dealt with *in situ*, removing the need for disposal. The seedlings of many pest plant species (e.g., woolly nightshade and Chinese privet) can be controlled by hand-pulling and may be left to rot on site. It is essential that plant seeds, tubers, and fragments are not dispersed from the current infestation areas as some species can easily be spread by seed or fragments species (e.g., climbing asparagus). Where cut vegetation is to be left on site, seed heads should be removed wherever possible and disposed of carefully to avoid new infestations establishing.

## 8.6 Pest plant control outcomes

No mature, flowering or fruiting pest plants or exotic ground cover species should be remaining in the planting areas prior to planting work being carried out. Within the proposed management units, no mature, flowering or fruiting pest plants should be remaining by the end of the first year of control. After this stage ongoing maintenance should be carried out to keep the planting areas and management units in a pest plant free state in perpetuity. All newly established pest plants, regrowth of unsuccessfully controlled pest plants, and plants that are hindering the growth of indigenous plantings, should be controlled during regular maintenance visits. See Section 10 for the frequency and timing of maintenance work.

## 8.7 Agrichemical use, record keeping and reporting

All environmental pest plant control operations should be undertaken by “Growsafe” certified operators, in line with the Agrichemical Users’ Code of Practice (NZS 8409 2004: The Management of Agrichemicals) and industry best practice. This includes recording and maintaining records of all agrichemical usage on appropriate spray record sheets.

Reports summarising the pest plant control work undertaken during each year of the programme should be presented to Auckland Council on an annual basis. This report should include, but is not limited to:

- Chemical application method.
- Start and finish time of application.
- Concentration, volume, brand name and active ingredient of herbicides used.
- The timing of pest plant control rounds.
- Weather conditions during control rounds.
- Pest plant species controlled.
- The results/effectiveness of the control.
- Pest plant control priorities for the following year.

## 8.8 Banned flora

Potentially invasive exotic species should not be planted in Churchill Park. This includes any species listed in the ARPMP, in the National Pest Plant Accord or on the [weedbusters.org.nz](http://weedbusters.org.nz) website.

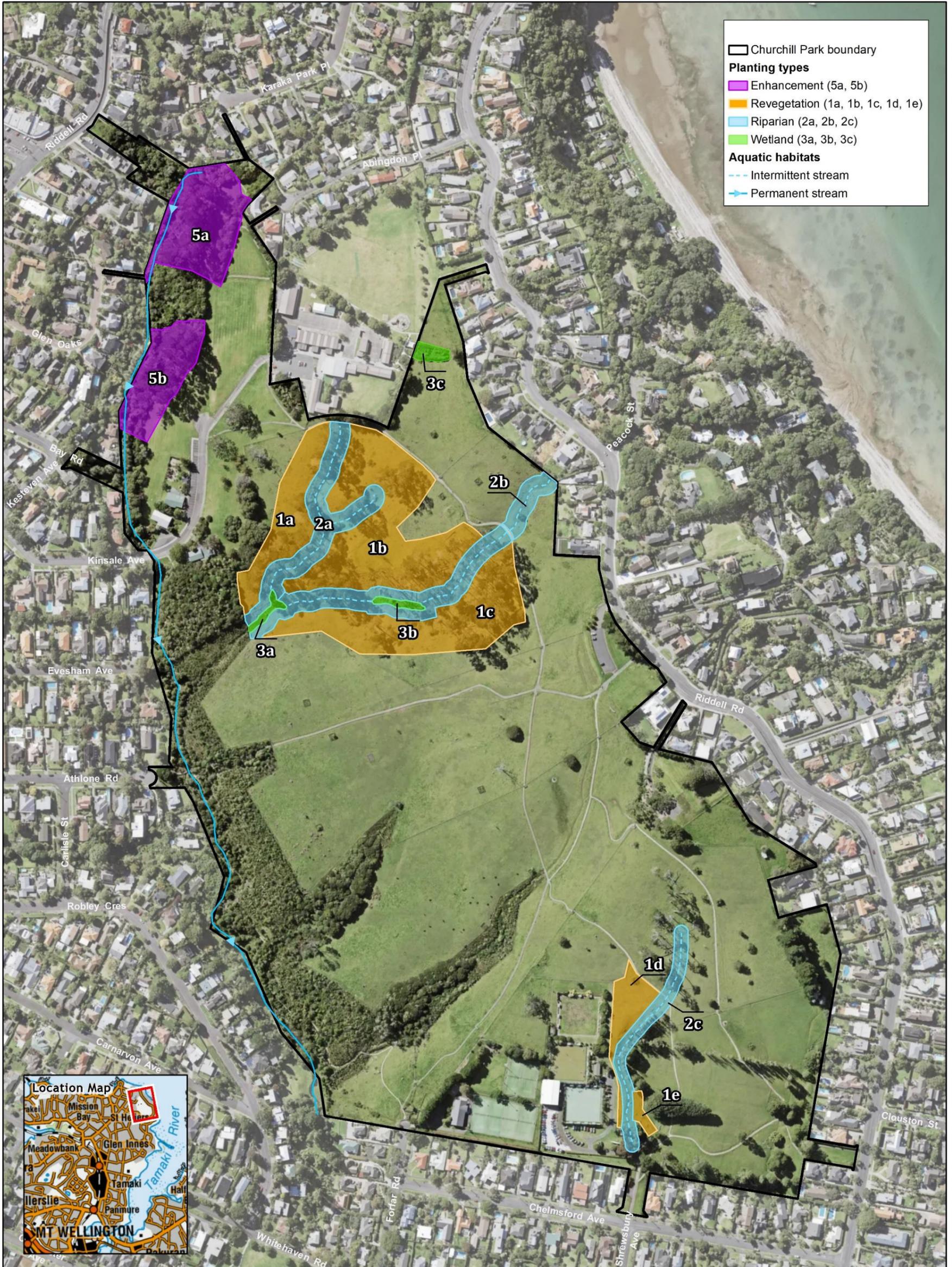
## 9. PLANTING

### 9.1 Overview

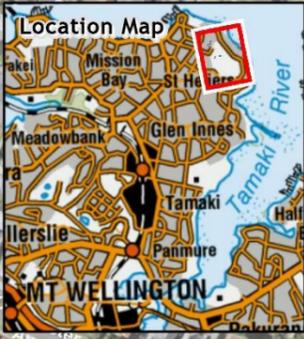
Ten planting areas have been identified within Management Units 1-4 and 6, which consist of two riparian zones, three revegetation areas, three wetlands, and two enhancement planting areas:

- Enhancement planting throughout existing areas of indigenous forest and shrubland in the Park with shade-tolerant forest species (Planting Areas 5A and 5B).
- Riparian and upslope planting throughout the existing areas of grassland (Planting Areas 2A and 2B).
- Wetland planting (Planting Areas 3A and 3B), and wetland enhancement planting in the small northern wetland (Planting area 3C).

The locations of the planting areas are shown in Figure 2. All planting within these areas should follow the plant schedules provided below and the timeline presented in Section 10. Percentages for each plant species have been provided in the plant schedules, although total plant numbers will be confirmed once the planting areas have been confirmed. Note that plant numbers for the enhancement planting areas will need to be determined once the pines have been removed from planting areas 5A and 5B.



- Churchill Park boundary
- Planting types**
- Enhancement (5a, 5b)
- Revegetation (1a, 1b, 1c, 1d, 1e)
- Riparian (2a, 2b, 2c)
- Wetland (3a, 3b, 3c)
- Aquatic habitats**
- Intermittent stream
- Permanent stream



**Figure 2. Proposed areas for indigenous restoration planting at Churchill Park, Glendowie**

**Wildlands**  
 www.wildlands.co.nz, 0508 WILDNZ  
 Scale: 1:3,500  
 Date: 19/10/2022  
 Cartographer: FM  
 Format: A3

**Data Acknowledgment**  
 Maps contain data sourced from LINZ  
 Crown Copyright Reserved

Report: 5797  
 Client:  
 Ref: 06 1804  
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 File: Figure\_Planting\_v4.mxd



### 9.1.1 Planting Areas 1A to 1E – Indigenous revegetation

These areas include exotic grassland on drier slopes throughout planting areas 1A – 1E (inclusive) (Table 5). Only the kikuyu and other aggressive species will need to be controlled prior to planting as per Section 9.2. Species selected for these areas are typical of WF11 (kauri, podocarp, broadleaved forest). Canopy cover is expected to be reached within three to five years, and the shade created will naturally suppress light-dependent exotic grass, shrub, and herb species. The planting schedule for these areas is provided in Table 5.

Table 5: Indicative planting schedule for Planting Areas 1A – 1E

Species	Common Name	Size	Spacing (m)	Cover (%)	1A (5,600 m <sup>2</sup> )	1B (15,200 m <sup>2</sup> )	1C (1,100 m <sup>2</sup> )	1D (2,400 m <sup>2</sup> )	1E (500 m <sup>2</sup> )
<i>Agathis australis</i> <sup>1</sup>	kauri	2L	5	2	50	150	10	20	5
<i>Beilschmiedia tarairi</i> <sup>1</sup>	taraire	2L	5	2	50	150	10	20	5
<i>Coprosma robusta</i>	karamū	1L	1.4	10	290	780	55	120	25
<i>Cordyline australis</i>	tī kōuka	1L	1.4	10	290	780	55	120	25
<i>Hebe stricta</i>	koromiko	1L	1.4	5	140	390	30	60	10
<i>Knightia excelsa</i> <sup>1</sup>	rewarewa	2L	5	3	80	230	15	35	5
<i>Kunzea robusta</i>	kānuka	1L	1.4	25	710	1,940	140	305	65
<i>Leptospermum scoparium</i>	mānuka	1L	1.4	12	340	930	65	145	30
<i>Melicytus ramiflorus</i>	māhoe	1L	3	10	250	750	50	120	25
<i>Pittosporum eugenioides</i>	tarata	1L	3	10	250	750	50	120	25
<i>Podocarpus totara</i> <sup>1</sup>	tōtara	2L	5	3	80	230	15	35	5
<i>Pseudopanax arboreus</i>	five-finger	2L	3	5	140	380	25	60	10
<i>Vitex lucens</i>	pūriri	2L	5	3	80	230	15	35	5
<b>Total</b>				<b>100</b>	<b>2,750</b>	<b>7,690</b>	<b>535</b>	<b>1,195</b>	<b>240</b>

1. Plant in Years 3-5 when sufficient shelter is provided from surrounding plants. Taraire should be planted in damper, less exposed areas, e.g., top slope.

### 9.1.2 Planting Areas 2A and 2B – Riparian zones

These planting areas are within the ten-metre buffer zone along the intermittent streams flowing through Management Units 3 and 4 and the permanent stream in MU1 and 2. The plantings will achieve canopy closure within three to five years and will buffer much of the existing wetland habitat. All of the species are tolerant of flooding events. These planting schedule for the two riparian zones is presented in Table 6.

Table 6: Planting schedule for Planting Area 2A (1.2 hectares) and 2B (0.15 hectare)

Species	Common Name	Grade	Spacing (m)	Cover (%)	2A (12,000 m <sup>2</sup> )	2B (1,500 m <sup>2</sup> )	Plant placement notes
<i>Aristotelia serrata</i>	wineberry	1L	1.4	10	490	60	Plant on drier soils, within a 10-metre buffer zone of wetland/stream edge
<i>Dacrycarpus dacrydioides</i>	kahikatea	2L	5	2.5	100	15	
<i>Cordyline australis</i>	tī kōuka	1L	1.4	15	735	90	
<i>Leptospermum scoparium</i>	mānuka	1L	1.4	20	980	120	
<i>Melicytus ramiflorus</i>	māhoe	1L	1.4	15	735	90	
<i>Veronica stricta</i>	koromiko	1L	1.4	15	735	90	
<i>Phormium tenax</i>	harakeke	0.5L	1.4	15	735	90	
<i>Rhopalostylis sapida</i>	nīkau	1L	1.4	2.5	120	15	
<i>Sophora chathamica</i>	kōwhai	1L	1.4	5	245	30	
<b>Total</b>				<b>100</b>	<b>4,875</b>	<b>600</b>	
<i>Carex lessoniana</i>	rautahi	0.5L	0.75	40	855	215	Plant on moist soils, on the immediate stream margin to a width of 1-2 metres.
<i>Carex virgata</i>	pūrei	0.5L	0.75	30	640	160	
<i>Cyperus ustulatus</i>	giant umbrella sedge	0.5L	0.75	30	640	160	
<b>Total</b>				<b>100</b>	<b>2,135</b>	<b>535</b>	

### 9.1.3 Planting Areas 3A and 3C – Wetland revegetation

The plant species in the planting schedule below (Table 7) are suitable to plant in wetland and swamp forest habitats that remain permanently damp or wet throughout the year. Sedge species should be densely planted throughout both planting areas. Swamp maire (*Syzygium maire*) and pukatea (*Laurelia novae-zelandiae*) can be planted on the margins of the wetland areas at a minimum spacing of five metres.

Table 7: Planting schedule for Planting Area 3A (c.0.04 ha) and 3B (c.0.3 ha)

Species	Common Name	Grade	Spacing (m)	3A (407m <sup>2</sup> )	3B (379m <sup>2</sup> )
<i>Carex lessoniana</i>	rautahi	0.5L	0.5	165	175
<i>Carex secta</i>	pukio	0.5L	0.5	155	160
<i>Carex virgata</i>	pūrei	0.5L	0.5	165	175
<i>Juncus pallidus</i>	wi	0.5L	0.5	65	70
<i>Laurelia novae-zelandiae</i>	pukatea	2L	5	5	5
<i>Phormium tenax</i>	harakeke	0.5L	1.4	20	25
<i>Syzygium maire</i>	maire tawake	2L	5	5	5

<b>Total</b>				580	615
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### 9.1.1 Planting area 3C – Wetland enhancement planting

The plant species in the planting schedule below (Table 8) are suitable to plant in wetland and swamp forest habitats that remain permanently damp or wet throughout the year. Sedge and flax species are already densely planted throughout the area so are unlikely to be needed, however additional species could be planted to improve the diversity of the area including wi, and rautahi. Swamp maire and pukatea could be planted on the margins of the wetland areas at a minimum spacing of five metres.

Table 8: Planting schedule for Planting Area 3C (c.0.05 ha)

Species	Common Name	Grade	Spacing (m)	Number
<i>Carex lesssoniana</i>	rautahi	0.5L	0.5	50
<i>Juncus pallidus</i>	wi	0.5L	0.5	50
<i>Laurelia novae-zelandiae</i>	pukatea	2L	5	5
<i>Syzygium maire</i>	maire tawake	2L	5	5
<b>Total</b>				110

### 9.1.1 Planting areas 5A and B – Enhancement planting

Enhancement planting throughout existing areas of indigenous forest and shrubland in planting areas 5A and 5B with mature phase forest species could be undertaken to enhance the botanical diversity of the project area. The plant schedule for this area is provided in Table 9.

Table 9: Planting schedule for Planting Areas 5A (0.78 ha) and 5B (0.53 ha)

Species	Common Name	Grade	Spacing (m)	Cover (%)	5A (7,800 m <sup>2</sup> )	5B (5,300 m <sup>2</sup> )
<i>Alectryon excelsus</i> <sup>1</sup>	titoki	2L	5	10	5	5
<i>Beilschmiedia tarairi</i> <sup>1</sup>	taraire	2L	5	10	5	5
<i>Corynocarpus laevigatus</i>	karaka	2L	5	10	30	20
<i>Dacrycarpus dacrydioides</i> <sup>1</sup>	kahikatea	2L	5	15	30	20
<i>Podocarpus totara</i>	tōtara	2L	5	10	15	10
<i>Pseudopanax arboreus</i>	five-finger	2L	5	15	10	5
<i>Rhopalostylis sapida</i>	nīkau	2L	5	5	80	55
<i>Sophora chathamica</i>	kōwhai	2L	5	10	40	25
<i>Vitex lucens</i>	pūriri	2L	5	15	30	20
<b>Total</b>				<b>100</b>	<b>245</b>	<b>165</b>

1. Plant in sheltered, damper areas closer to floodplain of permanent stream.

## 9.2 Site preparation

Appropriate site preparation is essential to the success of indigenous revegetation plantings. All environmental pest plants should be controlled within the planting areas (as per Section 7 above). In addition, all non-invasive exotic grasses and herbaceous plants should also be blanket sprayed with a Glyphosate-based herbicide before planting work is carried out. As rank kikuyu is present within the planting areas,

spraying should be undertaken at least 12 weeks prior to planting, to allow time for the vegetation to break down.

### 9.3 Plant stock and availability

All plants should be sourced from the Tāmaki Ecological District, in line with Auckland Council's eco-sourcing Code of Practice. To ensure availability, the plant stock should be ordered as far in advance as possible, especially for slower-growing species required in larger grades (e.g., kahikatea).

### 9.4 Plant layout and spacing

In general, most shrub and smaller tree species should be planted at 1.4 metre centres. Larger growing species (e.g., kahikatea, pūriri) should be planted further apart at approximately five metre centres, while maintaining an overall coverage of 1.4 metre spacing between all plants. Along stream edges and within wetland areas, sedges and rushes should be planted at 0.5-0.75 metre centres (3-4 plants/m<sup>2</sup>).

### 9.5 Maintenance

New revegetation and infill areas should be inspected at least three times during the first three years following planting, and annually for the next two years. During these visits, plants should be released from exotic vegetation to ensure they are able to receive sufficient sunlight to thrive. As the plants become established, they will begin to out-compete other exotic species and the amount of maintenance required will decrease. However, as the area comprises a mix of mostly low growing species, at least some ongoing maintenance will be required in perpetuity.

Infill planting may be required depending on plant survival. Infill plants should be of the same grade as those used in the initial planting. The number and species of infill plants should be identified in the February or March preceding the infill planting season.

If planting is carried out during July and/or August (while soil moisture is high), watering should not be required during the summer months. However, if plants start to show signs of water stress (e.g., wilting or dropping leaves) watering should be carried out to reduce plant losses and infill planting requirements.

### 9.6 Rabbit and pūkeko management

Rabbits (*Oryctolagus cuniculus*) and pūkeko (*Porphyrio melanotus melanotus*) are likely to be present. Both of these species have the potential to hinder the establishment of indigenous revegetation plantings. Rabbits browse on the foliage of plants and may damaging the root balls, while pūkeko frequently pull new plants out of the ground soon after planting. If rabbits and/or pūkeko are abundant at the site, control should be undertaken prior to planting. Post-planting monitoring should also be undertaken, to determine if these species are having an impact. If rabbits and pūkeko are found to be negatively impacting the planting area control should be initiated immediately.

### 9.6.1 Rabbit control

Rabbit control should be undertaken if animals are common in and around the planting area prior to planting, or if damage to the new plants from these species is detected.

Spotlight shooting at night is the most effective option to control rabbits, preferably using a .22 calibre rifle with a suppressor. All personnel undertaking shooting need to hold a current firearms license and be skilled and experienced in undertaking spotlight shooting control operations. The landowners and any close neighbours should be notified prior to any control operation. The police should be advised immediately prior to, and following, control operations involving the use of firearms in urban and peri-urban areas.

### 9.6.2 Pūkeko control

Pūkeko control should be undertaken if they are abundant in and around the planting area prior to planting, or if damage to the new plants from species is detected.

Shooting is the most effective control method for pūkeko. If shooting is to be undertaken during the game bird season, it can be carried out under a game bird hunting licence from Fish and Game NZ, as long as the permit conditions are followed. Any pūkeko control that takes place outside of the game bird season requires a Permit to Disturb, which can be sought from, and issued by Fish and Game NZ, if they approve the reasoning for the control. The Permit to Disturb details the approved control methods and number of birds that can be culled.

### 9.6.3 Record keeping and reporting

Records of all pest animal control operations should be maintained in line with industry best practice. A summary of the pest animal control work needed to maintain the planting areas during each year of the programme should be presented to Auckland Council on an annual basis. This includes, but is not limited to:

- Timing of control rounds;
- Weather conditions during control rounds;
- A record of shooting nights undertaken and all pest animals shot; and
- A record of correspondence (if any) regarding the pest animal control operation.

## 10. WORK PROGRAMME, RESOURCES, AND TIMELINE

The work programmes for pest plant control, rabbit and pūkeko control, and planting is provided below. Timing is based on the Auckland Council financial year of 1 July to 30 June.

### Year 1

Task	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Order plants (to be completed once EMP is approved by Council)												
Site Preparation												
Initial pest plant control												
Follow-up pest plant control												
Rabbit and pūkeko (if required)												

### Year 2

Task	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Planting												
Rabbit and pūkeko (if required)												
Infill site preparation (if required)												
Follow-up pest plant control												
Monitoring of planting and releasing where necessary												

### Year 3

Task	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Infill planting (if required)												
Rabbit and pūkeko (if required)												
Follow-up pest plant control												
Monitoring of planting and releasing where necessary												

### Year 4

Task	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Follow up pest plant control												

Monitoring of planting and releasing where necessary													
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**Year 5**

Task	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Follow up pest plant control												
Monitoring of planting and releasing where necessary												

**Year 6**

Task	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Follow up pest plant control												
Monitoring of planting and releasing where necessary												

**Ongoing**

Task	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Follow up pest plant control												
Monitoring of planting and releasing where necessary												

## ACKNOWLEDGMENTS

David Stejskal (Auckland Council) provided client liaison and comments on the draft report.  
Kristen Spooner (Done. Project Planning and Delivery) provided project liaison.

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## LIST OF VASCULAR PLANT SPECIES RECORDED AT CHURCHILL PARK, GLENDOWIE

### INDIGENOUS SPECIES

#### Gymnosperms

<i>Agathis australis</i>	kauri
<i>Dacrycarpus dacrydioides</i>	kahikatea
<i>Podocarpus totara</i> var. <i>totara</i>	tōtara

#### Monocot. trees and shrubs

<i>Cordyline australis</i>	tī kōuka, cabbage tree
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#### Dicot. trees and shrubs

<i>Coprosma macrocarpa</i> subsp. <i>minor</i>	karamū, kāramuramu
<i>Coprosma repens</i>	taupata
<i>Coprosma robusta</i>	karamū, kāramuramu
<i>Corynocarpus laevigatus</i>	karaka
<i>Griselinia lucida</i>	puka
<i>Hoheria populnea</i>	houhere, lacebark
<i>Kunzea robusta</i>	kānuka
<i>Leptospermum scoparium</i> agg.	mānuka
<i>Melicope ternata</i>	wharangi
<i>Melicytus ramiflorus</i> subsp. <i>ramiflorus</i>	māhoe
<i>Metrosideros excelsa</i>	pōhutukawa
<i>Myoporum laetum</i>	ngaio
<i>Myrsine australis</i>	māpou, matipou, māpau
<i>Olearia albida</i>	tanguru
<i>Piper excelsum</i> subsp. <i>excelsum</i>	kawakawa
<i>Pittosporum crassifolium</i>	karo
<i>Pittosporum eugenoides</i>	tarata; lemonwood
<i>Pittosporum tenuifolium</i>	kōhūhū, rautāhiri, rautāwhiri
<i>Pseudopanax lessonii</i>	houpara
<i>Pseudopanax lessonii</i> × <i>P. arboreaus</i>	
<i>Vitex lucens</i>	pūriri

#### Dicot. lianes

<i>Calystegia soldanella</i> × <i>C. tuguriorum</i>	
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#### Ferns

<i>Blechnum minus</i>	swamp kiokio
<i>Cyathea dealbata</i>	ponga, silver fern
<i>Deparia petersenii</i> subsp. <i>congrua</i>	
<i>Microsorium pustulatum</i>	kōwaowao, pāraharaha, hound's tongue
fern	
<i>Pyrrosia elaeagnifolia</i>	leather-leaf fern

## Sedges

*Carex flagellifera* manaia

## Rushes

*Juncus edgariae* wi, wīwī

## Monocot. herbs (other than orchids, grasses, sedges, and rushes)

*Arthropodium cirratum* rengarenga  
*Phormium tenax* harakeke, flax

## **NATURALISED AND EXOTIC SPECIES**

### Gymnosperms

*Araucaria heterophylla* Norfolk Island pine  
*Cupressus macrocarpa* macrocarpa  
*Pinus radiata* radiata pine

### Monocot. trees and shrubs

*Asparagus aethiopicus* (*Asparagus sprengeri*) bushy asparagus  
*Cordyline fruticosus* ti  
*Phoenix canariensis* Phoenix palm

### Dicot. trees and shrubs

*Acacia melanoxylon* Tasmanian blackwood  
*Chrysanthemoides monilifera* boneseed  
*Cotoneaster glaucophyllus* cotoneaster  
*Crataegus monogyna* hawthorn  
*Euonymus japonicus* Japanese spindleberry  
*Ligustrum lucidum* tree privet  
*Ligustrum sinense* Chinese privet  
*Prunus* sp. ornamental cherry  
*Quercus robur* English oak  
*Rosa wichuraiana* rambler rose  
*Rosa* sp. climbing rose  
*Rubus* sp. (*R. fruticosus* agg.) blackberry  
*Salix ×fragilis* crack willow  
*Solanum mauritianum* woolly nightshade  
*Syzygium smithii* lillypilly, monkey apple  
*Ulex europaeus* gorse

### Monocot. lianes

*Asparagus asparagoides* smilax  
*Asparagus scandens* climbing asparagus  
*Monstera deliciosa* fruit salad plant

### Dicot. lianes

*Araujia hortorum* moth plant  
*Hedera helix* English ivy  
*Lonicera japonica* Japanese honeysuckle

## Ferns

*Nephrolepis cordifolia* tuber ladder fern

## Grasses

*Cenchrus clandestinus* kikuyu grass  
*Cortaderia selloana* pampas  
*Ehrharta erecta* veldt grass  
*Holcus lanatus* Yorkshire fog  
*Paspalum distichum* Mercer grass  
*Piptatherum miliaceum* smilgrass  
*Setaria palmifolia* palm grass

## Sedges

*Carex divulsa* grey sedge  
*Carex longebrachiata* Australian sedge  
*Cyperus eragrostis* umbrella sedge

## Rushes

*Juncus effusus* var. *effusus* soft rush, leafless rush

## Monocot. herbs (other than orchids, grasses, sedges, and rushes)

*Agapanthus praecox* agapanthus  
*Allium triquetrum* onion weed  
*Clivia* sp. bush lily  
*Crocasmia ×crocasmiflora* montbretia  
*Hedychium gardnerianum* kahili ginger, wild ginger  
*Tradescantia fluminensis* tradescantia  
*Zantedeschia aethiopica* arum lily

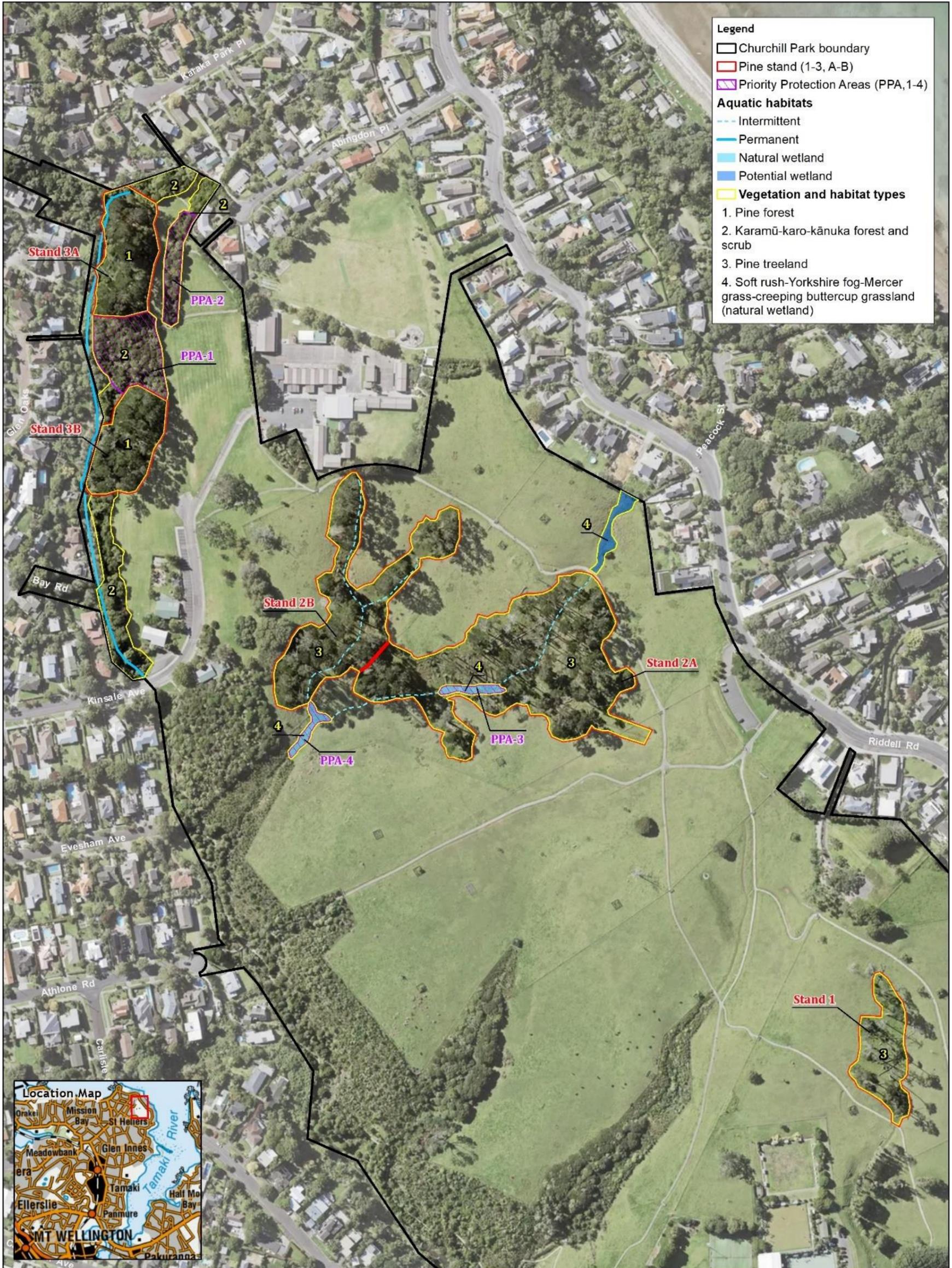
## Composite herbs

*Helminthotheca echioides* oxtongue  
*Hypochaeris radicata* catsear  
*Lapsana communis* nipplewort

## Dicot. herbs (other than composites)

*Acanthus mollis* bear's breeches  
*Daucus carota* wild carrot  
*Euphorbia peplus* milkweed  
*Galium aparine* cleavers  
*Geranium robertianum* herb Robert  
*Nasturtium officinale* watercress  
*Oxalis incarnata* lilac oxalis  
*Plantago lanceolata* narrow-leaved plantain  
*Polygala myrtifolia* sweet pea shrub  
*Ranunculus repens* creeping buttercup  
*Rumex conglomeratus* clustered dock  
*Tropaeolum majus* garden nasturtium  
*Verbena bonariensis* purple-top

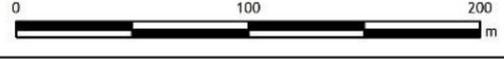
VEGETATION AND HABITAT  
TYPES WITHIN THE FIVE  
SUBJECT PINE STANDS AT  
CHURCHILL PARK, GLENDOWIE



**Figure 2. Vegetation and habitat types within the five subject pine stands at Churchill Park, Glendowie**

**Data Acknowledgment**  
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 Date: 15/10/2021  
 Cartographer: FM  
 Format: A3

## LIST OF PEST PLANT SPECIES RECORDED WITHIN CHURCHILL PARK, GLENDOWIE

Common name	Species Name
Agapanthus	<i>Agapanthus praecox</i>
Arum lily	<i>Zantedeschia aethiopica</i>
Australian sedge	<i>Carex longebrachiata</i>
Bear's breeches*	<i>Acanthus mollis</i>
Bindweed*	<i>Calystegia</i> sp.
Blackberry (wild aggregates)	<i>Rubus fruticosus</i> agg.
Boneseed	<i>Chrysanthemoides monilifera</i>
Bushy asparagus	<i>Asparagus aethiopicus</i>
Chinese privet	<i>Ligustrum sinense</i>
Climbing asparagus	<i>Asparagus scandens</i>
Clivia lily*	<i>Clivia miniata</i>
Cotoneaster	<i>Cotoneaster glaucophyllus</i>
Crack willow	<i>Salix fragilis</i>
English ivy	<i>Hedera helix</i> subsp. <i>helix</i>
Fruit salad plant*	<i>Monstera deliciosa</i>
Garden nasturtium*	<i>Tropaeolum majus</i>
Gorse	<i>Ulex</i> spp.
Greys sedge	<i>Carex divulsa</i>
Hawthorn	<i>Crataegus monogyna</i>
Japanese honeysuckle	<i>Lonicera japonica</i>
Japanese spindle tree	<i>Euonymus japonicus</i>
Kikuyu grass*	<i>Cenchrus clandestinus</i>
Macrocarpa*	<i>Cupressus macrocarpa</i>
Mercer grass	<i>Paspalum distichum</i>
Monkey apple / lillipilli	<i>Syzygium smithii</i> syn. <i>Acmena smithii</i>
Montbretia	<i>Crocasmia x crocosmiiflora</i>
Moth plant	<i>Araujia hortorum</i>
Ornamental cherry	<i>Prunus</i> spp.
Palm grass	<i>Setaria palmifolia</i>
Pampas	<i>Cortaderia jubata</i> and <i>C. selloana</i>
Phoenix palm	<i>Phoenix canariensis</i>
Radiata pine*	<i>Pinus radiata</i>
Rambler rose*	<i>Rosa wichuraiana</i>
Smilax	<i>Asparagus asparagoides</i>
Sweet pea shrub	<i>Polygala myrtifolia</i>
Tasmanian blackwood*	<i>Acacia melanoxylon</i>
Ti*	<i>Cordyline fruticosa</i>
Tradescantia	<i>Tradescantia fluminensis</i>
Tree privet	<i>Ligustrum lucidum</i>
Tuber ladder fern	<i>Nephrolepis cordifolia</i>
Wild ginger	<i>Hedychium gardnerianum</i> and <i>H. flavescens</i>

Common name	Species Name
Woolly nightshade	<i>Solanum mauritianum</i>

\* Not currently included in the ARPMP 2020-2030.

## RECOMMENDED HERBICIDE TREATMENTS

Pest Plant	Control Method(s)	Chemical(s)	Application Rate	Timing	Remarks
Agapanthus ( <i>Agapanthus praecox</i> )	Dig out and dispose off site	-	-	Year round	Only if this can be done without posing a weed hygiene risk
	Knapsack – foliar spray	Triclopyr 600g/L	60ml triclopyr + 20ml organosilicone/10L water	Year round	Will require repeat applications.
	Cut and treat stems	Triclopyr 600g/L	100ml triclopyr/1L water	Year round	Slash leaves close to ground, leave on site to rot down. Treat fresh bases with herbicide mix.
Arum lily ( <i>Zantedeschia aethiopica</i> )	Hand pull seedlings/small plants	-	-	Year round	
	Dig out and dispose off site	-	-	Year round	Only if this can be done without posing a pest plant hygiene risk.
	Cut and spray stems of large plants	Metsulfuron 600g/KG + Glyphosate 510g/L	1g metsulfuron + 70ml glyphosate/1L water	October-March	Monitor for re-growth. Spray immediately following cutting.
Australian sedge ( <i>Carex longebrachiata</i> )	Knapsack - foliar spray	Glyphosate 510g/L	100ml glyphosate/10L water	October-April	
Bear's breeches ( <i>Acanthus mollis</i> )	Dig out and dispose off site	-	-	Year round	
	Cut and treat stump	Glyphosate gel 120g/KG	Paste with glyphosate gel	October-March	
Bindweed ( <i>Calystegia sepium x silvatica</i> )	Knapsack - foliar spray	Triclopyr 600g/L	30ml triclopyr/10L water	October-February	Pull vines away from non-target vegetation before spraying.
Blackberry ( <i>Rubus fruticosus</i> )	Cut and treat stumps	Glyphosate gel 120g/KG	Paste with glyphosate gel	December-April	
	Knapsack - foliar spray	Triclopyr 600g/L	60ml triclopyr/10L water	December-April	Preferred choice close to water.
	Cut and treat stumps	Triclopyr 600g/L	60ml triclopyr/1L water	October-April	
Boneseed ( <i>Chrysanthemoides monilifera</i> )	Hand pull seedlings/small plants	-	-	Year round	
	Cut and treat stumps	Triclopyr 600g/L	60ml triclopyr/1L water	October-April	
Bushy asparagus ( <i>Asparagus aethiopicus</i> )	Knapsack – foliar spray	Glyphosate 510g/L	140ml glyphosate/10L water	October-March	DO NOT use penetrant when spraying against tree trunks

Pest Plant	Control Method(s)	Chemical(s)	Application Rate	Timing	Remarks
	Cut and treat stumps	Glyphosate gel 120g/KG	Paste with glyphosate gel	October-April	
Chinese privet ( <i>Ligustrum sinense</i> )	Hand pull seedlings/small plants	-	-	Year round	
	Cut and treat stumps	Glyphosate gel 120g/KG	Paste with glyphosate gel	October-April	
	Drill and inject	Glyphosate 510g/L	70ml glyphosate + 2ml organosilicone/1L water	October-April	
	Knapsack - foliar spray	Glyphosate 510g/L	70ml glyphosate + 10ml organosilicone/10L water	October-April	Seedlings and sapling plants <50cm. Full coverage required.
		Triclopyr 600g/L	60ml triclopyr + 10ml organosilicone/10L water		
Metsulfuron 600g/KG	5g metsulfuron + 10ml organosilicone/10L water				
Climbing asparagus ( <i>Asparagus scandens</i> )	Knapsack - foliar spray	Glyphosate 510g/L	140ml glyphosate/10L water	October-March	DO NOT use penetrant if spraying against tree trunks
			210ml glyphosate/10L water	April-September	ONLY in frost free areas on healthy growth
		Clopyralid 300g/L	50ml clopyralid/10 litre water	October-March	Can be foliar sprayed over woody vegetation (avoid <i>Pittosporum</i> sp.) and monocots without damage to these species. BEFORE spraying it is imperative that spray equipment is well rinsed to remove other herbicide residues. DO NOT use penetrants/surfactants. DO NOT spray over water.
Climbing rose ( <i>Rosa wichuraiana</i> )	Cut and treat stumps	Glyphosate gel 120g/KG	Paste with glyphosate gel	Year round	
	Knapsack - foliar spray	Glyphosate 510g/L	70ml glyphosate/10L water	October-March	
		Metsulfuron 600g/KG	5g metsulfuron/10L water	October-March	
Clivia ( <i>Clivia miniata</i> )	Knapsack - foliar spray	Metsulfuron 600g/KG	5g metsulfuron/10L water	November-February	
Cotoneaster ( <i>Cotoneaster glaucophyllus</i> )	Hand pull seedlings/small plants	-	-	Year round	
	Cut and treat stumps	Glyphosate gel 120g/KG	Paste with glyphosate gel	October-April	
	Drill and inject/frill and spray	Glyphosate 510g/L	70ml glyphosate + 2ml organosilicone/1L water	October-April	

Pest Plant	Control Method(s)	Chemical(s)	Application Rate	Timing	Remarks
Crack willow ( <i>Salix fragilis</i> ), Grey willow ( <i>Salix cinerea</i> ), Tortured willow ( <i>Salix matsudana</i> 'Tortuosa'), Weeping willow ( <i>Salix babylonica</i> ),	Cut and treat stumps	Metsulfuron 600g/KG	5g metsulfuron + 2ml organosilicone/1L water	October-April	
	Drill and inject/Bore and spray	Metsulfuron 600g/KG	5g metsulfuron + 2ml organosilicone/1L water	October-April	Preferred option as leaving the tree standing avoids broken twigs/branches resprouting on ground.
		Glyphosate 510g/L	250ml glyphosate/1L water (25% glyphosate)	October-April	
	Basal bark application	Triclopyr 600g/L	2L triclopyr + 8L Syntol oil	October-April	ONLY on trees with base diameter <30cm
	Knapsack - foliar spray	Metsulfuron 600g/KG	2.5g metsulfuron/10L water	Year round	
English ivy ( <i>Hedera helix</i> )	Cut stems and treat stumps	Glyphosate gel 120g/KG	Paste with glyphosate gel	November-March	Leave foliage in host to die off.
	Knapsack - foliar spray	Metsulfuron 600g/KG	5g metsulfuron + 20ml organosilicone /10L water	November-March	
		Glyphosate 510g/L	70ml glyphosate + 20ml organosilicone/10L water	November-March	
English oak ( <i>Quercus robur</i> ) + Pin oak ( <i>Quercus palustris</i> )	Hand pull seedlings/small plants	-	-	Year round	
	Cut and treat stump	Glyphosate gel 120g/KG	Paste with glyphosate gel	October-April	
Fruit salad plant ( <i>Monstera deliciosa</i> )	Hand pull seedlings/small plants	-	-	Year round	
	Cut and treat stump	Metsulfuron 600g/KG	5g metsulfuron/1L water	October-March	
Garden nasturtium ( <i>Tropaeolum majus</i> )	Knapsack - foliar spray	Triclopyr 600g/L	60ml triclopyr/10L water	November-March	Pull vines away from non-target vegetation before spraying.
Gorse ( <i>Ulex europaeus</i> )	Cut and treat stumps	Glyphosate gel 120g/KG	Paste with glyphosate gel	October-March	
	Knapsack – foliar spray	Triclopyr 600g/L	60ml triclopyr + 10ml organosilicone/10L water	October-March	
		Metsulfuron 600g/KG	5g metsulfuron + 10ml organosilicone/10L water	October-March	
		Clopyralid 300g/L	125ml Clopyralid/10L water	October-January	
Grey sedge ( <i>Carex divulsa</i> )	Dig out small infestations	-	-	Year round	
	Knapsack - foliar spray	Glyphosate 510g/L	100ml glyphosate/10L water	October-April	
Hawthorn ( <i>Crataegus monogyna</i> )	Hand pull seedlings/small plants	-	-	Year round	
	Cut and treat stumps	Glyphosate gel 120g/KG	Paste with glyphosate gel	October-April	
	Drill and inject	Metsulfuron 600g/KG	5g metsulfuron + 2ml organosilicone/1L water	October-April	

Pest Plant	Control Method(s)	Chemical(s)	Application Rate	Timing	Remarks
Japanese honeysuckle ( <i>Lonicera japonica</i> )	Knapsack - foliar spray	Clopyralid 300g/L	70ml clopyralid/10L water	October-February	Can be foliar sprayed over woody vegetation (avoid hebe, kawakawa, kowhai, saltmarsh ribbonwood.) and monocots without damage to these species. BEFORE spraying it is imperative that spray equipment is well rinsed to remove other herbicide residues. DO NOT use penetrants/surfactants. DO NOT spray over water.
		Triclopyr 600g/L	60ml triclopyr/10L water	October-March	Use when spraying over monocots. DO NOT spray over water.
		Glyphosate 510g/L	70ml glyphosate/10L water	October-March	Only to be used where non-target damage can be avoided, i.e. ground cover situations, or where this species is growing on other pest plants only.
	Cut and treat stems	Glyphosate gel 120g/KG	Paste with glyphosate gel	October-March	Do not pull vegetation from host plant.
Japanese spindle tree ( <i>Euonymus japonicus</i> )	Cut and treat stumps	Glyphosate gel 120g/KG	Paste with glyphosate gel	October-March	
Kikuyu ( <i>Cenchrus clandestinus</i> )	Knapsack – foliar spray	Glyphosate 510g/L	70ml glyphosate/10L water	Year round	Good for initial control
	Knapsack – foliar spray	Haloxypop 100g/L	70ml haloxypop/10L water	Year round	Grass specific herbicide. Useful for releasing around indigenous plantings to minimise non-target damage.
Macrocarpa ( <i>Cupressus macrocarpa</i> )	Hand pull seedlings/small plants	-	-	Year round	
	Ring bark or fell larger trees	-	-	Year round	
Mercer grass ( <i>Paspalum distichum</i> )	Knapsack - foliar spray	Glyphosate 510g/L	70ml glyphosate/10L water	September - April	
		Haloxypop 100g/L	150ml haloxypop/10L water	September - April	Useful for releasing around indigenous plantings to minimise non-target damage. DO NOT use over water.

Pest Plant	Control Method(s)	Chemical(s)	Application Rate	Timing	Remarks
Monkey apple ( <i>Syzygium smithii</i> )	Hand pull seedlings/small plants	-	-	Year round	
	Cut and treat stumps	Glyphosate gel 120g/KG	Paste with glyphosate gel	October-April	
	Drill and inject, frill and spray	Glyphosate 510g/L	70ml glyphosate + 2ml organosilicone/1L water	October-April	
Montbretia ( <i>Crocsmia xcrocsmiiflora</i> )	Knapsack - foliar spray	Glyphosate 510g/L	100ml glyphosate + 10ml organosilicone/10L water	October-February	Follow-up control will be necessary.
		Metsulfuron 600g/KG + glyphosate 510g/L	5g metsulfuron + 70ml glyphosate + 10ml organosilicone/10L water	October-February	
Moth plant ( <i>Araujia hortorum</i> )	Hand pull seedlings/ small vines (if small numbers)	-	-	Year round	Dispose of off in a safe manner.
	Cut and treat stump	Triclopyr 600g/L	60ml triclopyr/1L water	October-March	Leave cut vegetation in host to die off. REMOVE SEED PODS if possible and dispose of safely.
		Picloram gel 43g/KG	Paste with picloram gel	October-March	
Ornamental cherry ( <i>Prunus</i> spp.)	Hand pull seedlings/small plants	-	-	November-March	
	Cut and treat stumps	Glyphosate gel 120g/KG	Paste with glyphosate gel	November-March	
	Drill and inject, frill and spray	Glyphosate 510g/L	70ml glyphosate + 2ml organosilicone/1L water	November-March	
Palm grass ( <i>Setaria palmifolia</i> )	Hand pull seedlings	-	-	Year round	Take care to get all roots.
	Knapsack - foliar spray	Glyphosate 510g/L	140ml glyphosate/10L water	October-April	
Pampas ( <i>Cortaderia selloana</i> , <i>C. jubata</i> )	Knapsack - foliar spray	Glyphosate 510g/L	140ml glyphosate + 10ml organosilicone/10L water	October-March	Thoroughly cover all foliage.
	Slash and spray regrowth	Haloxypop 100g/L	150ml haloxypop + 50ml crop oil/10L water	October-March	Or use on smaller plants
Phoenix palm ( <i>Phoenix canariensis</i> )	Hand pull seedlings/small plants.	-	-	Year round	Sharp spines can cause injury to humans
	Cut and treat stumps	Glyphosate gel 120g/KG	Paste with glyphosate gel	Year round	
	Drill and inject	Glyphosate 510g/L	Undiluted	Year round	Drill holes at least 2.5 cm deep every 10 cm around trunk, near the ground, and inject each with 10 ml glyphosate.
Pine ( <i>Pinus radiata</i> , <i>P. pinaster</i> & <i>P. patula</i> )	Hand pull seedlings/small plants	-	-	Year round	
	Ring bark or fell larger trees	-	-	Year round	

Pest Plant	Control Method(s)	Chemical(s)	Application Rate	Timing	Remarks
	Drill and inject/bore and spray	Glyphosate 510g/L	250ml glyphosate/1L water (25% glyphosate)	Year round	50% or undiluted glyphosate will be more effective in Autumn/Winter.
Rambler rose ( <i>Rosa wichuraiana</i> )	Foliar spray	Metsulfuron 600g/KG	5g metsulfuron /10L water	Year round	
Smilax ( <i>Asparagus asparagoides</i> )	Knapsack - foliar spray	Glyphosate 510g/L	140ml glyphosate/10L water	October-March	Do not add penetrant when spraying against tree trunks.
Sweet pea shrub ( <i>Polygala myrtifolia</i> )	Hand pull seedlings/small plants	-	-	Year round	
	Cut and treat stumps	Glyphosate gel 120g/KG	Paste with glyphosate gel	October-April	
Tasmanian blackwood ( <i>Acacia melanoxylon</i> )	Hand pull seedlings/small plants	-	-	Year round	
	Cut and treat stumps	Glyphosate gel 120g/KG	Paste with glyphosate gel	October-April	
	Drill and inject	Glyphosate 510g/L	140ml glyphosate + 2ml organosilicone/1L water	October-April	
Ti ( <i>Cordyline fruticosa</i> )	Cut and treat stumps	Glyphosate gel 120g/KG	Paste with glyphosate gel	October-March	
	Knapsack - foliar spray	Metsulfuron 600g/KG	5g metsulfuron/10L water	October-March	
Tradescantia ( <i>Tradescantia fluminensis</i> )	Dig out/rake and dispose off site	-	-	Year round	Only if this can be done without posing a pest plant hygiene risk. Can be black-bagged and left to cook in sun.
	Knapsack - foliar spray	Triclopyr 600g/L	60ml triclopyr + 10ml organosilicone/10L water	November-March	Pull away from non-target species before spraying.
Tree privet ( <i>Ligustrum lucidum</i> )	Cut and treat stumps	Glyphosate gel 120g/KG	Paste with glyphosate gel	November-March	
	Drill and inject	Glyphosate 510g/L	140ml glyphosate + 2ml organosilicone/1L water	November-March	
Tuber ladder fern ( <i>Nephrolepis cordifolia</i> )	Knapsack - foliar spray	Metsulfuron 600g/KG	5g metsulfuron/10L water	March-May	
Wild ginger ( <i>Hedychium gardnerianum</i> , <i>H. flavescens</i> )	Hand pull seedlings/small plants.	-	-	October to February	Ensure no tuber left behind.
	Knapsack - foliar spray	Metsulfuron 600g/KG	5g metsulfuron + 10ml organosilicone/10L water	October-April	Not for use around native vegetation or waterways.
	Cut and treat stems/tubers (recommended method)	Metsulfuron 600g/KG	20g metsulfuron/10L water	October-April	For application near waterways and indigenous vegetation.
		Glyphosate gel 120g/KG	Paste with glyphosate gel	October-April	For small infestations and application near waterways and indigenous vegetation.

Pest Plant	Control Method(s)	Chemical(s)	Application Rate	Timing	Remarks
Woolly nightshade ( <i>Solanum mauritianum</i> )	Hand pull seedlings/small plants	-	-	Year round	
	Saplings - cut and treat stump	Glyphosate gel 120g/KG	Paste with glyphosate gel	Year round	



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