



GREENSCENENZ

ENHANCING AND PROTECTING
LIVING ENVIRONMENTS

North Shore Golf Club,
Albany

Ecological Management Plan

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Appendix 1. Species List

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Acronyms

Acronym/Term	Description
EF	Exotic forest
OW	Open water
RMA	Resource Management Act 1991
RPMP	Regional Pest Management Plan 2020-2030
SA1-1.2	Mangrove forest and scrub
SEA	Significant Ecological Area
UC	Unclassified
VS2	Kānuka scrub/forest
WF7	Puriri forest
WF11	Kauri, podocarp, broadleaved forest

1 Introduction

1.1 Background

GreensceneNZ Ltd has been engaged by *Auckland Council, Environmental Services* to provide a management plan to restore native habitats and control pests at the North Shore Golf Club, 51 Appleby Road, Albany.

This report provides an assessment of the ecological condition and recommended management actions with respect to prioritising activities and restoring native ecosystems.

This management plan has been prepared to provide additional guidance to the current pest management and restoration of native habitats on site. This report has been compiled with reference to a site visit undertaken on 22 March 2023.

The key matters addressed in this report are as follows:

- Current and potential ecosystems on-site;
- Pest plant and animal management as part of ongoing management and restoration;
- Restoration and planting recommendations; and
- Staging of works.



2 Site Description

The North Shore Golf Club is located at No.51 Appleby Road, Albany (Figure 1). The golf course is a large 27 hole course, that offers three 18 hole options. This 83ha property situated near the Albany Highway is part of the larger 314ha Albany West catchment. The Albany Highway (to the east), Schnapper Rock Road (to the south) and Lucas Creek (to the west) form the boundaries for the catchment. The North Shore Golf Club is just over 25% of the total catchment area and provides the largest permeable surface within the catchment. A number of overland flow paths, flood plains/wetlands and areas of open water are within the golf course land (Figure 2).

Historical ecology of the surrounding area would have been made up of Kauri, podocarp, broadleaved forest (WF11) and Puriri forest (WF7) (Figure 3). This would have generally comprised of podocarp species on ridges and peaks of the area, transitioning to broadleaved species on the slopes and gullies. Current ecosystem types as classified by Singers et al. (2017) are much more fragmented due to historical deforestation and land development. Current ecosystems on site include regenerating Kānuka scrub (VS2) and Exotic forest (EF) (Figure 4). Labels OW and UC on Figure 4 represent open water and unclassified ecosystem types respectively. The muddy mangrove lined banks of the Lucas Creek are typical of the inlets of the inner Waitematā Harbour.

Significant Ecological Area (SEA) overlays cover parts of the terrestrial vegetation (SEA_T_8078) and marine (SEA_M2_57b) ecosystems (Figure 5). The qualifiers for SEA status include threat status and rarity for endangered ecosystems, and as stepping stones, migration pathways and buffers. The mangroves and salt marshes along Lucas Creek are important ecological habitat for native fauna such as black shag (*Phalacrocorax carbo*), kingfisher (*Todiramphus sanctus*) and white-fronted tern (*Sterna striata*). The vegetation on site is predominantly exotic specimen trees that have been planted along the fairways. Native plants have been used in new plantings which include riparian and coastal areas of the course. The vegetation canopy cover of the site is approximately 23% of the total land area (Figure 6), there is potential for this to be increased by extending planting to out of bounds areas within the course.



Figure 1: Property boundary (black outline) showing location of North Shore Golf Club

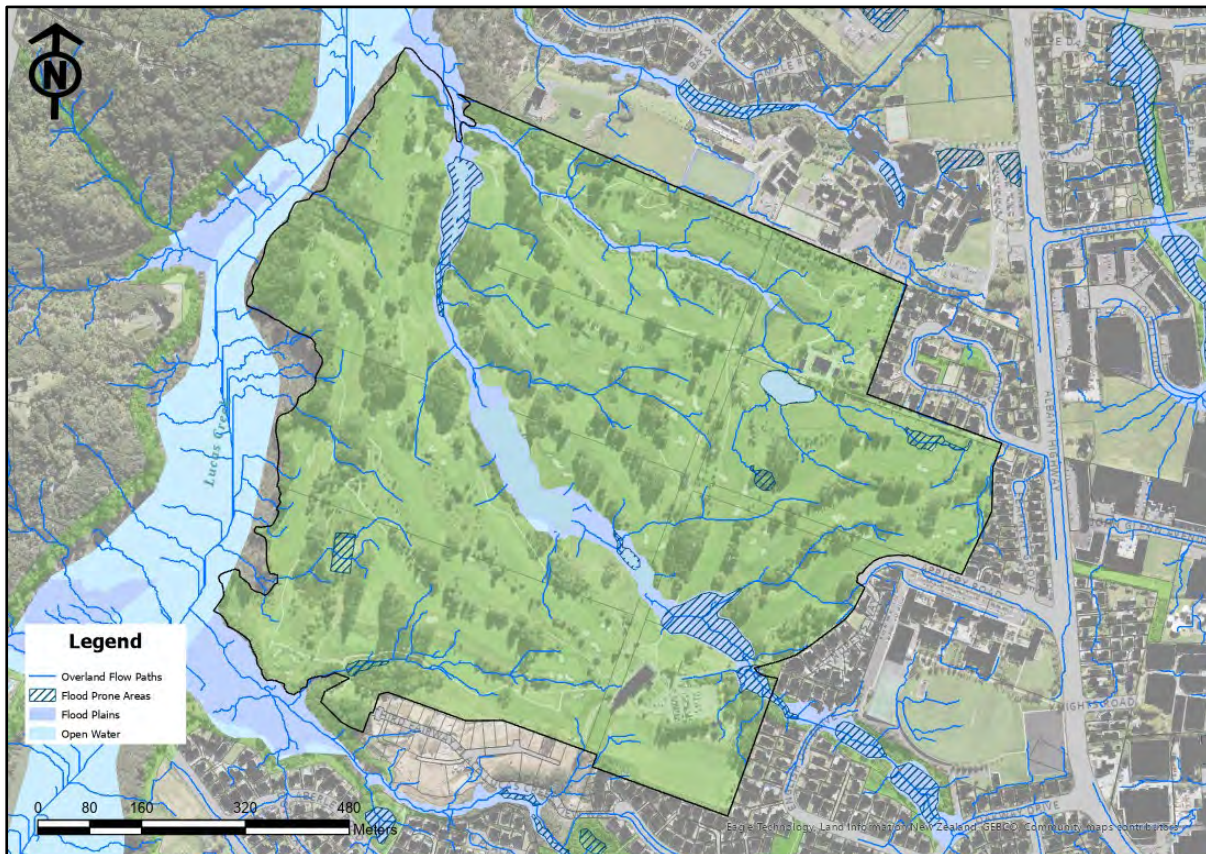


Figure 2: Shows the hydrology of the area, flood plains and network of overland flow paths

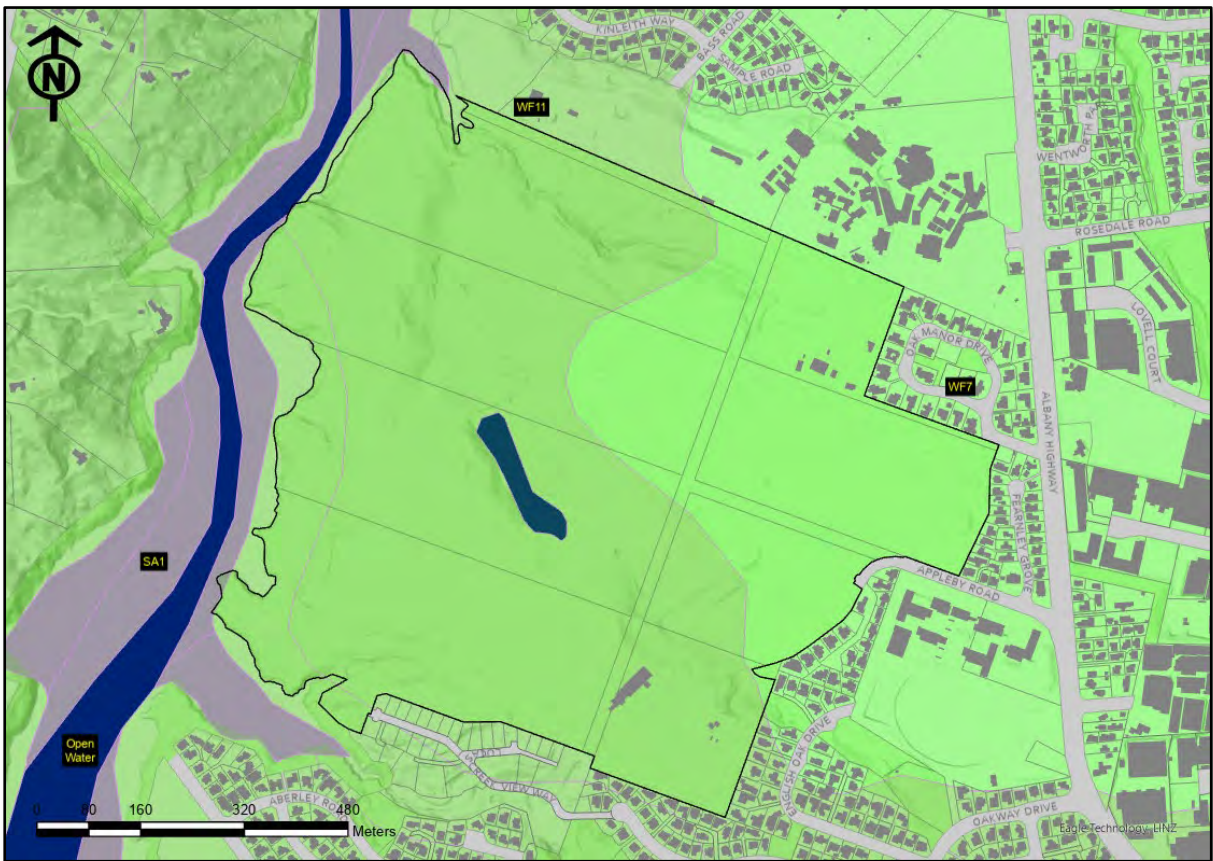


Figure 3: Historical/potential vegetation on site include WF9 and WF11 ecosystem types

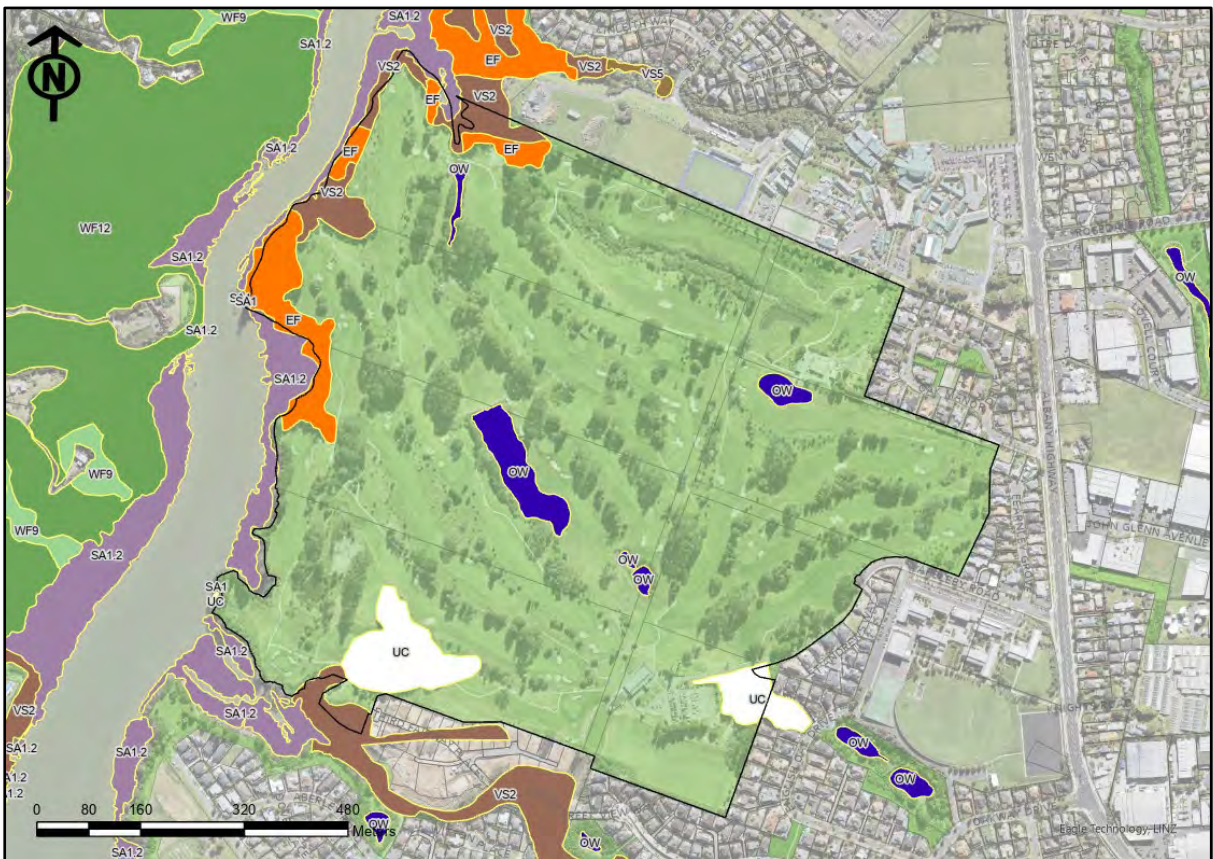


Figure 4: Showing current ecosystem type over the golf course area consisting of; VS3 and WL19

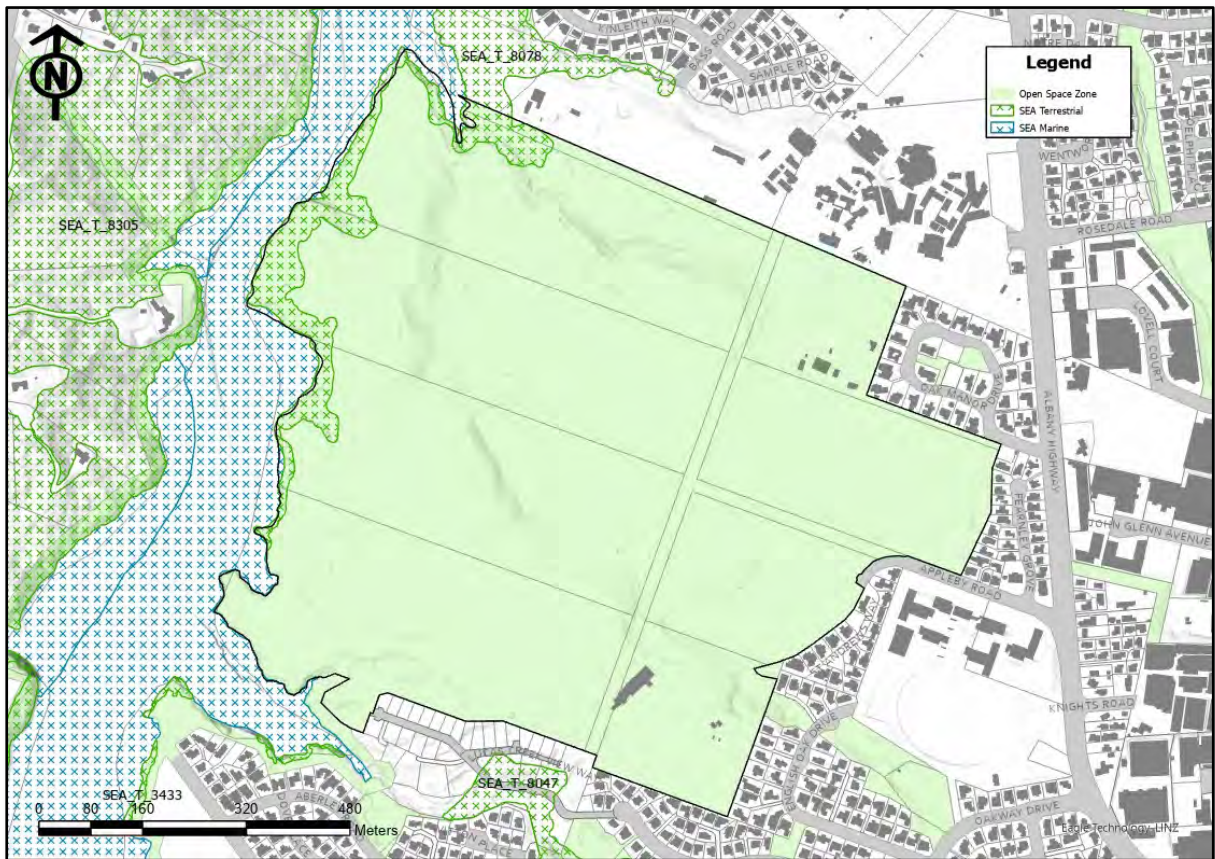


Figure 5: AUP-OP overlays showing Open space zones, SEA terrestrial and marine areas



Figure 6: Vegetation canopy cover shown in green



2.1 Site Features

The North Shore Golf Course topography generally has a western aspect that slopes from 45m above sea level from the west to approximately 5m in the east. The eastern edge of the course is a steep bank of exotic coastal forest along the true right bank of the Lucas Creek. The coastal forest canopy is predominantly pine (*Pinus radiata*), the understory and forest floor has a mix of native and exotic scrub; natives such as māpou (*Myrsine australis*), mingimingi (*Leucopogon fasciculatis*), kānuka (*Kunzea robusta*) are common along the coastal forest. Pest plants such as lilly pilly (*Syzygium australis*), Chinese privet (*Ligustrum sinense*), gorse (*Ulex europaeus*) and pampas (*Cortaderia selloana*) are common also. The coastal vegetation transitions to salt marsh and mangroves (*Avicennia marina* subsp. *australasica*) along the mud flats of Lucas Creek. The golf course has six open water features on site, these are mostly smaller ponds, although one is a large body of water (10,000m²) situated centrally within the golf course. Overland flow paths and streams on site all flow west into the Lucas Creek. The water features and streams provide habitat for aquatic fauna, including the native pūtangitangi/paradise shelduck (*Tadorna variegata*).



Photo 1: Pine tree dominated coastal forest along the western boundary



Photo 2: Coastal forest understory and edge vegetation



Photo 3: One of the open water features present on site

Exotic specimen trees make up the majority of trees on site, mostly pine, conifers and gum (*Eucalyptus* sp.). Pest plants are also common as specimen trees; species such as lilly pilly, paperbark (*Melaleuca quinquenervia*) and Norfolk Island hibiscus (*Lagunaria patersonia*) are abundant throughout the course (Photo 4).



Photo 4: Exotic pest plants such as Norfolk Island hibiscus (left) and lilly pilly (right) are common specimen trees on site

2.2 Management Areas

This report will provide management recommendations, identify areas where restoration would be beneficial to the surrounding biodiversity, and provide a plan for future activities. Management recommendations include ongoing pest plant control and monitoring in areas where reinvasion is likely to occur, as well as the gradual removal of pest plants from restoration areas as natives establish.

Removal of pest plants should be prioritised to reduce the seed source for potential reinvasion or establishment. Lilly pilly is becoming an issue on site with the amount of seedlings establishing in and around the coastal forest. Restoration planting in out of bounds areas is recommended to increase canopy cover and provide pathways for native fauna such as birds, invertebrates and reptiles to disperse. Additional benefits to restoration planting to open areas will reduce the management activities by replacing unused grass areas that require mowing and upkeep from staff to new ecologically important habitat. Potential management restoration areas have been identified in Figure 7 below and in the following Sections to provide management actions for the areas identified and where pest plants are present.

Planting around ponds will also help improve water quality and provide habitat. Plant species that could be used include low growing sedges and rushes to maintain sightlines across the course. A table of recommended species has been provided in Section 3 that can be used where applicable.



Figure 7: Recommended Management Areas, new plantings to out of bounds areas and lakeside planting

Restoration of these areas will help to improve and enhance the ecological value of the various habitats on site. Removal of pest plants will reduce the potential for these species to disperse and establish in other areas. New plantings will provide a buffer to existing areas of vegetation, improve water quality, reduce edge effects and create additional stepping stones to help establish pathways for dispersal of native fauna and create additional habitat for breeding and food sources.

2.3 Future Growth

North Shore Golf Club is looking to potentially sell off the area of land currently used as the driving range. Proceeds of this sale will help to fund future projects. The proposed new driving range would likely be constructed along the southern boundary, just west of the existing driving range. South of the proposed new driving range is an area of residential development, where concern for golf balls entering private property has been expressed. The property boundary along this edge would likely require screening to prevent damage to adjacent properties. Nets and/or tree planting may help provide screening and reduce the risk of ball strike to private property. The club is also looking to replace existing turf grass with a warm temperature variety that will be more sustainable by reducing management and watering requirements in response to changing climate.



3 Management Activities

A variety of ongoing ecological management activities are already underway at North Shore Golf Club. *Applied Biosecurity Solutions* are undertaking a couple of projects on site including use of biocontrol agents for alligator weed (*Alternanthera philoxeroides*) and control of Himalayan gooseberry (*Ribes himalense*). Pest animal control is being undertaken on site by *Kaipatiki Project*, with a number of bait lines and traps situated around the golf course. *SPS Biosecurity Limited* are investigating tree health on site as well.

Recent storm events have also contributed to the failure of some large trees on site. Cleanup of these trees (mostly senescent pines) is still ongoing. Planned management of some 300 trees, including pine and gum, will take place to manage aging/senescent trees to reduce risk associated with limb and whole tree failure.

The following sections outline recommended management areas, pest control and a 5 year (and onwards) restoration management plan to assist in enhancing the ecological value of this area. The Pest Plant Control Table (Table 1) and Pest Animal Control Table (Table 2) have been provided to aid in managing pest plants and animals located within the property. A 'Pest Control Plan' has also been provided in Figure 8 and in Appendix 2 of this report to direct control efforts to specific locations on site. Management activities, including pest plant control and restoration planting recommended in this report should complement the current actions being undertaken by the club and local community groups.

3.1 Pest Management

Where appropriate, invasive plant species have been identified that are listed in the Regional Pest Management Plan (RPMP); the RPMP also includes animal pests and diseases such as kauri dieback (*Phytophthora agathadicida*). While pest plants may be recommended for removal, they also provide habitat and ecosystem services, therefore control of pest plants should be managed to ensure the ecosystem services they provide are not compromised by their removal.

3.1.1 Pest Plants

Prioritising which pest plants to control first should help enhance the native habitat, climbing vines should be targeted first as these can suppress native regeneration and smother plants before they can establish. They can also establish within the forest canopy and cover large areas. Invasive vines identified on site include jasmine (*Jasminum polyanthum*) (Photo 5) and English ivy (*Hedra helix*).

Aquatic pest plants such as parrot's feather should be targeted as these can spread quite easily through water movement. In some cases parrot's feather is taking advantage of gaps created by alligator weed control (Photo 6).

Control of ground covers such as agapanthus (*Agapanthus praecox*) and periwinkle (*Vinca major*) (Photo 7) should be targeted next, as these can suppress native regeneration by preventing seedlings to establish.

Pest plants such as pampas (*Cortaderia selloana* and *C. jubata*, Photo 8) should be managed next as these produce large quantities of wind-dispersed seed that can spread over a wide area.

Lilly pilly is prevalent across the golf course, with many large mature trees growing along the fairways. The prevalence of lilly pilly is exasperated by the large amount of seed source material due to the large trees on site. Because of this many seedlings and young plants are establishing within the coastal forest



along the western boundary (Photo 9). Control of these seedlings and mature trees should be combined to tackle the spread of this pest plant in the area.

Other pest shrubs and trees such as Chinese privet should be the next priority as they are tolerant of a variety of conditions and can establish and persist in areas of shade within native bush. Much the same as the aforementioned lilly pilly, Chinese privet is prevalent within the coastal forest and is a common occurrence along the forest edge.

A number of specimen trees located within the golf course are listed as pest plants as well. This includes lilly pilly, Brazilian pepper tree (*Schinus terebinthifolia*) and Norfolk Island hibiscus. These pest plants can displace native species, outcompeting them for space and light.

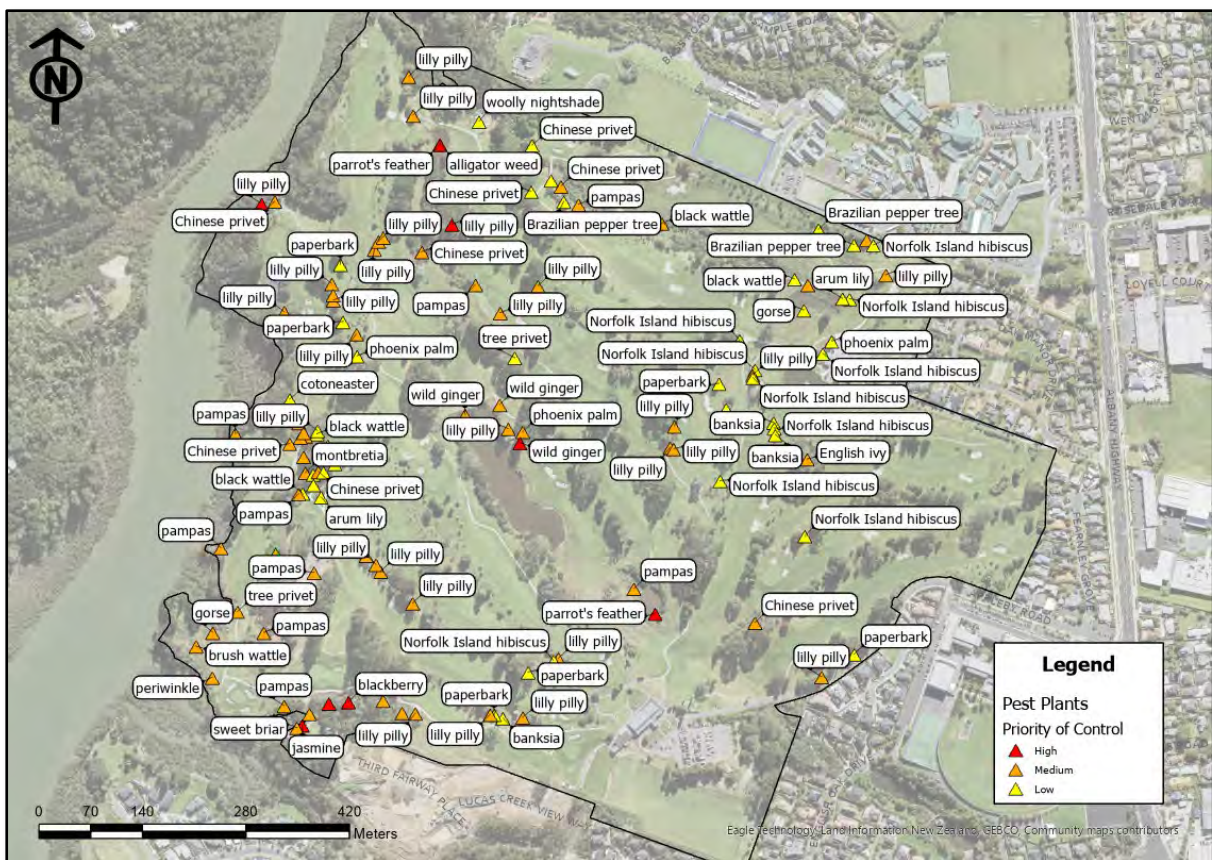


Figure 8: Specific pest plant locations identified on site and priority for control



Photo 5: Jasmine growing over tree ferns, other pest plants can be found here including pampas (right) and agapanthus (foreground)



Photo 6: Aquatic pest plant parrot's feather growing amongst alligator weed in open water on site



Photo 7: Periwinkle forming a dense ground cover in open areas of disturbance.



Photo 8: Pampas growing in open areas, seeds are wind dispersed from the large flowerheads



Photo 9: Lilly pilly seedlings are common within the coastal forest understory

Regular monitoring and control will help to identify new areas where pest plants establish and old areas where they persist, generally along forest margins, on open ground and in areas of disturbance are likely places where pest plants can be found. Table 1 below has a variety of control methods that may be used to control pest plants found on the course and surrounding areas.

Table 1: Pest Plant Control Table

Botanical Name	Common Name	RPMP 2020-2030 Status	Habitat	Control Methods
<i>Acacia mearnsii</i>	Black wattle	Whole Region - Sustained Control	Scrubland	<ol style="list-style-type: none"> 1. Hand pull or dig out small plants. 2. Cut and paste with double strength glyphosate gel. 3. Ringbark and paste/spray cut (double strength glyphosate gel or 750ml glyphosate/1L). 4. Drill and fill (750ml glyphosate and 10ml penetrant/1L). 5. Foliar spray seedlings (200ml glyphosate/10L).



Botanical Name	Common Name	RPMP 2020-2030 Status	Habitat	Control Methods
<i>Agapanthus praecox</i>	Agapanthus	Parks - Site-led and GNR Whole Region - Sustained Control	Disturbance/forest margins	<ol style="list-style-type: none"> 1. Dig out isolated plants. 2. Slash leaves close to ground & paint stump (Vigilant gel or triclopyr 100ml/L or Yates Hydrocotyle Killer 500ml/L or glyphosate 250ml/L or metsulfuron 10g + 20ml penetrant/L). 3. Spray (60ml triclopyr + 20ml penetrant/10L).
<i>Alternanthera philoxeroides</i>	Alligator weed	Great Barrier Island - Exclusion Parks - Site-led Whole Region - Sustained Control	Lakes/Wetlands	<ol style="list-style-type: none"> 1. Biocontrol agents (beetle & moth). 2. Dig out small patches removing all stem fragments. 3. Cover with weedmat for 6-12 months. 4. Weed wipe (land) (5g metsulfuron + 1ml penetrant/1L). 5. Spray terrestrial sites spring-autumn (5g metsulfuron + 10ml penetrant/10L). 6. Spray aquatic sites spring-autumn (glyphosate 20ml/L + penetrant).
<i>Banksia integrifolia</i>	Coastal banksia	Parks - Site-led Whole Region - Sustained Control	Coastal	<ol style="list-style-type: none"> 1. Pull small seedlings. 2. Cut & stump paint with metsulfuron gel. 3. Drill and fill with 10g metsulfuron-methyl/1L water. 4. Use arborist to remove large trees.
<i>Cortaderia jubata</i>	Purple pampas	Parks - Site-led Whole Region - Sustained Control	Coastal	<ol style="list-style-type: none"> 1. Grub out small plants, use digger for larger plants. 2. Weed wipe (200ml glyphosate + 2ml penetrant/1L). 3. Spray summer-autumn (150ml haloxyfop + 50ml crop oil/10L). 4. Spray summer-autumn dense sites (100ml glyphosate + 20ml penetrant/10L).



Botanical Name	Common Name	RPMP 2020-2030 Status	Habitat	Control Methods
<i>Cortaderia selloana</i>	Pampas	Parks - Site-led Whole Region - Sustained Control	Disturbance	<ol style="list-style-type: none"> 1. Grub out small plants, use digger for larger plants. 2. Weed wipe (200ml glyphosate + 2ml penetrant/1L). 3. Spray summer-autumn (150ml haloxyfop + 50ml crop oil/10L). 4. Spray summer-autumn dense sites (100ml glyphosate + 20ml penetrant/10L).
<i>Cotoneaster glaucophyllus</i>	Cotoneaster	Whole Region - Sustained Control	Forest margins	<ol style="list-style-type: none"> 1. Hand pull seedlings. 2. Cut & paint summer-autumn (5g metsulfuron/1L or Vigilant gel). 3. Frill or feather bark and paint summer-autumn (5g metsulfuron/1L). 4. Spray summer-autumn (5g metsulfuron + 10ml penetrant/10L).
<i>Crocasmia x crocosmiiflora</i>	Montbretia	Whole Region - Sustained Control	Disturbance	<ol style="list-style-type: none"> 1. Dig out small infestations. 2. Weed wipe at full leaf (1g metsulfuron + 100ml glyphosate + 1ml penetrant/1L). 3. Spray foliage after flowering (100ml glyphosate/10L). 4. Spray at full leaf (100ml glyphosate + 4g metsulfuron + 10ml penetrant/10L).
<i>Hedera helix</i>	English ivy	Whole Region - Sustained Control	Forest	<ol style="list-style-type: none"> 1. Aerial vines cut stem and paint (5g metsulfuron/1L or 50ml Tordon BK/1L). 2. Use vial treatment (1g metsulfuron/20ml, 5-10m apart). Move vials monthly until eliminated. 3. Spray summer (5g metsulfuron + 10ml penetrant/10L).
<i>Hedychium gardnerianum</i>	Wild ginger	Great Barrier Island - Eradication Parks - Site-led & GNR Whole Region - Sustained Control	Forest	<ol style="list-style-type: none"> 1. Slash stems and dig out all rhizomes. 2. Cut above collar at base and stump paint (1g metsulfuron/1L or Vigilant gel). 3. Spray spring-late autumn (5g metsulfuron + 10ml penetrant/10L).



Botanical Name	Common Name	RPMP 2020-2030 Status	Habitat	Control Methods
<i>Jasminum polyanthum</i>	Jasmine	Parks - Site-led Whole Region - Sustained Control	Forest Margins	<ol style="list-style-type: none"> 1. Cut & paint stem (5g metsulfuron + 1ml penetrant/1L or 250ml 2,4-D plus dicamba + 10ml penetrant/1L). 2. Use vial treatment in summer (1g metsulfuron/20ml, 5-10m apart). Move vials monthly until eliminated. 3. Cut back and spray regrowth in summer (5g metsulfuron + 10ml penetrant/10L or 2,4-D plus dicamba + 10ml penetrant/10L).
<i>Lagunaria patersonii</i>	Norfolk Island Hibiscus	Parks - Site-led Whole Region - Sustained Control	Coastal	<ol style="list-style-type: none"> 1. Hand pull seedlings. 2. Cut and stump Paint (1g metsulfuron/1L).
<i>Ligustrum lucidum</i>	Tree privet	Great Barrier Island - Eradication Parks - Site-led Whole Region - Sustained Control	Forest	<ol style="list-style-type: none"> 1. Pull or dig seedlings. 2. Cut and stump Paint (1g metsulfuron/1L). 3. Drill and fill: 1 hole per 20cm stem diameter & fill each hole (2g metsulfuron/50ml). 4. Spray spring-autumn (5g metsulfuron + 10ml penetrant/10L).
<i>Ligustrum sinense</i>	Chinese privet	Parks - Site-led Whole Region - Sustained Control	Forest Margins	<ol style="list-style-type: none"> 1. Pull or dig seedlings. 2. Cut and stump Paint (1g metsulfuron/1L). 3. Drill and fill: 1 hole per 20cm stem diameter & fill each hole (2g metsulfuron/50ml). 4. Spray spring-autumn (5g metsulfuron + 10ml penetrant/10L).
<i>Melaleuca quinquenervia</i>	Paperbark	Whole Region - Sustained Control	Wetlands	<ol style="list-style-type: none"> 1. Hand pull seedlings. 2. Cut and pastewith metsulfuron gel. 3. Ringbark stem and paint with metsulfuron gel. 4. Drill and fill (5g metsulfuron/1L water)



Botanical Name	Common Name	RPMP 2020-2030 Status	Habitat	Control Methods
<i>Myriophyllum aquaticum</i>	Parrots feather	Great Barrier Island - Exclusion Whole Region - Sustained Control	Aquatic	<ol style="list-style-type: none"> 1. Rake up and dispose, follow up spray required. 2. Weed mat 3-4 months. 3. Lower water level, mechanically remove, use weedmat or dry out thoroughly 2-3 weeks. 4. Spray emergent vegetation and banks 500mm above water level Oct-Nov (100ml glyphosate/10L, use formulation approved for use over water. Respray growth before 50mm high (approx 3-5 weeks apart). Respray Jan-Feb, check over winter for regrowth.
<i>Paraserianthes lophantha</i>	Brush wattle	Whole Region - Sustained Control	Disturbance	<ol style="list-style-type: none"> 1. Hand pull seedlings. 2. Cut & stump paint (5g metsulfuron/1L). 3. Drill holes every 200mm and fill (250mls glyphosate/1L or 10mls triclopyr undiluted).
<i>Phoenix canariensis</i>	Phoenix palm	Parks - Site-led Whole Region - Sustained Control		<ol style="list-style-type: none"> 1. Dig out seedlings and small plants. 2. Cut & stump paint (250ml glyphosate/1L). 3. Stem inject (10ml undiluted glyphosate for every 100mm stem diameter). 4. Spray active growth spring-summer (200ml glyphosate + 20ml penetrant/10L).



Botanical Name	Common Name	RPMP 2020-2030 Status	Habitat	Control Methods
<i>Phyllostachys sp.</i>	Bamboo	Whole Region - Sustained Control		<ol style="list-style-type: none"> 1. Dig out and dispose. 2. Cut close to ground: spray regrowth before it reaches 60cm (200ml Amitrole + 20ml penetrant/10L), continue respraying (4-6 treatments) until regrowth ceases. 3. Cut stray emergent shoots at ground level, inject 10ml undiluted Amitrole into each stem. 4. Apply hexazinone 10cm into soil by injection 30cm apart or in trenches cut on uphill side at 1m spacings inside infestation (no application on downhill side). Caution using Amitrole and hexazinone as they are residual and non selective. 5. Amongst desirable plants spray (300ml haloxyfop + 100ml crop oil/10L).
<i>Plectranthus ecklonii</i>	Blue spur flower	Whole Region - Sustained Control	Forest Margins	<ol style="list-style-type: none"> 1. Grub out small plants removing all fragments. 2. Cut & stump paint (200ml glyphosate/1L or 1g metsulfuron/1L or 100ml triclopyr/1L). 3. Spray (100ml glyphosate + 20ml penetrant/10L or 2g metsulfuron + 10ml penetrant/10L).
<i>Rosa rubiginosa</i>	Sweet briar	Whole Region - Sustained Control	Disturbance	<ol style="list-style-type: none"> 1. Dig out small patches removing all roots and stems. 2. Cut and stump paint summer-autumn (1g metsulfuron/1L). 3. Spray at full leaf (5g metsulfuron + 10ml penetrant/10L or 60ml Tordon BK/10L).
<i>Rumex sagittatus</i>	Climbing dock	Whole Region - Sustained Control	Disturbance	<ol style="list-style-type: none"> 1. Dig out small infestations. 2. Spray regrowth summer (100ml glyphosate + 20ml penetrant/10L or 5g metsulfuron + 10ml penetrant/10L).



Botanical Name	Common Name	RPMP 2020-2030 Status	Habitat	Control Methods
<i>Schinus terebinthifolius</i>	Brazilian pepper tree	Whole Region - Sustained Control		<ol style="list-style-type: none"> 1. Hand pull seedlings and saplings. 2. Cut and paste (metsulfuron gel or 1g metsulfuron/1L water). 3. Drill and fill (10g metsulfuron/1L).
<i>Solanum mauritianum</i>	Woolly nightshade	Great Barrier Island - Eradication Parks - Site-led & GNR Whole Region - Sustained Control	Forest Margins	<ol style="list-style-type: none"> 1. Pull up small plants. 2. Cut & stump paint (100ml Tordon BK/1L or 100ml triclopyr/1L or picloram gel). 3. Paint a 70cm high collar around stem with picloram gel to kill standing. 4. Make 2 cuts either side of stem & fill each cut (1.5ml Tordon BK). 5. Spray Oct-Feb (60ml triclopyr + 10ml penetrant/10L).
<i>Syzygium smithii</i>	Monkey apple	Parks - Site-led Whole Region - Sustained Control	Forest	<ol style="list-style-type: none"> 1. Pull or dig out seedlings. 2. Drill and fill: Drill 1 hole/100mm stem diameter and fill (2g metsulfuron/50ml). 3. Cut and stump paint (5g metsulfuron/1L). 4. Frill and paint (4g metsulfuron + 10ml penetrant/1L). 5. Spray spring-autumn (5g metsulfuron + 10ml penetrant/10L).
<i>Ulex sp.</i>	Gorse	Whole Region - Sustained Control & GNR	Disturbance	<ol style="list-style-type: none"> 1. Use biocontrol agents. 2. Hand pull small plants. 3. Cut and stump paint (50ml triclopyr/1L or 1g metsulfuron/1L or 50ml Tordon BK/1L or Vigilant gel or 200ml glyphosate + 10ml penetrant/1L). 4. Spray all year (100ml glyphosate + 20ml penetrant/10L). 5. Spray spring-summer (60ml triclopyr + 10ml penetrant/10L). 6. Spray autumn-winter (5g metsulfuron + 10ml penetrant/10L).



Botanical Name	Common Name	RPMP 2020-2030 Status	Habitat	Control Methods
<i>Vinca major</i>	Periwinkle	Whole Region - Sustained Control	Forest Clearings	<ol style="list-style-type: none"> 1. Weedmat for 6 months. 2. Hand pull removing all plant material. 3. Weed wipe (300ml glyphosate + 2ml penetrant/1L). 4. Spray (200ml glyphosate + 20ml penetrant/10L). Requires constant follow up, spray (300ml glyphosate + 20ml penetrant/10L).
<i>Zantedeschia aethiopica</i>	Arum lily	Whole Region - Sustained Control	Wetlands	<ol style="list-style-type: none"> 1. Slash tops and dig out tubers. 2. Cut and stump paint (1g metsulfuron + 100ml glyphosate + 10ml penetrant/1L). 3. Weed-wipe (1g metsulfuron + 150ml glyphosate + 10ml penetrant/1L). 4. Spray Jun-Sept (3g metsulfuron + 150ml glyphosate + 10ml penetrant/10L). Two applications early in season to prevent flowering, one follow up later to control regrowth. 5. Spray spring-late autumn (5g metsulfuron + 10ml penetrant/10L).

3.1.2 Pest Animals

Pest animal control is required to manage pests such as mustelids, possums and rats. Rats and possums are opportunistic omnivores, which feed on native flora (flowers, seeds and leaves), and fauna (birds, insects and lizards). Rat species such as Norway rat (*Rattus norvegicus*) are common along waterways and streams, whereas the ship rat (*R. rattus*) are more arboreal and quite at home within the forest canopy. Mustelids are a large threat to native birds and will predate ground nesting birds and their eggs, native birds such as pūtangitangi are vulnerable to mustelids. Rabbits (*Oryctolagus cuniculus*) may also be found in open grass areas and as herbivores can feed on more palatable native seedlings as they establish.






The use of chew cards and tracking tunnels can help to establish an estimate of pest animal population numbers as well as track success of pest control efforts. Current pest animal control efforts are well established with traps (Photo 10) and bait lines located around the course, the information provided in Table 2 may be supplementary to current efforts or provide alternatives such as automatic traps like the Good Nature range of pest control devices.



Photo 10: Mustelid DOC 200 trap (left) and possum Timms trap (right) being used for pest animal control



Table 2: Pest Animal Control Table

Pest Species	Control Type	Methods
Possums	<p>Timms Trap Plastic box with a hole in the front which possums put their head through to get the bait. A spring loaded bar strikes the possum under the chin killing them humanely.</p> 	<ul style="list-style-type: none"> Fix trap securely to a fence or tree at a height of 1.5m, away from any tracks or paths. Set trap on a dry night with a piece of fresh fruit such as apple or kiwifruit. Check trap in the morning and clear kill and reset as necessary.
Possums, rats & mice	<p>Bait Station Cheap effective predator control. Can deliver a variety of pellets or bait blocks for targeted control.</p> 	<ul style="list-style-type: none"> Set out bait stations 1 per hectare (for possum control) or at every 100m through control area or 2 per hectare for rat control. Pulsing of bait stations can maximise their effect, do this by filling 3-4 times within a 4-6 week period before and after winter when food sources are less available to pests. Different baits can be used depending on the target species: <ul style="list-style-type: none"> - Diphacinone (Ditrac, Liquatox) for rat control - Brodifacoum (Talon, Pestoff) for possum control
Mustelids	<p>Doc 200 Sturdy trap made from H4 treated timber and galvanised mesh. Mustelids are lured in through the small hole in the mesh at one end. This directs them across a pressure sensitive treadle, releasing a spring loaded trigger instantly killing them.</p> 	<ul style="list-style-type: none"> Eggs can be used as a visual lure for Mustelids, DOC 200s have three nails near the end of the trap where an egg can be placed in plain sight. Rabbit lure or chicken necks can also be used as a sent attractant. The best time to control populations is in autumn. This helps prevent reinvasion from juveniles dispersing from their home range over summer. Traps should be placed along forest edges, pasture boundaries or under scrub cover. Select dry sites and avoid boggy wet ground. A helpful resource can be found at this website www.youtube.com/user/DOCskillable this has some instructional videos in the use and setting of pest mammal traps.
Possums, rats & mustelids	<p>Goodnature Traps More expensive than other trap types however the method of delivery ensures no toxins enter the environment and the self resetting mechanism provides multiple kills. A CO2 canister propels the humane killing mechanism, lures within the trap entice curious target pests.</p> 	<ul style="list-style-type: none"> Fix trap to tree or fence post Set out 1 per hectare for possums or 2 per hectare for rodents Refresh lure every month and replace CO2 every 6 months A24 trap for rats and stoats A12 trap for possums
Rabbits	<p>Bait station for dispensing Pindone rabbit pellets, placed on the ground for ease of access by rabbits.</p> 	<ul style="list-style-type: none"> Place bait station in area with rabbit signs (dung and scratching) Restock bait station every night for first 3-4 nights Seal bait station during the day and during wet weather to protect bait from exposure and non-target animal species



3.2 Management and Restoration Recommendations

The following Sections outline the management actions recommended to enhance the biodiversity and ecosystems on site. A summary of each management area have been provided with recommendations for planting appropriate native specimens for the management areas provided in Table 3. Staging of the various activities, as well as timing of pest control/planting has also been provided to help guide restoration efforts.

Management to areas of existing vegetation such as Area A and B require selective control to remove pest plants from within forest habitats as well as increased planting to the forest margins (Photo 11) to reduce the likelihood of pest plants establishing and to provide a buffer to the forest interior. Small pest plants may be hand pulled or spot sprayed to control them within the bush environment. Emergent native species could also be planted within these areas to provide secondary succession species and increase biodiversity. Enhancement planting can occur prior to weed control as well as afterwards as gaps are created.

Areas of new plantings have been identified to extend existing areas of vegetation, as well as to open grassed areas (Photo 12) that are out of bounds. The plant list recommended in Table 3 for New Plantings can be used almost anywhere on site where restoration planting has the opportunity to occur. Planting up open areas will help provide a buffer to reduce the establishment of pest plants as well as connect areas of bush, create pathways for native fauna to disperse and by providing new habitat and food source.

Extending plantings around (and in) open water (Photo 13) will help improve water quality and create habitat. Planting around the banks will help intercept surface water and provide organic material for aquatic fauna. By planting aquatic native plants in standing water will also create habitat, reduce water temperature and reduce space where aquatic pest plants can occur. Where sight lines need to be maintained, low growing species such as sedges and ferns can be used (Figure 9).

Additional species have been recommended for specimen tree planting. This species list has been taken from the characteristic flora that would have been common in historical forests of the area. Specimen tree planting can be used to replace pest plant specimen trees (Photo 13), complement the existing species and increase biodiversity. As the trees mature they will also provide a seed source for these species to establish in restoration planting areas. An indicative planting plan has been provided in Appendix 3 as a guideline to the various ecosystems and habitats on site.

Where screening is required along the boundary with residential housing, tall native trees could be planted to provide a natural barrier to environmental factors such as wind, noise, as well as providing a barrier to intercept golf balls. Species can be selected from the specimen tree list and planted in staggered rows (Figure 10).

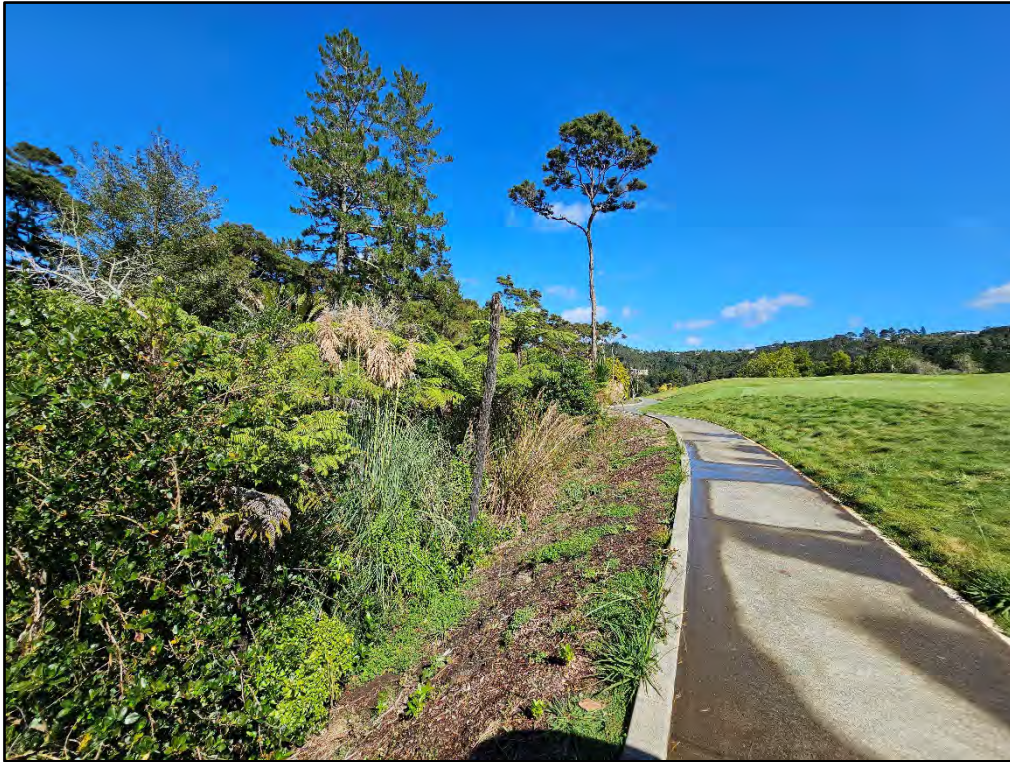


Photo 11: Open areas along edges of native restoration/coastal forest that would benefit from additional planting to prevent pest plants establishing



Photo 12: Out of bounds areas where native plantings would provide greater biodiversity, increase canopy cover and reduce areas where pest plants can establish



Photo 13: Open water features where lakeside plantings will help improve water quality and provide habitat for aquatic fauna

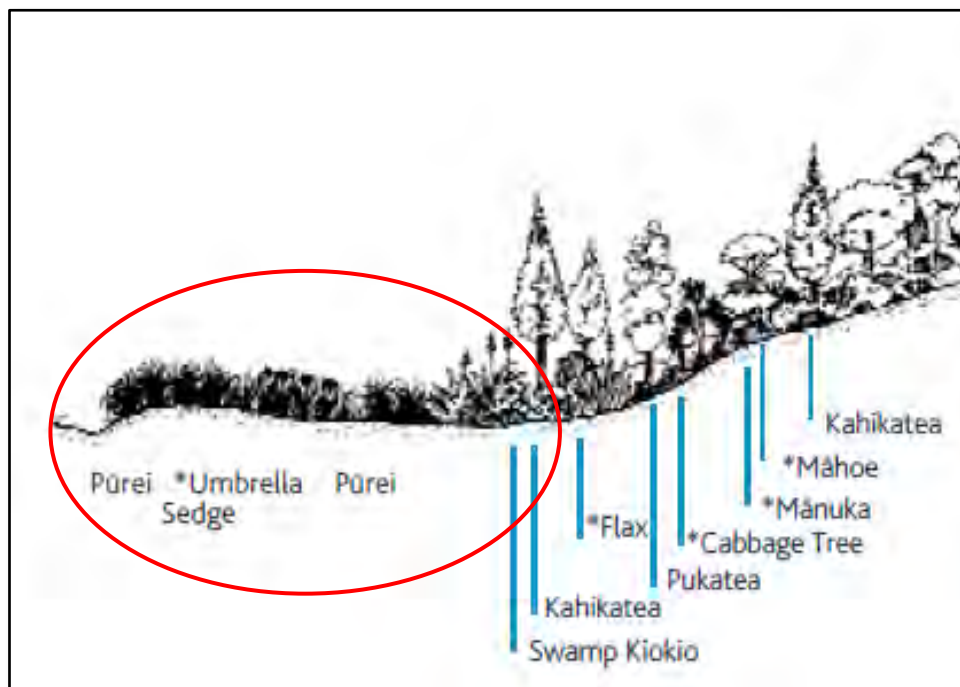


Figure 9: Example of wetland/riparian planting, for areas requiring clear line of sight plant low growing species such as purei, flax and sedges (red circle). Source Auckland Council planting guides.



Photo 14: Removal of pest plants such as paperbark tree will improve biodiversity and reduce seed source for potential reinvasion



Figure 10: Indicative screening planting of specimen trees



Area A

- Prioritise pest plant control of vines such as Japanese honeysuckle and moth plant, that has established on the edges of the riparian margins.
- Plant native trees such as kahikatea, swamp maire and ti kouka to parts of the wetland areas so that they can eventually provide shade to reduce light availability to pest plants.
- Where pest plant control takes place these areas will need to be maintained and/or planted out with primary native species such as manuka to reduce space availability for pest plants to re-establish.
- Three months prior to restoration planting prepare the site by clearing weeds/grass such as Japanese honeysuckle, gorse and kikuyu.
- Follow up management of restoration planting will be required to release plantings from weeds overgrowing the site and check plants have established.
- As native canopy establishes pest plants such as Chinese privet will need to be controlled as they will persist in shaded areas of native bush.

Area B

- Maintain existing areas of restoration planting.
- Extend riparian planting to grass banks under established pine and gum trees.
- Three months prior to restoration planting prepare the site by clearing weeds/grass such as kikuyu.
- Aquatic plants such as purei and giant umbrella sedge can be planted within standing water, these sedges will provide additional shading to water and provide food and habitat for aquatic fauna such as brown teal.
- Follow up management of restoration planting will be required to release plantings from weeds overgrowing the site and check plants have established.

New Plantings / Out of Bounds Areas

- Three months prior to restoration planting prepare the site by clearing weeds/grass such as kikuyu.
- Restoration planting in out of bounds, open areas and extensions to existing native bush should have plants spaced 1m apart to reduce the space availability for pest plants to re-establish.
- A mix of natives suited to full sun should be planted in these areas, as canopy cover establishes other natives can establish that will eventually provide secondary forest growth.
- Follow up management of restoration planting will be required to release plantings from weeds overgrowing the site and check plants have established.



Lakeside Planting

- Clear grass prior to planting.
- Planting the banks of the lake will help improve water quality by providing shade, reduce water temperature, provide habitat and food in the form of increase in organic matter for freshwater invertebrates, as well as filtering surface runoff.
- Aquatic plants such as purei and giant umbrella sedge can be planted within standing water; these sedges will provide additional shading to water and provide food and habitat for aquatic fauna.
- Follow up management of restoration planting will be required to release plantings from weeds overgrowing the site and check plants have established.

Specimen Tree Planting

- Suitable sized native specimen trees can be planted out once hardened off.
- Plant new specimen trees close to locations where pest trees such as lilly pilly, Brazilain pepper tree, paperbark and Norfolk Island hibiscus will eventually be removed.
- Follow up maintenance and releasing plants from weeds will be required.
- As new specimen trees mature, remove established pest plant trees in the vicinity.

Table 3: Recommended Ecological Restoration Species

Botanical name	Common name	Growth	Grade	Spacing
Management Areas A – 64,384m²				
<i>Agathis australis</i> #	kauri	60m tree	12-45lt	10m
<i>Corynocarpus laevigatus</i> #	karakā	15m tree	12-45lt	10m
<i>Dodonaea viscosa</i> >*	akeake	12 tree	1.5lt	1m
<i>Entelea arborescens</i> >*	whau	8m tree	1.5lt	1m
<i>Leptospermum scoparium</i> >*	mānuka	5m tree	1.5lt	1m
<i>Melicytus ramiflorus</i> *	māhoe	15m tree	1.5lt	1m
<i>Metrosideros excelsa</i> #	pōhutukawa	20m tree	12-45lt	10m
<i>Myrsine australis</i> >*	māpou	6m tree	1.5lt	1m
<i>Piper excelsum</i> >	kawakawa	5m shrub	1.5lt	1m
<i>Sophora chathamica</i> #	coastal kōwhai	20m tree	12-45lt	10m
<i>Veronica Macrocarpa</i> >*	hebe	3m shrub	1.5lt	1m
Management Area B – 17,228m²				
<i>Cordyline australis</i>	tī kōuka	20m tree	5lt	5m
<i>Dacrycarpus dacrydioides</i> #	kahikatea	50m tree	12-45lt	10m
<i>Leptospermum scoparium</i> >*	mānuka	5m tree	1.5lt	1m
<i>Melicytus ramiflorus</i> *	māhoe	15m tree	1.5lt	1m
<i>Myrsine australis</i> >*	māpou	6m tree	1.5lt	1m
<i>Sophora chathamica</i> #	coastal kōwhai	20m tree	5L	5m
<i>Vitex lucens</i> #	pūriri	20m tree	12-45lt	10m
Lakeside Plantings – 2,035m²				
<i>Austroderia fulvida</i> +	kakaho	3.5m grass	1.5lt	1m
<i>Apodasmia similis</i> +	oioi	0.6m rush	1.5lt	0.5m
<i>Carex secta</i> v +	purei	1.5m sedge	1.5lt	1m
<i>Carex virgata</i> +	pūkio	1m sedge	1.5lt	0.5m
<i>Cordyline australis</i>	tī kōuka	20m tree	2.5lt	5m
<i>Cyperus ustulatus</i> +	giant umbrella sedge	2m sedge	1.5lt	1m
<i>Dacrycarpus dacrydioides</i>	kahikatea	50m tree	5-12lt	10m
<i>Dicksonia squarrosa</i>	whēki	8m fern	1.5lt	1m



<i>Eleocharis sphacelata</i> v	kutakuta	2m sedge	1.5lt	1m
<i>Machaerina articulata</i> v	jointed baumea	2m sedge	1.5lt	1m
<i>Parablechnum novae-zelandiae</i> +	kiokio	1m fern	1.5lt	0.5m
<i>Phormium tenax</i>	harakeke	3m herb	1.5lt	1m
New Plantings/Out of Bounds – 18,985m²				
<i>Dodonaea viscosa</i> >*	akeake	12 tree	1.5lt	1m
<i>Entelea arborescens</i> >*	whau	8m tree	1.5lt	1m
<i>Leptospermum scoparium</i> >*	mānuka	5m tree	1.5lt	1m
<i>Melicytus ramiflorus</i> *	māhoe	15m tree	1.5lt	1m
<i>Myrsine australis</i> >*	māpou	6m tree	1.5lt	1m
<i>Piper excelsum</i> >	kawakawa	5m shrub	1.5lt	1m
<i>Veronica Macrocarpa</i> >*	hebe	3m shrub	1.5lt	1m
Native Specimen Trees				
<i>Agathis australis</i>	kauri	60m tree	45-160lt	10m
<i>Beilschmiedia tarairi</i>	taraire	22m tree	45-160lt	10m
<i>Dacrydium cupressinum</i>	rimu	35m tree	45-160lt	10m
<i>Didymocheton spectabilis</i>	kohekohe	15m tree	45-160lt	10m
<i>Knightea excelsa</i>	rewarewa	30m tree	45-160lt	10m
<i>Metrosideros excelsa</i>	pōhutukawa	20m tree	45-160lt	10m
<i>Phyllocladus trichomanoides</i>	tānekaha	25m tree	45-160lt	10m
<i>Podocarpus totara</i>	tōtara	30m tree	45-160lt	10m
<i>Vitex lucens</i>	pūriri	20m tree	45-160lt	10m

* Plants for open areas with no canopy cover

v Plant in standing water

> Forest edges

+ Low growing plants

Specimen trees to enhance existing bush

3.2.1 Restoration Staging

This section has been provided for planning and timing of management actions within the golf course to prioritise work. Staging of these works is a guideline; if an action does not take place one year then it can be pushed out to the following year. Staging of pest plant removal and restoration efforts should utilise the following guidelines when planning work for each management area:

- Ensure areas of pest plant/tree clearance can be planted the following year.
- Work out the capacity for replanting areas and ensure a nursery can provide enough stock the following year.
- Generally, only clear pest plants if you can replant the same area in the next planting season as this will reduce the ability of pest plant reinvasion by reducing the available space.
- Areas that are replanted will require ongoing maintenance to remove weeds, release grasses from around plants and replace plants that fail to establish.

Year 1:

- Target invasive pest plants establishing within native bush areas such as jasmine and ivy.
- Control aquatic pest plants such as parrot's feather.
- Establish a planting plan for out of bounds areas and riparian zones.

Year 2:

- Continue with targeted weed control activities from previous year; focus on ground cover weeds such as agapanthus and periwinkle. Control pest plants on the edges of the course and within native bush as well.
- Secure plant stock identified for planting areas.



- Weed control and site preparation for restoration planting areas.
- Continue ongoing maintenance and checks for reinvasion to previously cleared areas.
- Specimen trees and enhancement trees can be planted around the course and within native bush as required.

Year 3:

- Continue weed control activities from previous year; focus on low priority pest plants such as woolly nighshade, gorse and Chinese privet.
- Begin restoration planting to previously prepared sites.
- Continue ongoing maintenance and checks for reinvasion to previously cleared/planted areas.

Year 4:

- Continue with targeted weed control where pest plants persist or invade.
- Continue with previous site preparation and restoration planting activities if there is still weed control and restoration planting to be undertaken.
- Continue cycle of replanting cleared areas and clearing of pest plants in preparation for the next growing season.
- Continue ongoing maintenance and checks for reinvasion to previously cleared/planted areas.

Year 5:

- Continue ongoing maintenance around plantings and checks for reinvasion of pest species.
- All pest plants (specimen trees and groundcovers) should be cleared from the golf course.
- Continue maintenance of native plantings and replace trees if they fail to establish.

Beyond 5 Years:

- Maintain pest animal and pest plant control initiatives (i.e. check for reinvasion from seed stock still present in the soil).
- Continue maintenance of native plantings and replace trees if they fail to establish.
- As areas are identified for restoration planting in the future, continue cycle of site preparation and planting from previous years as required.

Year 1

Activity	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Site preparation/ Weed control												
Planting season												
Follow up pest plant control												



Years 2-5 onwards

Activity	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Site preparation												
Planting season												
Follow up pest plant control												

3.3 Eco Benefits

Ecosystem services provide benefits to people from the many natural processes that occur within the surrounding environment. These may include some of the following benefits, improved water quality, carbon sequestration, soil stability, recreation, cultural values and health benefits. By restoring the ecosystems and protecting the biodiversity they provide for, will ensure the natural functions will continue to provide long-term benefits not only to the native flora and fauna but to humans as well. Water quality and biodiversity will be improved by the proposed restoration planting.

There will be some carbon loss in pest plant and tree removal, however replanting with natives will help to mitigate any carbon loss occurring through tree removal. That being said, larger pest trees removed on site (such as lilly pilly) or where senescent trees are removed may be mulched and retained on site, mulch can be used in restoration planting areas as it is suitably aged. Some carbon will be lost by decomposition into the atmosphere however, carbon sequestration from native plantings will provide an increase in carbon stores over time. Figure 13 below shows an example of the potential amount of carbon sequestered by a single pōhutukawa tree over time.



The models used in this Carbon Calculator are based on a number of growth models and allometric equations developed for New Zealand native trees and shrubs. The actual amount of carbon sequestered by a particular stand can vary from the calculator predictions and are dependent on site quality, stand characteristics and management. Tāne's Tree Trust can take no responsibility for the estimates provided by the Calculator.

Figure 11: Native tree Carbon Calculator results for one tree after 80years. Source Tane's Tree Trust



4 Recommendations

This report has been prepared to provide guidance and recommendations for management actions to restore and enhance biodiversity on-site. Ecological restoration on-site will provide biosecurity control of pest plants and animals and biodiversity enhancement in the form of native restoration planting. Restoration efforts throughout the property will help improve the overall ecological condition by the eradication of pest plant seed sources, providing habitat and connectivity for native species to disperse and improve water quality of ponds on-site, which will benefit the adjacent waterways, such as Lucas Creek and the wider catchment area.

Management recommendations and restoration staging identified in Section 3 may be adjusted to suit the capabilities of staff, funding and plant availability. Ensure management activities (i.e. vegetation clearance) coincide with planned restoration planting the following year. This would need to be coordinated with funding, potential volunteers (planting days etc.) and suppliers (or on-site nursery) to ensure enough stock can be provided for the upcoming planting season and that plants have enough time to develop suitable rootstock.

The planting recommendations and species selections have been provided as guidelines for the ecosystems on site. Native species recommended to be planted may be used to complement any existing planting plans or be incorporated into any planting plans that may be developed in the future.

Ongoing engagement with community groups such as Kaipatiki Project, local schools as well as club members will help maintain momentum in improving the biodiversity of the site. Engaging club members with activities such as planting days, fundraising, donating and / or adopting trees are ways to get internal support with restoration efforts. Community initiatives, such as the EnviroSchools program and volunteer organisations like Kaipatiki Project are amazing resources outside the club that can help provide social and environmental benefits, raise the profile of the club and help create appreciation for nature and the surrounding environment.



5 References and Links

Singers, N. J. D., Osborne, B., Lovegrove, T., Jamieson, A., Boow, J., Sawyer, J. W. D., ... Webb, C. (2017). *Indigenous terrestrial and wetland ecosystems of Auckland*. Auckland Council, Te Kaunihera o Tāmaki Makaurau.

<https://knowledgeauckland.org.nz/media/1399/indigenous-terrestrial-and-wetland-ecosystems-of-auckland-web-print-mar-2017.pdf>

Auckland Council Pest Plant Search

<https://www.tiakitamakaurau.nz/protect-and-restore-our-environment/pests-in-auckland/pest-search/>

Weedbusters

<https://www.weedbusters.org.nz/>

Goodnature Pest Control

https://goodnature.co.nz/?gclid=Cj0KCQjwpfHzBRCiARIsAHHzyZrn4qSNOmm5slggxqBxzheSgUAWWWJHnbjX6-ajFuvkdMHV9ztMnq4aApYPEALw_wcB

Carbon Calculator

<https://www.tanestrees.org.nz/resource-centre/carbon-calculator/>

Appendix 1. Species List

INDIGENOUS SPECIES

Botanical name

Common name

Lichen

Collema sp.
Dirinaria applanata
Flavoparmelia sp.
Parmotrema sp.
Ramalina celastri
Usnea rubicunda

lichen
 lichen
 lichen
 lichen
 lichen
 red beard lichen

Ferns

Asplenium oblongifolium
Cyathea dealbata
Cyathea medullaris
Pteridium esculentum
Zealandia pustulata subsp. *pustulata*

shining spleenwort
 silver fern, ponga
 mamaku
 bracken, rarauhe
 hound's tongue fern

Gymnosperm Trees & Shrubs

Agathis australis
Dacrycarpus dacrydioides
Dacrydium cupressinum
Phyllocladus trichomanoides
Podocarpus totara var. *totara*

kauri
 kahikatea
 rimu
 tānekaha
 tōtara

Monocot. Herbs

Astelia solandri
Dianella nigra
Phormium tenax

kaiwharawhara
 tūrutu
 harakeke, flax

Monocot. trees and shrubs

Cordyline australis
Rhopalostylis sapida

cabbage tree, tī kōuka
 nīkau

Grasses

Oplismenus hirtellus subsp. *imbecillis*

basket grass

Sedges

Carex virgata
Cyperus ustulatus
Gahnia setifolia
Gahnia xanthocarpa
Machaerina articulata

swamp sedge, pūkiō
 giant umbrella sedge
 mapere, gahnia, giant gahnia,
 razor sedge
 gahnia, mapere
 jointed baumea



Machaerina rubiginosa
Machaerina sinclairii

baumea
machaerina

Dicot. Lianes

Calystegia sepium subsp. *roseata*
Muehlenbeckia astonii

bindweed, pohue
shrubby tororaro

Dicot. Herbs other than composites

Haloragis erecta subsp. *erecta*

toatoa, fire weed, shrubby
haloragis

Persicaria decipiens

swamp willow weed,
tutunawai

Dicot. trees and shrubs

Alectryon excelsus subsp. *excelsus*
Ascarina lucida var. *lucida*
Avicennia marina subsp. *australasica*
Coprosma rhamnoides
Coprosma robusta
Corynocarpus laevigatus
Geniostoma ligustrifolium var. *ligustrifolium*
Griselinia littoralis
Hedycarya arborea
Kunzea robusta
Leptecophylla juniperina subsp. *juniperina*
Leptospermum scoparium var. *scoparium*
Leucopogon fasciculatus
Melicytus ramiflorus
Meryta sinclairii
Metrosideros excelsa
Metrosideros kermadecensis
Myrsine australis
Olearia furfuracea
Pittosporum crassifolium
Pittosporum eugenioides
Pittosporum tenuifolium
Pomaderris kumeraho
Pseudopanax lessonii
Sophora chathamica
Sophora tetraptera
Veronica sp.
Vitex lucens

tītoki
hutu
manawa
twiggy coprosma
karamū
karaka
hangehange
broadleaf, kāpuka, papauma
porokaiwhiri, pigeonwood
kānuka
prickly mingimingi
mānuka
mingimingi, tall mingimingi
māhoe
pukanui, puka
pōhutukawa
Kermadec pōhutukawa
māpou
akepiro
karo
tarata, lemonwood
kōhūhū
kūmarahou
houpara
coastal kōwhai
large-leaved kōwhai
hebe
pūriri



EXOTIC SPECIES

Botanical name

Common name

Ferns

Nephrolepis cordifolia

tuber ladder fern

Gymnosperm Trees & Shrubs

Agathis robusta

Queensland kauri

Araucaria heterophylla

Norfolk Island pine

Cedrus atlantica

atlas cedar

Cryptomeria japonica

Japanese cedar

Hesperocyparis macrocarpa

macrocarpa

Pinus ponderosa

ponderosa pine

Pinus radiata

radiata pine

Sequoia sempervirens

redwood

Taxodium distichum

bald cypress

Monocot. Herbs

Agapanthus praecox subsp. orientalis

agapanthus

Amaryllis belladonna

naked ladies

Clivia gardeni

clivia lily

Crocasmia x crocosmiiflora

montbretia

Hedychium gardnerianum

wild ginger, kahili ginger

Zantedeschia aethiopica

arum lily

Monocot. Trees and shrubs

Phoenix canariensis

phoenix palm

Grasses

Bambusa sp.

bamboo

Cenchrus clandestinus

kikuyu

Cortaderia jubata

purple pampas grass

Cortaderia selloana

pampas grass

Paspalum dilatatum

paspalum

Sedges

Cyperus congestus

umbrella sedge

Dicot. Herbs composites

Coreopsis tinctoria

tickseed

Dicot. Herbs other than composites

Alternanthera philoxeroides

alligator weed

Myriophyllum aquaticum

parrot's feather

Nymphaea sp.

water lily

Plantago lanceolata

narrow-leaved plantain

Plectranthus ecklonii

blue spur flower



<i>Ranunculus repens</i>	buttercup
<i>Rumex sagittatus</i>	climbing dock
<i>Verbena</i> sp.	vervain
<i>Vinca major</i>	periwinkle
Dicot. Lianes	
<i>Hedera helix</i>	English ivy
<i>Jasminum polyanthum</i>	climbing jasmine
Dicot. trees and shrubs	
<i>Acacia mearnsii</i>	black wattle
<i>Agonis flexuosa</i>	peppermint myrtle
<i>Alnus</i> sp.	alder
<i>Banksia integrifolia</i>	banksia
<i>Casuarina</i> sp.	sheoak
<i>Cinnamomum camphora</i>	camphor laurel
<i>Cotoneaster glaucophyllus</i>	cotoneaster
<i>Eucalyptus cinerea</i>	silver dollar gum
<i>Eucalyptus</i> sp.	gum tree
<i>Fraxinus angustifolia</i>	claret ash
<i>Fraxinus excelsior</i>	European ash
<i>Grevillea robusta</i>	silky oak
<i>Lagunaria patersonia</i>	Norfolk Island hibiscus
<i>Ligustrum lucidum</i>	tree privet
<i>Ligustrum sinense</i>	Chinese privet
<i>Liquidambar styraciflua</i>	liquidambar
<i>Lophostemon confertus</i>	Queensland box
<i>Magnolia grandiflora</i>	Southern magnolia
<i>Melaleuca citrina</i>	crimson bottlebrush
<i>Melaleuca quinquenervia</i>	paperbark tree
<i>Paraserianthes lophantha</i>	brush wattle
<i>Phytolacca octandra</i>	inkweed
<i>Platanus x acerifolia</i>	London plane
<i>Quercus robur</i>	European oak
<i>Schinus terebinthifolius</i>	Brazilian pepper tree
<i>Solanum mauritianum</i>	woolly nightshade
<i>Syzygium australe</i>	brush cherry
<i>Syzygium smithii</i>	lilly pilly, monkey apple
<i>Ulex europaeus</i>	gorse

Appendix 2. Management Areas and Pest Control

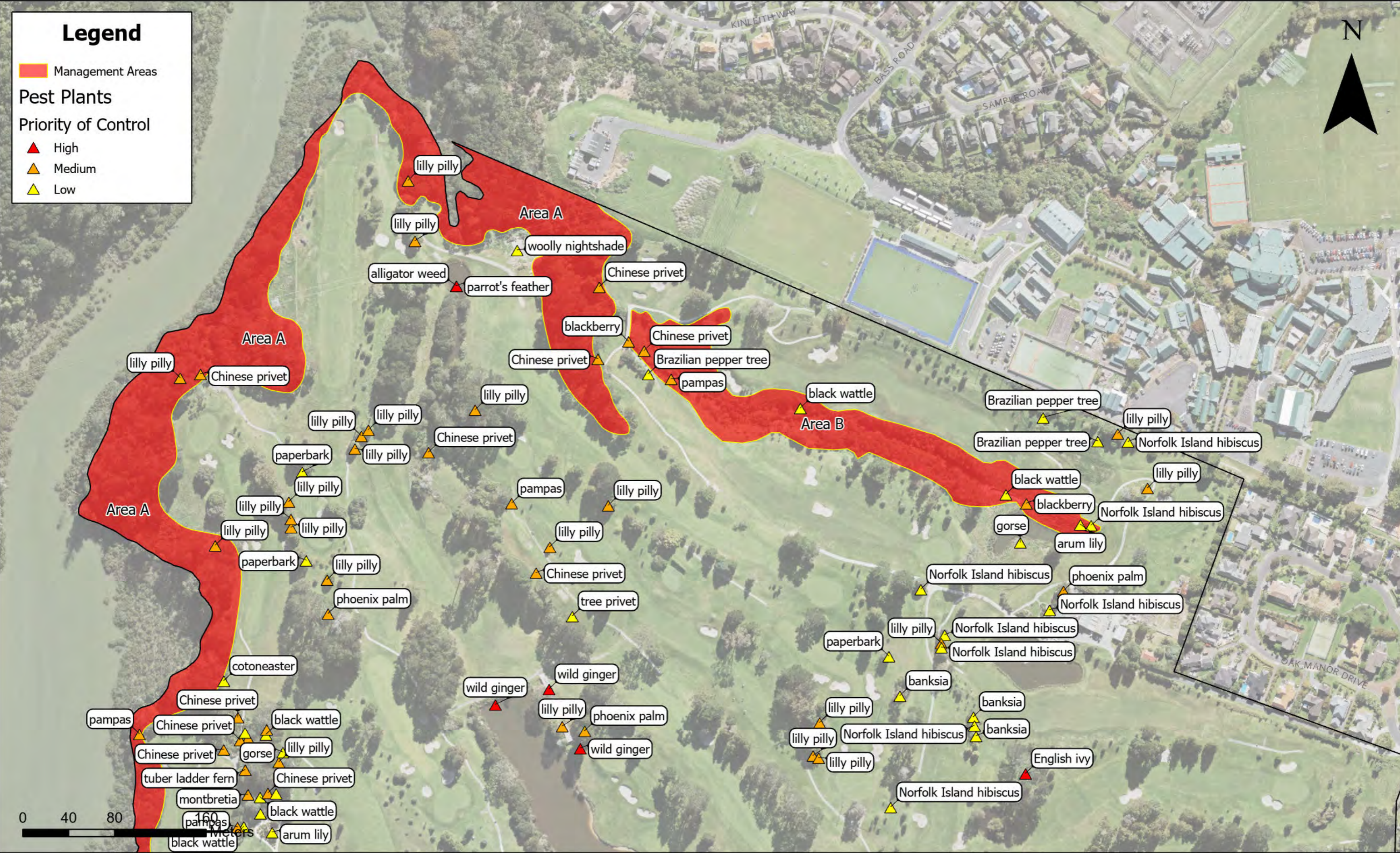
Legend

Management Areas

Pest Plants

Priority of Control

- ▲ High
- ▲ Medium
- ▲ Low



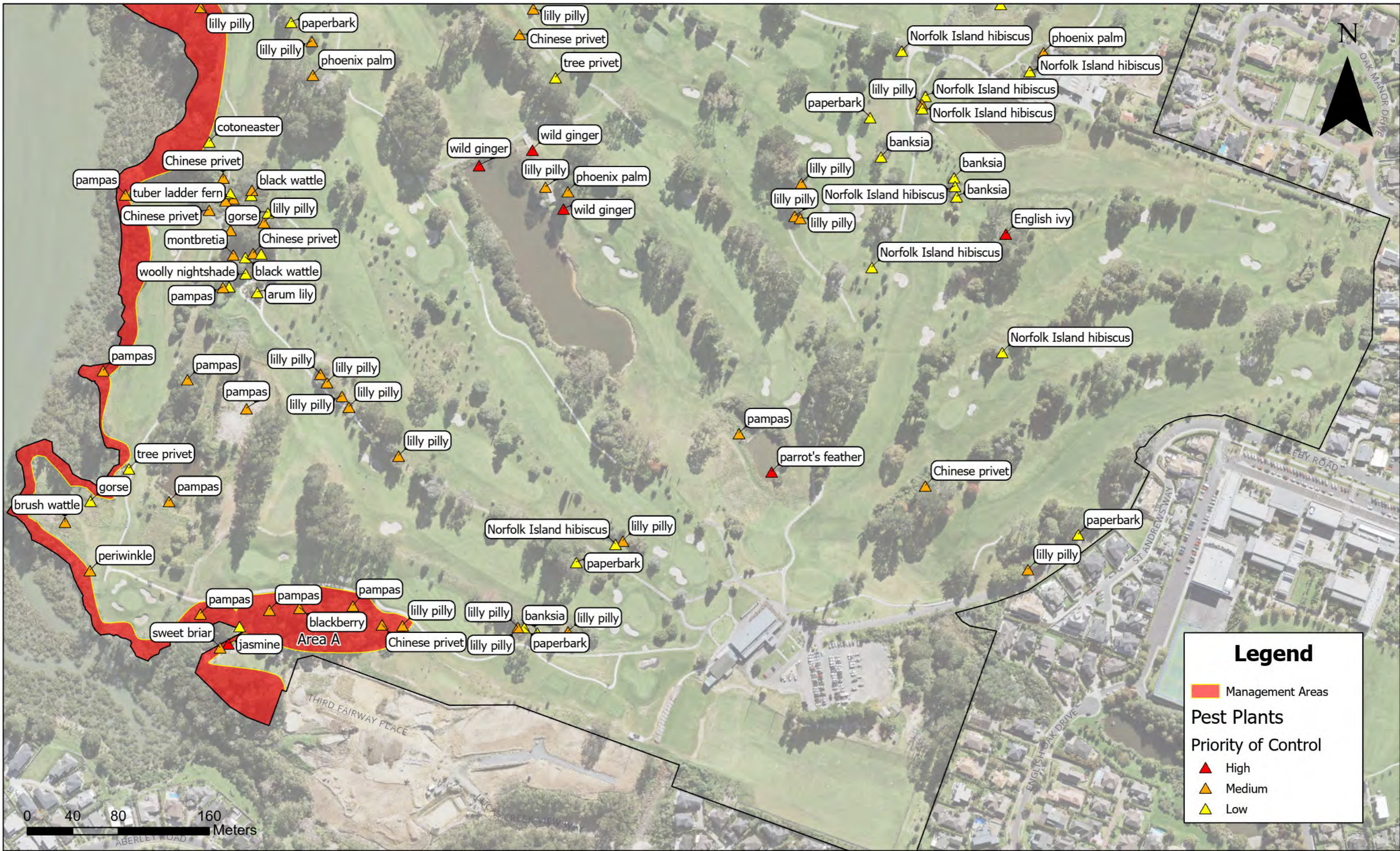
Spatial Reference
 Name: NZGD 2000 New Zealand Transverse Mercator
 PCS: NZGD 2000 New Zealand Transverse Mercator
 GCS: GCS NZGD 2000
 Datum: NZGD 2000
 Projection: Transverse Mercator

Disclaimer: Tree locations are subject to limitations as outlined in the Arboricultural Report Section 2. This content must not be amended or used for any other purposes other than those intended. All images are for illustrative purposes only and not to be used for construction purposes.



PROJECT NAME GOLF COURSE RESTORATION		PROJECT # G16756
PROJECT ADDRESS NORTH SHORE GOLF CLUB	DATE 19/04/2023 SCALE @ A3 1:3,000	MAP # NSGC01
MAP NAME MANAGEMENT AREAS	DRAWN CR CHECKED AH	REV A
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Legend

- Management Areas
- Pest Plants
- Priority of Control
 - High
 - Medium
 - Low

Spatial Reference
 Name: NZGD 2000 New Zealand Transverse Mercator
 PCS: NZGD 2000 New Zealand Transverse Mercator
 GCS: GCS NZGD 2000
 Datum: NZGD 2000
 Projection: Transverse Mercator

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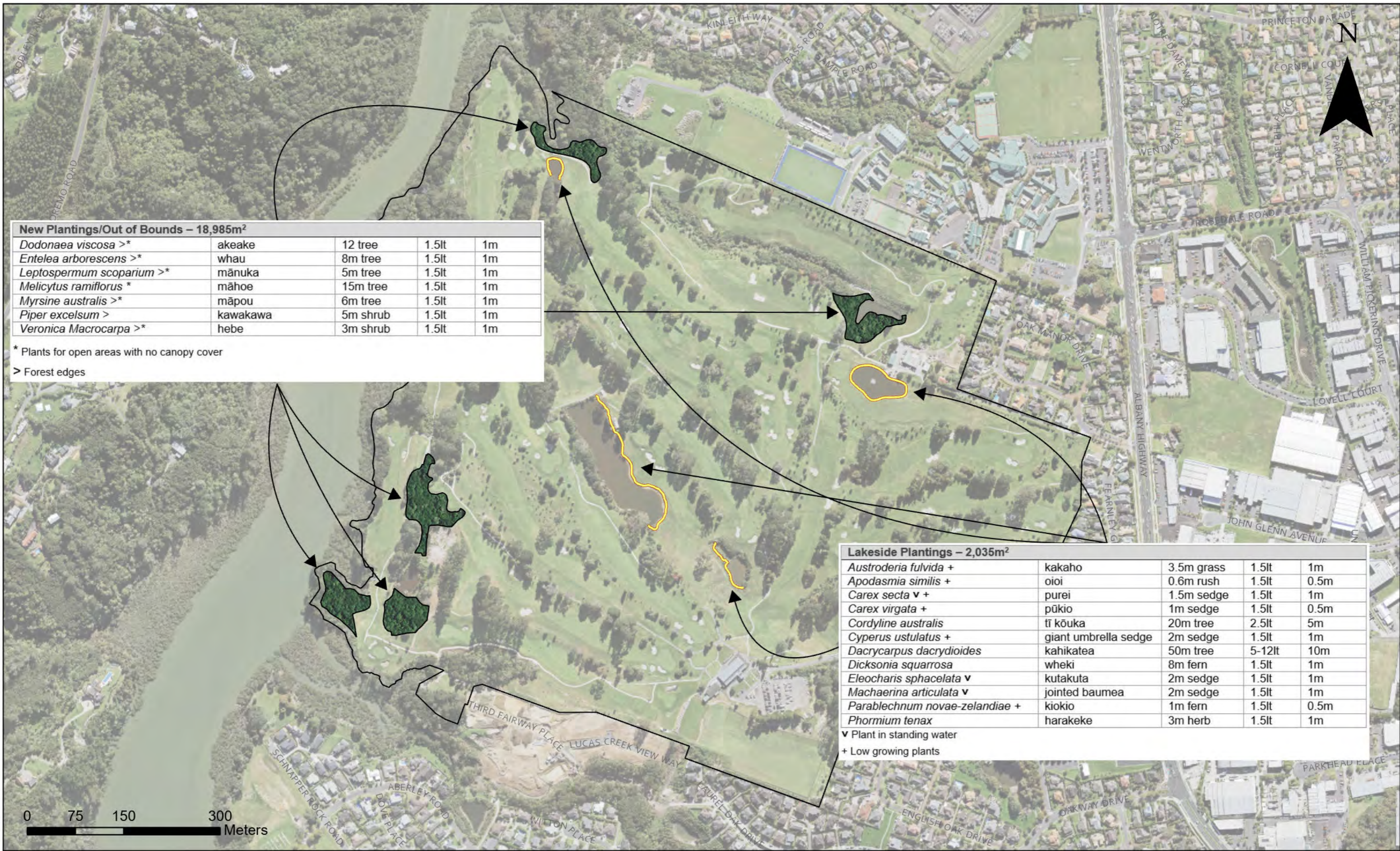


PROJECT NAME GOLF COURSE RESTORATION		PROJECT # G16756
PROJECT ADDRESS NORTH SHORE GOLF CLUB	DATE 19/04/2023	MAP # NSGC02
MAP NAME MANAGEMENT AREAS	SCALE @ A3 1:3,000	DRAWN CR
	CHECKED AH	REV A
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Appendix 3. Planting Plan



New Plantings/Out of Bounds – 18,985m²

<i>Dodonaea viscosa</i> >*	akeake	12 tree	1.5lt	1m
<i>Entelea arborescens</i> >*	whau	8m tree	1.5lt	1m
<i>Leptospermum scoparium</i> >*	mānuka	5m tree	1.5lt	1m
<i>Melicytus ramiflorus</i> *	māhoe	15m tree	1.5lt	1m
<i>Myrsine australis</i> >*	māpou	6m tree	1.5lt	1m
<i>Piper excelsum</i> >	kawakawa	5m shrub	1.5lt	1m
<i>Veronica Macrocarpa</i> >*	hebe	3m shrub	1.5lt	1m

* Plants for open areas with no canopy cover

> Forest edges

Lakeside Plantings – 2,035m²

<i>Austroderia fulvida</i> +	kakaho	3.5m grass	1.5lt	1m
<i>Apodasmia similis</i> +	oioi	0.6m rush	1.5lt	0.5m
<i>Carex secta</i> ▼ +	purei	1.5m sedge	1.5lt	1m
<i>Carex virgata</i> +	pūkio	1m sedge	1.5lt	0.5m
<i>Cordyline australis</i>	tī kōuka	20m tree	2.5lt	5m
<i>Cyperus ustulatus</i> +	giant umbrella sedge	2m sedge	1.5lt	1m
<i>Dacrycarpus dacrydioides</i>	kahikatea	50m tree	5-12lt	10m
<i>Dicksonia squarrosa</i>	wheki	8m fern	1.5lt	1m
<i>Eleocharis sphacelata</i> ▼	kutakuta	2m sedge	1.5lt	1m
<i>Machaerina articulata</i> ▼	jointed baumea	2m sedge	1.5lt	1m
<i>Parablechnum novae-zelandiae</i> +	kiokio	1m fern	1.5lt	0.5m
<i>Phormium tenax</i>	harakeke	3m herb	1.5lt	1m

▼ Plant in standing water

+ Low growing plants

Spatial Reference
 Name: NZGD 2000 New Zealand Transverse Mercator
 PCS: NZGD 2000 New Zealand Transverse Mercator
 GCS: GCS NZGD 2000
 Datum: NZGD 2000
 Projection: Transverse Mercator

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PROJECT NAME GOLF COURSE RESTORATION		PROJECT # G16756
PROJECT ADDRESS NORTH SHORE GOLF CLUB	DATE 19/04/2023 SCALE @ A3 1:5,311	MAP # NSGC03
MAP NAME PLANTING PLAN	DRAWN CR CHECKED AH	REV A
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