# Key Native Ecosystem Plan for Peka Peka Coast

2015-18

KNE
KEY NATIVE ECOSYSTEM

greater WELLINGTON
REGIONAL COUNCIL
Te Pane Matua Taiao

# Contents

# 1. Key Native Ecosystem plans

New Zealand's indigenous biodiversity continues to decline nationally, and in the Wellington region. Major reasons for the decline are that native species are preyed on or outcompeted by invasive species and ecosystems and habitats are lost or degraded through human resource use and development. Active management to control threats is required to protect indigenous biodiversity. Regional councils have responsibility to maintain indigenous biodiversity, as well as to protect significant vegetation and habitats of threatened species, under the Resource Management Act 1991 (RMA).

Greater Wellington Regional Council's (GWRC's) vision for biodiversity is:

> *"The Wellington region contains a full range of naturally occurring habitats and ecosystems that are in a healthy functioning state and supporting indigenous biodiversity"*

GWRC's Biodiversity Strategy 2011-21[1] provides a common focus across the council's departments, and guides activities relating to biodiversity. One of its goals is: High value biodiversity areas are protected.

In order to achieve this vision and goal, the Key Native Ecosystem (KNE) programme seeks to protect some of the best examples of ecosystem types in the Wellington region by managing, reducing, or removing threats to their values. Sites with the highest biodiversity values have been identified and then prioritised for management. Active management of KNE sites can involve control of ecological weeds and pest animals, fencing to exclude stock, restoration planting and helping landowners to legally protect these areas.

KNE sites are managed in accordance with three-year KNE plans, such as this one, prepared for each area by the GWRC's Biodiversity department in collaboration with the landowners and other stakeholders. These plans outline the ecological values and threats specific to each KNE site, set out objectives for biodiversity management, and prescribe the operational actions and budget required to work towards achieving the objectives.

Much of the work planned in KNE sites will be carried out by GWRC staff or contractors engaged by GWRC. For example, the Biosecurity department carries out ecological weed and pest animal control to achieve the objectives set out in KNE plans.

GWRC also recognizes that working relationships between the management partners are critical for achieving the objectives for the KNE site. Under the KNE programme, GWRC staff also work with landowners and volunteer community groups involved in protection or restoration work within KNE sites.

KNE plans are reviewed regularly to ensure the activities undertaken to protect and restore the KNE site are informed by experience and improved knowledge about the site.

# 2. Peka Peka Coast Key Native Ecosystem

Peka Peka Coast KNE site is located between Peka Peka Beach and Waikanae Beach townships, on the Kapiti Coast (see Appendix 1, Map 1). The 39 hectare KNE site comprises Te Kowhai Stream estuary, a 3 kilometre strip of coastline and, the Pharazyn Reserve coastal dunelands and associated wetlands area. It includes various coastal ecosystems including wetlands, sand dunes and a relatively unmodified estuary[2]. These ecosystems contain threatened and uncommon coastal plants and bird-life and are an important habitat corridor along the Kapiti coast for native flora and fauna.

## Landowner and stakeholders

GWRC works in collaboration with landowners and other interested parties (management partners and stakeholders) where appropriate to achieve shared objectives for the site. In preparing this plan GWRC has sought input from landowners and relevant stakeholders, and will continue to involve them as the plan is implemented.

## Landowner

Kapiti Coast District Council (KCDC) owns and maintains all the lands within the KNE site, including the Pharazyn Reserve and the Te Kowhai Stream estuary, which is part of the wider Ngāwhakangutu Reserve[3].

## Management partners and key stakeholders

The management partners are KCDC and GWRC.

KCDC funds the management of biodiversity in parts of the KNE site as an Ecological Site of Significance in accordance with The District Plan[4] and the Pharazyn Reserve Landscape and Ecological Restoration Plan[5]. Funding sources are available via the KCDC Coastal Restoration Fund and/or the Pharazyn Reserve Management Fund. However, these are contestable budgets that can alter on an annual basis.

Within GWRC, the Biodiversity and Biosecurity departments are actively involved in the management of the KNE Site. The Biodiversity department plans and coordinates biodiversity management activities and provides biodiversity advice. The Biosecurity department carries out pest control activities.

Three volunteer community groups are key stakeholders for the KNE site. These are the Pharazyn Reserve Focus Group, the Peka Peka Guardians (who focus on the Peka Peka beach area) and, the Peka Peka Restoration Group (which focus on restoring an area of dunes adjacent to Marram Way). A fourth volunteer community group (unnamed to date) has recently been formed to do restoration work in the wider Ngāwhakangutu Reserve, that includes areas of the Te Kowhai Estuary within the KNE site.

## Ecological values

Ecological values are a way to describe native biodiversity found at a site, and what makes it special. These ecological values can be various components or attributes of

ecosystems that determine an area's importance for the maintenance of regional biodiversity. Examples of values are the provision of important habitat for a threatened species, or particularly intact remnant vegetation typical of the ecosystem type. The ecological values of a site are used to prioritise allocation of resources to manage KNE sites within the region.

The KNE site is located in the Foxton Ecological District that is typically characterised by coastal sand dune ecosystems [6]. Foxton ecological district has warm summers and mild winters. It has annual rainfall of 800-1200 mm, prevailing westerly to north-westerly winds, and relatively frequent gales.

The KNE site comprises a degraded but relatively unmodified sand dune and estuarine landscape with elements of original native vegetation cover still present.

Of note in recognising the ecological values at the KNE site are the following:

**Uncommon ecosystems:** Unmodified estuaries, active sand dunes and stable sand dunes are Naturally Rare ecosystem types at a national scale[7]. Estuaries have been classified as Vulnerable and the other types of ecosystems as Endangered[8]. Wetlands are considered uncommon in the Wellington region with less than 3% of the original extent remaining today [9].

**Threatened environments:** The Threatened Environment Classification[10] indicates that a small area of this KNE site is classified as Acutely Threatened. However, this is not considered representative of the KNE site as more than 98% of the site consists of habitat that is classified as Chronically Threatened, having between 10-20% of the original cover of native vegetation remaining.

**Threatened species:** At a national level three At Risk plant species, six Threatened or At Risk bird species and two At Risk freshwater fish species have been recorded within KNE site. Nationally threatened species recorded at the site are listed in Appendix 2. On a regional level two plant species are considered threatened, listed in Appendix 3.

The Singers and Rogers[11] classification of pre-human vegetation indicates the KNE site comprised three habitat types. Spinifex-pīngao grassland/sedgeland (DN2) would have dominated the foredunes. A coastal sand dune mosaic (DN2/5 which contains some characteristics of spinifex-pīngao grassland/sedgeland (DN2) and oioi, knobby clubrush sedgeland (DN5)) was present on the back dunes of Pharazyn Reserve and Te Kowhai estuary. A kahikatea-pukatea forest (WF8) would have been present in the wetland areas of Te Kowhai estuary and the wetlands in the east of the Pharazyn Reserve.

The KNE site currently comprises aspects of the original vegetation described above within the three main ecosystem types now present. These are: the Te Kowhai estuary, active foredunes and, backdunes with associated wetland swales (depressions between ridges). These are described in more detail below.

## Te Kowhai estuary

The plant communities of the estuary include mainly native sedges and rushes with the occasional flax (*Phormium tenax*), toetoe (*Cortaderia toetoe*) and taupata (*Coprosma repens*). The lower estuary is dominated by three-square (*Schoenoplectus pungens*) and sand sedge (*Carex pumila*), with small patches of batchelor's buttons (*Cotula*

*coronipifolia*). The upper estuary is dominated by *Carex geminata* which forms thick bands adjacent to the stream edge amongst a mosaic of native rushes, reeds, sedges and exotic grasses.

The estuary is known to support longfin eel (*Anguilla dieffenbachia*), shortfin eel (*A. australis*), banded kokupu (*Galaxias fasciatus*) and inanga (*Galaxias maculatus*)[12] and is likely to be important for other migratory fish species.

## Active foredunes

The native vegetation present in the foredunes largely consists of spinifex (*Spinifex hirsutus*), pīngao (*Ficinia spiralis*), sand gossamer grass (*Lachnogrostis billiardierei*), sand piripiri (*Acmaena pallidus*), shore convolvulus (*Calystegia soldanella*) and wīwī (*Ficinia nodosa*). Taupata, pōhuehue (*Muehlenbeckia complexa*), toetoe and flax are present but distributed sparsely across this ecosystem.

The foredunes at Marram Way have had native species planted such as pīngao, speckled sedge (*Carex testacea)*, sand tussock (*Poa billardierei)* and New Zealand sand daphne (*Pimelia prostrata* subsp*. prostrata).*

## Backdunes with wetland swales

The backdunes in the Te Kowhai and Pharazyn areas are currently in a degraded state with poor native cover. However, pōhuehue, taupata, native spinach (*Tetragonia trigyna*) and bracken fern (*Pteridium esculatum*) and the occasional mature kānuka (*Kunzea amathicola*) are present. In the back dunes of the Pharazyn Reserve and Marram Way areas large scale revegetation has been underway for several years bringing a measure of native plant presence and diversity back into these areas.

The wetland swale within Pharazyn Reserve contains raupō (*Typha orientalis*) in standing water with other native species including flax, wīwī (*Juncus edgariae*), *Isolepis prolifer*, giant umbrella sedge (*Cyperus ustulatus*) and pūrei (*Carex secta*) present in damp areas.

Across the KNE site shorebirds including Caspian tern (*Hydroprogne caspia*), red-billed gull (*Larus novaehollandiae*), South Island oystercatcher (*Haematopus finschi*), pied stilt, (*Himantopus himantopus leucocephalus*), black backed gull (*Larus dominicanus*), white-fronted tern (*Sterna sterna striata*) and variable oystercatcher (*Haemotopus unicolour*) have all been observed[13].

## Key threats to ecological values at the site

Ecological values can be threatened by human activities, and by introduced animals and plants, that change the natural balance of native ecosystems. The key to protecting and restoring biodiversity as part of the KNE programme is to manage the threats to the ecological values at the site.

Ecological weeds are widespread and dominate throughout the KNE site and are considered the greatest threat to the ecological values of the dune and estuarine ecosystems out-competing native plant species and preventing natural regeneration.

The key weed species are marram grass (*Ammophila arenaria*), boxthorn (*Lycium ferocissimum*), pampas grass (*Cortaderia selloana/C. jubata*), blackberry (*Rubus fruticosus* agg.) and reed sweetgrass (*Glyceria maxima*).

Marram grass (an introduced species) is described as an ecological transformer. It alters sand dune structure and function creating higher, steeper dune systems than would naturally occur in a native spinifex-dominated dunes system. Furthermore, marram does not stabilise sand as well as spinifex, and given the higher profile of marram-created dunes erosion often occurs. Spinifex dunes also have the advantage of being able to recover after storm events whereas marram grass does not have the same ability.

Informal recreation activities, including off road motor biking and 4-wheel driving, have caused erosion, spreading of ecological weeds and habitat loss.

While the key threats discussed in this section are recognised as the most significant, a number of other threats to the KNE site have also been identified. Table 1 presents a summary of all known threats to the KNE site (including those discussed above), detailing which operational areas they affect, how the threat impacts on ecological values, and whether they will be addressed by the proposed management activities.

**Table 1: Threats to ecological values present at Peka Peka Coast KNE site.**

**The codes alongside each threat correspond to activities listed in the operational plan (Table 2), and are used to ensure that actions taken are targeted to specific threats. A map of operational areas can be found in Appendix 1 (see Map 3).**

| Threat code | Threat and impact on biodiversity in the KNE site | Operational area/location |
|---|---|---|
| **Ecological weeds** | | |
| EW-1 (*) | Aquatic ecological weed species such as reed sweet grass, mercer grass (*Paspalum distichum*), lagarosiphon* (*Lagarosiphon major*) and monkey musk* (*Mimulus guttatus*) choke waterways and outcompete native plants. | A |
| EW-2 | Climbing and creeping ecological weeds species such as blackberry, convolvulus (*Convolvulus* sp.), climbing dock (*Rumex sagittatus*) and cape ivy (*Senecio angulatus*) smother and outcompete native vegetation, suppressing natural regeneration. | Entire KNE site |
| EW-3 | Broadleaf ground-covering ecological weed species such as the exotic ice plant (*Carpobrotus edulis*), agapanthus (*Agapanthus praecox*) and purple groundsel (*Senecio elegans*) suppress natural regeneration. | Entire KNE site |
| EW-4 | Exotic grasses such as marram grass, pampas and kikuyu (*Pennisetum clandestinum*) form thick swards which suppress native plant regeneration. | Entire KNE site |
| EW-5 | Woody weed species such as banksia (*Banksia integrifolia*), lupin (*Lupinus arboreus*), boxthorn, Scots pine (*Pinus silvestris*), boneseed, white correa (*Correa alba*), brush wattle (*Paraserianthes lophantha*), evergreen buckthorn (*Rhamnus alaternus*) and the non-local native karo (*Pittosporum crassifolium*) outcompete and displace native vegetation and can alter ecosystem function. | Entire KNE site |

| Threat code | Threat and impact on biodiversity in the KNE site | Operational area/location |
|---|---|---|
| **Pest animals** | | |
| PA-1* | Possums (*Trichosurus vulpecula*) over-browse indigenous vegetation and prey on indigenous fauna. | Entire KNE site |
| PA-2 | Mustelid species (*Mustela* spp.) predate on native birds and their eggs, lizards and invertebrates, reducing breeding success and potentially causing local extinctions. | Entire KNE site |
| PA-3 (*) | Rats (*Rattus* spp.) and mice* (*Mus musculus*) browse native fruit, seeds and vegetation. They compete with native fauna for food and, if they eat too many seeds or flowers, can reduce plant regeneration. Rats are known to predate invertebrates, lizards and native birds[14]. | Entire KNE site |
| PA-4 | Hedgehogs (*Erinaceus europeaeus*) predate on native invertebrates, lizards[15] and the eggs and chicks of ground-nesting birds[16]. | Entire KNE site |
| PA-5* | Rabbits (*Oryctolagus cuniculus*) and hares (*Lepus europaeus*) browse native vegetation and can cause localised erosion of the dune systems. | Entire KNE site |
| PA-6* | Cats (*Felis catus*) predate on native birds, lizards and invertebrates, reducing native fauna breeding success and potentially causing local extinctions. | Entire KNE site |
| **Human activities** | | |
| HA-1* | Off-road driving through the dunes by motorbikes and 4-wheel drive vehicles causes habitat loss, affects dune stability and disturbs native fauna. | Entire KNE site |
| HA-2 | Informal walking track creation through the dunes causes erosion. Clearance of vegetation and encroachment into dunes reduces the amount of habitat present. | Entire KNE site |
| HA-3* | Dumping of garden waste introduces ecological weeds. Ecological weeds can dominate native plant species and prevent natural regeneration. | Entire KNE site |
| HA-4* | Flood protection earthworks can cause habitat loss, affect dune stability, disturb fauna and affect hydrological patterns and natural stream profiles. | A |
| HA-5* | Agricultural land uses in the wider catchment are known to pollute the stream causing a reduction in diversity and abundance of native invertebrates. | Te Kowhai Stream |
| **Other threats** | | |
| OT-1 | Habitat degradation and fragmentation has increased the edge effect on the ecosystem exposing the KNE site to increased light, wind and plant invasion, and greater susceptibility to the effects of extreme weather events and climate change. | Entire KNE site |

***Threats marked with an asterisk are not addressed by actions in the operational plan.**

# 3. Objectives and management activities

Objectives help to ensure that management activities carried out are actually contributing to improving the ecological condition of the site.

## Objectives

The following objectives will guide the management activities at the Peka Peka Coast KNE site.

1. **To improve the structure* and function† of native plant communities**
2. **To improve the habitat for native birds**

* The living and non-living physical features of an ecosystem. This includes the size, shape, complexity, condition and the diversity of species and habitats within the ecosystem.

† The biological processes that occur in an ecosystem. This includes seed dispersal, natural regeneration and the provisioning of food and habitat for animal species.

## Management activities

Management activities are targeted to work towards the objectives above by responding to the threats outlined in Section 2. The broad approach to management activities is described briefly below, and specific actions, with budget figures attached, are set out in the operational plan (Table 2).

It is important to note that not all threats identified in Section 2 can be adequately addressed. This can be for a number of reasons including financial, legal, or capacity restrictions. This is discussed in the broad management approach.

Several management/restoration plans have been prepared for specific areas within the KNE site. These include the Pharazyn Reserve Landscape and Ecological Restoration Plan 2011[17], the Peka Peka Dunes 5-year Restoration Plan[18], and the Ngawhakangutu Reserve Management Plan 2012[19]. These plans guide the work undertaken within the KNE site and provide more detail on restoration planting.

The primary management activities undertaken in the KNE site are ecological weed control and restoration planting. Pest animals are also controlled and recreational activities are managed, but these activities are limited in scope.

The KNE site has been divided into five operational areas, A-F (See Appendix 1, Map 2). These are:

A: Te Kowhai estuary and associated dunelands (11.3 ha)

B: Foredunes from Te Kowhai estuary to Peka Peka Rd (4.8 ha)

C: Marram Way foredunes (3.3 ha)

D: Foredunes between Pharazyn dunes and Marram Way foredunes (4.2 ha)

E: Pharazyn Reserve dunes (14 ha)

### Ecological weed control

Ecological weed control will be undertaken across the KNE site to increase the native plant dominance and provide conditions for natural regeneration. In order to achieve this, an ecological weed control approach has been developed that has identified and prioritised ecological weeds present within the KNE site based on the severity of ecological impact a weed species has.

As a result, GWRC will control widespread weed species with high ecological impact such as boxthorn, pampas, blackberry and gorse across the entire KNE site annually.

In 2016/17, GWRC will undertake control of marram grass and broadleaf ground-covering weeds such as iceplant and agapanthus on the foredunes to allow spinifex and pīngao to naturally re-colonise this ecosystem. This activity will commence from the seaward edge of the foredunes, working inland.

In 2016/17 and 2017/18 GWRC will control aquatic weeds in wetland areas (Operational Area A) and, undertake targeted control of kikuyu grass in the Pharazyn Reserve (Operational area E) to allow native regeneration to take place.

The operational plan (Table 2) contains more information about the specific requirements in each operational area. Appendix 4, Table 7 contains a full list of weed species and their ecological impact.

## Pest animal control

Little is understood about the impacts of pest animals on the ecological values of the KNE site. However, as a precaution some limited pest animal control is undertaken as adverse effects on native plants and animals are likely to be occurring.

A small predator control network of seven DOC 200 predator kill-traps has been installed in operational area E (Pharazyn Reserve) to control mustelids and rats. The purpose of this network is to protect the native wetland and shorebird populations from predation. The traps are serviced monthly by the Pharazyn Reserve Group with bait supplied by KCDC.

KCDC are working with a newly formed and currently unnamed community group to install and service five DOC 200 predator kill-traps in 2015/16 in operational area A (Te Kowhai estuary). These traps will be serviced by the community group volunteers on a monthly basis targeting mustelids to providing some protection to native shorebirds.

## Revegetation

KCDC coordinates all revegetation across the KNE site in accordance with the Peka Peka Five-Year Restoration Plan[20] and the Pharazyn Reserve Landscape and Ecological Restoration Plan[21]. These documents should be referred to for detailed information about the revegetation project however, the broad principles are discussed below with costings and plant species provided in Appendix 5. Given the presence of rabbits within the KNE site all plantings will be protected using rabbit guards.

Revegetation is undertaken to increase native plant cover and to reintroduce absent native species within the KNE site. Revegetation will contribute to stabilising the degraded sand dune areas and will provide a seed source for on-going regeneration.

KCDC, working with the Peka Peka Restoration Group, will undertake annual revegetation planting within operational area C (the Marram Way Dunes) using 150 eco-sourced plants including species such as shore spurge, pīngao, and sand coprosma (*Coprosma acerosa*) to compliment the native species currently present.

KCDC, with the Pharazyn Reserve Focus Group will plant 2,000 native plant species annually within operational area E (the Pharazyn Reserve). GWRC will contribute to the revegetation of operational area E by providing funding for 400 native flax plants annually to be planted in the central areas of the Pharazyn Reserve that currently have little native plant cover. These will be planted in groups of 200 (see Appendix 5, Map 4).

KCDC will plant 100 flax plants in operational area A (Te Kowhai Estuary) annually.

## Recreational activity management

KCDC discourages the development and use of informal tracks through the sand dunes. These tracks cause erosion, dune blow-outs, can spread ecological weeds or damage revegetation planting sites. KCDC will create defined tracks, and/or re-align access ways in accordance with best practice dune walkway installation guidelines[22] .

# 4. Operational plan

The operational plan shows the actions planned to achieve the stated objectives for the Peka Peka Coast KNE site, and their timing and cost over the three-year period from 1 July 2015 to 30 June 2018. The budget for the 2016/17 and 2017/18 years are indicative only and subject to change. A map of operational areas can be found in Appendix 1 (see Map 3).

**Table 2: Three year operational plan for the Peka Peka Coast KNE site.**

| Objective | Threat | Activity | Operational area | Delivery | Description/detail | Target | Timetable & resourcing | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | 2015/16 | 2016/17 | 2017/18 |
| 1 | EW-4, EW-5 | Ecological weed control | Entire KNE site | Biosecurity department | Control of boxthorn, blackberry, iceplant, gorse, acacia, agapanthus, pampas, boneseed, Scots pine, banksias, white correa and non-local native species | Reduction in abundance of target weed species | $10,000 | $4,000 | $6,000 |
| 1 | EW-1 | Ecological weed control | A | Biosecurity department | Control of marginal aquatic weeds including reed sweet grass | Reduction in abundance of target weed species | Nil | $500 | $500 |
| 1 | EW-3, EW-4 | Ecological weed control | Entire KNE site | Biosecurity department | Control of marram grass and broadleaf weeds, rolling back infestations from the coast inland | Reduction in abundance of target weed species | Nil | $3,500 | Nil |
| 1 | EW-4 | Ecological weed control | E | Biosecurity department | Targeted control of kikuyu grass | Reduction in abundance of target weed species | Nil | $500 | $500 |
| 1 | OT-1 | Ecological weed control | C | Biosecurity department | Site preparation ahead of revegetation planting including control of ecological weeds | Reduction in ecological weeds at planting site | $1,000 | $500 | $500 |
| 1 | OT-1 | Ecological weed control | A | Biosecurity department | Climber, woody weed and groundcover weed control, including site preparation for restoration planting | Reduction in abundance of target weed species | $500 | $500 | $500 |

| Objective | Threat | Activity | Operational area | Delivery | Description/detail | Target | Timetable & resourcing | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | 2015/16 | 2016/17 | 2017/18 |
| 1 | OT-1 | Revegetation | C | KCDC | Planting of 150 native dune species annually with the Peka Peka Restoration Group (Appendix 5) | 70% plant survival | $500* | $500* | $500* |
| 1 | OT-1 | Revegetation | E | GWRC | Planting 400 native flax plants in two groups (200 each group) annually, as per planting plan (Appendix 5) | 70% plant survival | $2,000 | $2,000 | $2,000 |
| 1 | OT-1 | Revegetation | E | KCDC | Planting 2,000 native plants from a range of dune scrub and wetland species, as per planting plan (Appendix 5) | 70% plant survival | $15,000^ | $15,000^ | $15,000^ |
| 1 | OT-1 | Revegetation | A | KCDC | Planting 100 flax plants annually, as per planting plan (Appendix 5) | 70% plant survival | $500* | $500* | $500* |
| 2 | PA-2, PA-3 | Pest animal control | A, E | KCDC | Install five DOC 200 kill-traps at Te Kowhai Estuary for the Pharazyn Community Group to service monthly | Reduce the impact of predators on native shorebirds | $500* | $200* | $200* |
| 1 | HA-2 | Recreational activity management | Entire KNE site | KCDC | Monitoring and management of informal track creation | Reduction in number of informal walkways crossing dunes | Not known | Not known | Not known |
| | | | | | | **Total** | **$30,000** | **$27,700** | **$26,200** |

* Subject to KCDC Coastal Restoration Fund availability

^Subject to KCDC Pharazyn Reserve Management Fund

# 5. Funding summary

## GWRC budget

The budgets for the 2016/17 and 2017/18 years are indicative only and subject to change.

**Table 3: GWRC allocated budget for the Peka Peka Coast KNE site.**

| Management activity | Timetable & resourcing | | |
|---|---|---|---|
| | 2015/16 | 2016/17 | 2017/18 |
| **Ecological weed control** | $5,500 | $4,500 | $4,000 |
| **Revegetation** | $2,000 | $2,000 | $2,000 |
| **Total** | **$7,500** | **$6,500** | **$6,000** |

## Other contributions

The budget is subject to confirmation through KCDC's long term planning process.

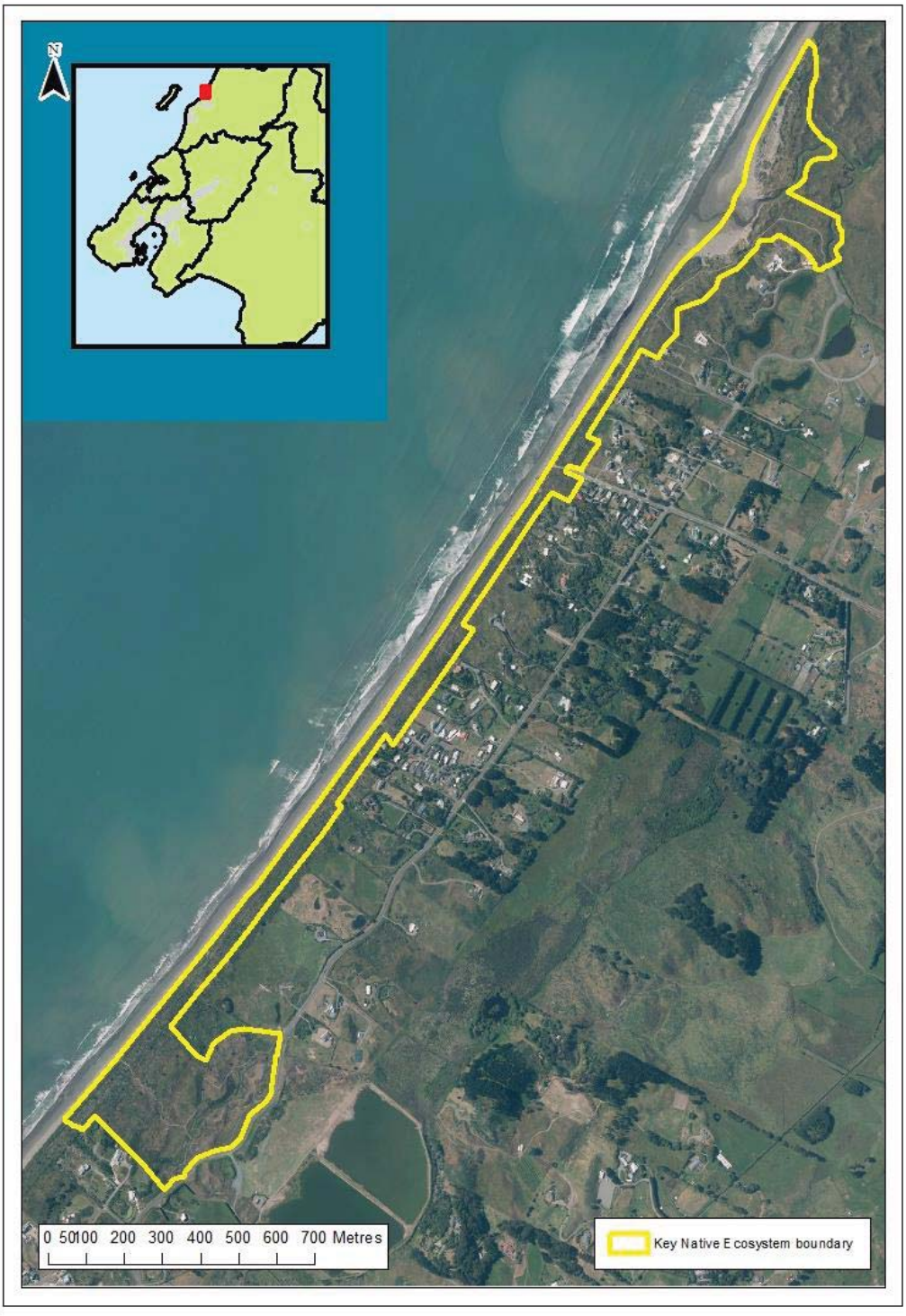
**Table 4: Additional allocated budget for the Peka Peka Coast KNE site from KCDC.**

| Management activity | Timetable & resourcing | | |
|---|---|---|---|
| | 2015/16 | 2016/17 | 2017/18 |
| **Ecological weed control** | $6,000 | $5,000 | $4,000 |
| **Pest animal control** | $500* | $200* | $200* |
| **Revegetation** | $16,000*^ | $16,000*^ | $16,000*^ |
| **Total** | **$22,500** | **$21,200** | **$20,200** |

* Subject to funding from the KCDC Coastal Restoration Fund

^Subject to funding from the KCDC Pharazyn Reserve Management Fund

# Appendix 1: Site maps




**Map 1: Peka Peka Coast KNE site boundary.**


**Map 2: Operational areas in the Peka Peka Coast KNE site.**


**Map 3: Current pest animal control in Pharayzn Reserve (operational area E) of the Peka Peka Coast KNE site.**

## Appendix 2: Threatened species list

The New Zealand Threat Classification System lists extant species according to their threat of extinction. The status of each species group (plants, reptiles, etc.) is assessed over a three-year cycle[23] with the exception of birds that are assessed on a five-year cycle[24]. Species are regarded as Threatened if they are classified as Nationally Critical, Nationally Endangered or Nationally Vulnerable. They are regarded as At Risk if they are classified as Declining, Recovering, Relict or Naturally Uncommon. The following table lists Threatened and At Risk species that are resident in, or regular visitors to, the KNE site.

**Table 5: Threatened and At Risk species recorded in the Peka Peka Coast KNE site.**

| Scientific name | Common name | Threat status | Source |
|---|---|---|---|
| **Plants (vascular)[25]** | | | |
| *Ficinia spiralis* (natural and planted) | Pīngao | At Risk-Declining | Mike Urlich, GWRC, pers. obs 2014 |
| *Euphorbia glauca* (planted) | Shore spurge | At Risk-Declining | http://www.gw.govt.nz/peka-peka-restoration-group/ |
| *Kunzea amathicola* | Rawiritoa | At Risk-Declining | Mike Urlich, GWRC, pers. obs 2015 |
| **Birds[26]** | | | |
| *Hydroprogne caspia* | Caspian tern | Threatened-Nationally Vulnerable | http://ebird.org/content/newzealand/ (accessed 22/01/2014) |
| *Larus novaehollandiae scopulinus* | Red-billed gull | Threatened-Nationally Vulnerable | Todd et al. undated[27] |
| *Haematopus finschi* | South Island oystercatcher | At Risk-Declining | http://ebird.org/content/newzealand/ (accessed 22/01/2014) |
| *Himantopus himantopus leucocephalus* | Pied stilt | At Risk-Declining | Todd et al. undated |
| *Sterna striata striata* | White-fronted tern | At Risk-Declining | http://ebird.org/content/newzealand/ (accessed 22/01/2014) |
| *Haematopus unicolor* | Variable oystercatcher | At Risk-Recovering | Todd et al. undated |
| **Freshwater fish[28]** | | | |
| *Anguilla dieffenbachii* | Long fin eel | At Risk-Declining | Boffa Miskell 201229 |
| *Galaxias maculatus* | Inanga | At Risk-Declining | Boffa Miskell 201230 |

# Appendix 3: Regionally threatened plant species list

The following table lists regionally threatened plant species that have been recorded in the Peka Peka Coast KNE site. The regional threat status of plant species is listed in the Plant Conservation Strategy for Wellington Conservancy 2004-2010[31].

**Table 6: Regionally threatened plant species recorded in the Peka Peka Coast KNE site.**

| Scientific name | Common name | Threat status | Source |
|---|---|---|---|
| *Ficinia spiralis* | Pīngao, golden sand sedge | Gradual decline | Robyn Smith, GWRC, pers comm 2015 |
| *Pimelia* aff. *arenaria* AK 21633 | Sand daphne | Regionally vulnerable | Robyn Smith, GWRC, pers comm 2015 |

# Appendix 4: Ecological weed species

Ecological weeds recorded in the Peka Peka Coast KNE site are listed in Table 7.

**Table 7: Ecological weed species recorded in the Peka Peka Coast KNE site.**

| Scientific Name | Common Name | Weed tier | Ecological impact* |
|---|---|---|---|
| *Agapanthus praecox* subsp. *orientalis* | Agapanthus | Groundcover | Moderate |
| *Ammophila arenaria* | Marram | Exotic grass | Severe |
| *Banksia integrifolia* | Banksia | Woody weed | Moderate |
| *Calystegia sylvatica* | Great bindweed | Climber | Moderate |
| *Carpobrotus edulis* | Ice plant | Groundcover | High |
| *Chryanthemoides monilifera* | Boneseed | Woody weed | Severe |
| *Correa alba* | White correa | Woody weed | Moderate |
| *Cortaderia selloana* | Pampas | Exotic grass | High |
| *Cupressus macrocarpa* | Macrocarpa | Woody weed | Moderate |
| *Cytisus proliferus* | Tree lucerne | Woody weed | Low |
| *Gazania rigens* | Gazania | Groundcover | High |
| *Glyceria maxima* | Reed sweet grass | Marginal aquatic | Severe |
| *Lupinus arboreus* | Lupin | Woody weed | Low |
| *Lycium ferocissimum* | Boxthorn | Woody weed | Severe |
| *Metrosideros excels*** | Pohutukawa | Woody weed | Low |
| *Paraserianthes lophantha* | Brush wattle | Woody weed | High |
| *Paspalum distichum* | Mercer grass | Exotic grass | Low |
| *Pennisetum clandestinum* | Kikuyu grass | Groundcover | High |
| *Pinus radiata* | Radiata pine | Woody weed | Moderate |
| *Pittosporum crassifolium* | Karo | Woody weed | High |
| *Rhamnus alaternus* | Evergreen buckthorn | Woody weed | Severe |
| *Rubus fruticosus* agg. | Blackberry | Climber | High |
| *Rumex sagittatus* | Climbing dock | Climber | Low |
| *Salix fragilis* | Crack willow | Woody weed | High |
| *Sambucus nigra* | Elderberry | Woody weed | Low |
| *Schedonorus arundinaceus* | Tall fescue | Exotic grass | Moderate |
| *Senecio elegans* | Purple groundsel | Groundcover | Low |
| *Ulex europaeus* | Gorse | Woody weed | High |
| *Zizania latifolia* | Manchurian rice grass | Marginal aquatic | Severe |

*Ecological impact defined by GWRC Biodiversity Officer

**Non local native species.

# Appendix 5: Planting plan

Below are the details of the revegetation work that will be undertaken in the Peka Peka Coast KNE site. Plant species to be used are listed and the table identifies numbers of plants that will be used and all costs associated with the planting programme.

## Planting plan for Pharyzn Reserve (operational area E)

**A: KCDC planting (Map 4)**

Area size: 1.8 ha

Plants for this planting area will be chosen from the following species:

Red matipo *(Myrsine australis)*

Taupata *(Coprosma repens)*

Ngaio *(Myoporum laetum)*

Toetoe *(Cortaderia toetoe)*

Flax *(Phormium tenax)*

Kānuka *(Kunzea amathicola)*

**Table 8: KCDC planting costs for Pharyzn Reserve.**

| Item | 2015/16 | | 2016/17 | | 2017/18 | |
|---|---|---|---|---|---|---|
| | Number | Total ($) | Number | Total ($) | Number | Total ($) |
| Plants | 1,500 | $7,500 | 1,500 | $7,500 | 1,500 | $7500 |
| Combiguard plant protectors | | $1,000 | | $1,000 | | $1,000 |
| Site preparation spray | | $1,000 | | $1,000 | | $1,000 |
| Planting labour | | $4,500 | | $4,500 | | $4,500 |
| Maintenance spray | | $1,000 | | $1,000 | | $1,000 |
| **Total** | | **$15,000** | | **$15,000** | | **$15,000** |

**B: GWRC node planting (Map 4)**

**Area size:**

2015-16 planting = 1.9 ha

2016-17 planting = 1.5 ha

2017-18 planting = 0.8 ha

Plants for this planting area will be chosen from the following species:

Flax (*Phormium tenax*)

**Table 9: GWRC planting costs for Pharazyn Reserve.**

| Item | 2015/16 | | 2016/17 | | 2017/18 | |
|---|---|---|---|---|---|---|
| | Number | Total ($) | Number | Total ($) | Number | Total ($) |
| Plants | 400 | $1,200 | 400 | $1,200 | 400 | $1,200 |
| Planting labour | | $800 | | $800 | | $800 |
| **Total** | | **$2,000** | | **$2,000** | | **$2,000** |

## KCDC Planting plan for Te Kowhai estuary (operational area A)

Area size: 4 hectares

Plants for this planting area will be chosen from the following species:

Flax (*Phormium tenax*)

**Table 10: KCDC planting costs for Te Kowhai estuary.**

| Item | 2015/16 | | 2016/17 | | 2017/18 | |
|---|---|---|---|---|---|---|
| | Number | Total ($) | Number | Total ($) | Number | Total ($) |
| Plants | 100 | $300 | 100 | $300 | 100 | $300 |
| Planting labour | | $200 | | $200 | | $200 |
| **Total** | | **$500** | | **$500** | | **$500** |

## KCDC Planting plan for Marram Way Dunes (operational area C)

Area size: 1 hectare

Plants for this planting area will be chosen from the following species:

Flax (*Phormium tenax*)

Pīngao (*Ficinia spiralis*)

Wīwī (*Ficinia nodosa*)

Speckled sedge (*Carex testacea)*,

Sand tussock (*Poa billardierei)*

New Zealand sand daphne (*Pimelia prostrata* subsp*. prostrata)*

**Table 11: KCDC planting costs for Marram Way foredunes.**

| Item | 2015/16 | | 2016/17 | | 2017/18 | |
|---|---|---|---|---|---|---|
| | Number | Total ($) | Number | Total ($) | Number | Total ($) |
| Plants | 150 | $500 | 150 | $500 | 150 | $500 |
| Planting labour | | Nil | | Nil | | Nil |
| **Total** | | **$500** | | **$500** | | **$500** |

**Note: plants planted by Peka Peka restoration Group.**


**Map 4: Planting areas in the Pharazyn Reserve Dunes area of the Peka Peka Coast KNE site.**

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