Key Native Ecosystem Operational Plan for Wellington South Coast

2020-2025

Greater Wellington
Te Pane Matua Taiao

Contents

1. Purpose

The purpose of the five-year Key Native Ecosystem (KNE) Operational Plan for Wellington South Coast KNE site is to:

- Identify the parties involved
- Summarise the ecological values and identify the threats to those values
- Outline the objectives to improve ecological condition
- Describe operational activities (eg, ecological weed control) that will be undertaken, who will undertake the activities and the allocated budget

KNE Operational Plans are reviewed every five years to ensure the activities undertaken to protect and restore the KNE site are informed by experience and improved knowledge about the site.

This KNE Operational Plan is aligned to key policy documents that are outlined below (in Section 2).

2. Policy Context

Regional councils have responsibility for maintaining indigenous biodiversity, as well as protecting significant vegetation and habitats of threatened species, under the Resource Management Act 1991 (RMA)[1].

Plans and Strategies that guide the delivery of the KNE Programme are:

Greater Wellington Long Term Plan

The Long Term Plan (2018-2028)[2] outlines the long term direction of the Greater Wellington Regional Council (Greater Wellington) and includes information on all our major projects, activities and programmes for the next 10 years and how they will be paid for. This document outlines that Greater Wellington will actively manage selected high value biodiversity sites. Most of this work is undertaken as part of the KNE Programme.

Proposed Natural Resources Plan

The Proposed Natural Resources Plan (PNRP) provides the high level strategic framework which sets out how Greater Wellington, Mana whenua partners and the community work together and includes:

- Guiding Principles that underpin the overall management approach of the plan (eg, Kaitiakitanga)
- Sites with significant indigenous biodiversity values
- Sites of significance to mana whenua (refer Schedules B, C, Schedule D)

Greater Wellington Regional Pest Management Plan 2019-2039

The KNE programme is an important driver for managing many of the pests that are prioritised in this KNE Operational Plan. Without active management of KNE sites, many native plants and animals in these ecosystems would struggle to thrive. The KNE programme aims to provide protection to maintain or restore the ecological function of these ecosystems as well as the native plants and animals they support. This is done mainly by managing threats such as harmful pests or introduced plants and animals.

Greater Wellington Biodiversity Strategy

The Greater Wellington Biodiversity Strategy[3] (the Strategy) is an internal document that sets a framework that guides how Greater Wellington protects and manages biodiversity in the Wellington region to work towards the Vision.

Vision

Healthy ecosystems thrive in the Wellington region and provide habitat for native biodiversity

The Strategy provides a common focus across Greater Wellington's departments and guides activities relating to biodiversity. The Vision is underpinned by four operating principles and three strategic goals. Goal One drives the delivery of the KNE Programme.

Goal One

Areas of high biodiversity value are protected or restored

3. The Key Native Ecosystem Programme

The KNE Programme is a voluntary programme of work. There is no statutory obligation for Greater Wellington to do this work. Greater Wellington invites selected landowners to discuss whether they would like to be involved in the programme. When work is done on private land, it is at the discretion of landowners, and their involvement in the programme is entirely voluntary. Involvement may just mean allowing work to be undertaken on that land.

The programme seeks to protect some of the best examples of original (pre-human) ecosystem types in the Wellington region by managing, reducing, or removing threats to their ecological values. Sites with the highest biodiversity values have been identified and prioritised for management. Sites are identified as of high biodiversity value for the purposes of the KNE Programme by applying the four ecological significance criteria described below.

Representativeness	Rarity/ distinctiveness	Diversity	Ecological context
The extent to which ecosystems and habitats represent those that were once typical in the region but are no longer common place	Whether ecosystems contain Threatened/At Risk species, or species at their geographic limit, or whether rare or uncommon ecosystems are present	The levels of natural ecosystem diversity present, ie, two or more original ecosystem types present	Whether the site provides important core habitat, has high species diversity, or includes an ecosystem identified as a national priority for protection

A site must be identified as ecologically significant using the above criteria and be considered "sustainable" for management in order to be considered for inclusion in the KNE Programme. "Sustainable" for the purposes of the KNE Programme is defined as: a site where the key ecological processes remain intact or continue to influence the site and resilience of the ecosystem is likely under some realistic level of management.

KNE sites can be located on private or publicly owned land. However, land managed by the Department of Conservation (DOC) is generally excluded from this programme.

KNE sites are managed in accordance with five-year KNE plans prepared by Greater Wellington's Biodiversity department. Greater Wellington works with the landowners, mana whenua and other operational delivery providers to achieve mutually beneficial goals.

4. Wellington South Coast Key Native Ecosystem site

Wellington South Coast KNE site (121 ha) covers a coastal escarpment on the southern tip of the Wellington peninsula. This escarpment is located between the Wellington City suburb of Owhiro Bay and the mouth of the Kārori Stream. The KNE site is split across two areas, with one part being located within the Te Kopahou Reserve and other comprising the Te Wai-Komaru conservation covenant (see Appendix 1, Map1). Other important features within the KNE site include the Red Rocks and Sinclair Head Scientific Reserves.

The KNE site comprises the coastal shore platform formed by earthquake uplifts and steep and exposed coastal escarpment with associated gullies that are exposed to strong onshore winds. The KNE site is known to support diverse and threatened vegetation communities and an array of threatened wildlife including coastal shore birds, lizards, and marine mammals.

The coastal platform contains low-lying beaches, gravel dunes and rock stack environments supporting hardy shrubs, grasses and herbs adapted to the salty environment including rare plants vulnerable to damage. Features of particular interest include the Kinnoull sand dunes, the Kārori stream mouth and small pockets of marsh and native coastal turf associated with seal haul-outs. The coastal platform has also been subject to restoration planting efforts for a number of years.

The steep escarpment supports extensive areas of wind-shorn grey scrub merging into rocky cliff environments which contain shrub, flax, tussock and herb vegetation. The

exposed tops of ridges and spurs support native grasses, tussock, speargrass, grey scrub and shrublands.

5. Parties involved

There are many organisations, groups and individuals that play important roles in the care of the KNE site.

5.1. Landowners

The Wellington City Council (WCC) owns and manages the parts of the KNE site within the Te Kopahou Reserve. WCC manages this reserve in line with the objectives set out within "*Our Natural Capital – Wellington's Biodiversity Strategy and Action Plan*"[4] and the "Outer Green Belt Management Plan"[5] .

The New Zealand Forestry Group Ltd (NZ Forestry Group) owns the lands associated with the Te Wai-Komaru conservation covenant. This area includes the Kinnoull sand dunes. This land is subject to the overall objective stated in the covenant deed, being: (*T)he Land must be managed so as to preserve the Reserve Values*[6]. This covenant binds all subsequent owners of the land to ensure the reserve values are preserved.

5.2. Operational delivery

WCC is responsible for managing the Te Kopahou Reserve and undertakes biodiversity management activities including ecological weed control, restoration planting and the control of animal pests. WCC is the primary contact for community groups and bach owners undertaking restoration or pest control activities within the Reserve. WCC has also been actively involved in management activities at the Kinnoull sand dune in the past and continues to undertake restoration planting at the dune site.

Within Greater Wellington, the Biodiversity and Biosecurity departments are responsible for the delivery of management activities, primarily at the Kinnoull sand dune. The Biodiversity department is the overarching lead department for Greater Wellington on the coordination of their biodiversity management activities and advice. The Biosecurity department carries out pest control activities within the KNE site and also the wider landscape through their Regional Pest Management Plan (RPMP).

5.3. Mana whenua partners

Parts of the Wellington South Coast KNE site are a site of significance for Ngāti Toa Rangatira and Taranaki Whānui ki te Upoko o te Ika a Maui (see Table 1) and they are aware that their areas of interest are located on territorial authority/private land.

The area between Sinclair Head and Red Rocks is important culturally for both iwi groups and has been recognised under Greater Wellington's PNRP, Schedule C (see Table 1 below).

Table 1: Ngāti Toa Rangatira and Taranaki Whānui ki te Upoko o te Ika a Maui sites of significance in Wellington South Coast KNE site[7]

Sites of significance	Mana whenua values
Ngāti Toa Rangatira (Schedule C): • Te Rimurapa – Pariwhero (Sinclair Head – Red Rocks)	mahinga kai, Te Ara a Kupe, wāhi tūpuna, wāhi pakanga, mahi touhokohoko, wāhi maumahara
Taranaki Whānui ki te Upoko o te Ika a Maui (Schedule C): • Te Rimurapa – Pariwhero (Sinclair Head – Red Rocks)	mahinga kai

Greater Wellington recognises the value and importance of working with mana whenua in their roles as kaitiaki in areas within the KNE site. The KNE operational plan activities will:

- make a small but valuable contribution to the overall expected PNRP outcomes including mahinga kai (food gathering)
- ensure people working in KNE sites understand the requirements of the Accidental Discovery Protocol
- endeavour to ensure that Ngāti Toa Rangatira and Taranaki Whānui ki te Upoko o te Ika a Maui values for the site are protected

5.4. Stakeholders

The Cross Country Vehicle Club is a regular user of the Red Rocks coastal track. The club engages with WCC on volunteer opportunities within the KNE site, including pest control activities.

Within the KNE site boundary, there are 10 baches. The five bach owners at Mestanes Bay and four bach owners at Red Rocks have ground leases for their dwellings with WCC. The one bach owner at Long Beach has a ground lease with NZ Forestry Group.

6. Ecological values

This section describes the various ecological components and attributes that make the KNE site important. These factors determine the site's value at a regional scale and how managing it contributes to the maintenance of regional biodiversity.

6.1. Ecological designations

Table 2, below, lists ecological designations at all or part of the Wellington South Coast KNE site.

Table 2: Designations at the Wellington South Coast KNE site

Designation level	Type of designation
National	Parts of the Wellington South Coast KNE site are designated by DOC as Scientific Reserves: • Sinclair Head • Red Rocks
Regional	Parts of the Wellington South Coast KNE site are scheduled under the Proposed Natural Resources Plan (PNRP) as Ecosystems and Habitats with Significant Indigenous Biodiversity Values: • Significant habitat for indigenous birds in the coastal marine area (Schedule F2c) • River with Significant Indigenous Ecosystems – habitat for threatened and at risk species (Schedule F1): Kārori Stream • River with Significant Indigenous Ecosystems – habitat for six or more migratory fish species (Schedule F1): Kārori Stream
District	Part of the Wellington South Coast KNE site is designated as Historic Reserve: • Te Kopahou Reserve
Other	Part of the Wellington South Coast KNE site is protected via a DOC conservation covenant: • Te Wai – Komaru Conservation Covenant Part of the Wellington South Coast KNE site is protected via a WCC conservation covenant: • Kinnoull Conservation Covenant Part of the Wellington South Coast KNE site is scheduled under GWRC's PNRP as a site with significant geological features in the coastal marine area (Schedule J): • Pariwhero/Red Rocks

6.2. Ecological significance

The Wellington South Coast KNE site is considered to be of regional importance because:

- It contains highly **representative** ecosystems that were once typical or commonplace in the region
- It contains ecological features that are **rare or distinctive** in the region
- It contains high levels of ecosystem **diversity**, with several ecosystem types represented within the KNE site boundary, including several naturally uncommon ecosystems
- Its **ecological context** is valuable at the landscape scale as it contains a variety of inter-connected habitats

Representativeness

The Kinnoull sand dune and Kārori stream mouth within the KNE site are on land environments that the Threatened Environment Classification[8] classifies as Acutely Threatened (having less than 10% of its indigenous cover remaining nationally). The remainder of the KNE site is considered Critically Under-protected (having >30% indigenous cover remaining nationally, but <10% protected)[9].

The Singers and Rogers[10] classification of pre-human vegetation indicates the original ecosystem present was primarily kohekohe, tawa forest type (MF6) of which only 15% remains of the original extent in the Wellington Region[11]. A coprosma, muehlenbeckia shrubland/herbfield/rockland vegetation type (CL3) would have been present along much of the lower escarpment and steep escarpment cliff-faces. Much smaller patches of tawa, kamahi, podocarp (MF7) types were also present on the hilltops. Although modified, valuable aspects of these original vegetation types remain within the KNE site today.

Rarity/distinctiveness

Several naturally uncommon ecosystems are present within the KNE site and are associated with dynamic coastal edge habitats. These are active sand dunes (threat status; Endangered), coastal turfs (Critically Endangered), estuaries (Vulnerable), marine mammal haul-outs (Critically Endangered) and shingle beaches (Endangered)[12].

Within the KNE site several plant species listed as Threatened in New Zealand's national threat classification system[13] have been recorded. The KNE site also provides seasonal/core habitat for nine Nationally Threatened or At Risk bird species. Four Nationally Threatened or At Risk native fish species are known to be present, along with one lizard species and two invertebrate species. Nationally threatened species are listed in Appendix 2.

The KNE site and immediate surroundings are known to support the only North Island population of speargrass weevil (*Lyperobius huttonii*). This species is at the limit of its natural geographic range at these locations.

Diversity

The KNE site contains a diverse range of ecosystems types including forest, scrub, sand dune, estuarine, coastal turf and coastal cliff communities. The KNE site is also noted as containing high plant species diversity[14].

Ecological context

Several ecosystems within the KNE site are considered a national priority for conservation. These ecosystem types, including coastal turfs, and active sand dunes, have become uncommon on a national scale primarily due to human activity[15].

The south coast is indicated as one of 10 key coastal sites in the region that are a priority for protection and coastal management[16].

The KNE site forms part of an important wildlife corridor in the region from the south coast to the Porirua coastline connecting up other several KNE sites including, the Western Wellington Forests, Porirua Western Forests and Whitireia Coast KNE sites.

6.3. Ecological features

Vegetation communities and plants

Much of the original canopy and emergent tree species such as kohekohe (*Dysoxylum spectabile*), tītoki (*Alectryon excelsus* supsp*. excelsus*), northern rātā (*Metrosideros robusta*) and tawa (*Beilschmiedia tawa*) are severely reduced or absent due to pest animal foraging browsing pressure. However, the coastal escarpment and cliff vegetation communities still contain high plant species diversity, with 235 species recorded by Druce[17]. The predominant vegetation now mainly consists of regenerating low-lying coastal grey-scrub, flax and tussock land and scree slopes[18].

Plant species of particular note in the area include the nationally threatened Cook Strait kōwhai (*Sophora molloyi*), sand tussock (*Poa billardierei*), *Muehlenbeckia astonii* and regionally vulnerable *Melicytus orarius*, speargrass (*Aciphylla squarrosa* var. *squarrosa*). These species are severely reduced in numbers locally and are part of WCC's wider seed collection and planting programme.

Regenerating coastal grey-scrub is present in the escarpment and adjoining gullies. Typical species present here include māhoe (*Melicytus ramiflorus*), coastal tree daisy (*Olearia solandri*), taupata (Coprosma *repens*), tauhinu (*Ozothamnus leptophyllus*), mingmingi (*Coprosma propinqua* var. *propinqua*), ribbonwood (*Plagianthus divaricatus*), kamahi (*Weinmannia racemosa*), kaikōmako (*Pennantia corymbosa*), red matipo (*Myrsine australis*), tree fuschia (*Fuschia excorticata*), akiraho (*Olearia paniculata*), cabbage tree (*Cordyline australis*), koromiko (*Veronica stricta* var. *stricta*), mānuka (*Leptospermum scoparium* var. *scoparium*), kawakawa (*Piper excelsum* subsp. *excelsum*), thick-leaved māhoe (*Melicytus crassifolius*), coastal flax (*Phormium cookianum* subsp. *cookianum*) and toetoe (*Austroderia toetoe*).

Towards the base of the escarpment species such as silver tussock (*Poa cita*), native ice plant (*Disphyma australe* subsp. *australe*), shore groundsel (*Senecio lautus*), coastal spleenwort (*Asplenium appendiculatum* subsp*. maritimum*), glasswort (*Sarcocornia quinqueflora* subsp. *quinqueflora*), bidibid (*Acaena anserinifolia*), slender clubrush

(*Isolepis cernua* var. *cernua*) and bachelors button (*Cotula coronopifolia*) are also present[19,20,21,22].

The Kinnoull sand dunes were severely damaged in the past by off-road vehicles and pest animals. Previously, the site was known to contain sand tussock (*Poa billardierei*), sand daphne (*Pimelea villosa*), sand coprosma (*Coprosma acerosa*), pīngao (*Ficinia spiralis*) and spinifex (*Spinifex sericeus*). However, by the early 2000s small pockets of sand tussock and pīngao were the only native plants present[23]. A fence now physically protects these dunes and some restoration planting of threatened plant species and pest plant control has also been undertaken. As a result, the dunes are showing good signs of recovery with the native sand binders and species of pimelea and raoulia establishing well. However, some small infestations of marram grass are still present[24].

Coastal turfs are located amongst the rocky platforms and are largely associated with the seal haul-out areas. Species composition includes remuremu (*Selliera radicans*), triglochin (*Triglochin striata*), sea primrose (*Samolus repens*), *Lilaeopsis novae-zelandiae*, glasswort (*Sarcocornia quinqueflora* subsp. *quinqueflora*) and bachelors button (*Cotula coronopifolia*)[25]. Other notable recorded species around the rocky platforms within the KNE site include scattered populations of the threatened species sea holly (*Eryngium vesiculosum*) and woollyhead (*Craspedia uniflora* var. *maritima*).

Species

Mammals

Male New Zealand fur seal (*Arctocephalus forsteri*) haul-out sites are present throughout the KNE site but, have been particularly associated with Red Rocks and Sinclair Head. Male seals are mainly present between May – October.

Birds

The KNE site is recognised as being core habitat for a number of coastal bird species including threatened species. Bird species recorded at the KNE site include red-billed gull (*Larus novaehollandiae*), New Zealand pipit (*Anthus novaseelandiae*), variable oystercatcher (*Haematopus unicolor*), white-fronted tern (*Sterna striata*), black shag (*Phalacrocorax carbo*)[26], banded dotterel (*Charadrius bicinctus*)[27], reef heron (*Egretta sacra*) and the little 'blue' penguin (*Eudyptula minor*)[28]. Banded dotterels have recently been recorded nesting within the KNE site.

The ebird online database contains number of other bird species sightings that are occasional or seasonal users of the KNE site; fluttering shearwater (*Puffinus gavia*), little shag (*Phalacrocorax melanoleucos*), Australasian gannet (*Morus serrator*), southern black-backed gull (*Larus dominicanus*), northern giant petrel (*Macronectes halli*) and the migrant bird wandering albatross (*Diomedea exulans*)[29].

Reptiles

In 2016, surveys were conducted in the wider Te Kopahou Reserve but, only two lizard species were recorded: the minimac gecko (*Woodworthia* 'Marlborough Mini') and northern grass skink (*Oligosoma polychroma*)[30]. In 2014, surveys observed three species of lizard within the KNE site; the northern-grass skink, the raukawa gecko (*Woodworthia maculata*) and the minimac gecko[31].

Previous coastal lizard surveys along the wider southern coastline have recorded northern grass skinks, common geckos, glossy brown skinks (*Oligosoma zelandicum*) and copper skinks (*Oligosoma aeneum*)[32]. It is likely that these species are present within the KNE site.

Fish (inc koura and lamprey)

Kārori Stream is recognised for its value to native freshwater fish. New Zealand Freshwater Fish Database (NZFFD) contains records within the stream of native fish including, banded kōkopu (*Galaxias fasciatus*), īnanga (*G. maculatus*), kōaro (*G. brevipinnis*), longfin eel (*Anguilla dieffenbachii*), shortfin eel (*A. australis*), lamprey (*Geotria australis*) and upland bully (*Gobiomorphus breviceps*)[33].

Invertebrates

The KNE site and immediate surroundings support the only North Island population of speargrass weevil (*Lyperobius huttonii*); this population is also the only known coastal location of this species[34]. Speargrass weevils are wholly dependent on the speargrass plant for its entire life-cycle[35]. Other invertebrates of note include the Katipō spider (*Lactrodectus katipo*), observed in the dune vegetation, and *Notoreas* species of moths. These moths are solely reliant on pimelea plants[36].

7. Threats to ecological values at the KNE site

Ecological values can be threatened by human activities, and by introduced animals and plants that change ecosystem dynamics. The key to protecting and restoring biodiversity as part of the KNE Programme is to manage threats to the ecological values at each KNE site.

7.1. Key threats

Ecological weeds are widespread throughout the KNE site. These weeds range from mature pine trees to ground-covering plant species (see Table 1). Ecological weed species displace or inhibit regeneration of native species, resulting in altered vegetation structure and composition.

A suite of pest animal species are present within the KNE site and are considered a wider issue across the entire Wellington south coast peninsula. Pest animal foliage browsers are considered the biggest threat as these severely inhibit the regeneration of the vegetation communities and threatened plant species. These species include possums (*Trichosurus vulpecula*), feral goats (*Capra hircus*), rabbits (*Oryctolagus cuniculus*) and hares (*Lepus europaeus*). All four species are known to be present locally and are likely to be adversely affecting the regeneration of the KNE's native vegetation cover.

Feral pigs (*Sus scrofa*) are locally present and root up vegetation during their foraging, adversely affecting natural regeneration. In particular, feral pigs also actively seek out speargrass plants within the KNE site and surrounding area, and then destroy them to eat the root.

Mustelids (*Mustela* spp.), hedgehogs (*Erinaceus europeaeus*) and rats (*Rattus* spp.) have been recorded in the KNE sites. These pest species adversely affect the KNE site's biodiversity values by preying on nesting birds, lizards and invertebrates.

Recreation activities within the KNE site can damage the sand dunes and shingle beach habitats and disturb wildlife, including nesting coastal birds. The main threat to the KNE site in this regard is motorbike, quad bike and 4X4 vehicle use. In addition, uncontrolled dogs can disturb and/or kill breeding birds and their chicks.

While the key threats discussed in this section are recognised as the most significant, a number of other threats to the KNE site's values have also been identified. Table 3 presents a summary of all known threats to the Wellington South Coast KNE site (including those discussed above), detailing which operational areas they affect, how each threat affects ecological values, and whether they will be addressed by management activities.

Table 3: Summary of all threats to ecological values present at the Wellington South Coast KNE site

Threat code	Threat and impact on biodiversity in the KNE site	Operational area/location
Ecological weeds		
EW-1	Ground covering ecological weeds smother and displace native vegetation, inhibit indigenous regeneration, and alter vegetation structure and composition. See Appendix 4 for a list of weed species known at the KNE site)	Entire KNE site
EW-2	Woody weed species displace native vegetation, inhibit indigenous regeneration, and alter vegetation structure and composition. See Appendix 4 for a list of weed species known at the KNE site)	Entire KNE site
EW-3	Climbing weeds smother and displace native vegetation often causing canopy collapse, inhibit indigenous regeneration, and alter vegetation structure and composition. See Appendix 4 for a list of weed species known at the KNE site)	Entire KNE site
Pest animals		
PA-1	Possums (*Trichosurus vulpecula*) browse palatable canopy vegetation until it can no longer recover[37,38]. This destroys the forest's structure, diversity and function. Possums may also prey on native birds and invertebrates[39]	Entire KNE site
PA-2*	Rats (*Rattus* spp.) browse native fruit, seeds and vegetation. They compete with native fauna for food and can reduce forest regeneration. They also prey on invertebrates, lizards and native birds[40,41].	Entire KNE site
PA-3	Mustelids (stoats[42,43] (*Mustela erminea*), ferrets[44,45] (*M. furo*) and weasels[46,47] (*M. nivalis*)) prey on native birds, lizards and invertebrates, reducing their breeding success and potentially causing local extinctions	Entire KNE site
PA-4	Hedgehogs (*Erinaceus europaeus*) prey on native invertebrates[48], lizards[49] and the eggs[50] and chicks of ground-nesting birds[51]	Entire KNE site

Threat code	Threat and impact on biodiversity in the KNE site	Operational area/location
PA-5*	House mice (*Mus musculus)* browse native fruit, seeds and vegetation, and prey on invertebrates. They compete with native fauna for food and can reduce forest regeneration. They also prey on invertebrates, lizards and small eggs and nestlings[52,53].	Entire KNE site
PA-6*	Feral, stray and domestic cats (*Felis catus*) prey on native birds[54], lizards[55] and invertebrates[56], reducing native fauna breeding success and potentially causing local extinctions[57]	Entire KNE site
PA-7	Rabbits (*Oryctolagus cuniculus*) and hares (*Lepus europaeus*) graze on palatable native vegetation and prevent natural regeneration in some environments[58]. Rabbits are particularly damaging in sand dune environments where they graze native binding plants and restoration plantings	Entire KNE site
PA-8*	Red deer (*Cervus elaphus*) browse the forest understory and can significantly change vegetation composition by preferential browsing and preventing regeneration[59,60,61]	Entire KNE site
PA-9	Feral pigs (*Sus scrofa*) root up the soil and eat roots, invertebrates, seeds and native plants preventing forest regeneration[62]	Entire KNE site
PA-10	Goats (*Capra hircus*) browsing affects the composition and biomass of native vegetation in the understory tiers of forest habitats, preventing regeneration of the most palatable understory species and reducing species diversity[63]	Entire KNE site
PA-11*	Brown trout (*Salmo trutta*) and rainbow trout (*Oncorhynchus mykiss*) prey on native fish and compete with them for food resources[64]	Kārori Stream
Human activities		
HA-1*	Recreational use such as tramping, mountain biking and horse riding can cause damage and disturbance of the native ecosystem. It is also likely to disturb native fauna and introduce ecological weeds	Entire KNE site
HA-2*	Encroachment of residential gardens into the KNE site from urban areas causes habitat loss and introduces ecological weeds	Coastal Platform
HA-3*	Dogs (*Canis lupus familiaris*), if uncontrolled/unleashed can disturb or kill nesting birds and chicks, and lizards within the KNE site, particularly in close proximity to walking tracks[65]	Entire KNE site
HA-4*	Recreational vehicles such as 4WDs and motorbikes can cause damage to dune systems and disturbance of the native ecosystem	Coastal Platform
Other threats		
OT-1*	Fire is a natural occurrence, which can be instrumental in creating new ecosystems and providing for new succession opportunities; however, fire can be destructive to native flora and fauna and create conditions for pest plant invasion	Site wide

*Threats marked with an asterisk are not addressed by actions in the operational delivery schedule

The codes alongside each threat correspond to activities listed in the operational delivery schedule (Table 5), 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 2).

8. Vision and objectives

8.1. Vision

Protection and restoration of the KNE site's key ecological processes and wildlife, ensuring the site plays a full part in the protection and dispersal of flora and fauna along a safe wildlife corridor between the Wellington's south coast and the Porirua coastline.

8.2. Objectives

Objectives help to ensure that operational activities carried out are actually contributing to improvements in the ecological condition of the site.

The following objectives will guide the operational activities at the Wellington South Coast KNE site.

1. **Protect and restore the key ecological processes and systems**
2. **Protect threatened coastal birds and invertebrates**
3. **Protect coastal reptiles**
4. **Protect uncommon ecosystems and rare plant species**
5. **Develop relationships and engage with community**

9. Operational activities

Operational activities are targeted to work towards the objectives above (Section 8) by responding to the threats outlined in Section 7. The broad approach to operational activities is described briefly below, and specific actions, with budget figures attached, are set out in the operational delivery schedule (Table 5).

It is important to note that not all threats identified in Section 7 can be adequately addressed. This can be for a number of reasons including financial, legal, or capacity restrictions.

9.1. Ecological weed control

The aim of weed control is to reduce the density and distribution of targeted high impact pest plants enabling coastal ecological processes to be maintained, it also allows for the protection and regeneration of the native seed bank and provides support to restoration planting efforts. See Appendix 1, Map 2 for ecological weed control operational area locations.

Greater Wellington will undertake annual ecological weed control at the Kinnoull sand dunes (operational areas B and D) to prevent invasion of high impact ecological weeds. This weed control will enable native dune plants to continue to establish, and protects identified threatened plant species. See Appendix 3 for a full list of ecological weeds that will be controlled.

WCC will undertake annual weed control along the coastal platform within the Te Kopahou Reserve (operational area A). Specific areas targeted for consistent control are the restoration planting sites, historic infestation sites and Sinclair Head scientific reserve.

Greater Wellington Biosecurity department will control the pest plant boneseed along Wellington South Coast KNE site escarpment in the Te Kopahou Reserve (operational area C). This forms part of the regional strategy to reduce adverse effects of boneseed[66] and is programmed to be undertaken annually for the next five years via helicopter aerial herbicide application. This operation is primarily funded outside of the KNE programme (via Regional Pest Management Plan (RPMP) boneseed Sustained Control programme). Greater Wellington's Biodiversity department and WCC contribute extra funding to this operation to maximise the effectiveness of the Sustained Control programme (by expanding the area under annual control) which provides greater protection of the KNE site's ecological features and processes.

9.2. Pest animal control

Greater Wellington undertake night-shooting twice a year targeting rabbits and hares at the Kinnoull sand dune (operational area B and D). This is aimed at protecting the sand-binding plants and ensuring dune system processes are allowed to develop naturally. Whilst on-route to the sand dunes, other pest animals such as possums are often controlled, if encountered.

WCC has recently established a mustelid control network consisting of DOC 200/250 kill-traps and GoodNature A24 self-setting traps within the Te Kopahou reserve surrounding the KNE site. These traps are serviced by community volunteer groups on a monthly basis in collaboration with Capital Kiwi. WCC plans to continue developing the pest control network within this area with the help of volunteers and is currently planning to increase the network through the use of self-resetting traps along the escarpment.

In addition, WCC also manages a pest animal control network within operational area A and B. The pest control regime involves the servicing of DOC 200/250 kill-traps. These traps target stoats and hedgehogs and provide protection to banded dotterels and other shore-birds within the operational areas. This is particularly important during the nesting and fledgling period between July and March. During this period banded dotterels are particularly vulnerable to predation and nest disturbance.

WCC undertakes control of feral goats and pigs in the wider landscape through Te Kopahou Reserve, Kinnoull Station and Terawhiti Station. This will benefit the KNE site by reducing the overall browsing pressure on regenerating vegetation and the rooting up of regionally rare plants such as speargrass. This control work has been ongoing since 2016/17.

Greater Wellington's Regional Possum predator Control Programme (RPPCP) has installed a poison bait-station network across much of the Wellington peninsula including Kinnoull Station and Te Kopahou Reserve. The primary aim of the RPPCP is to control possums across the greater Wellington landscape to low levels[67]. This programme is expected to help protect the KNE site's values. See Appendix 1, Map 3 for pest animal control operational areas.

9.3. Restoration planting

WCC coordinates and supports community groups in all restoration planting activities within the KNE site. Restoration planting has been an important part of the management of the Wellington south coast and Kinnoull sand dune. This planting supports the regeneration of native vegetation communities and providing erosion control (See Appendix 1, Map 4 for restoration planting operational areas). However, this is a difficult environment to establish new plantings in, being typical of the Cook Strait eco-district conditions. These conditions include very exposed areas with steep escarpments, shallow soils, scree and bare rock. WCC engages the local bach owners and volunteer groups to undertake plantings at Fly Rock (Map 4; operational area A) and around the baches (Map 4; operational area C) within the KNE site.

Further annual plantings are expected to occur within the Te Kopahou Reserve planting sites using eco-sourced stock. Some of the details of restoration planting that will be undertaken in the Wellington South Coast KNE site are shown on table 4. Species to be planted include Threatened and regionally rare species such as sand coprosma, pingao, spinfex sand tussock, as well as more common species such as silver tussock, coastal flax, and taupata.

Table 4: Summary of restoration planting at the Wellington South Coast KNE site

Operational area	Timing	Total number of plants per planting season	Management requirements
A – Fly Rock area	June-August	500	Continued animal control and fencing
C – South Coast Baches owner area	June-August	500	Continued animal control and fencing
B – Waipapa Stream mouth area	June-August	500	Continued animal control and fencing
D – Kinnoull dunes area	June-August	2-300	Rabbit/hare control of *existing* plantings

9.4. Threatened and regionally rare plant seed collection

WCC has approval from DOC and the Forestry Group Ltd to collect seed and cuttings from the Te Wai-Komaru conservation covenant. This approval has allowed WCC to collect seed and cuttings annually for the following threatened species:

- *Muehlenbeckia astonii:* establish stock plants and build a viable insurance population by crossing with other locally found remnant plant populations. Some stock maybe cyro-preserved by WCC as part of this programme
- *Poa billardierei:* collect seed and establish insurance population stock
- *Aciphylla squarrosa* var. *squarrosa:* collect seed and replant locally
- *Sophora molloyi:* collect seed and replant locally.

Greater Wellington and WCC will continue to work in partnership with others such as the threatened plant working group to develop this programme and increase the populations of existing threatened and locally rare or uncommon plant species.

9.5. Monitoring and surveys

Speargrass weevil surveys will be conducted by WCC during the course of this operational plan to evaluate the current population and to inform appropriate management and protection measures. This may include fencing off areas to protect vulnerable plant and animal species from known threats (eg, to protect Speargrass plants from pigs or to protect vulnerable rare plants from rabbit/hare browse).

Native bird monitoring will be coordinated by WCC to monitor the establishment and of dispersal native birds within Te Kopahou Reserve to help understand the role of the reserve as a wildlife corridor, in particular the coastal end of the reserve.

Freshwater seepages are known throughout the KNE site but are not mapped and their management requirements are poorly understood. WCC will map and identify management requirements of all known seepages to restore these habitats in the KNE site where appropriate will be undertaken during the course of this operational plan.

Photopoints were established in 1998 to monitor and record the effects on the vegetation communities after implementing the policy and site work at that time to limit off road vehicles to the formed coast road. These photopoints will be re-done during the course of this operational plan.

The Kinnoull sand dune was fenced in 2010. In 2021 Greater Wellington will undertake an audit of the fence to ensure it still functions in protecting the dune system. Maintenance activities if required, arising from this audit will need to be planned and funded but, are not included in this operational plan.

9.6. Community engagement

WCC will continue to continue to engage with, develop and facilitate partnerships within the community to help look after and promote public awareness of the special values of Te Kopahou Reserve and coast; for example, care groups, track work, public education days. This work has become increasingly important with the emergence of community-led projects such as the development of Predator-free communities and Capital Kiwi.

WCC will continue to run regular public education days, in collaboration with the police, recreational motorised vehicle clubs and other agencies, to encourage visitors to share the coastal road and tracks respectfully, keep to tracks, and avoid damaging the fragile ecology in KNE site.

WCC will continue to work with the neighbours and the wider community to ensure efforts to protect species are connected through the landscape as an ecological corridor regardless of land ownership. This may include supporting private landowners with pest control and restoration planting efforts.

10. Operational delivery schedule

The operational delivery schedule shows the actions planned to achieve the stated objectives for the Wellington South Coast KNE site, and their timing and cost over the five-year period from 1 July 2020 to 30 June 2025. The budget for years 2021/22 to 2024/25 are indicative only and subject to change. A map of operational areas can be found in Appendix 1 (see Map 2).

Table 5: Five-year operational plan for the Wellington South Coast KNE site

Objective	Activity	Operational area	Actions	Intended outcome	Implementing party	Timetable and resourcing where allocated				
						2020/21	2021/22	2022/23	2023/24	2024/25
1	Ecological weed control	A	Annual aerial boneseed control as funded by RPMP, including additional contributions by Biodiversity and WCC	Sustained control of boneseed	Greater Wellington Biosecurity department	✓ $13,500 (GWRC) & $5,000 (WCC)	✓ $13,500 (GWRC) & $5,000 (WCC)	✓ $13,500 (GWRC) & $5,000 (WCC)	✓ $13,500 (GWRC) & $5,000 (WCC)	✓ $13,500 (GWRC) & $5,000 (WCC)
1, 4	Ecological weed control	B	Weed sweep across Kinnoull dunes	Expansion of native flora and active dune processes maintained	Greater Wellington Biosecurity department	✓ $1,500	✓ $1,500	✓ $1,500	✓ $1,500	✓ $1,500
1, 4	Ecological weed control	A	Weed sweep across coastal platform targeting restoration planting sites and turf communities	No new weeds established in operational area	WCC	✓ $6,500	✓ $6,500	✓ $6,500	✓ $6,500	✓ $6,500
1, 4	Pest animal control	B	Night shooting twice annually at the Kinnoull dunes, targeting rabbits and hares. Also control other pest animals seen on route along red rocks road	Suppression of browsing pest animals to facilitate vegetation growth	Greater Wellington Biosecurity department	✓ $2,500	✓ $2,500	✓ $2,500	✓ $2,500	✓ $2,500

Objective	Activity	Operational area	Actions	Intended outcome	Implementing party	Timetable and resourcing where allocated				
						2020/21	2021/22	2022/23	2023/24	2024/25
2	Pest animal control	A & wider Te Kopahou Reserve	Servicing mustelid control network on a monthly basis across the Te Kopahou Reserve	Mustelid control across entire reserve established and pests controlled	WCC and volunteers	✓ $1,000	✓ $1,200	✓ $1,400	✓ $1,600	✓ $1,800
1, 4	Pest animal control	A & wider Te Kopahou Reserve	Reserve-wide possum and ungulate control	Regeneration of forested landscape	WCC	✓ $40,000	✓ $30,000	✓ $30,000	✓ $30,000	✓ $30,000
2,3	Pest animal control	A and B	Servicing control network long shoreline on a monthly basis, deployment of additional protection when bird nests found (eg, extra traps and fencing)	Protection of reptiles and coastal shore birds	WCC	✓ $1,000	✓ $1,000	✓ $1,000	✓ $1,000	✓ $1,000
1, 4	Restoration plantings	A, B	Annual plantings detailed as per 9.3	Expansion of native vegetation cover across the site	WCC	✓ $9,000	✓ $9,000	✓ $9,000	✓ $9,000	✓ $9,000
4	Rare plant seed collection	Site wide	Annual seed/material collections and growing on	Increased populations of threatened and locally rare/uncommon plant species	WCC / threatened plant working group	✓	✓	✓	✓	✓
2	Monitoring and surveys	Site wide	Speargrass weevil survey	Population evaluated and management requirements identified	WCC			✓		

Objective	Activity	Operational area	Actions	Intended outcome	Implementing party	Timetable and resourcing where allocated				
						2020/21	2021/22	2022/23	2023/24	2024/25
2	Monitoring and surveys	A	Monitor native birds at coastal end of Te Kopahou reserve (including coast)	Understand the role/value of the site as a habitat and in bird establishment and dispersal	WCC		✓			
1	Monitoring and surveys	A, B	Re-do photopoints from 1998		WCC	✓	✓			
4	Monitoring and surveys	Site-wide	Seepages mapped, vegetation communities and management actions described	Uncommon ecosystems protected and managed appropriately	WCC				✓	
4	Monitoring and surveys	B	Kinnoull sand dune fence audit	Dune system protection ensured	Greater Wellington Biodiversity department		✓			✓
5	Community engagement	Site-wide	WCC working with volunteer groups at the KNE site and surrounding Council-land	Support community in their efforts to protect the values at the KNE site	WCC	✓	✓	✓	✓	✓

11. Funding contributions

11.1. Budget allocated by Greater Wellington

The budget for the years 2020/21 and 2023/24 are indicative only and subject to change.

Table 6: Greater Wellington allocated budget for the Wellington South Coast KNE site

Management activity	Timetable and resourcing				
	2020/21	2021/22	2022/23	2023/24	2024/25
Ecological weed control (inc RPMP sustained control programme (boneseed))	$15,000	$15,000	$15,000	$15,000	$15,000
Pest animal control	$2,500	$2,500	$2,500	$2,500	$2,500
Total	**$17,500**	**$17,500**	**$17,500**	**$17,500**	**$17,500**

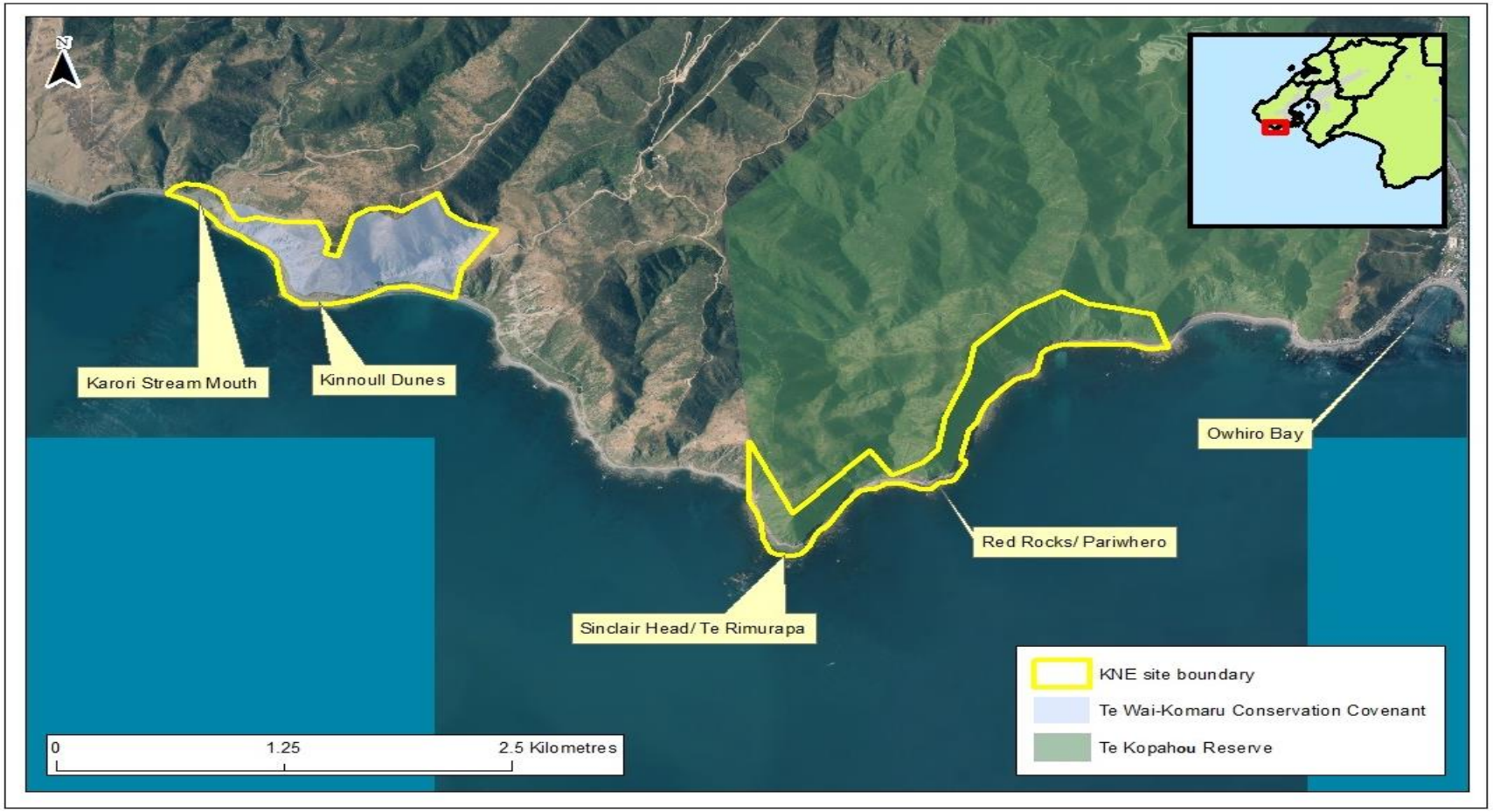
11.2. Budget allocated by WCC

The budget allocated (below) indicates the wider Te Kopahou Reserve budget and may not be allocated within the KNE site and is subject to change.

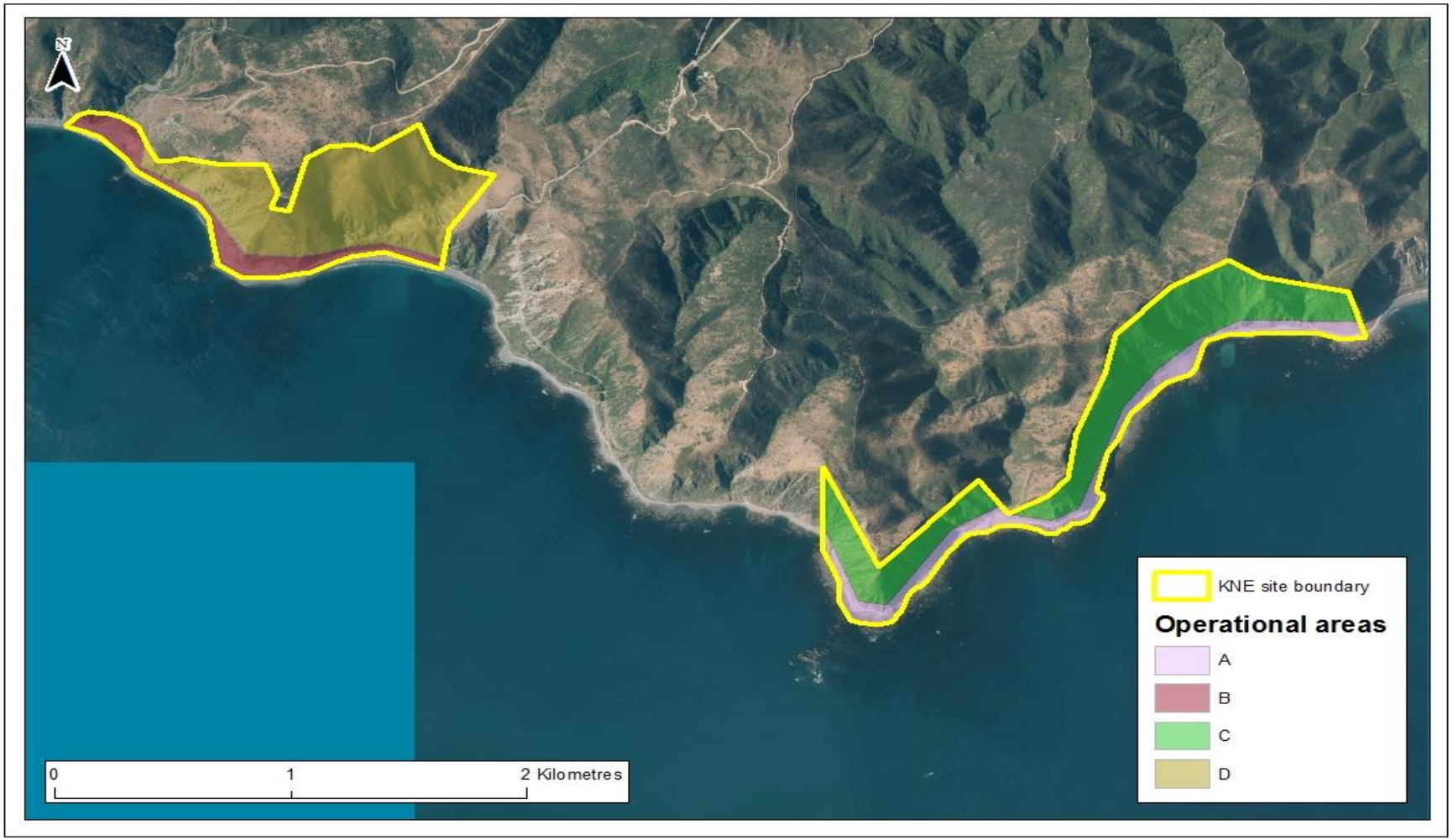
Table 7: WCC allocated budget for the Te Kopahou Reserve

Management activity	Timetable and resourcing				
	2020/21	2021/22	2022/23	2023/24	2024/25
Ecological weed control	$17,000	$17,000	$17,000	$17,000	$17,000
Pest animal control	$40,000	$40,000	$40,000	$40,000	$40,000
Revegetation	$9,000	$9,000	$9,000	$9,000	$9,000
Fencing (for nesting shore birds)	*If required*	*If required*	*If required*	*If required*	*If required*
Total	**$66,000**	**$66,000**	**$66,000**	**$66,000**	**$66,000**

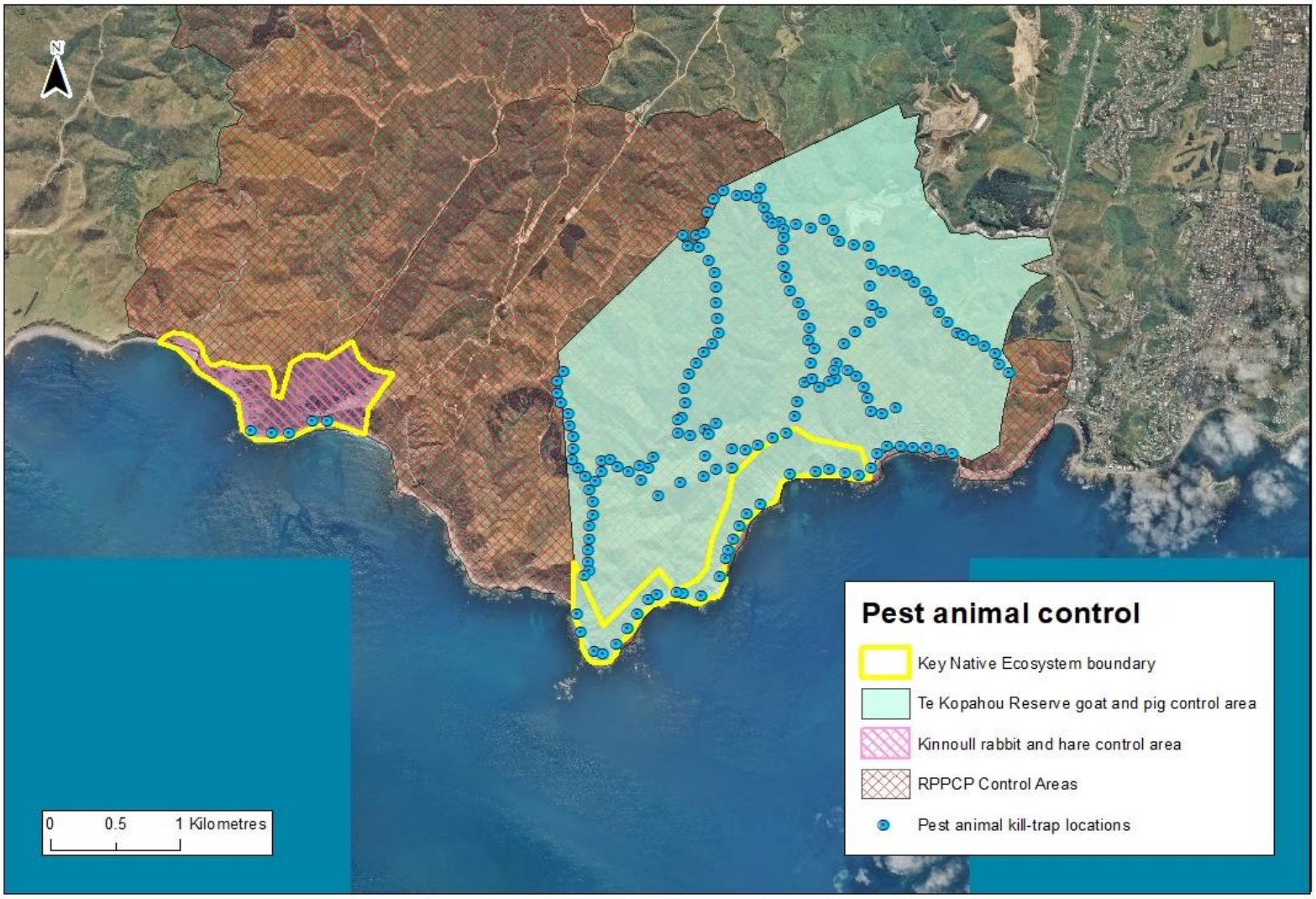
Appendix 1: Site maps



Map 1: The Wellington South Coast KNE site boundary



Map 2: Ecological weed control operational areas in the Wellington South Coast KNE site



Map 3: Pest animal control operational areas in the Wellington South Coast KNE site

Map 4: Restoration planting operational areas in the Wellington South Coast KNE site

Appendix 2: Nationally threatened species list

The New Zealand Threat Classification System lists species according to their threat of extinction. The status of each species group (plants, reptiles, etc) is assessed over a five-year cycle[68]. 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 Wellington South Coast KNE site.

Table 8: Threatened and At Risk species at the Wellington South Coast KNE site

Scientific name	Common name	Threat status	Observation
Plants(vascular)[69]			
Coprosma acerosa	Sand coprosma	At-Risk – Declining	Spence and Bergin (2009)[70]
Ficinia spiralis	Pingao	At-Risk – Declining	Spence and Bergin (2009)
Melicytus crassifolius	Thick-leaved mahoe	At Risk – Declining	Druce (1992)[71]
Melicytus orarius	n/a	At-Risk – Declining	Druce (1992)
Muehlenbeckia astonii	Shrubby tororaro	Threatened – Nationally Endangered	WCC[72]
Pimelea villosa	Sand daphne	At-Risk – Declining	Spence and Bergin (2009)
Poa billardierei	Sand tussock	At-Risk – Declining	Spence and Bergin (2009)
Sophora molloyi	Cook strait kōwhai	At- Risk – Naturally Uncommon	Brian Thomas. WCC, pers obs (2016)
Birds[73]			
Anthus novaeseelandiae	New Zealand pipit	At-Risk – Declining	GWRC, 2015[74]
Charadrius bicinctus	Banded dotterel	Threatened – Nationally Vulnerable	Spence and Bergin 2009
Egretta sacra	Reef heron	Threatened – Nationally Endangered	WCC
Eudyptula minor	Little ‘blue’ penguin	At-Risk – Declining	WCC
Haematopus unicolor	Variable oystercatcher	At-Risk – Recovering	GWRC (2015)
Larus novaehollandiae	Red-billed gull	Threatened – Nationally Vulnerable	GWRC (2015)
Phalacrocorax carbo	Black shag	At-Risk – Naturally Uncommon	GWRC (2015)

Scientific name	Common name	Threat status	Observation
Sterna striata	White-fronted tern	At-Risk – Declining	GWRC (2015)
Reptiles [75]			
Oligosoma zelandicum	Glossy brown skink	At-Risk – Declining	Milne and Sawyer (2002)[76]
Freshwater fish[77]			
Anguilla dieffenbachii	Longfin eel	At-Risk – Declining	GWRC (2015)
Galaxias brevipinnis	Kōaro	At-Risk – Declining	GWRC (2015)
Galaxias maculatus	Īnanga	At-Risk – Declining	GWRC (2015)
Geotria australis	Lamprey	Threatened – Nationally Vulnerable	GWRC (2015)
Invertebrates (Araneae – spiders)[78](terrestrial invertebrates)[79]			
Lactrodectus katipo	Katipō Spider	At Risk – Declining	Spence and Bergin (2009)
Lyperobius huttonii	Speargrass weevil	Threatened – Nationally Endangered	Spence and Bergin (2009)

Appendix 3: Ecological weed species

The following table lists key ecological weed species that have been recorded in the Wellington South Coast KNE site.

Table 10: Ecological weed species recorded in the Wellington South Coast KNE site

Scientific name	Common name	Notes
Acanthus mollis	Bear's Breeches	
Agapanthus praecox subsp. *orientalis*	Agapanthus	
Aloe maculata	Aloe	
Ammophila arenaria	Marram	
Angelica pachycarpa	Angelica	
Arctotheca calendula	Cape weed (arctotis)	
Berberis darwinii	Darwin's barberry	
Buddleja davidii	Buddleia	
Cakile edentula var. *edentula*	Sea rocket	
Carpobrotus edulis	South African iceplant	
Centranthus ruber subsp. *ruber*	Spur valerian	Widespread and abundant species only to be controlled where specifically instructed
Chrysanthemoides monilifera subsp. *monilifera*	Boneseed	RPMP sustained control programme species
Cortaderia spp.	Pampas	
Cotyledon orbiculata var. *orbiculata*	Pig's ear	
Crassula multicava subsp. *multicava*	Fairy crassula	
Crocosmia x *crocosmiiflora*	Montbretia	
Cytisus scoparius	Broom	
Erigeron karvinskianus	Mexican daisy	
Euphorbia characias subsp. *characias*	Wulfen spurge	
Euryops chrysanthemoides	Paris daisy	
Foeniculum vulgare	Fennel	
Gazania rigens	Gazania	
Glaucium flavum	Horned poppy	
Hedera helix	English ivy	
Hydrangea macrophylla	Hydrangea	
Lathyrus latifolius	Everlasting pea	New species recorded since last operational plan

Scientific name	Common name	Notes
Lonicera japonica	Japanese honeysuckle	
Lupinus arboreus	Tree lupin	
Malva arborea	Tree mallow	
Metrosideros excelsa	Pohutukawa	A New Zealand native plant that is not local to the KNE site
Osteospermum fruticosum	Dimorphotheca	
Paraserianthes lophantha	Brush wattle	
Parietaria judaica	Pellitory of the Wall	Widespread and abundant species only to be controlled where specifically instructed
Pinus spp.	Wilding pines	
Pittosporum crassifolium	Karo	A New Zealand native plant that is not local to the KNE site
Pseudosasa japonica	Bamboo	
Rosa rubiginosa	Briar rose	
Senecio angulatus	Cape ivy	
Senecio elegans	Purple groundsel	
Silybum marianum	Variegated thistle	
Tradescantia fluminensis	Tradescantia	
Tropaeolum majus	Nasturtium	
Ulex europaeus	Gorse	
Zantedeschia aethiopica	Arum lily	

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September 2020
GW/BD-G-20/26