Key Native Ecosystem Plan for Wellington South Coast

2016-2019

KNE
KEY NATIVE ECOSYSTEM

greater WELLINGTON
REGIONAL COUNCIL
Te Pane Matua Taiao

Contents

1. The Key Native Ecosystem programme

The Wellington region's native biodiversity has declined since people arrived and the ecosystems that support it face ongoing threats and pressures. 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).

Greater Wellington Regional Council's (GWRC) Biodiversity Strategy (2016)[1] sets a framework that guides how GWRC protects and manages biodiversity in the Wellington region to work towards the vision below.

GWRC's vision for biodiversity

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

The Strategy provides a common focus across the council's departments and guides activities relating to biodiversity under this overarching vision, which is underpinned by four operating principles and three strategic goals. Goal One drives the delivery of the Key Native Ecosystem (KNE) programme.

Goal One

Areas of high biodiversity value are protected or restored

The KNE programme is a non-regulatory voluntary programme that 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 publically owned land. However, land managed by the Department of Conservation (DOC) is generally excluded from this programme.

KNE sites are managed in accordance with three-year KNE plans, such as this one, prepared by the GWRC's Biodiversity department in collaboration with the landowners and other stakeholders. These plans outline the ecological values, threats, and management objectives for sites and describe operational activities such as ecological weed and pest animal control. 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. Wellington South Coast Key Native Ecosystem

Wellington South Coast KNE site (121ha) covers a coastal escarpment on the southern tip of the Wellington peninsula. This escapement is located between the Wellington City suburb of Owhiro Bay and the mouth of the Karori 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).

The KNE site comprises steep and exposed coastal escarpment and associated gullies with extensive areas of regenerating coastal scrub. At the toe of the escarpment features of particular interest include the Kinnoull sand dunes, the Karori stream mouth, coastal turfs associated with seal haul-outs and restoration planting areas. The KNE site also supports an array of wildlife including coastal birds, lizards, and marine mammals. Other important features within the KNE site include the Red Rocks and Sinclair Head Scientific Reserves.

3. Landowners, management partners and stakeholders

GWRC works in collaboration with landowners, management partners and stakeholders where appropriate to achieve shared objectives for the site. GWRC also recognizes that effective working relationships are critical for achieving the management objectives for each KNE site. In preparing this plan GWRC has sought input from landowners, management partners and relevant stakeholders, and will continue to involve them as the plan is implemented.

3.1. Landowners

The KNE site' ownership is split between the Wellington City Council (WCC) and The New Zealand Forestry Group Ltd.

WCC own and manage the parts of the KNE site within the Te Kopahou Reserve. WCC manage this reserve in line with the objectives set out within "*Our Natural Capital – Wellington's Biodiversity Strategy and Action Plan"*[2], the "*South Coast Management Plan"*[3], and the "*Owhiro Bay Quarry Closure Management Plan"*[4].

The New Zealand Forestry Group Ltd own 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*[5]. This covenant binds all subsequent owners of the land to ensure the reserve values are preserved.

3.2. Management partners

Management partners are those that fund or have an active role in the implementation of the KNE plan or the management of the KNE site. The management partners at this site are WCC and GWRC.

WCC are responsible for managing the Te Kopahou Reserve. WCC are also the primary contact for community groups and bach owners undertaking restoration or pest control activities. WCC are currently developing a Master Plan document for the management of the Te Kopahou Reserve. This plan will detail any biodiversity management activities including ecological weed control, restoration planting, controlling of animal pests. WCC have also been actively involved in the management of the Kinnoull Dunes.

Within GWRC, the management partners are the Biodiversity and Biosecurity departments. The Biodiversity department is the overarching lead department for GWRC on the coordination of biodiversity management activities and advice within the KNE site. In addition, GWRC will work with WCC in developing the Master Plan document for the Te Kopahou Reserve, so to ensure the ecological values are maintained and enhanced in accordance with the KNE plan operations. The Biosecurity department coordinates and carries out pest control activities within the KNE site and the wider landscape through regional pest control programmes.

3.3. Treaty partners

Ngāti Toa Rangatira and Taranaki Whanui ki te Ika a Maui are treaty partners at the KNE site. The area between Sinclair Head and Red Rocks is important culturally for

both iwi groups and has been recognised under the Proposed Natural Resources Plan (PNRP), Schedule C (see Table 1). The immediate area around Red Rocks is significant to Ngāti Toa Rangatira as it was an area where food and materials were gathered. The area also links to iwi ancestry and Kupe. A battleground, a trading site and memorial sites exist within it.

The area around Sinclair Head-Red Rocks is significant to Taranaki Whānui ki te Upoko o te Ika a Maui as an area where food and materials were gathered.

3.4. Other Stakeholders

DOC is a stakeholder as they manage the conservation covenant and scientific reserves within the KNE site boundary.

The Cross Country Vehicle Club 4X4 group are regular users of the Red Rocks track. The club engages with WCC on volunteer opportunities within the KNE site.

Tourist operators regularly use the area for responsible off-road tourist experiences along the wild south coast (eg, Seal Coast Safari).

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.

4. 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 these values contribute to the maintenance of regional biodiversity.

4.1. Ecological designations

Table 1, below, lists ecological designations at all or part of the Wellington South Coast KNE site.

Table 1: 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 GWRC's proposed Natural Resources Plan (PNRP) as Ecosystems and Habitats with Significant Indigenous Biodiversity Values: • River with Significant Indigenous Ecosystems - habitat for threatened and at risk species (Schedule F1): Karori Stream • River with Significant Indigenous Ecosystems - habitat for six or more migratory fish species (Schedule F1): Karori Stream • Significant habitat for indigenous birds in the coastal marine area (Schedule F2c)
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 mana whenua values (Schedule C) to Ngāti Toa Rangatira and Taranaki Whānui ki te Upoko o te Ika a Maui: • Te Rimurapa – Pariwhero (Sinclair Head – Red Rocks) 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

4.2. 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 naturally uncommon ecosystems
- Its **ecological context** is valuable at the landscape scale as it provides core/seasonal habitat for threatened indigenous coastal bird and marine mammal species within the KNE site.

Representativeness

The Kinnoull dunes and Karori stream mouth within the KNE site are on land environments that the Threatened Environment Classification[6] 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)[7].

The Singers and Rogers (2014)[8] 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[9]. 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)[10].

Within the KNE site several plant species listed as Threatened in New Zealand's national threat classification system[11] 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.

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, havebecome uncommon on a national scale primarily due to human activity[12].

Kinnoull Dunes are recorded as one of ten coastal sites in the region that are a priority for protection and coastal management[13].

4.3. Ecological features

Habitats (vegetation)

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 by 1992[14]. The predominant vegetation now mainly consists of regenerating low-lying coastal grey-scrub, flax and tussock land and scree[15].

Plant species of particular note in the area include the nationally threatened Cook Strait kōwhai (*Sophora molloyi*), *Melicytus obovatus*, *Muehlenbeckia astonii* and regionally vulnerable plant 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 in this shrubland 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*), 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*) and 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 l[16 17,18,19].

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 2000's small pockets of sand tussock and pīngao were the only native plants present[20]. A fence now physically protects these dunes. 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[21].

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*)[22]. 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 in previous years. Male seals are mainly present between May – October.

Birds

The KNE site is recognised as being core/seasonal habitat for a number of coastal bird species including threatened species. Bird species recorded in 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*)[23], banded dotterel (*Charadrius bicinctus*)[24], reef heron (*Egretta sacra*) and the little penguin (*Eudyptula minor*)[25]. Banded dotterels have recently been recorded nesting within the KNE site.

The ebird online database contains the following additional bird sighting records for the area; 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*)[26]. However, the KNE site is unlikely to form a key component of all these species' lifecycles.

Reptiles

Recent surveys observed three species of lizard within the KNE site; the northern-grass skink (*Oligosoma polychroma*), the raukawa gecko (*Woodworthia maculata*), and the minimac gecko (*Woodworthia* 'Marlborough Mini')[27]. Previously, glossy brown skinks (*Oligosoma zelandicum*) and copper skinks (*Oligosoma aeneum*) have been recorded. These species are likely to still be present[28].

Fish (inc koura and lamprey)

Karori 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*)[29].

Invertebrates

The KNE site and immediate surroundings support the only North Island population of speargrass weevil (*Lyperobius huttonii*). This species is wholly dependent on the speargrass plant for its entire life-cycle[30]. 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[31].

5. 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.

5.1. 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 includes possums (*Trichosurus vulpecula*), feral goats (*Capra hircus*), rabbits (*Oryctolagus cuniculus*) and hares (*Lepus europaeus*). All four speices 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 predating 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 2 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 2: 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	Entire KNE site
EW-2	Woody weed species displace native vegetation, inhibit indigenous regeneration, and alter vegetation structure and composition. See Appendix 4	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	Entire KNE site
Pest animals		
PA-1	Hedgehogs (*Erinaceus europaeus*) prey on native invertebrates[32], lizards[33] and the eggs[34] and chicks of ground-nesting birds[35]	Entire KNE site
PA-2*	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[36,37]	Entire KNE site
PA-3	Possums (*Trichosurus vulpecula*) browse palatable canopy vegetation until it can no longer recover[38,39]. This destroys the forest's structure, diversity and function. Possums may also prey on native birds[40] and invertebrates	Entire KNE site
PA-4	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[41,42]	Entire KNE site
PA-5	Mustelids (stoats[43,44] (*Mustela erminea*), ferrets[45,46] (*M. furo*) and weasels[47,48] (*M. nivalis*)) prey on native birds, lizards and invertebrates, reducing their breeding success and potentially causing local extinctions	Entire KNE site
PA-6*	Feral and domestic cats (*Felis catus*) prey on native birds[49], lizards[50] and invertebrates[51], reducing native fauna breeding success and potentially causing local extinctions[52]	Entire KNE site
PA-7	Rabbits (*Oryctolagus cuniculus*) and hares (*Lepus europaeus*) graze on palatable native vegetation and prevent natural regeneration in some environments[53]. 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)* and fallow deer (*Dama dama*) browse the forest understory and can significantly change vegetation composition by preferential browsing and preventing regeneration[54,55,56]	Entire KNE site

Threat code	Threat and impact on biodiversity in the KNE site	Operational area/location
PA-9	Feral pigs (*Sus scrofa*) root up the soil and eat roots, invertebrates, seeds and native plants preventing forest regeneration[57]	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[58]	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[59]	Karori Stream
Human activities		
HA-1*	Recreational use of the KNE site includes tramping, camping and mountain biking and can cause damage and disturbance of the native ecosystem values. It is also likely to disturb native fauna and introduce ecological weeds. Other associated threats include new track creation and campfires that can potentially cause habitat and species losses	Red Rocks walkway
HA-2*	Encroachment of residential gardens into the KNE site from bachs causes habitat loss and introduces ecological weeds	Entire KNE site
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[60]	Entire KNE site
HA-4*	Water-based activities such as boating, fishing and white baiting can introduce weed species and cause disturbance of the shore birds.	Entire KNE site
HA-5*	Recreational vehicles such as 4WDs and motorbikes can cause damage to dune systems and disturbance of the native ecosystem	Coastal 4X4 track

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

The codes alongside each threat correspond to activities listed in the operational plan (Table 3), 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).

6. Management objectives

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

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

1. **To improve the structure* and function† of native plant communities**
2. **To improve the habitat for threatened native animals (eg, speargrass weevil, coastal birds)**
3. **To protect threatened native plants**
4. **To engage the community in management of the KNE site (pest animal control)**

* 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 provision of food and habitat for animals.

7. Management activities

Management activities are targeted to work towards the objectives above (Section 6) by responding to the threats outlined in Section 5. 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 3).

It is important to note that not all threats identified in Section 5 can be adequately addressed. This can be for a number of reasons including financial, legal, or capacity restrictions.

7.1. Ecological weed control

The aim of weed control is to reduce the density and distribution of targeted high impact pest plants enabling regeneration of the native seed bank and provide support to restoration planting efforts. See Appendix 1, Map 2 for operational area locations.

GWRC will undertake annual ecological weed control along the toe of the Te Kopahou escarpment, including areas of restoration plantings and at the Kinnoull sand dunes (operational areas A and B). This weed control work will enable native plants to continue to establish, prevent invasion of high impact ecological weeds onto the escarpment (where it will be harder to control them in the future) and to protect identified threatened plant species from competition by high priority ecological weeds. See Appendix 4 for a full list of ecological weeds that will be controlled.

GWRC will undertake a pest plant survey of the escarpment face (operational areas C and D) in 2016/17 to gain a better understanding of the issues on the steep escarpment faces and to identify high priority weed control areas. Subsequently these areas will be programmed for progressive control of ecological weeds. This control work will release the native regenerating vegetation from competition pressure by using either abseil or helicopter contractors to apply herbicide.

In addition, GWRC Biosecurity department 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 contain the spread of boneseed[61] and is programmed to be undertaken annually for the next three years (subject to WCC approval) via helicopter aerial herbicide application. This operation is funded outside of the KNE programme.

7.2. Pest animal control

It is recognised that pest animals are a wider reaching issue across the Wellington peninsula and are difficult to manage in isolation within the KNE site. However, there are targeted pest animal control initiatives (feral pigs and goats) occurring within the lifecycle of this KNE plan within the wider area that will provide control across the landscape to low levels of some key pest animal threats. Control of feral pigs and goats will afford some protection to the biodiversity values within the KNE site.

The rationale behind the pest animal control within the KNE site is to target pest animals that are not being addressed by the wider landscape control regimes. Pest animal control will be undertaken where it is the most effective option for protecting the values of the KNE site.

Pest animal control within the KNE site

Rabbits and hares are thought to be abundant locally. Their exact population sizes and what impact they are having on the value of the KNE site is currently unknown. Therefore, in 2016/17 GWRC will undertake a survey and assessment of the rabbit and hare populations and their impact on the Kinnoull Dunes and conservation covenant vegetation communities (operational areas B and D). The survey will be undertaken by infrared night vision scope twice a year. Some control (via shooting) of rabbits and hares may be possible during the survey period. From this survey a management strategy will be devised. Management options could include the control of rabbits and hares by toxin-bait, fumigation and closure of active burrows, or night shooting in targeted areas. If GWRC considers that effective control is not feasible the council may provide funding for fencing off sensitive areas from rabbits and hares eg, the Kinnoull fore-dunes or the restoration planting areas.

To establish a reactive pest animal control regime during the bird-breeding season WCC will engage with the wider volunteer community. A major aim will be providing protection to banded dotterels that nest within the KNE site at the Kinnoull dunes and between Red Rocks and Sinclair Head (operational areas A and B). The pest control regime will involve the reactive installation and servicing of DOC 200 kill-traps. These traps will target stoats and hedgehogs during the nesting and fledgling period between July and January. During this period banded dotterels are particularly vulnerable to predation and nest disturbance.

Pest animal control in the wider landscape

WCC undertake control of feral goats and pigs in the wider area (primarily Te Kopahou Reserve). This will benefit the KNE site by reducing the overall browsing pressure on regenerating vegetation and the rooting up of speargrass plants. This control work is expected to commence in 2016/17.

GWRC's Regional Possum and Predator Control Programme (RPPCP) will be installing a poison bait-station network across the Wellington peninsula during 2016. The primary aim of the RPPCP is to control possums across the greater Wellington landscape to low levels[62]. GWRC's commercial pest animal control unit (BioWorks) undertakes the RPPCP. Bioworks activities will include control on the Kinnoull Station and Te Kopahou Reserve, with some of the network potentially installed within the KNE site boundary. WCC are likely to provide additional support to the RPPCP within the Te Kopahou Reserve by supplementing the RPPCP's pest control network to create a more intensive overall control network.

See Appendix 1, Map 3 for RPPCP and Te Kopahou Reserve pest animal operational areas.

7.3. Restoration planting

WCC coordinates 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 dunes. This planting supports the regeneration of native vegetation communities and providing erosion control (See Appendix 1, Map 4 for planting site 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 3. Species to be planted include sand coprosma, silver tussock, coastal flax, taupata, pingao, spinfex and sand tussock.

Table 3: 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	200 (2016/17); 500 (2017/18); 500 (2018/19)	Continued animal control and fencing
D - Kinnoull dunes area	None planned	None planned	Rabbit/hare control of *existing* plantings

7.4. Threatened Species Seed collection

WCC have 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
- *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

8. Operational plan

The operational plan shows the actions planned to achieve the stated objectives for the Wellington South Coast KNE site, and their timing and cost over the three-year period from 1 July 2016 to 30 June 2019. The budget for the 2017/18 and 2018/19 years are indicative only and subject to change. A map of operational areas can be found in Appendix 1 (see Map 2).

Table 4: Three-year operational plan for the Wellington South Coast KNE site

Objective	Threat	Activity	Operational area	Delivery	Description/detail	Target	Timetable and resourcing		
							2016/17	2017/18	2018/19
1,3	EW-1, 2, 3	Ecological Weed Control	A, B	GWRC Biosecurity department	Annual ecological weed sweep of the toe of the escarpment and shingle ridges. See Appendix 4 for list of target species.	Reduction in the distribution and abundance of ecological weed species	$5,000	$5,000	$5,000
1,3	EW-1, 2, 3	Ecological Weed Control	C, D	GWRC Biosecurity department	Aerial ecological weed survey of the KNE site's escarpment faces to delineate hotspot ecological weed zones	Reduction in the distribution and abundance of ecological weed species	$5,000	Nil	Nil
1,3	EW-1, 2, 3	Ecological Weed Control	C, D	GWRC Biosecurity department	Progressive ecological weed control via abseil contractors in hotspot ecological weed zones on escarpment faces utilising aerial survey information	Reduction in the distribution and abundance of ecological weed species	Nil	$5,000	$5,000
1	EW-3	Ecological Weed Control	C	GWRC Biosecurity department	Annual aerial boneseed control operation on Te Kopahou escarpment as part of the regional pest control strategy.	Reduction in the distribution and abundance of target weed species	$10,000	$10,000	$10,000
1,3	PA-7	Pest Animal Control	B, D	GWRC Biosecurity department	Rabbit/hare population monitoring and control operations at Kinnoull dunes twice a year.	Reduction in the distribution and abundance of rabbits/hares	$2,500	$2,500	$2,500

Objective	Threat	Activity	Operational area	Delivery	Description/detail	Target	Timetable and resourcing		
							2016/17	2017/18	2018/19
2,4	PA-1, 3, 5	Pest Animal Control	A, B	WCC utilising volunteer assistance	Reactive DOC 200 kill-trap control network establishment during breeding bird season at identified Threatened bird species nest sites. Breeding season largely between July – January.	successful fledgling of nesting sites	Nil	Nil	Nil
1	PA-1, 3, 4, 5	Pest Animal Control	A, B, C, D and wider landscape area	BioWorks and WCC	RPPCP bait station installation and servicing across the wider landscape. WCC to infill with predator control within Te Kopahou Reserve.	Possums <5% RTC *	†	†	†
1,3	PA-9, 10	Pest Animal Control	A, C and wider Reserve area	WCC	Feral pig and goat control in Te Kopahou Reserve		†	†	†
1,3		Threatened plant species seed collection	Entire KNE site	WCC	Annual seed and cuttings collection of threatened plant species within the KNE site	Grow plants for research and for re-establishing populations back in the area	†	†	†
1,4		Restoration Planting	A, B	WCC	Annual restoration planting of eco-sourced plants in target areas. See Appendix 1, Map 4		†	†	†
						Total	**$22,500**	**$22,500**	**$22,500**

*RTC = Residual Trap Catch. The control regime has been designed to control possums to this level but monitoring will not be undertaken. Experience in the use of this control method indicates this target will be met.

**TTI = Tracking Tunnel Index. The control regimes have been designed to control rats and mustelids to this level.

†Funded outside of the KNE programme and cannot be detailed at this time.

9. Funding contributions

9.1. Budget allocated by GWRC

The budget for the 2017/18 and 2018/19 years are indicative only and subject to change.

Table 5: GWRC allocated budget for the Wellington South Coast KNE site

Management activity	Timetable and resourcing		
	2016/17	2017/18	2018/19
Ecological weed control	$15,000	$15,000	$15,000
Pest animal control	$2,500	$2,500	$2,500
Total	**$17,500**	**$17,500**	**$17,500**

9.2. Budget allocated by WCC

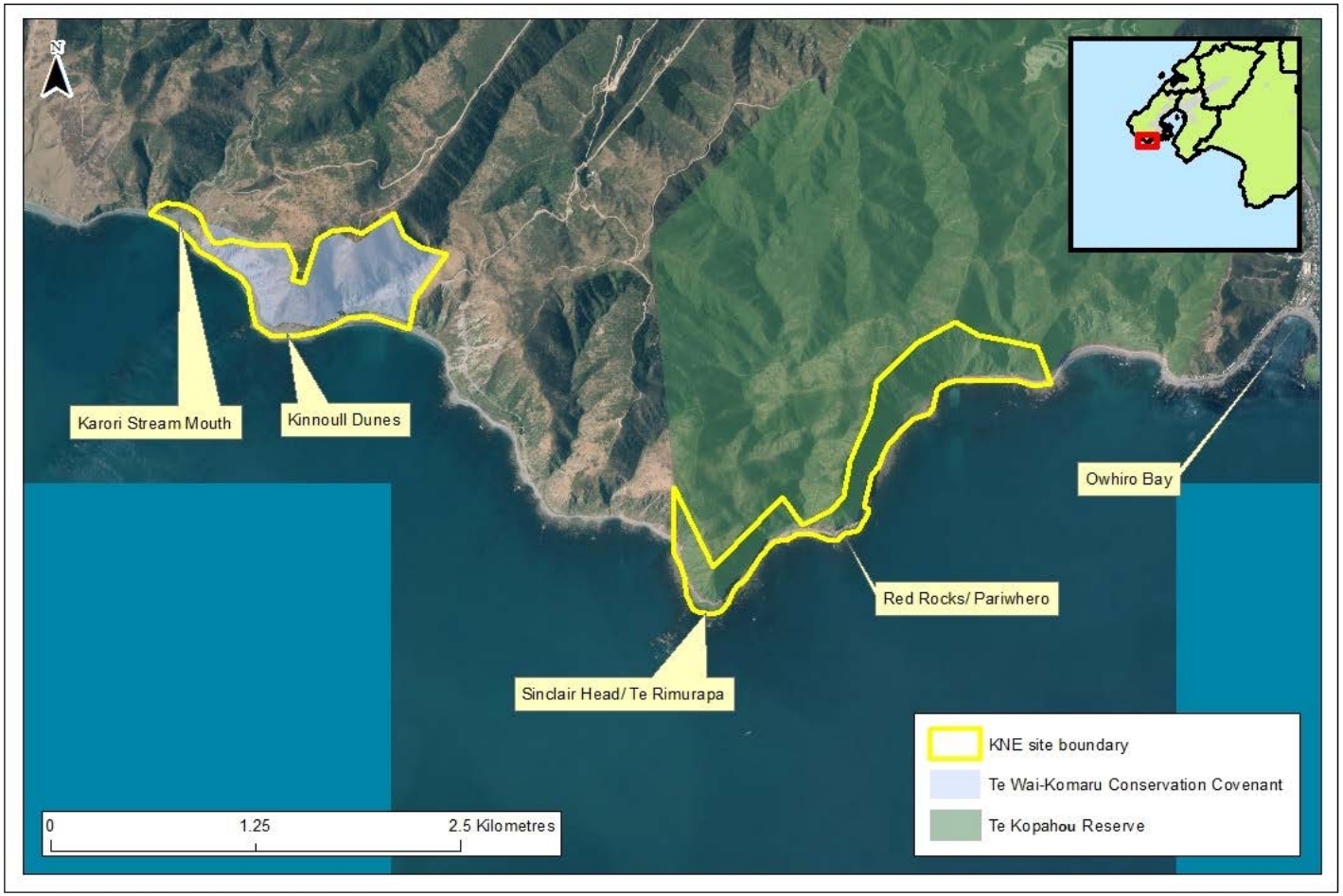
The budget for the 2017/18 and 2018/19 years are indicative only and subject to change.

WCC undertake a number of management activities that have benefit towards the KNE site (see Table 4) but are funded outside of the KNE programme budget. The funding for these management activities and are not detailed below.

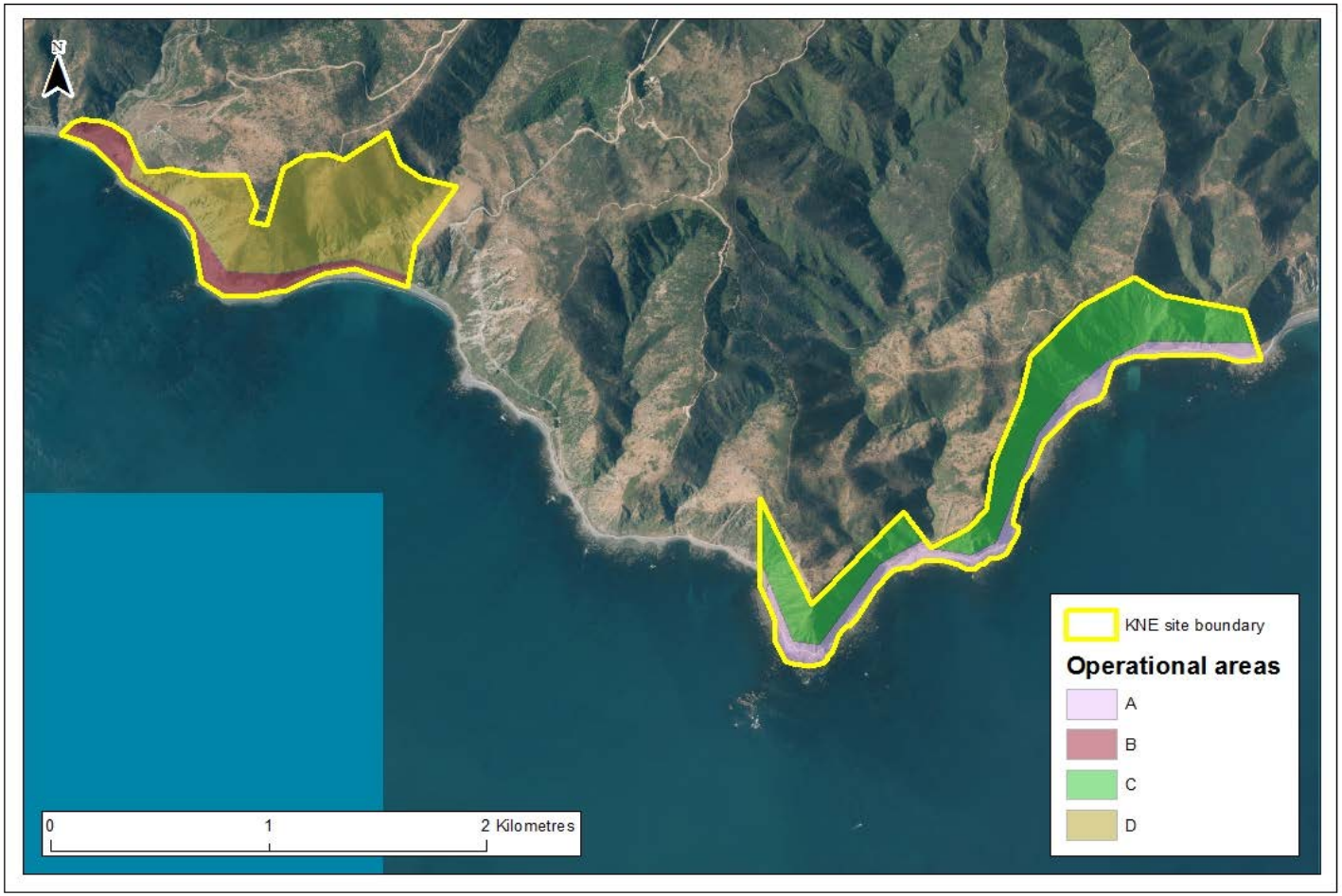
Table 6: Additional allocated budget for the Wellington South Coast KNE site from WCC

Management activity	Timetable and resourcing		
	2016/17	2017/18	2018/19
Ecological weed control	$5,000	$5,000	$5,000
Total	**$5,000**	**$5,000**	**$5,000**

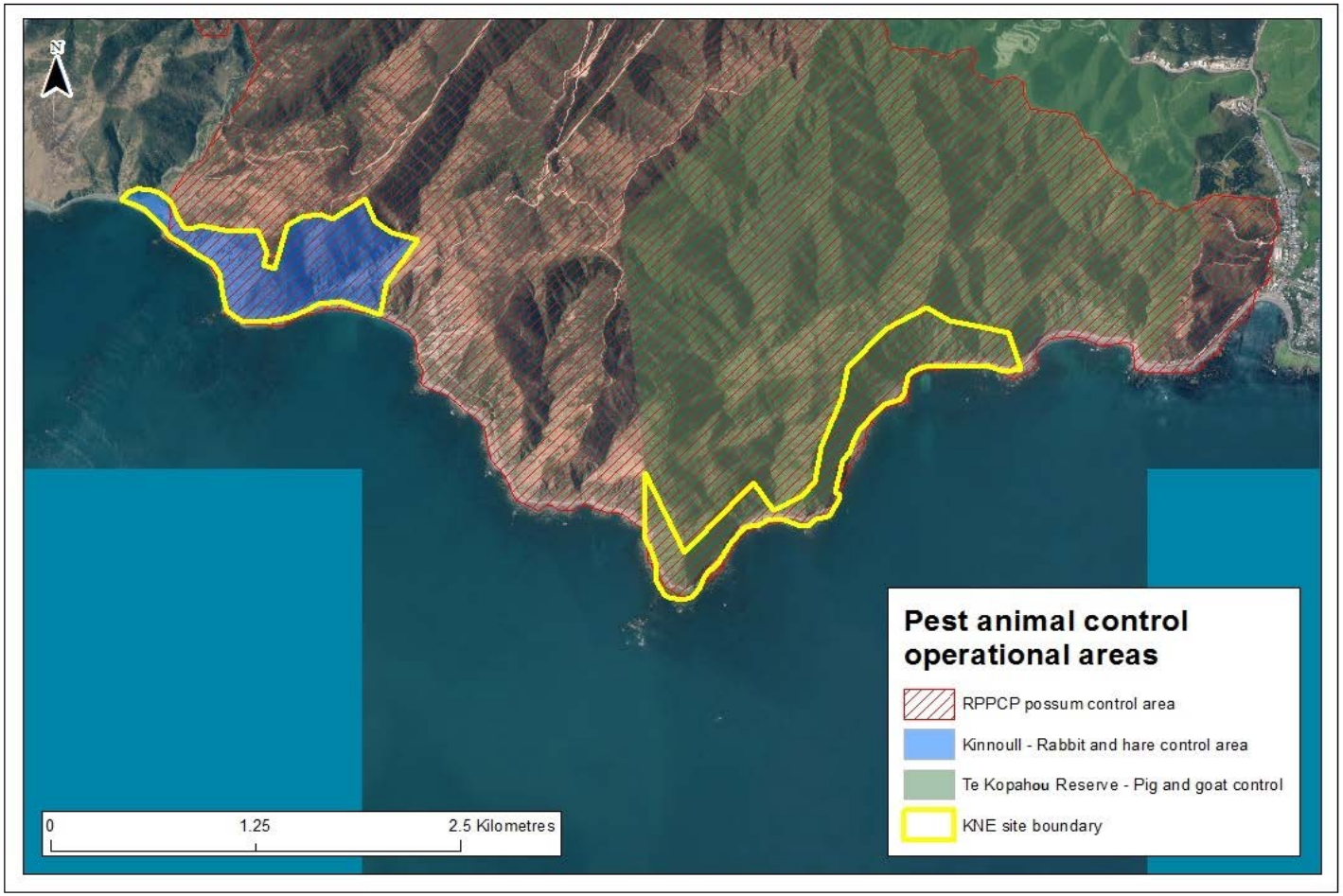
Appendix 1: Site maps



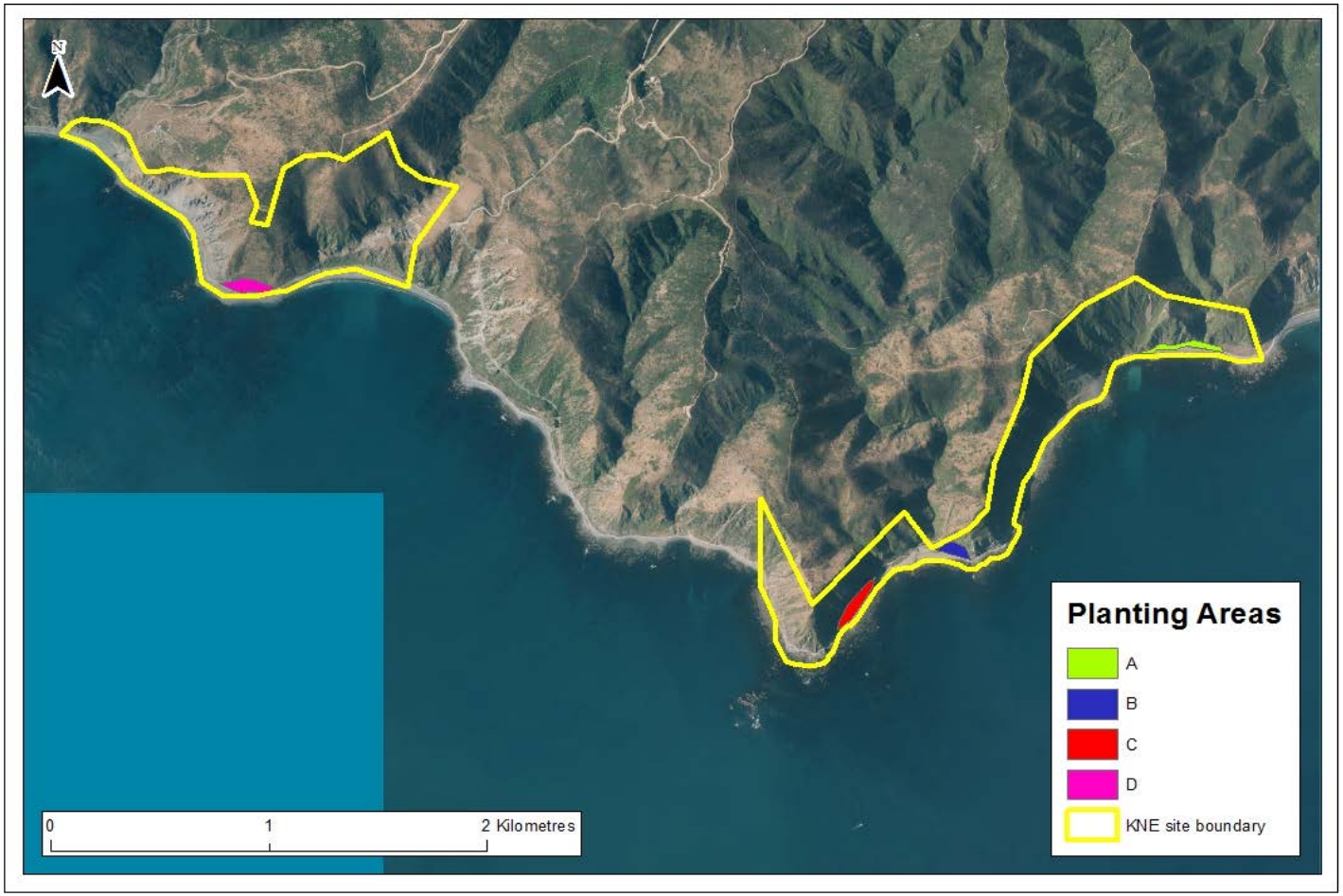
Map 1: The Wellington South Coast KNE site boundary



Map 2: Pest plant operational areas in the Wellington South Coast KNE site



Map 3: Pest animal operational areas in the Wellington South Coast KNE site and wider area



Map 4: Restoration planting 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 three-year cycle[63], with the exception of birds which are assessed on a five-year cycle[64]. 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 7: Threatened and At Risk species at the Wellington South Coast KNE site

Scientific name	Common name	Threat status	Observation
Plants(vascular)[65]			
Coprosma acerosa	Sand coprosma	At-Risk – Declining	Spence, H and Bergin, Dr D. 2009[66]
Ficinia spiralis	Pingao	At-Risk – Declining	Spence, H and Bergin, Dr D. 2009
Melicytus crassifolius	Thick-leaved mahoe	At Risk - Declining	Druce 1992[67]
Melicytus obovatus	n/a	At-Risk – Naturally Uncommon	Druce 1992
Muehlenbeckia astonii	Shrubby tororaro	Threatened – Nationally Endangered	WCC[68]
Pimelea villosa	Sand daphne	At-Risk – Declining	Spence, H and Bergin, Dr D. 2009
Poa billardierei	Sand tussock	At-Risk – Declining	Spence, H and Bergin, Dr D. 2009
Sophora molloyi	Cook strait kōwhai	At- Risk – Naturally Uncommon	Brian Thomas, WCC. pers obs. 2016.
Birds[69]			
Anthus novaeseelandiae	New Zealand pipit	At-Risk – Declining	GWRC, 2015[70]
Charadrius bicinctus	Banded dotterel	Threatened – Nationally Vulnerable	Spence, H and Bergin, Dr D. 2009
Egretta sacra	Reef heron	Threatened – Nationally Endangered	WCC
Eudyptula minor	Little penguin	At-Risk – Declining	WCC
Haematopus unicolor	Variable oystercatcher	At-Risk – Recovering	GWRC, 2015
Larus novaehollandiae	Red-billed gull	Threatened – Nationally Vulnerable	GWRC, 2015

Scientific name	Common name	Threat status	Observation
Phalacrocorax carbo	Black shag	At-Risk – Naturally Uncommon	GWRC, 2015
Sterna striata	White-fronted tern	At-Risk – Declining	GWRC, 2015
Reptiles [71]			
Oligosoma zelandicum	glossy brown	At-Risk – Declining	Milne, R and Sawyer, J. 2002. [72]
Freshwater fish[73]			
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)[74]**(terrestrial invertebrates)**[75]			
Lactrodectus katipo	Katipō Spider	At Risk - Declining	Spence, H and Bergin, Dr D. 2009
Lyperobius huttonii	Speargrass weevil	Threatened – Nationally Endangered	Spence, H and Bergin, Dr D. 2009

Appendix 4: Ecological weed species

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

Table 9: 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)	
Buddleja davidii	Buddleia	
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*	
Cortaderia spp.	Pampas	
Cotyledon orbiculata var. *orbiculata*	Pig's ear	
Crassula multicava subsp. *multicava*	Fairy crassula	
Crocosmia x *crocosmiiflora*	Montbretia	
Cytisus scoparius	Broom	
Foeniculum vulgare	Fennel	
Gazania rigens	Gazania	
Glaucium flavum	Horned poppy	
Hedera helix	English ivy	
Hydrangea macrophylla	Hydrangea	
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	

Scientific name	Common name	Notes
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
Senecio angulatus	Cape ivy	
Senecio elegans	Purple groundsel	
Silybum marianum	Variegated thistle	
Tradescantia fluminensis	Tradescantia	
Tropaeolum majus	Nasturtium	

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