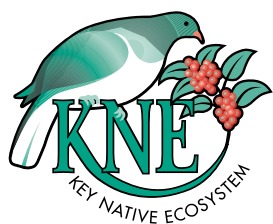


Key Native Ecosystem Plan for Paekākāriki Escarpment

2015-2018



greater WELLINGTON
REGIONAL COUNCIL
Te Pane Matua Taiao



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1. Key Native Ecosystem plans

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

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

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

GWRC's Biodiversity Strategy 2011-21¹ provides a common focus across the council's departments, and guides activities relating to biodiversity. One of its goals is: High value biodiversity areas are protected.

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

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

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

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

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

2. Paekākāriki Escarpment Key Native Ecosystem

The Paekākāriki Escarpment KNE site is located between Paekākāriki and Pukerua Bay (see Appendix 1, Map 1). It is 118 ha of land that straddles the boundary between the Kāpiti Coast District and Porirua City councils' jurisdictions. The KNE site comprises an exposed, steep coastal escarpment and contains remnant and regenerating coastal forests, grey scrub, and flaxland. The majority of the KNE site is legally protected, either by agreement between KiwiRail and the QEII National Trust, or through being within local council road reserve and recreation reserve designations.

Landowners and stakeholders

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

Landowners

The KNE site has the following three landowners.

- KiwiRail owns 110.5 ha
- New Zealand Transport Agency (NZTA), owns 1.5 ha of road reserve in the northern part of the KNE site
- Kāpiti Coast District Council (KCDC) owns 6 ha of the north of the KNE site. This is contained within the A.T. Clarke Reserve (a recreation reserve), and a road reserve

Management partners and key stakeholders

The four organisations who manage areas within the KNE site for biodiversity are GWRC, KCDC, QEII National Trust (QEII) and Nga Uruora Kāpiti Project Inc. (Nga Uruora).

Within GWRC, the Biodiversity and Biosecurity departments both have an active role in the management of the KNE site. The Biodiversity department plans and coordinates biodiversity management activities and provides biodiversity advice. The Biosecurity department carries out pest control activities.

KCDC fund the management of parts of the KNE site as an Ecological Site of Significance in accordance with the proposed Kapiti Coast District Plan². The District Plan includes rules that prevent modification to any ecological site without resource consent and identifies the need to provide non-regulatory incentives to assist landowners to effectively manage ecological sites on their property.

KiwiRail have granted QEII a 'license to occupy', which allows QEII to manage the land for biodiversity purposes. Nga Uruora has a formal management agreement with QEII to undertake biodiversity work within KiwiRail-owned land. Nga Uruora's management is guided by the Nga Uruora-Kāpiti Project Trust Strategic Plan³. Under this plan they

have undertaken pest plant and animal control, restoration planting and bird monitoring.

Te Araroa Trust is considered a stakeholder as they are responsible for the maintenance and administration of Te Araroa – New Zealand’s Trail, part of which passes through the KNE site.

Ecological values

Ecological values are a way to describe indigenous biodiversity found at a site, and what makes it special. These ecological values can be various components or attributes of ecosystems that determine an area’s importance for the maintenance of regional biodiversity. Examples of values are the provision of important habitat for a threatened species, or particularly intact remnant vegetation typical of the ecosystem type. The ecological values of a site are used to prioritise allocation of resources to manage KNE sites within the region.

The KNE site lies within the Cook Strait Ecological District⁴, characterised by a maritime climate with frequent gales, and annual rainfall of c.1200 mm.

39.42 ha of the northern part of the KNE site has been classified as a Significant Ecological Site (K135: Pukerua Bay Coastal Scarp) within the KCDC District Plan⁵.

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

Threatened environments: The Threatened Environment Classification⁶ has identified areas within the KNE site as Acutely Threatened (1 ha), Critically Under-protected (36 ha) and At Risk (2.5 ha). The remainder of the KNE site is not classified within the Threatened or At Risk categories. See Appendix 1, Map 2.

Threatened species: The New Zealand Threat Classification system⁷ lists four Threatened or At Risk plant species and three Threatened or At Risk bird species nationally (see Appendix 2) within the KNE site. Three regionally threatened plant species are present within the KNE site (see Appendix 3).

The Singers and Rogers (2014)⁸ classification of pre-human vegetation indicates the KNE site would have predominantly comprised of coprosma and muehlenbeckia shrubland/herbfield/rockland (CL3) on the steeper slopes of the site. A kohekohe/tawa forest (MF6) would have been present throughout the remainder of the KNE site. There is currently only 15% of the original extent of MF6 forest type remaining in the Wellington region making it a regionally threatened ecosystem⁹. Elements of MF6 and CL3 vegetation types still remain within the KNE site today. However, the KNE site has been more recently described as containing the following vegetation types^{10,11}:

- Kohekohe-māhoe forest: Located in the A.T. Clarke Reserve
- Kohekohe-māhoe-akiraho-nīkau forest: Located in the central part of the KNE site
- Ngaio-māhoe-karaka forest: Isolated patches are present at the southern end of the KNE site
- Mingimingi-wharariki scrub-flaxland: This exposed scrub-flaxland of mingimingi (*Coprosma propinqua*) and wharariki (*Phormium cookianum*) contains

emergent cabbage trees (*Cordyline australis*) and is spread throughout the southern and central parts of the KNE site

- Kānuka forest: Wind-shorn kānuka (*Kunzea robusta*) forest is present in the central section of the KNE site
- Grey scrub: This ecosystem type is dominated by *Coprosma propinqua*. Other species present include thick-leaved māhoe (*Melicytus crassifolius*), shrubby pōhuehue (*Muehlenbeckia complexa*), coastal tree daisy (*Olearia solandri*), and tauhinu (*Ozothamnus leptophyllus*). Grey scrub is scattered throughout the KNE site.

Over 100 indigenous plant species have been recorded in the KNE site¹². Canopy species include kohekohe (*Dysoxylum spectabile*), māhoe (*Melicytus ramiflorus*), akiraho (*Olearia paniculata*) and nīkau (*Rhopalostylis sapida*). Other less common species present include pigeonwood (*Hedycarya arborea*), tītoki (*Alectryon excelsus*), māpou (*Myrsine australis*), ngaio (*Myoporum laetum*) and the non-local native karaka (*Corynocarpus laevigatus*). The New Zealand iris (*Libertia peregrinans*) and large leaf milk tree (*Streblus banksii*) are also present.

The KNE site is known to support native bird species including bellbird (*Anthornis melanora*), tūī (*Prothemadera novaeseelandiae*), New Zealand falcon (*Falco novaeseelandiae*), New Zealand pipit (*Anthus novaeseelandiae*) and grey warbler (*Gerygone igata*)¹³.

There are no records for lizard species within the KNE site. However, it is likely that common species of lizard such as the glossy brown skink (*Oligosoma zelandicum*), northern grass skink (*O. polychroma*), copper skink (*O. aeneum*) and Raukawa gecko (*Woodworthia maculata*) are present given the suitability of the habitat and records of these species within 2 km of the KNE site at Pukerua Bay¹⁴.

Key threats to ecological values at the site

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

Ecological weeds are considered the biggest threat to these values within the KNE site, with the largest infestations present at its northern and southern sectors. Ecological weeds are, however, widespread across the entire KNE site (see Appendix 4 for more information) and are known to consistently invade the KNE site due to its disturbed and largely open habitat, and as a result of garden dumping.

Pest animals such as rats (*Rattus* spp.), mustelids (*Mustela* spp.) and feral cats (*Felis catus*) are likely to be preying on indigenous fauna in the KNE site. Possums (*Trichosurus vulpecula*) are likely to be affecting the condition and composition of indigenous vegetation by over-browsing. Sheep occasionally escape from neighbouring farms and access the site where they can damage vegetation through browsing.

While the key threats discussed in this section are recognised as the most significant, a number of other threats to the KNE site have also been identified. Table 1 presents a

summary of all known threats to the KNE site (including those discussed above), detailing which operational areas they affect, how each threat impacts on ecological values, and whether they will be addressed by the proposed management activities.

Table 1: Threats to ecological values present at the Paekākāriki Escarpment KNE site

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

Threat code	Threat and impact on biodiversity in the KNE site	Operational area/location
Ecological weeds		
EW-1	Climbing weeds can smother native vegetation causing canopy collapse and preventing natural regeneration from occurring. Key species include climbing asparagus (<i>Asparagus scandens</i>), cape ivy (<i>Senecio angulatus</i>), banana passionfruit (<i>Passiflora</i> spp), English ivy (<i>Hedera helix</i>) and German ivy (<i>Senecio mikanoides</i>)	Entire KNE site
EW-2	Woody weeds can outcompete and displace indigenous vegetation and prevent or slow natural regeneration. Key species include boxthorn (<i>Lycium ferocissimum</i>), boneseed (<i>Chrysanthenoides monilifera</i>), brush wattle (<i>Paraserianthes lophantha</i>) and non-local natives such as karo (<i>Pittosporum crassifolium</i>) and karaka (<i>Corynocarpus laevigatus</i>)	Entire KNE site
EW-3	Broadleaf groundcover weeds can form complete cover on the forest floor preventing natural regeneration. Key species include periwinkle (<i>Vinca major</i>) and tradescantia (<i>Tradescantia fluminensis</i>)	Entire KNE site
EW-4	Invasive grasses spread aggressively and form thick swards that displace native vegetation and prevent natural regeneration. Key species include kikuyu grass (<i>Pennisetum clandestinum</i>) and pampas grass (<i>Cortaderia selloana</i> C. jubata)	Entire KNE site
Pest animals		
PA-1	Possums (<i>Trichosurus Vulpecula</i>) browse palatable canopy vegetation until it can no longer recover ^{15,16} . This destroys the forest's structure, diversity and function. Possums also prey on native birds ¹⁷ and invertebrates	Entire KNE site
PA-2	Mustelids (stoats ^{18,19} (<i>Mustela erminea</i>)), ferrets ^{20,21} (<i>M. furo</i>) and weasels ^{22,23} (<i>M. nivalis</i>) prey on native birds, lizards and invertebrates, reducing their breeding success and potentially causing local extinctions	Entire KNE site
PA-3	Rats (<i>Rattus</i> 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 ^{24,25}	Entire KNE site
PA-4	Hedgehogs (<i>Erinaceus europaeus</i>) prey on native invertebrates ²⁶ , lizards ²⁷ and the eggs ²⁸ and chicks of ground-nesting birds ²⁹	Entire KNE site

Threat code	Threat and impact on biodiversity in the KNE site	Operational area/location
PA-5*	Rabbits (<i>Oryctolagus cuniculus</i>) and hares (<i>Lepus europaeus</i>) are known to graze on palatable native vegetation and prevent natural regeneration in some environments ³⁰ . In drier times hares especially will penetrate into wetland forest areas browsing and reducing regenerating native seedlings	Entire KNE site
PA-6*	Feral and domestic cats (<i>Felis catus</i>) prey on native birds ³¹ , lizards ³² and invertebrates ³³ , reducing native fauna breeding success and potentially causing local extinctions ³⁴	Entire KNE site
PA-7*	House mice (<i>Mus musculus</i>) 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 lizards, small eggs and nestlings ^{35,36}	Entire KNE site
Human activities		
HA-1*	Management activities associated with rail corridor maintenance pose a fire risk as vegetation within the site is flammable (eg, rank grassland and kānuka)	Entire KNE site
HA-2*	Rubbish dumping can attract rodents and also spread ecological weeds	Site boundary
HA-3	Agricultural practices, particularly sheep incursions through weak points in fences from neighbouring farms, can result in pugging soils, the grazing of native vegetation which inhibits regeneration, wildlife disturbance and increasing nutrient content of soils and watercourses ³⁷	Eastern site boundary
Other threats		
OT-1*	Landslides caused by the erosion-prone underlying geology, occasional high rainfall events, and steepness of the terrain can cause habitat loss and provide disturbed areas for ecological weed invasion	Entire KNE site

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

3. Objectives and management activities

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

Objectives

The following objectives will guide the management activities at the Paekākāriki Escarpment KNE site.

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

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

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

Management activities

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

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

The main management activities undertaken within the KNE site are ecological weed control, pest animal control and revegetation. These activities are undertaken to increase native plant dominance and reintroduce native plant species to the site. In turn, this will increase native plant regeneration, and improve habitat quality for indigenous fauna such as birds and lizards. For practicality of management the KNE site has been divided into six operational areas: A to F (See Appendix 1, Map 3).

Ecological weed control

KCDC and Nga Uruora will control ecological weeds within the KCDC district boundaries of the KNE site (operational areas A-C). GWRC will manage ecological weeds within the remainder of the KNE site (operational areas D-F).

Within the KNE site GWRC's approach to ecological weeds is to control the weed species that have the greatest ecological impact. This includes controlling climbing species such as English ivy, banana passionfruit, and climbing asparagus, woody weed species such as boxthorn, karo and boneseed, and exotic grass species such as pampas and kikuyu. The steep cliffs in some areas of the KNE site and the bordering high-speed transport corridors are, however, too dangerous to access. As a result, boxthorn and karo located at the foot of the escarpment between the rail corridor and State Highway 1, and ecological weeds on the cliff faces will not be controlled by GWRC.

To provide a clear transport corridor along the rail line and to reduce the abundance of ecological weeds, KiwiRail contractors will control English ivy, periwinkle, boxthorn and

cape ivy. They do this where possible and to the best of their ability in the course of their weed sweeps through the rail corridor within 5 m of track centre line and to a maximum of 20 m from any third party property boundary.

A full list of weed species and their ecological impact in the KNE site is provided in Appendix 4.

Pest animal control

The pest animal control network at the KNE site (see Appendix 1, Map 4) is serviced on a fortnightly basis by Nga Uruora and includes 42 Pelifeed poison bait stations and 22 DOC 200 kill-traps that target possums, rats and mustelids. GWRC and KCDC provide Nga Uruora with poison bait to maintain this network. From 2016/17, GWRC will undertake an annual health and safety audit and service of the network. A small network of Timms kill-traps, targeting possums has fallen out of regular servicing.

GWRC and Nga Uruora are currently reviewing options for effective pest animal control across the whole KNE site. GWRC and Nga Uruora will collaborate to design a more effective pest animal control network within three years of this KNE Plan being published.

GWRC, under the Regional Possum Predator Control Programme (RPPCP)³⁸, has installed and continues to maintain approximately 300 poison bait stations on farmland adjacent to the KNE site. This programme aims to reduce the numbers of pest animals to a residual trap catch of 5% or lower in the wider landscape. This programme provides benefits to the KNE site by preventing possum reinvasion.

Revegetation

The objectives of revegetation are to increase native plant dominance and reintroduce indigenous plant species that would have been present in the past but are now absent from the KNE site³⁹.

Nga Uruora undertakes all revegetation within the KNE site using eco-sourced plants. They plant approximately five hundred native plants annually and use the following strategic approach to guide revegetation activities:

- Plant along the stream corridor in operational areas B and C. Species planted include flax, coastal tree daisy and toetoe (*Austroderia* spp.)
- Plant along existing tracks (in operational areas A, B, C & D). Species planted include akiraho, coastal tree daisy and karamū (*Coprosma robusta*)
- Plant around the quarry (in operational area C). Species planted include tauhinu, coastal tree daisy and mānuka (*Leptospermum scoparium* var. *scoparium*)
- Enrichment planting, using tawa (*Beilschmiedia tawa*), tōtara (*Podocarpus totara*) and northern rātā (*Metrosideros robusta*), will be done in selected sites along the escarpment (in operational areas A, B, and C). These plants are donated by Project Crimson, a charitable trust that aims to protect New Zealand's endangered pohutukawa and rātā trees

- Nga Uruora will also plant individual clusters of approximately 10 trees (mainly mānuka and kānuka) in parts of the escarpment within operational areas B, C and D, which currently have poor tree coverage.

Nga Uruora volunteers will undertake weed control to release plants from weeds in all revegetation areas. Stream plantings will be weeded in the 2015/2016 spring and summer season and, if required, Nga Uruora volunteers will water planted trees in dry conditions.

Community engagement

Nga Uruora will engage the Paekākāriki community through regular public meetings and their newsletter *The Coprosmopolitan*.

Monitoring

Nga Uruora undertakes bird monitoring annually within the KNE site using the five minute bird count (5MBC) methodology⁴⁰. This will continue on an annual basis and be used to inform future management for native bird species. The 5MBC is currently undertaken in operational area E.

Nga Uruora is currently investigating opportunities to expand the survey area to include the central part of the KNE site (operational areas D and E).

Fencing

In the course of operations GWRC, KCDC and Nga Uruora will inform the adjoining landowners if sheep have accessed the escarpment and when breaks in the fence have been identified.

Lizard survey

Nga Uruora will investigate the potential for undertaking lizard surveys within the KNE site. If undertaken these will investigate if lizards are present in selected habitats across the KNE site which have similar characteristics to the nearby Pukerua Coast KNE site, where threatened lizard species are present.

4. Operational plan

The operational plan shows the actions planned to achieve the stated objectives for the Paekākāriki Escarpment KNE site, and their timing and cost over the three-year period from 1 July 2015 to 30 June 2018. The budget for the 2016/17 and 2017/18 years are indicative only and subject to change. A map of operational areas can be found in Appendix 1 (see Map 2).

Table 2: Three-year operational plan for the Paekākāriki Escarpment KNE site

Objective	Threat	Activity	Operational area	Delivery	Description/detail	Target	Timetable and resourcing		
							2015/16	2016/17	2017/18
1	EW-1, EW-3	Ecological weed control	A,B,C	Nga Uruora	Control spraying of blackberry, German ivy, climbing asparagus, Cape ivy, tradescantia	Reduction in distribution and abundance of target ecological weeds	\$5,000	\$5,000	\$5,000
1	EW-1,	Ecological weed control	A	KCDC	Spraying of blackberry, and German ivy and tradescantia in A.T Clarke reserve	Reduction in distribution and abundance of target ecological weeds	\$3,000	\$3,000	\$3,000
1	EW-1, EW-2	Ecological weed control	B,C	KCDC and Nga Uruora	Cut and stump treat woody weeds including brush wattle, tree lucerne and boxthorn. Spray blackberry, German ivy and climbing asparagus	Reduction in distribution and abundance of target ecological weeds	Nil	Nil	Nil
1	EW-1	Ecological weed control	D,E,F	Biosecurity department	Cut and knapsack or gun and hose spray of cape ivy and English ivy. Initial works in 2015/16 and 2017/18 with follow up work in each year	Reduction in distribution and abundance of target ecological weeds	\$7,500	\$3,500	\$7,500
1	EW-2	Ecological weed control	D,E,F	Biosecurity department	Woody weed sweep involving hand-pulling of weeds or cut and stump treatment	Reduction in distribution and abundance of target ecological weeds	Nil	\$4,000	Nil

Objective	Threat	Activity	Operational area	Delivery	Description/detail	Target	Timetable and resourcing		
							2015/16	2016/17	2017/18
1	EW-1, EW-4	Ecological weed control	D,E,F	Biosecurity department	Knapsack spray of pampas grass and climbing rose control at southern part of KNE escarpment	Reduction in distribution and abundance of ecological weeds	\$500	\$500	\$500
2	PA-1, PA-2, PA-3, PA-4	Pest animal control	Entire KNE site	GWRC and KCDC	Purchase bait and provided it to Nga Uruora	Provide bait to Nga Uruora	\$1,450	\$1,450	\$1,450
1,2	PA-1, PA-2, PA-3, PA-4	Pest animal control	Entire KNE site	Nga Uruora	Service traps and bait stations monthly	Possums <5% RTC*	Nil	Nil	Nil
1,2	PA-1, PA-2, PA-3, PA-4	Pest animal control	Entire KNE site	Biosecurity department	Annual health and safety audit and service	Possums <5% RTC*	Nil	\$1,700	\$1,700
2	PA-1, PA-2, PA-3, PA-4	Monitoring	A	Nga Uruora	5 minute bird counts (repeat at site of previous years count)	1 X 5MBC count completed per year	Nil	Nil	Nil
1	EW-1, EW-2, EW-3, EW-4	Revegetation	A,B,C	Nga Uruora	Purchase potting mix and plant 500 assorted native trees per year including enrichment species	70 % survival rate	\$500	\$500	\$500
Total							\$17,950	\$19,650	\$19,650

*RTC= Residual Trap Catch. The control regime has been created 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.

5. Funding summary

GWRC budget

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

Table 3: GWRC Allocated budget for the Paekākāriki Escarpment KNE site

Management activity	Timetable and resourcing		
	2015/16	2016/17	2017/18
Ecological weed control	\$8,000	\$8,000	\$8,000
Pest animal control	\$900	\$2,600	\$2,600
Total	\$8,900	\$10,600	\$10,600

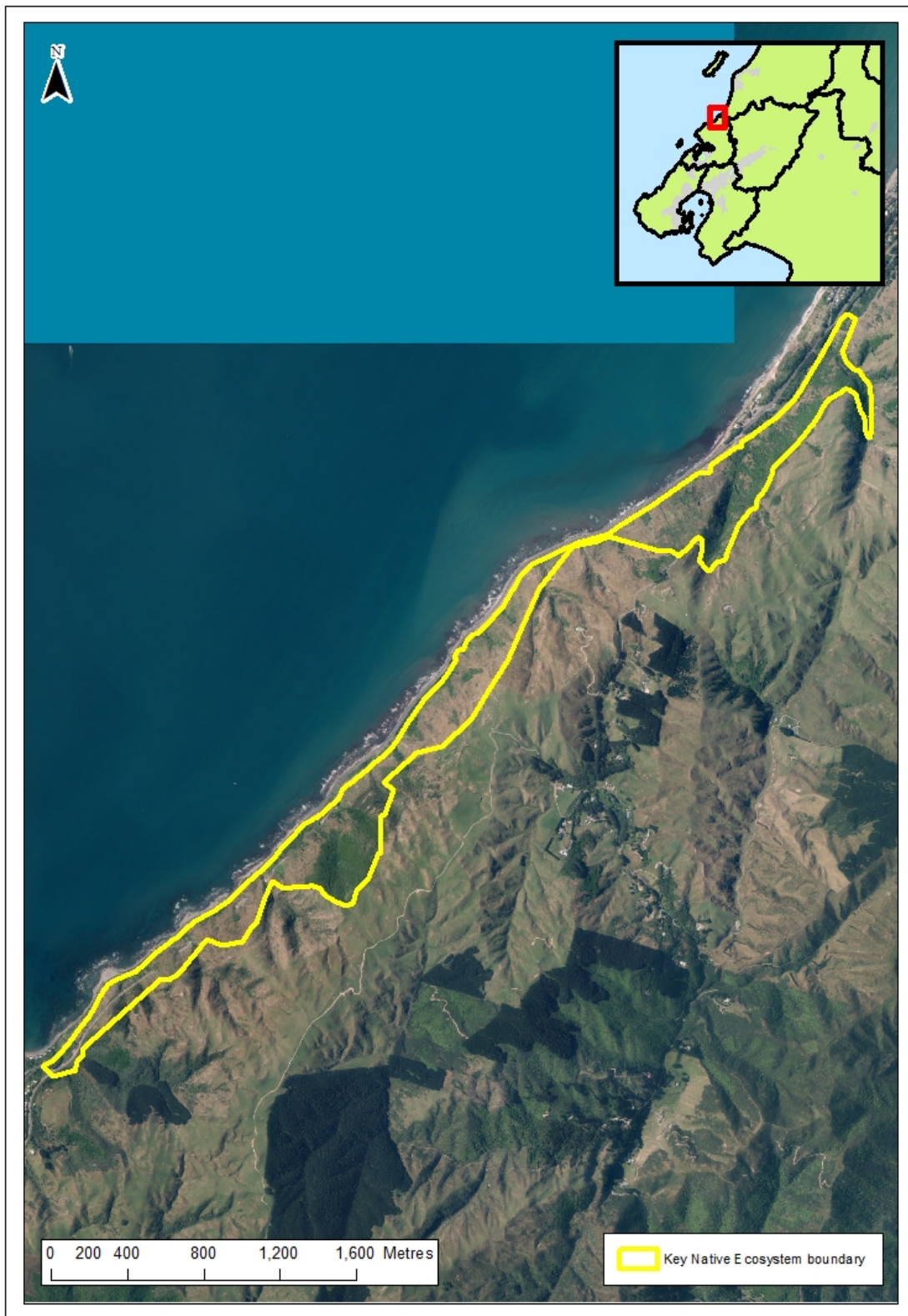
Other contributions

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

Table 4: Additional allocated budget from Nga Uruora Trust and KCDC for the Paekākāriki Escarpment KNE site

Management activity	Timetable and resourcing		
	2015/16	2016/17	2017/18
Ecological weed control (Nga Uruora)	\$5,000	\$5,000	\$5,000
Ecological weed control (KCDC)	\$3,000	\$3,000	\$3,000
Pest animal control (KCDC)	\$550	\$550	\$550
Re-vegetation (Nga Uruora)	\$500	\$500	\$500
Total	\$9,050	\$9,050	\$9,050

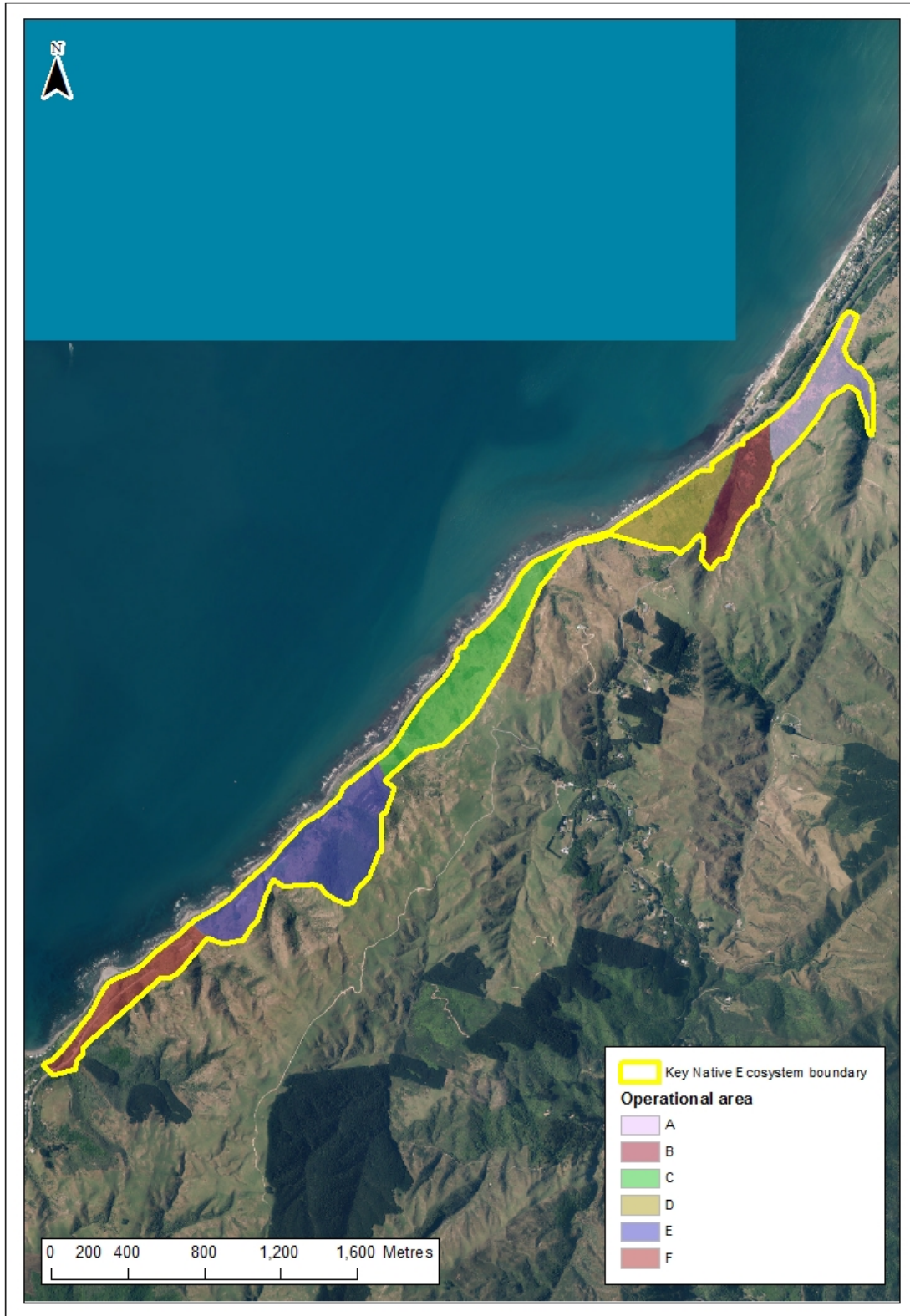
Appendix 1: Site maps



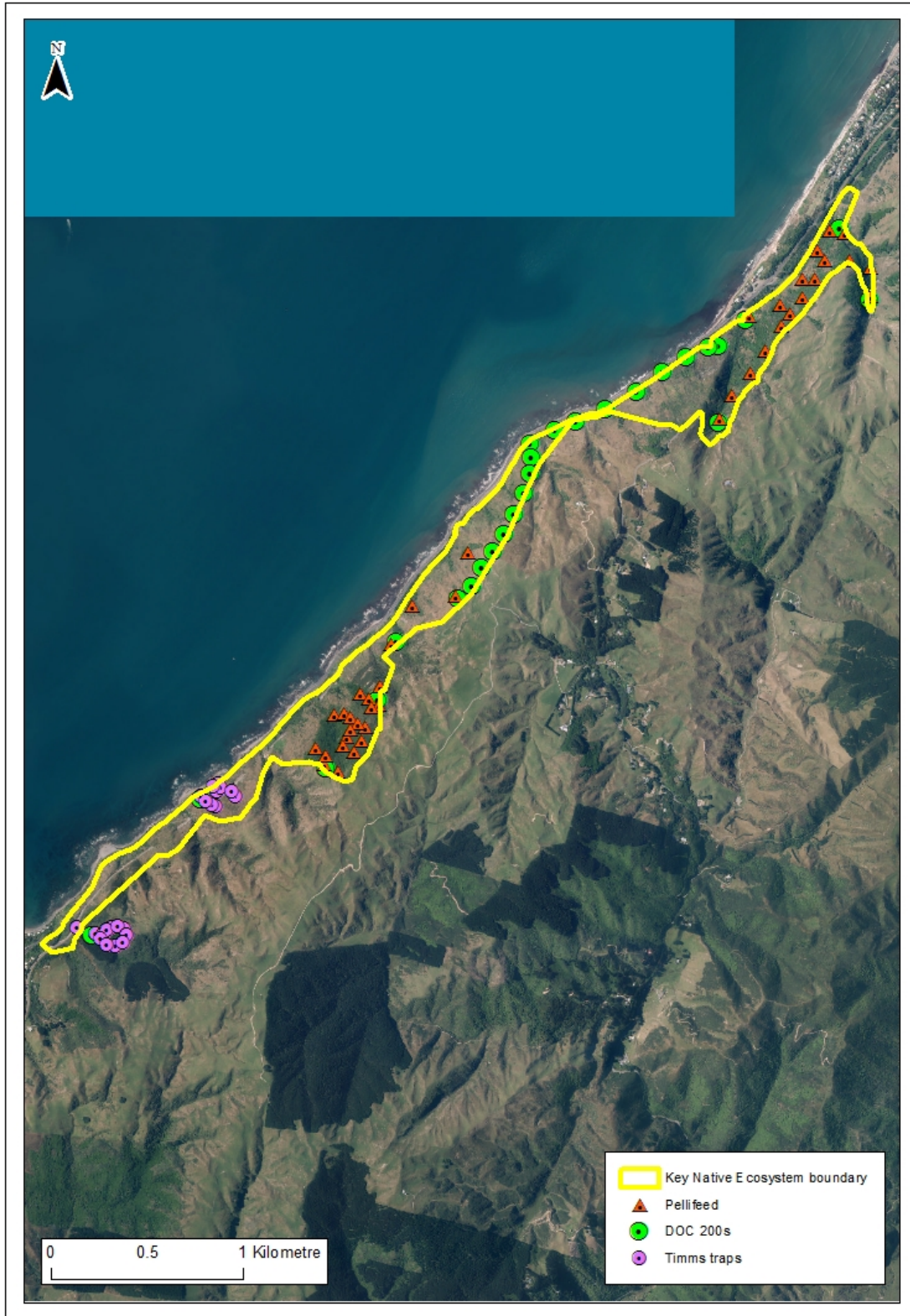
Map 1: Paekākāriki Escarpment KNE site boundary



Map 2: Land Environment New Zealand threat classification map for the Paekākāriki Escarpment KNE site (LENZ copyright Ministry for the Environment/Landcare Research)



Map 3: Operational areas in the Paekākāriki Escarpment KNE site



Map 4: Pest animal control in the Paekākāriki Escarpment KNE site

Appendix 2: 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 cycle⁴¹ with the exception of birds, which are assessed on a five-year cycle⁴². 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. Table 5 lists Threatened and At Risk species that are resident or regular visitors to the KNE site.

Table 5: Threatened and At Risk species recorded in the Paekākāriki Escarpment KNE site

Scientific name	Common name	Threat status	Observation
Plants (vascular)⁴³			
<i>Libertia peregrinans</i>	New Zealand iris, mikoikoi	Threatened-Nationally Vulnerable	NZPCN 2015 ⁴⁴
<i>Melicytus crassifolius</i>	Thick-leaved māhoe	At Risk-Declining	NZPCN 2015; Wassilieff 2010
<i>Arthropodium bifurcatum</i>	Rengarenga lily	At Risk-Relict	(Planted) Wassilieff 2010
<i>Streblus banksii</i>	Large-leaved milk tree	At Risk-Relict	(Planted) Wassilieff 2010; Wellington Botanical Society 2011 ⁴⁵
Birds⁴⁶			
<i>Falco novaeseelandiae</i> "bush"	Bush falcon	Threatened-Nationally Vulnerable	http://ebird.org/content/newzealand/ (accessed 22/01/2014) ⁴⁷
<i>Acanthisitta chloris granti</i>	North Island rifleman	At Risk-Declining	http://ebird.org/content/newzealand/ (accessed 22/01/2014)
<i>Anthus novaeseelandiae</i>	New Zealand pipit	At Risk-Declining	http://ebird.org/content/newzealand/ (accessed 22/01/2014)

Appendix 3: Regionally threatened plant species list

The following table lists regionally threatened plant species that have been recorded in the Paekākāriki Escarpment KNE site. The threat status of plant species is listed in the Plant Conservation Strategy for Wellington Conservancy 2004-2010⁴⁸.

Table 6: Regionally threatened plant species recorded in the Paekākāriki Escarpment KNE site

Scientific name	Common name	Threat status	Source
<i>Libertia peregrinans</i>	New Zealand iris, mikoikoi	Regionally Critical	NZPCN 2015 ⁴⁹
<i>Streblus banksii</i>	Large-leaved milk tree	Regionally Endangered	(Planted) Wassilieff 2010; Wellington Botanical Society 2011 ⁵⁰
<i>Melicytus crassifolius</i>	Thick-leaved māhoe	Gradual Decline	NZPCN 2015; Wassilieff 2010

Appendix 4: Ecological weed species

Ecological weed species recorded in Paekākāriki Escarpment KNE site are listed below.

Table 7: Ecological weed species recorded in the Paekākāriki Escarpment KNE site

Scientific Name	Common Name	Weed tier	Ecological impact*
<i>Acacia mearnsii</i>	Black wattle	Woody weed	High
<i>Agapanthus praecox</i> subsp. <i>orientalis</i>	Agapanthus	Groundcover	Moderate
<i>Allium triquetrum</i>	Onion weed	Groundcover	Low
<i>Alnus glutinosa</i>	Alder	Woody weed	Moderate
<i>Asparagus scandens</i>	Climbing asparagus	Climber	Severe
<i>Calystegia silvatica</i>	Convolvulus	Climber	Moderate
<i>Carpobrotus edulis</i>	Ice plant	Groundcover	Low
<i>Chamaecytisus prolifer</i>	Tree lucerne	Woody weed	Low
<i>Chrysanthemoides monilifera</i> subsp. <i>monilifera</i>	Boneseed	Woody weed	Severe
<i>Clematis vitalba</i>	Old man's beard	Climber	Severe
<i>Cortaderia selloana</i>	Pampas	Exotic grass	Severe
<i>Corynocarpus laevigatus</i>	Karaka	Woody weed	Severe
<i>Crocasmia</i> × <i>crocosmiiflora</i>	Montbretia	Groundcover	Low
<i>Cyperus eragrostis</i>	Umbrella sedge	Groundcover	Low
<i>Cytisus scoparius</i>	Broom	Woody weed	Moderate
<i>Hedera helix</i>	English Ivy	Climber	Severe
<i>Ipomoea indica</i>	Morning glory	Climber	High
<i>Lathyrus latifolius</i>	Everlasting pea	Climber	Moderate
<i>Lilium formanosum</i>	Formosan lily	Groundcover	Moderate
<i>Lupinus arboreus</i>	Tree lupin	Woody weed	Moderate
<i>Lycium ferocissimum</i>	Boxthorn	Woody weed	High
<i>Metrosideros excelsa</i>	Pōhutukawa	Woody weed	High
<i>Paraserianthes lophantha</i>	Brush wattle	Woody weed	High
<i>Passiflora</i> sp.	Banana passionfruit	Climber	Severe
<i>Pelargonium</i> sp.	Geranium	Groundcover	Low
<i>Pennisetum clandestinum</i>	Kikuyu grass	Exotic grass	High
<i>Pinus</i> spp.	Pine	Woody weed	High
<i>Pittosporum crassifolium</i>	Karo	Woody weed	Severe
<i>Rosa rubiginosa</i>	Brier rose	Climber	High
<i>Rubus fruticosus</i> agg.	Blackberry	Climber	High
<i>Rumex sagittatus</i>	Climbing dock	Climber	Low
<i>Senecio angulatus</i>	Cape ivy	Climber	Severe
<i>Senecio mikanioides</i>	German ivy	Climber	High
<i>Tradescantia fluminensis</i>	Tradescantia	Groundcover	High
<i>Tropaeolum majus</i>	Nasturtium	Climber	Moderate
<i>Ulex europaeus</i>	Gorse	Woody weed	High
<i>Vinca major</i>	Periwinkle	Groundcover	Moderate

*Ecological impact determined by a GWRC Biodiversity Officer

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