

# Key Native Ecosystem Plan for Porirua Western Forests

2018-2021



greater WELLINGTON  
REGIONAL COUNCIL  
Te Pane Matua Taiao





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## 1. Key Native Ecosystem plans

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 (Greater Wellington) Biodiversity Strategy<sup>1</sup> sets a framework that guides how Greater Wellington protects and manages biodiversity in the Wellington region to work towards the vision below.

**Greater Wellington’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. The vision 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 operational plans prepared by Greater Wellington's Biodiversity department. Greater Wellington works with landowners, mana whenua and other operational delivery providers to achieve mutually beneficial goals.

## **2. Porirua Western Forests Key Native Ecosystem site**

The Porirua Western Forests KNE site (315 ha) covers a series of forested ridges and valleys immediately west of Porirua City centre (see Appendix 1, Map 1). The KNE site is the largest remnant of indigenous forest in the Porirua City area and comprises coastal and lowland broadleaved-podocarp forest and regenerating scrub, which is at an advanced stage.

The KNE site is well connected within the wider ecological landscape. Most of the KNE site is within Porirua Scenic Reserve, one of several reserves in the western hills of Porirua. It is part of an important wildlife corridor that links the Wellington south coast to the Porirua coastline.

## **3. Parties involved**

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

### **Landowners**

Much of the KNE site is public land or reserve (263 ha) managed by Porirua City Council (PCC), including a small area of Crown land. The Porirua Scenic Reserve has Scenic 'A' Reserve classification and is managed in accordance with PCC's Porirua City Reserves Management Plan which provides for the protection and enhancement of heritage, natural and recreation values<sup>2</sup>.

DOC own the Raiha Street Conservation Area (see Appendix 1, Map 2 for land ownership).

Dan and Prudence Stevenson own Pikarere Farm, of which 49 ha is included within the KNE site. There is an extensive pest animal control network beyond the KNE site boundary covering large parts of Pikarere Farm.

### **Operational delivery**

The primary management partners are Greater Wellington and PCC, which jointly fund the management activities detailed in this plan. Within Greater Wellington, the

Biodiversity department coordinates biodiversity management activities and provide biodiversity advice, and the Biosecurity department undertake pest animal and plant control.

**Mana Whenua partners**

The Porirua Western Forests KNE site is a site of significance for Ngāti Toa Rangatira (see Table 1) and they are aware that their areas of interest are located on PCC land.

The PCC Reserves Management Plan permits plant material to be collected from Porirua Scenic Reserve for rongoā Māori.

**Table 1: Ngāti Toa Rangatira sites of significance relevant to the Porirua Western Forest KNE site<sup>3</sup>**

Sites of significance	Mana whenua values
Takapūwāhia Stream	wāhi tapu, urupā, wāhi tūpuna, wāhi maumahara, kāinga, marae, wai ora, wai māori, marae, kai awa, nohoanga, tauranga waka, rongoā, puna raranga, tohu whenua

**4. 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 Porirua Western Forests KNE site is significant because it comprises one of the best remaining representative examples of coastal kohekohe-podocarp and semi-coastal tawa-podocarp forest in the Wellington region. The KNE site is in the Wellington Ecological District<sup>4</sup>, which is characterised by steep, strongly-faulted hills. It has a mild, humid coastal climate<sup>5</sup>.

The KNE site has good ecological linkages to other natural areas, providing opportunities for seed dispersal by birds. The Whitireia Coast KNE site lies 3 km north-east, and the Karehana Bay Bush and Taupō Swamp Complex KNE sites are a further 2 km away. Mana Island is 4 km off shore to the north-west.

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

**Threatened environments:** The Threatened Environment Classification system (LENZ)<sup>6</sup> indicates that the majority (307 ha) of the KNE site is classified as At-Risk with 20-30% indigenous vegetation remaining nationally within this type of land environment. Some areas of the KNE site are classified as Acutely Threatened (2.8 ha) and Chronically Threatened (9.4 ha), while some is regarded as Less Reduced and Better Protected (2.6 ha) (see Appendix 1, Map 3).

**Threatened species:** The New Zealand Threat Classification system<sup>7</sup> lists three At Risk plant species within the KNE site. The fauna includes one Nationally Threatened species and six At Risk species (listed in Appendix 2).

The Singers and Rogers (2014)<sup>8</sup> classification of pre-human vegetation indicates that the KNE site comprised kohekohe/tawa forest (MF6), and tawa/kamaha/podocarp forest (MF7). It is estimated that these forest types have only 15% (MF6) and 21% (MF7) of the original extent remaining in the Wellington region<sup>9</sup>, making them regionally threatened and At Risk ecosystem types respectively.

The present day forest comprises coastal and semi-coastal tawa (*Beilschmiedia tawa*)-kohekohe (*Dysoxylum spectabile*) forest with podocarp species and indigenous scrub at a range of successional stages. The predominant vegetation type within Porirua Western Forests is tawa-kohekohe on the lower slopes, tawa-māhoe (*Melicytus ramiflorus*) on mid slopes, and māhoe-tawa on higher slopes. A variety of podocarp species occur in more mature forest pockets on the lower slopes, with some scattered higher up the hill.

The type of podocarp species depends on the local environment. Mataī (*Prumnopitys taxifolia*), miro (*Prumnopitys ferruginea*) and tōtara (*Podocarpus totara* var. *totara*) are found on the drier ridge above the Camp Elsdon track; large kahikatea (*Dacrydium dacrydioides*) occur around the meandering Mahinawa Stream at the Rangitūhi Crescent entrance; and tōtara and some juvenile rimu (*Dacrydium cupressinum*) occur sporadically in other locations. The KNE site is known to support at least 180 plant species including more than 60 species of fern and 14 species of orchid<sup>10</sup>.

The kohekohe canopy is in good condition and plentiful fruits and flowers support nineteen species of forest birds including large populations of tūi (*Prosthemadera novaeseelandiae*) and kererū (*Hemiphaga novaeseelandiae*). Red crowned kākārīki (*Cyanoramphus novaezelandiae*), yellow-crowned kākārīki (*Cyanoramphus auriceps*)<sup>11</sup>, bellbirds (*Anthornis melanura*) and whiteheads (*Mohoua albicilla*) — all infrequent on the Wellington peninsula<sup>12</sup> — have recently re-established themselves within the KNE site. New Zealand falcons (*Falco novaeseelandiae*) have been regularly sighted near the KNE site since 2009<sup>13</sup>.

Barking gecko (*Naultinus punctatus*) and ngahere gecko (*Mokopirirakau* “Southern North Island”), have been recorded in the KNE site<sup>14</sup>. The carnivorous snail *Wainuia urnula* is also present<sup>15</sup>.

Longfin eel (*Anguilla dieffenbachii*) and redfin bully (*Gobiomorphus huttoni*) are the only fish species that have been recorded at the KNE site<sup>16</sup>. Streams within the KNE site include Urukahika Creek, Mahinawa Stream, Takapuwahia Stream, and Mill Creek. Takapuwahia Stream flows into Porirua Harbour.

## 5. Key threats to ecological values at the site

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

The main threats to the ecological values of the Porirua Western Forests KNE site are ecological weeds (including those spread by green waste and rubbish dumping), pest animals, and adverse impacts from human activities such as track building, recreating and land encroachment.

A wide range of ecological weeds are present throughout the KNE site and include climbers, groundcover and woody weed species that impact native forest regeneration. Ecological weed species and their priority for control are listed in Appendix 4.

Track construction and its associated ongoing use (and unauthorised track building), have the potential to increase ecological weed issues throughout the KNE site by creating light gaps where weeds can establish, and by transporting weeds to places where they currently do not occur. Track building will also cause habitat loss, potentially in high value areas, and greater disturbance of wildlife such as nest birds.

A range of pest animals are known to be present in the area, including possums (*Trichosurus vulpecula*), rats (*Rattus* spp.) and mustelids (*Mustela* spp.). These and other pest species are known to degrade habitats through over-browsing forest foliage and preventing regeneration of the native forest cover. Some are also known to predate native birds, lizards and invertebrates.

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

Table 2: Summary of all threats to ecological values present at the Porirua Western Forests KNE site

Threat code	Threat and impact on biodiversity in the KNE	Operational area/location
<b>Ecological weeds</b>		
EW-1	Ground covering ecological weeds smother and displace native vegetation, inhibit indigenous regeneration, and alter vegetation structure and composition. Key weed species for control include: blackberry ( <i>Rubus fruticosus</i> agg.), everlasting pea ( <i>Lathyrus latifolius</i> ), periwinkle ( <i>Vinca major</i> ), tradescantia ( <i>Tradescantia fluminensis</i> ), pellitory of the wall ( <i>Parietaria judaica</i> ), onion weed ( <i>Allium triquetrum</i> ), stinking iris ( <i>Iris foetidissima</i> ), montbretia ( <i>Crocsmia × crocosmiiflora</i> ), oxeye daisy ( <i>Leucanthemum vulgare</i> ) and pampas ( <i>Cortaderia selloana</i> ) (see full list in Appendix 4)	Entire KNE site
EW-2	Woody weed species have the potential to displace native vegetation, out-compete indigenous regeneration, and alter vegetation structure and composition. Key weed species include boneseed ( <i>Chrysanthemoides monilifera</i> ), evergreen buckthorn ( <i>Rhamnus alaternus</i> ), cotoneaster ( <i>Cotoneaster glaucophylla</i> ), holly ( <i>Ilex aquifolium</i> ), oak ( <i>Quercus</i> spp.), Tasmanian ngaio ( <i>Myoporum</i> aff. <i>insulare</i> ), willow ( <i>Salix</i> spp.), brush wattle ( <i>Paraserianthes lophantha</i> ), and ornamental cherry ( <i>Prunus</i> sp.) (see full list in 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. Key weed species include: climbing asparagus ( <i>Asparagus scandens</i> ), old man's beard ( <i>Clematis vitalba</i> ), jasmine ( <i>Jasminum polyanthum</i> ), Japanese honeysuckle ( <i>Lonicera japonica</i> ), banana passionfruit ( <i>Passiflora tripartita</i> var. <i>mollissima</i> ), rose, ( <i>Rosa</i> sp.), Cape ivy ( <i>Senecio angulatus</i> ), German ivy ( <i>Delairea odorata</i> ) (see full list in Appendix 4)	Entire KNE site
<b>Pest animals</b>		
PA-1	Possoms browse palatable canopy vegetation until it can no longer recover <sup>17,18</sup> . This destroys the forest's structure, diversity and function. Possoms may also prey on native birds <sup>19</sup> and invertebrates	Entire KNE site
PA-2*	Feral, stray and domestic cats ( <i>Felis catus</i> ) prey on native birds <sup>20</sup> , lizards <sup>21</sup> and invertebrates <sup>22</sup> , reducing native fauna breeding success and potentially causing local extinctions <sup>23</sup>	Entire KNE site (esp. near urban edge)
PA-3	Mustelids (stoats <sup>24,25</sup> ( <i>Mustela erminea</i> ), ferrets <sup>26,27</sup> ( <i>M. furo</i> ) and weasels <sup>28,29</sup> ( <i>M. nivalis</i> )) prey on native birds, lizards and invertebrates, reducing their breeding success and potentially causing local extinctions	Entire KNE site
PA-4	Hedgehogs ( <i>Erinaceus europaeus</i> ) prey on native invertebrates <sup>30</sup> , lizards <sup>31</sup> and the eggs <sup>32</sup> and chicks of ground-nesting birds <sup>33</sup>	Entire KNE site
PA-5	Rats 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 <sup>34,35</sup>	Entire KNE site
PA-6*	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 invertebrates, lizards and small eggs and nestlings <sup>36,37</sup>	Entire KNE site

Threat code	Threat and impact on biodiversity in the KNE	Operational area/location
PA-7*	Goats ( <i>Capra hircus</i> ) 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 <sup>38</sup>	Entire KNE site
PA-8*	Feral pigs ( <i>Sus scrofa</i> ) root up the soil and eat roots, invertebrates, seeds and native plants preventing forest regeneration <sup>39</sup>	Entire KNE site
<b>Human activities</b>		
HA-1*	Illegal collection of orchids can cause local extinctions	Entire KNE site
HA-2	Garden escapes and garden waste dumping can spread weeds into the KNE site. Areas of native vegetation have been removed by landowners adjacent to the KNE site, creating open grassed areas and opening the forest up to weed and edge effects	KNE boundary (urban sections)
HA-3*	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

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

## 6. Objectives and management activities

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

### Objectives

The following objectives will guide the operational activities at the Porirua Western Forests 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 provision of food and habitat for animal species.

### Operational activities

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

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 further discussed in the sections below.

## Ecological weed control

The aim of weed control is to reduce the distribution and density of weeds to maintain native plant dominance and increase native plant regeneration. The priority weed control areas are adjacent to the residential boundary of the KNE site where many gardens cultivate weed species, and/or dump green waste within the KNE site.

The KNE site has five operational areas, A-E (see Appendix 1, Map 4), where the highest priority species will be controlled. Each operational area will be monitored annually and target weeds treated with a suitable herbicide. Once the highest priority weed species have been eliminated or controlled to very low densities, the lower priority species will be targeted.

The operational areas and highest priority species for control in each area are as follows:

**Operational area A (Raiha-Colonial Knob walkway):** Mid to late succession forest edge along Camp Elsdon and Urukahika Creek margins. Priority species for control are flowering cherry, blackberry, Japanese honeysuckle, ivy, tradescantia, montbretia, onion weed, stinking iris, greater bindweed and mature karo.

**Operational area B (Aparangi-Waiho):** Lower stature māhoe-gorse between Camp Elsdon and Waiho Terrace entrance. Priority species for control are karo, flowering cherry, tradescantia, climbing asparagus, English ivy and Japanese honeysuckle.

**Operational area C (Waiho-Ngahue):** Forest margin between Waiho Terrace entrance and Rangituhi Crescent. Priority species for control are Cape ivy, Japanese honeysuckle, oak, tradescantia, flowering cherry, convolvulus, English ivy, montbretia, periwinkle, jasmine and willow.

**Operational area D (Rangituhi):** Forest margin along Rangituhi Crescent. Priority species for control are tradescantia, pellitory of the wall, banana passionfruit and jasmine.

**Operational area E (Pikarere):** Regenerating indigenous bush between Rangituhi Crescent and Pikarere Street. Priority species for control are blackberry, gorse, pine, Cape ivy, wild rose, Tasmanian ngaio, karo and pōhutukawa.

## Pest animal control

The aim of pest animal control is to reduce canopy browsers to protect the forest and to reduce predators to maintain populations of native birds.

Possum control was initiated by Greater Wellington in 1996 and was intensified to include mustelids and rats from 2001. Within the KNE site there is a network of 214 poison bait stations that target possums and rats and 31 DOC200 kill-traps that target mustelids and hedgehogs. Poison bait stations and kill-traps are serviced every three months by Greater Wellington.

A large number of poison bait stations and kill-traps are located outside the KNE site boundary on Pikarere Farm to target possums and mustelids (see Appendix 1, Map 5). This network is serviced by Greater Wellington on a monthly basis (except in pasture areas during lambing season between August and October) to account for the greater density of possums and mustelids known to be present in this area. This network

provides a pest animal control buffer zone for the KNE site, reducing reinvasion of pest animals into the KNE site from neighbouring lands.

During 2014/15, Greater Wellington's Regional Possum Predator Control Programme (RPPCP) installed poison bait stations across the wider landscape between Makara and Porirua. The RPPCP aims to control possums to low densities across the landscape and is expected to benefit the KNE site by reducing the occurrence of possum reinvasions. These kill-traps and a bait station network are not included in Appendix 1, Map 5.

Kill-traps have also been installed on the northern edge of Te Rahui o Rangituhi (formally known as Colonial Knob Parkland) and are serviced and maintained by the Mana Cycle Group. These traps will help reduce reinvasion of predators into the KNE site. These kill-traps are not included in Appendix 1, Map 5.

### **Small mammal monitoring**

Greater Wellington funds small mammal monitoring, which is undertaken twice a year in the KNE site. Tracking tunnels are used to monitor the presence of small mammal species – primarily rats, but also mice and hedgehogs. The results of this monitoring will provide an indication of the effectiveness of the pest animal control network.

## 7. Operational delivery schedule

The operational plan shows the actions planned to achieve the stated objectives for the Porirua Western Forests KNE site, and their timing and cost over the three-year period from 1 July 2018 to 30 June 2021. The budget for the 2019/20 and 2020/21 years are indicative only and subject to change. A map of operational areas can be found in Appendix 1 (see Map 4).

**Table 3: Three-year operational delivery schedule for the Porirua Western Forests KNE site**

Objective	Threat	Activity	Operational area	Delivery	Description/detail	Target	Timetable and resourcing		
							2018/19	2019/20	2020/21
1	EW-1,2,3	Ecological weed control	A	Biosecurity department	Sweep for weed species; including flowering cherry, blackberry, ivy, tradescantia, Japanese honeysuckle, montbretia, onion weed, stinking iris, convolvulus and karo	Reduce distribution and density of target species	\$500	\$500	\$500
1	EW-1,	Ecological weed control	A	Biosecurity department	Control new sites of tradescantia	Reduce distribution and density of target species	\$250	\$250	\$250
1	EW-1,2,3	Ecological weed control	B	Biosecurity department	Follow-up control of karo, cherry and tradescantia. Sweep for climbing asparagus, English ivy and Japanese honeysuckle.	Reduce distribution and density of target species	\$3,500	\$3,000	\$3,000
1	EW-1,2,3	Ecological weed control	C	Biosecurity department	Sweep for Cape ivy, English ivy, Japanese honeysuckle, oak, tradescantia, cherry, convolvulus, montbretia, periwinkle, jasmine and willow	Reduce distribution and density of target species	\$2,500	\$2,000	\$1,000
1	EW-1,3	Ecological weed control	D	Biosecurity department	Sweep for tradescantia, pellitory of the wall, banana passionfruit and jasmine	Reduce distribution and density of target species	\$500	\$500	\$250
1	EW-1,2,3	Ecological weed control	E	Biosecurity department	Sweep for all ecological weeds (see Appendix 4: Table 8) focus on climbers and woody weeds	Reduce distribution and density of target species	\$2,250	\$3,250	\$4,500

Objective	Threat	Activity	Operational area	Delivery	Description/detail	Target	Timetable and resourcing		
							2018/19	2019/20	2020/21
1,2,3	PA-3,4,5	Small mammal monitoring	Whole KNE site	Environmental Science department	Small mammal monitoring and reporting completed twice per year	Rats <10% TTI* Mustelids <5% TTI**	\$2,000	\$2,000	\$2,000
1,2,3,	PA-1,3,4,5	Pest animal control	Whole KNE site	Biosecurity department	Pest animal control network in the KNE site serviced quarterly. Pest animal control network in the buffer areas serviced monthly	Mustelids <5% TTI** Possums <5%RTC* Rats <10% TTI*	\$35,600	\$35,600	\$35,600
<b>Total</b>							\$47,100	\$47,100	\$47,100

\*RTC = Residual Trap Catch. The control regime has been designed to control possums to this level. Experience in the use of this control method indicates this target will be met.

\*\*TTI = Tracking Tunnel Index. The control regime has been designed to control rats and mustelids to this level. Experience in the use of this control method indicates this target will be met.

## 8. Funding contributions

### Greater Wellington budget

The budget for the 2019/20 and 2020/21 years are indicative only and subject to change.

**Table 4: Greater Wellington allocated budget for the Porirua Western Forests KNE site**

Management activity	Timetable and resourcing		
	2018/19	2019/20	2020/21
Ecological weed control	\$7,500	\$7,500	\$7,500
Pest animal control	\$22,700	\$22,700	\$22,700
Small mammal monitoring	\$2,000	\$2,000	\$2,000
<b>Total</b>	<b>\$32,200</b>	<b>\$32,200</b>	<b>\$32,200</b>

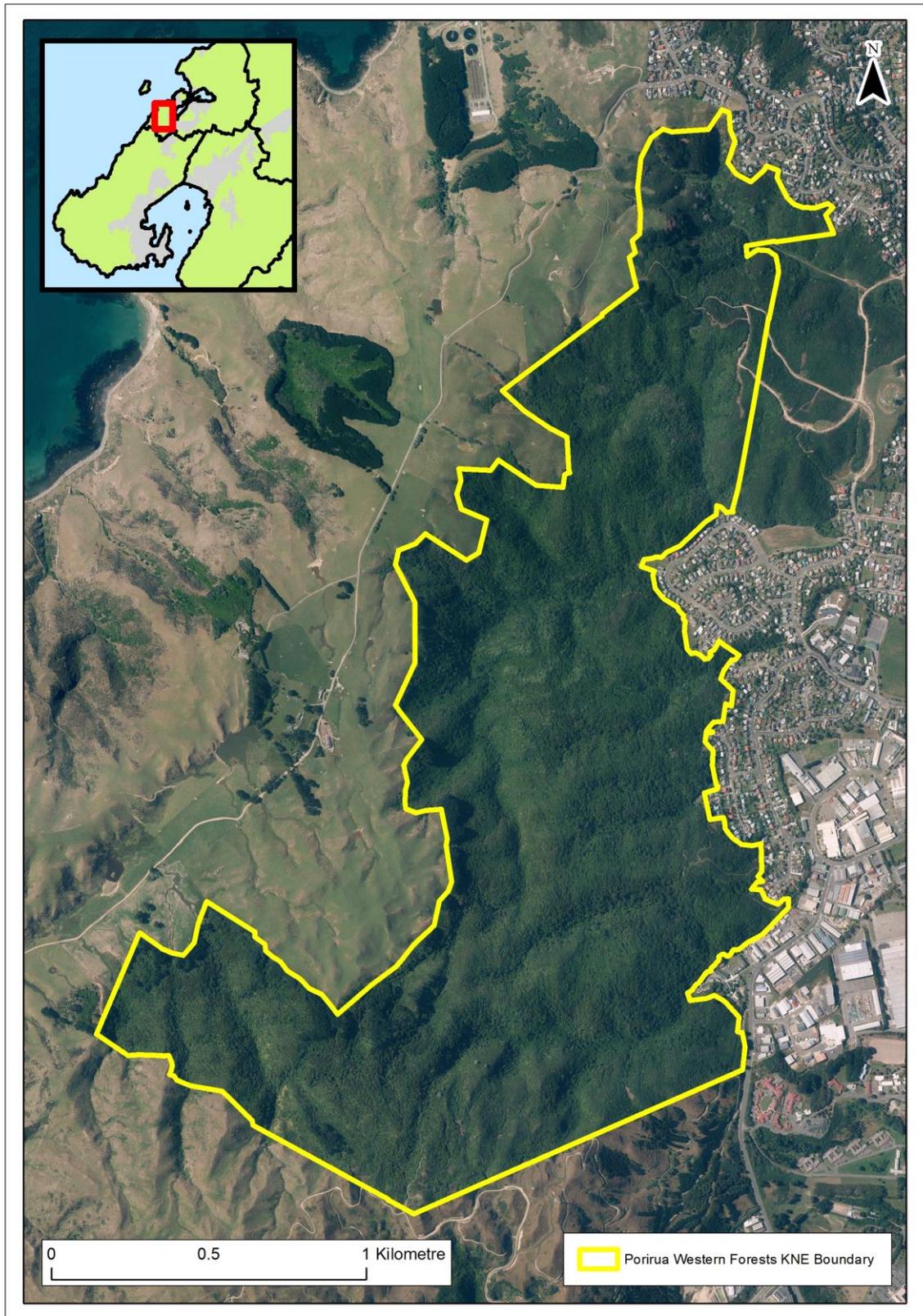
### Porirua City Council budget

The budget is subject to confirmation through the PCC long term planning process.

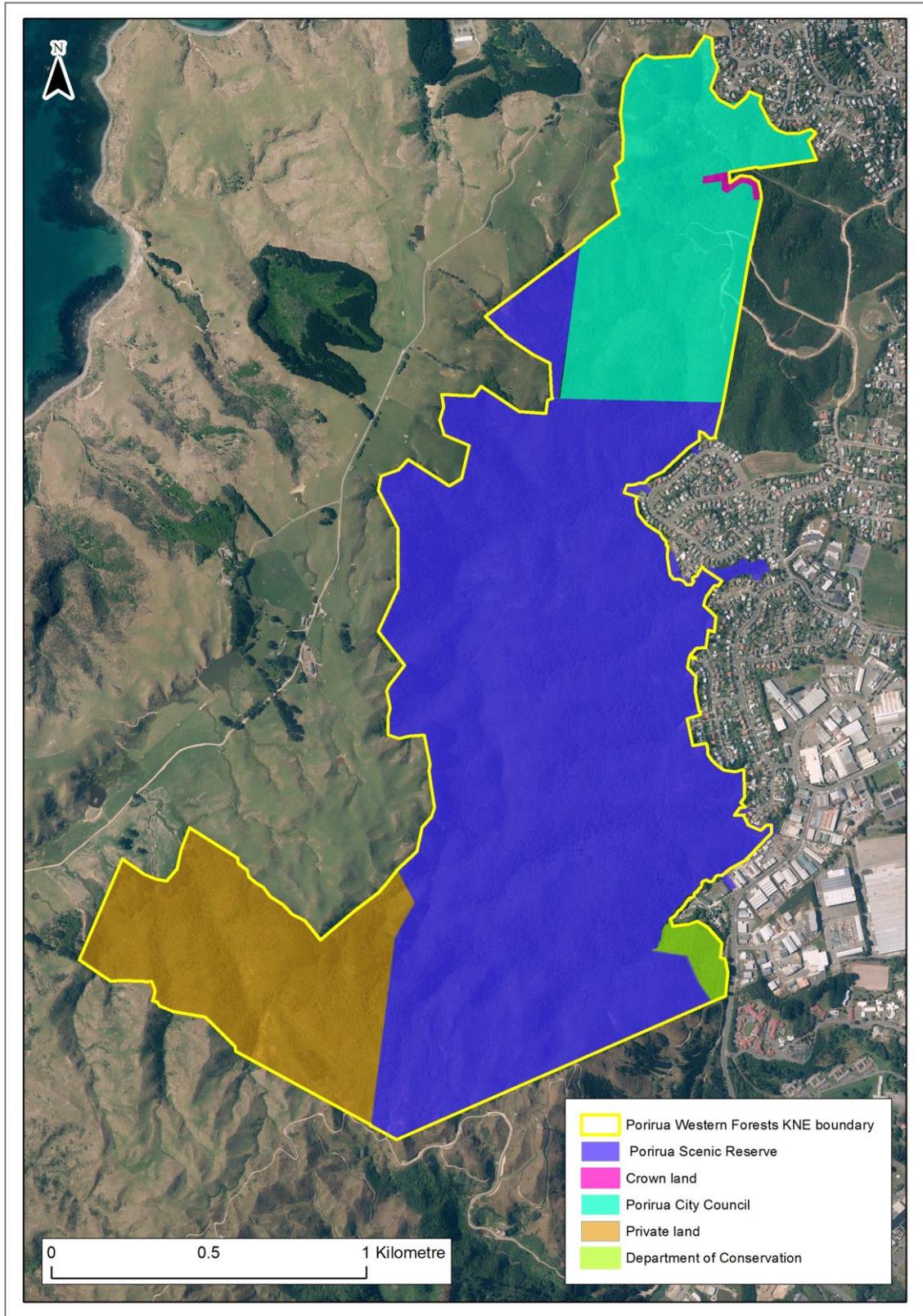
**Table 5: PCC allocated budget for the Porirua Western Forests KNE site**

Management activity	Timetable and resourcing		
	2018/19	2019/20	2020/21
Ecological weed control	\$2,000	\$2,000	\$2,000
Pest animal control	\$12,900	\$12,900	\$12,900
<b>Total</b>	<b>\$14,900</b>	<b>\$14,900</b>	<b>\$14,900</b>

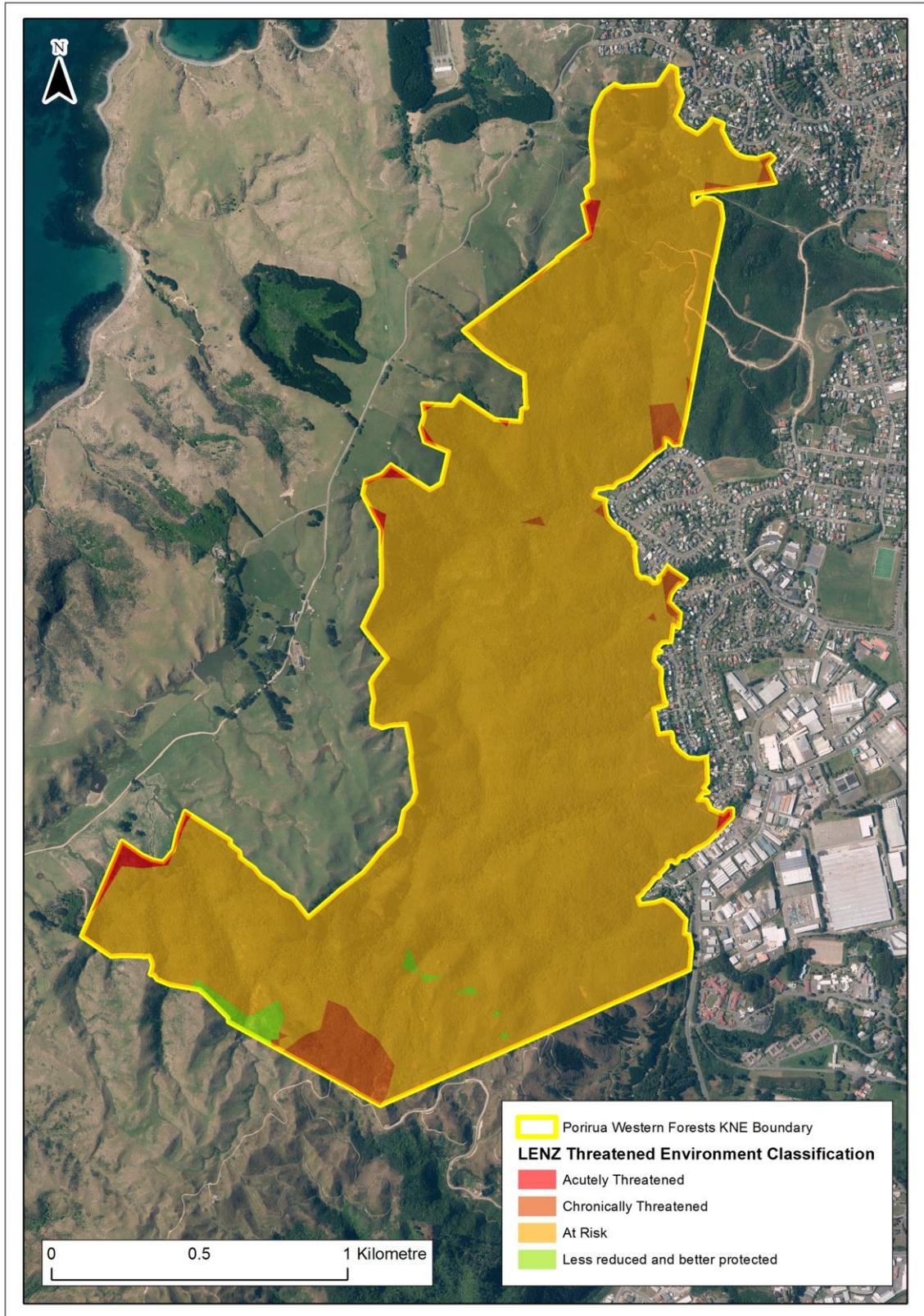
## Appendix 1: Site maps



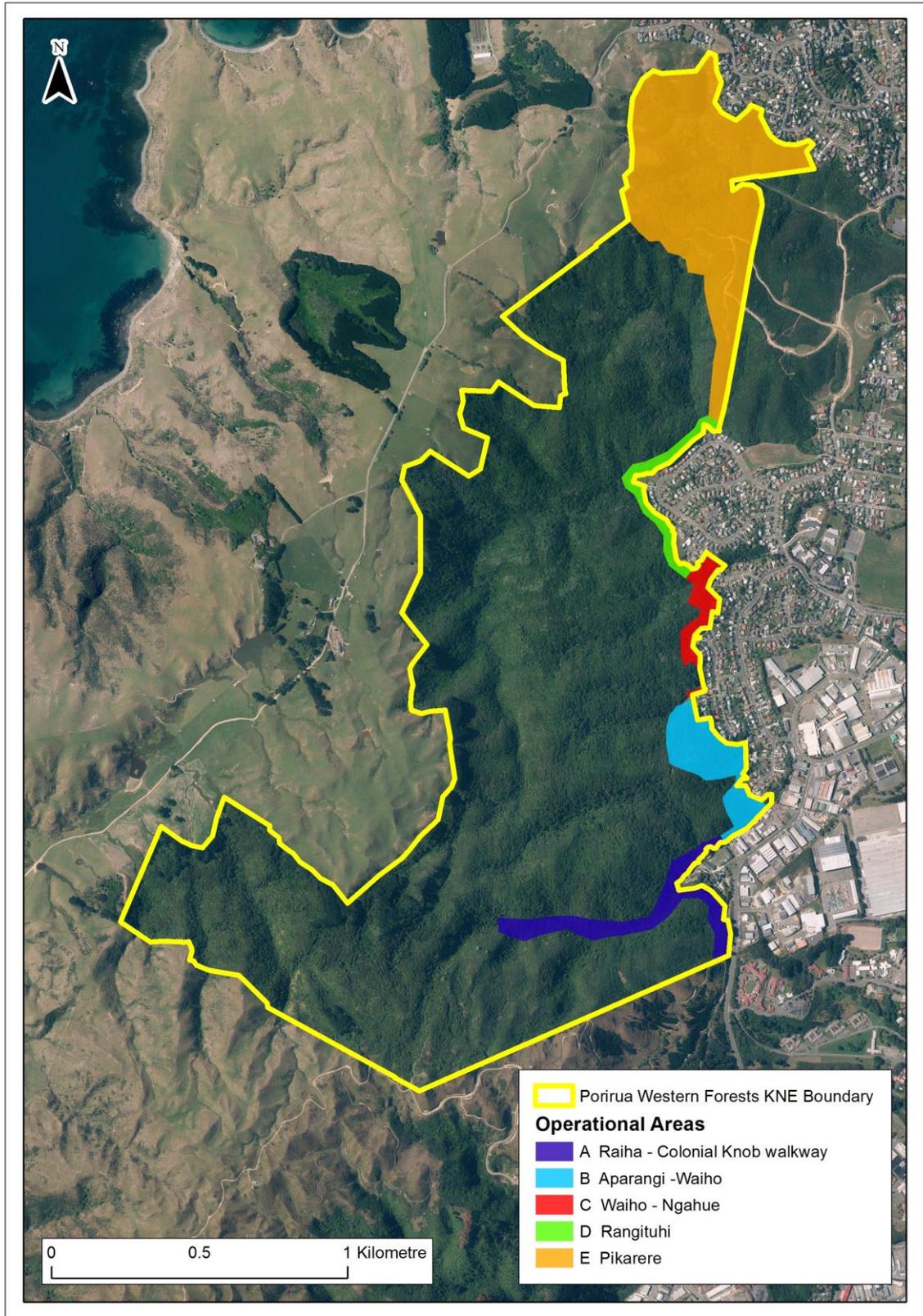
Map 1: The Porirua Western Forests KNE site boundary



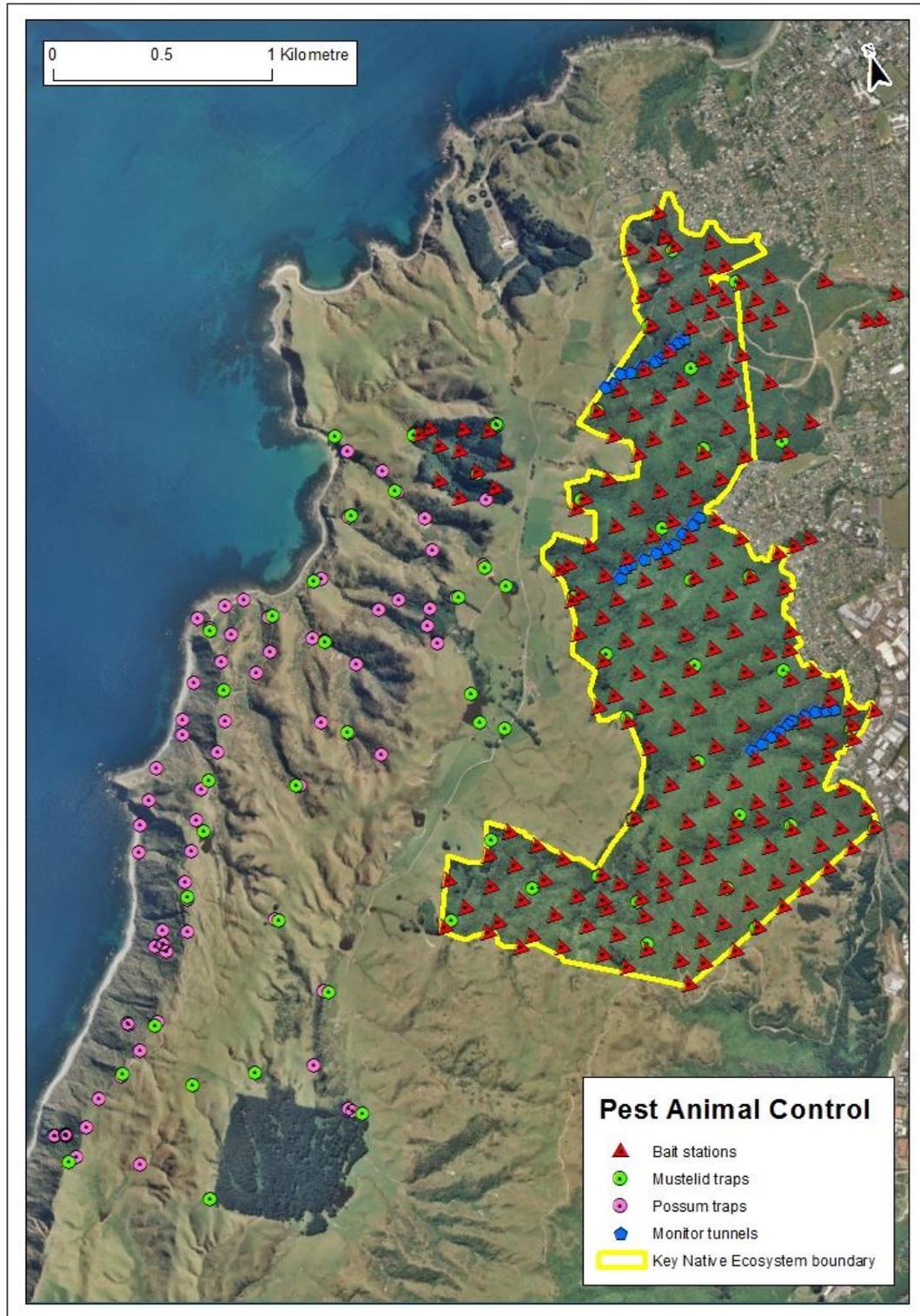
Map 2: Landowners at the Porirua Western Forests KNE site



Map 3: Land Environment New Zealand threat classifications for the Porirua Western Forests KNE site



Map 4: Operational areas in the Porirua Western Forests KNE site



Map 5: Pest animal control at the Porirua Western Forests KNE site and in the KNE site buffer area

## 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 five-year cycle<sup>40</sup>. Species are regarded as Threatened if they are classified as Nationally Critical, Nationally Endangered or Nationally Vulnerable. They are regarded as At Risk if they are classified as Declining, Recovering, Relict or Naturally Uncommon. The following table lists Threatened and At Risk species that are resident in, or regular visitors to, the KNE site.

**Table 6: Nationally threatened species at Porirua Western Forests KNE site**

Scientific name	Common name(s)	Threat status	Source
<b>Plants(vascular)<sup>41</sup></b>			
<i>Streblus banksii</i>	Large-leaved milk tree, tūrepo	At Risk – Relict	Enright <i>et al.</i> 1997-2000 <sup>42</sup>
<i>Pterostylis porrecta</i>	Shrimp-flowered greenhood orchid	At Risk - Naturally Uncommon	Enright <i>et al.</i> 1997-2000
<i>Solanum aviculare</i> var. <i>aviculare</i>	Poroporo	At Risk - Declining	Enright <i>et al.</i> 1997-2000
<b>Birds<sup>43</sup></b>			
<i>Falco novaeseelandiae</i>	New Zealand falcon, kārearea	At risk - recovering	Wildland Consultants 2014 <sup>44</sup>
<i>Nestor meridionalis</i>	North Island kākā	Threatened- Nationally Vulnerable	Wildland Consultants 2014
<i>Cyanoramphus novaezelandiae</i>	Red-crowned parakeet, kākārīki	At Risk – Relict	ebird database <sup>45</sup>
<b>Reptiles<sup>46</sup></b>			
<i>Naultinus punctatus</i>	Barking gecko	At Risk - Declining	Department of Conservation 2014 <sup>47</sup>
<i>Mokopirirakau</i> “Southern North Island”	Ngahere gecko	At Risk - Declining	Department of Conservation 2014
<b>Freshwater fish<sup>48</sup></b>			
<i>Anguilla dieffenbachii</i>	Longfin eel	At Risk - Declining	NIWA 2014 <sup>49</sup>
<i>Gobiomorphus huttoni</i>	Redfin bully	At Risk - Declining	NIWA 2014

### Appendix 3: Regionally threatened species list

The following table lists regionally threatened species that have been recorded in the KNE site. Native plant species have been identified in the Plant Conservation Strategy, Wellington Conservancy 2004-2010<sup>50</sup>.

**Table 7: Regionally threatened species at Porirua Western Forests KNE site**

Scientific name	Common name(s)	Threat status	Source
<b>Plants</b> <sup>51</sup>			
<i>Aciphylla squarrosa</i> var. <i>squarrosa</i>	Speargrass, taramea	Regionally Vulnerable	Enright <i>et al.</i> 1997-2000 <sup>52</sup>
<i>Adiantum fulvum</i>	Maidenhair	Regionally Sparse	Enright <i>et al.</i> 1997-2000
<i>Adiantum viridescens</i>	Maidenhair	Regionally Sparse	Enright <i>et al.</i> 1997-2000
<i>Drymoanthus adversus</i>	Drymoanthus	Regionally Critical	Enright <i>et al.</i> 1997-2000
<i>Pterostylis porrecta</i>	Shrimp-flowered greenhood	Regionally Critical	Enright <i>et al.</i> 1997-2000
<i>Raukaua edgerleyi</i>	Raukaua	Regionally Sparse	Enright <i>et al.</i> 1997-2000
<i>Streblus banksii</i>	Large-leaved milk tree, tūrepo	Regionally Endangered	Enright <i>et al.</i> 1997-2000
<b>Invertebrates</b>			
<i>Wainuia urnula</i>	Carnivorous snail	Regionally Sparse	Molluscs of New Zealand database <sup>53</sup>

## Appendix 4: Ecological weeds

Ecological weeds within the Porirua Western Forests KNE site. Plant species are listed in priority order for control.

**Table 8: Ecological weeds within the Porirua Western Forests KNE site**

Scientific Name	Common Name	Priority	Operational area
<i>Asparagus scandens</i>	Climbing asparagus	1	B, C, D, E
<i>Chrysanthemoides monilifera</i>	Boneseed	1	B, E
<i>Clematis vitalba</i>	Old man's beard	1	C, D, E
<i>Jasminum polyanthum</i>	Jasmine	1	C, D
<i>Lathyrus latifolius</i>	Everlasting pea	1	C, D, E
<i>Lonicera japonica</i>	Japanese honeysuckle	1	B, C, D, E
<i>Parietaria judaica</i>	Pellitory of the wall	1	A, C, D
<i>Passiflora tripartita</i> var. <i>mollissima</i>	Banana passionfruit	1	C, D, E
<i>Rhamnus alaternus</i>	Evergreen buckthorn	1	A, B, E
<i>Senecio angulatus</i>	Cape ivy	1	B, C, D
<i>Tradescantia fluminensis</i>	Tradescantia	1	A, B, C, D, E
<i>Cotoneaster glaucophylla</i>	Cotoneaster	2	A, B, C
<i>Crocasmia</i> × <i>crocosmiiflora</i>	Montbretia	2	B, C, D, E
<i>Hedera helix</i> subsp. <i>helix</i>	Ivy	2	B, C, D
<i>Ilex aquifolium</i>	Holly	2	A, B, C
<i>Leucanthemum vulgare</i>	Oxeye daisy	2	B, C, D
<i>Myoporum</i> aff. <i>insulare</i>	Tasmanian ngaio, boobialla	2	B, E
<i>Paraserianthes lophantha</i>	Brush wattle	2	B, C
<i>Pittosporum crassifolium</i>	Karo	2	A, B, C, D, E
<i>Pittosporum ralphii</i>	Karo	2	E
<i>Prunus</i> sp.	Ornamental cherry	2	A, B, C, D
<i>Calystegia silvatica</i>	Greater bindweed	3	A, B, C, D, E
<i>Cortaderia selloana</i>	Pampas	3	B, C, D, E
<i>Cupressus macrocarpa</i>	Macrocarpa	3	B, E
<i>Cytisus scoparius</i>	Broom	3	A, B, C, D, E
<i>Erica lusitanica</i>	Spanish heath	3	A, B, C
<i>Laurus nobilis</i>	Bay tree, sweet bay	3	B, C, D
<i>Pinus radiata</i>	Radiata pine	3	A, B, E (except for wilding pines priority = 2)
<i>Rubus fruticosus</i> agg.	Blackberry	3	A, B, C, D, E

Scientific Name	Common Name	Priority	Operational area
<i>Senecio glastifolius</i>	Purple ragwort	3	B, C, D, E
<i>Zantedeschia aethiopica</i>	Arum lily	3	B, C, D
<i>Actinidia deliciosa</i>	Kiwifruit	4	C, D
<i>Allium triquetrum</i>	Wild onion	4	A, B, C, D
<i>Foeniculum vulgare</i>	Fennel	4	B, C, D
<i>Ulex europaeus</i>	Gorse	4	A, B, C, D, E

## References

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- <sup>1</sup> Greater Wellington Regional Council. 2016. Greater Wellington Regional Council Biodiversity Strategy.
- <sup>2</sup> Porirua City Council. 2013. Porirua City Reserves Management Plan - <http://www.pcc.govt.nz/Publications/Reserves-Management-Plan>
- <sup>3</sup> Greater Wellington Regional Council. 2015. Proposed Natural Resources Plan. P. 297.
- <sup>4</sup> Department of Conservation. 1987. Ecological Regions and Districts of New Zealand.
- <sup>5</sup> Greater Wellington Regional Council. 2002. Eco-domains for the Wellington Region. Processes and patterns for defining diversity and distinctiveness. Greater Wellington Regional Council, Wellington. 46 p.
- <sup>6</sup> Walker S, Cieraad E, Grove P, Lloyd K, Myers S, Park T, Porteous T. 2007. Guide for users of the threatened environment classification, Version 1.1, August 2007. Landcare Research New Zealand. 34 p. plus appendix.
- <sup>7</sup> DOC. New Zealand Threat Classification System (NZTCS). <http://www.doc.govt.nz/nztcs>
- <sup>8</sup> Singers NJD, Rogers GM. 2014. A classification of New Zealand's terrestrial ecosystems. Science for Conservation No. 325. Department of Conservation, Wellington. 87 p.
- <sup>9</sup> Crisp P, Govella S, Crouch L. 2016. Identification and prioritization of high value terrestrial biodiversity sites for selection within the Key Native Ecosystem Programme in the Wellington region.
- <sup>10</sup> Enright P, Beveridge P, John O, Dench A, Allen A. George I. 2006. Plant checklist for Porirua Scenic Reserve and the bush on Pikarare Farm. New Zealand Plant Conservation Network dataset. Retrieved 17 April 2015.
- <sup>11</sup> Watson D. 2013. eBird database accessed 14 May 2015.
- <sup>12</sup> Robertson CJR, Hyvonen P, Fraser MJ, Pickard CR. 2007. Atlas of Bird Distribution in New Zealand 1999-2004. Ornithological Society of New Zealand, Wellington. 533 p.
- <sup>13</sup> Nicholson S. 2009. eBird website accessed 15 May 2015. <http://ebird.org.nz>
- <sup>14</sup> Department of Conservation. 2014. Bioweb Herpatofauna database. Accessed March 2014.
- <sup>15</sup> <http://www.mollusca.co.nz/speciesdetail.php?speciesid=1841&species=Wainuia%20urnula>.
- <sup>16</sup> NIWA. 2014. New Zealand Freshwater Fish Database. Accessed July 2014.
- <sup>17</sup> Pekelharing CJ, Parkes JP, Barker RJ. 1998. Possum (*Trichosurus vulpecula*) densities and impacts on fuchsia (*Fuchsia excorticata*) in South Westland, New Zealand. New Zealand Journal of Ecology 22(2): 197–203.
- <sup>18</sup> Nugent G, Sweetapple P, Coleman J, Suisted P. 2000. Possum feeding patterns. Dietary tactics of a reluctant folivore. In: Montague TL ed. The brushtail possum: Biology, impact and management of an introduced marsupial. Lincoln, Manaaki Whenua Press. Pp. 10–19.
- <sup>19</sup> Sweetapple PJ, Fraser KW, Knightbridge PI. 2004. Diet and impacts of brushtail possum populations across the invasion front in South Westland, New Zealand. New Zealand Journal of Ecology 28(1): 19–33.
- <sup>20</sup> King CM, Flux M, Innes JG, Fitzgerald BM. 1996. Population biology of small mammals in Pureora Forest Park: 1. Carnivores (*Mustela erminea*, *M.furo*, *M.nivalis* and *Felis catus*). New Zealand Journal of Ecology 20(2): 241–251.
- <sup>21</sup> Reardon JT, Whitmore N, Holmes KM, Judd LM, Hutcheon AD, Norbury G, Mackenzie DI. 2012. Predator control allows critically endangered lizards to recover on mainland New Zealand. New Zealand Journal of Ecology 36(2): 141–150.
- <sup>22</sup> King CM, Flux M, Innes JG, Fitzgerald BM. 1996. Population biology of small mammals in Pureora Forest Park: 1. Carnivores (*Mustela erminea*, *M.furo*, *M.nivalis* and *Felis catus*). New Zealand Journal of Ecology 20(2): 241–251.
- <sup>23</sup> Gillies C, Fitzgerald BM. 2005. Feral cat. In: King CM ed. The handbook of New Zealand mammals. Oxford University Press. Pp. 308–326.
- <sup>24</sup> Murphy E, Maddigan F, Edwards B, Clapperton K. 2008. Diet of stoats at Okarito Kiwi Sanctuary, South Westland, New Zealand. New Zealand Journal of Ecology 32(1): 41–45.
- <sup>25</sup> King CM and Murphy EC. 2005. Stoat. In: King CM ed. The handbook of New Zealand mammals. Oxford University Press. Pp. 261–287.

- <sup>26</sup> Ragg JR. 1998. Intraspecific and seasonal differences in the diet of feral ferrets (*Mustela furo*) in a pastoral habitat, east Otago, New Zealand. *New Zealand Journal of Ecology* 22(2): 113–119.
- <sup>27</sup> Clapperton BK, Byron A. 2005. Feral ferret. In: King CM ed. *The handbook of New Zealand mammals*. Oxford University Press. Pp. 294–307.
- <sup>28</sup> King CM. 2005. Weasel. In: King CM ed. *The handbook of New Zealand mammals*. Oxford University Press. Pp. 287–294.
- <sup>29</sup> King CM, Flux M, Innes JG, Fitzgerald BM. 1996. Population biology of small mammals in Pureora Forest Park: 1. Carnivores (*Mustela erminea*, *M.furo*, *M.nivalis* and *Felis catus*). *New Zealand Journal of Ecology* 20(2): 241–251.
- <sup>30</sup> Jones C, Sanders MD. 2005. European hedgehog. In: King CM ed. *The handbook of New Zealand mammals*. 2nd edition. Melbourne, Oxford University Press. Pp. 81–94.
- <sup>31</sup> Spitzen-van der Sluijs AM, Spitzen J, Houston D, Stumpel AHP. 2009. Skink predation by hedgehogs at Macraes Flat, Otago, New Zealand. *New Zealand Journal of Ecology* 33(2): 205–207.
- <sup>32</sup> Jones C, Moss K, Sanders M. 2005. Diet of hedgehogs (*Erinaceus europaeus*) in the upper Waitaki Basin, New Zealand. Implications for conservation. *New Zealand Journal of Ecology* 29(1): 29–35.
- <sup>33</sup> Jones C, Sanders MD. 2005. European hedgehog. In: King CM ed. *The handbook of New Zealand mammals*. 2nd edition. Melbourne, Oxford University Press. Pp. 81–94.
- <sup>34</sup> Daniel MJ. 1973. Seasonal diet of the ship rat (*Rattus r. rattus*) in lowland forest in New Zealand. *Proceedings of the New Zealand Ecological Society* 20: 21–30.
- <sup>35</sup> Innes JG. 2005. Ship rat. In: King CM ed. *The handbook of New Zealand mammals*. Oxford University Press. Pp. 187–203.
- <sup>36</sup> Ruscoe WA, Murphy EC. 2005. House mouse. In: King CM ed. *The handbook of New Zealand mammals*. Oxford University Press. Pp. 204–221.
- <sup>37</sup> Newman DG. 1994. Effect of a mouse *Mus musculus* eradication programme and habitat change on lizard populations on Mana Island, New Zealand, with special reference to McGregor's skink, *Cyclodina macgregori*. *New Zealand Journal of Ecology* 21: 443–456.
- <sup>38</sup> Parkes. JP. 2005. Feral goat. In: King CM ed. *The handbook of New Zealand mammals*. Oxford University Press. Pp. 374–391.
- <sup>39</sup> McIlroy JC. 2005. Feral pigs. In: King CM ed. *The handbook of New Zealand mammals*. Oxford University Press. Pp. 334–345.
- <sup>40</sup> Department of Conservation. 2008. *New Zealand Threat Classification System manual*.
- <sup>41</sup> de Lange PJ, Rolfe J, Champion P, Courtney S, Heenan P, Barkla J, Cameron E, Norton D, Hitchmough R. 2013. *Conservation status of New Zealand indigenous vascular plants, 2012*. *New Zealand Threat Classification Series* 3. 70 p.
- <sup>42</sup> Enright P, Beveridge P, John O, Dench A, and St George I. 1999. *List of vascular plants in Porirua Scenic Reserve and the bush on Pikarere Farm closed off by the electric fence including Mill Creek catchment*. Botanical Society trip report. Wellington Botanical Society, Wellington. 14 p.
- <sup>43</sup> Robertson HA, Baird K, Dowding JE, Elliot GP, Hitchmough RA, Miskelly CM, McArthur N, O'Donnell CFJ, Sagar PM, Scofield P, Taylor GA. 2017. *Conservation status of New Zealand birds, 2016*. *New Zealand Threat Classification Series* 19. 27p.
- <sup>44</sup> Wildland Consultants. 2014. *Assessment of potential ecological effects for mountain bike routes proposed for Rangituhi-Colonial Knob, Porirua*. Wildland Consultants Ltd Contract Report No. 3437. Prepared for Porirua City Council, Wellington. 67 p.
- <sup>45</sup> <http://ebird.org/content/newzealand/> (accessed 22/01/2014).
- <sup>46</sup> Hitchmough R, Barr B, Lettink M, Monks J, Reardon J, Tocher M, Van Winkel D, Rolfe J. 2016. *Conservation status of New Zealand reptiles, 2015*. *New Zealand Threat Classification Series* 17. 14 p..
- <sup>47</sup> Department of Conservation. 2014. *Bioweb Herpatofauna database*. Accessed March 2014.
- <sup>48</sup> Goodman JM, Dunn NR, Ravenscroft PJ, Allibone RM, Boubee JAT, David BO, Griffiths M, Ling N, Hitchmough RA, Rolfe JR. 2014. *Conservation status of New Zealand freshwater fish, 2013*. *New Zealand Threat Classification Series* 7. 12 p.
- <sup>49</sup> NIWA 2014. *New Zealand Freshwater Fish Database*. Accessed July 2014.
- <sup>50</sup> Sawyer JWD. 2004. *Plant conservation strategy, Wellington Conservancy (excluding Chatham Islands), 2004–2010*. Department of Conservation, Wellington. 91 p.

<sup>51</sup> Sawyer JWD 2004. Plant conservation strategy, Wellington Conservancy (excluding Chatham Islands), 2004–2010. Department of Conservation, Wellington. 91 p.

<sup>52</sup> Enright P, Beveridge P, John O, Dench A, Allen A, St George I, 2000: List of vascular plants in Porirua Scenic Reserve and the bush on Pikarere Farm closed off by the electric fence including Mill Creek catchment. Unpublished list held by the Department of Conservation.

<sup>53</sup> <http://www.mollusca.co.nz/speciesdetail.php?speciesid=1841&species=Wainuia%20urnula>.



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