Key Native Ecosystem Operational Plan for Belmont-Dry Creek

2018-2021

Greater Wellington
Te Pane Matua Taiao

Contents

1. Purpose

The purpose of the three-year Key Native Ecosystem (KNE) Operational Plan for Belmont-Dry Creek KNE site is to:

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

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

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

2. Policy Context

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

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

Greater Wellington 10 Year Plan

The 10 Year Plan (2015-2025)[2] outlines the long term direction of Greater Wellington Regional Council (Greater Wellington) and includes information on all our major projects, activities and programmes for the next 10 years and how they will be paid for. This document outlines that Greater Wellington will actively manage selected high value biodiversity sites. Most of this work is undertaken as part of the KNE programme.

Proposed Natural Resources Plan

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

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

Parks Network Plan

Management of Belmont Regional Park as a whole is guided by the Greater Wellington Parks Network Plan (PNP)[3] and the Belmont Regional Park Sustainable Land Use Plan[4].

These plans guide the recreational and amenity uses of Belmont Regional Park as well as identifying opportunities to protect biodiversity values.

Greater Wellington Biodiversity Strategy

The Greater Wellington Biodiversity Strategy[5] (the Strategy) is an internal document that sets a framework that guides how Greater Wellington protects and manages biodiversity in the Wellington region to work towards the Vision.

Vision

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

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

Goal One

Areas of high biodiversity value are protected or restored

3. The Key Native Ecosystem Programme

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

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

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

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

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

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

4. Belmont-Dry Creek Key Native Ecosystem site

Belmont-Dry Creek KNE site (613 hectares) is located in rolling and steep hill country on the south-western slopes of the Hutt Valley. The KNE site is bordered by State Highway 2 to the east and State Highway 58 to the north (see Appendix 1, Map 1).

The KNE site contains a 22 hectare remnant of lowland podocarp forest and a large area of regenerating mixed broadleaf and kanuka bush. The KNE site is one of five KNE sites which make up a band of native bush along the western hills of the Hutt Valley, and is considered important for landscape connectivity and native forest bird dispersal.

Most of the KNE site lies within Belmont Regional Park and is protected as Recreation Reserve within the Hutt City District Plan with the status of Significant Natural Resource (SNR), (SNR sites 1, 3 and 17 listed in the district plan)[67]. The remaining 50 ha of the KNE site are on private land adjacent to the regional park.

5. Parties involved

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

5.1. Landowners

Most of the KNE site (563 ha) is owned by the Crown and managed by Greater Wellington as part of Belmont Regional Park. The remaining 50 hectares is privately owned by M.W. and S.V. Judd, situated on the edge of their sheep and beef farm (see Appendix 1, Map 2).

5.2. Operational delivery

Greater Wellington's Biodiversity, Biosecurity and Parks departments are responsible for implementing the KNE operational plan. Biodiversity is the overarching lead department for Greater Wellington on the coordination of biodiversity management activities and advice within the KNE site. The Biosecurity department coordinates and carries out pest control activities. The Parks department manages recreational access and maintains assets such as the road, tracks and amenity areas.

5.3. Mana whenua partners

Ngāti Toa Rangatira (Ngāti Toa) and Taranaki Whānui ki Te Upoko o Te Ika a Maui (Taranaki Whānui) are Greater Wellington's mana whenua partners in Belmont-Dry Creek. Greater Wellington is committed to exploring opportunities on how mana whenua partners wish to be involved in the plan development or operational delivery of the KNE site.

Ngāti Toa

Ngāti Toa considers it has a strong historical connection with the Te Awa Kairangi (Hutt River) and its tributaries. They consider that the river is included within their extended rohe and it is an important symbol of their interests in the Harataunga area[8].

Ngāti Toa claims an association with the Te Awa Kairangi from the time of their participation in the invasion of the Hutt Valley during 1819 and 1820. While they did not remain in the area after this invasion, Te Awa Kairangi continued to be important to them following their permanent migration and settlement in the lower North Island in the late 1820s and early 1830s. Ngāti Toa's relationship to the Hutt Valley and river was not one defined by concentrated settlement and physical presence. Rather, the iwi felt their claim to the land was based on their powerful leadership and the relationship they had with iwi residing in the Hutt Valley who had been placed there by Ngāti Toa in the 1830s. For some years these iwi in the Hutt Valley paid tribute of goods such as canoes, eels and birds to Ngāti Toa[9].

Te Awa Kairangi was an important transport route, and small waka were used along the length of the river. The river was traditionally an area for gathering piharau, or the freshwater blind eel, as well as tuna (eel) from its tributaries. Harataunga also supported flax plantations, which were used by early Maori for trading with settlers. The river was also of great importance as it was the largest source of freshwater in the area[10].

Table 1: Ngāti Toa site of significance in Belmont-Dry Creek KNE site[11]

Site of significance	Mana whenua values[12]
Te Awa Kairangi/Hutt River	Ngā mahi a ngā Tūpuna: Ngāti Toa's relationship with Te Awa Kairangi and Wainuiomata Rivers extends back to the Amiowhenua expedition from 1819 and Te Rauparaha's initial invasion of the Hutt Valley. During that campaign the tauā (war party) marched around the western side of Te Whanganui-a-Tara, defeating the local iwi as they went. When they reached Te Awa Kairangi they constructed rafts which were used to aid them in their invasion of the Hutt Valley. Ngāti Toa's traditional relationship with each river as important mahinga kai, ara waka, and source of natural resources reflected the wider influence and mana of Ngāti Toa throughout the whole of the Hutt Valley
	Te Mahi Kai: Te Awa Kairangi was once the largest source of fresh water in the district, and supported a diverse and abundant native fishery resource which was important to Ngāti Toa's physical and cultural sustenance. In addition to sustaining a large variety of native fish populations, the river also provided access to forest birds, watercress, and numerous other food plants. Today, the lower reaches of the river in particular are in a state of extreme degradation due to the adverse effects of development within the Hutt Valley catchment over many decades. This has severely impacted on the ability to continue customary practices
	Te Mana o Te Tangata: Many iwi from around the region and from the top of the South Island are familiar with the life supporting capacity of this river and the wealth of freshwater foods and resources once harvested here
	Te Manawaroa o te Wai: Despite excessive land reclamations, modification, and environmental damage Te Awa Kairangi continues to support a variety of endemic wildlife; including endangered species. There is vast potential for environmental restoration and this is a primary objective for Ngāti Toa. Environmental issues continue to have a direct and significant impact on successive generations
	Te Mana o Te Wai: A defining feature of Ngāti Toa settlement in the Wellington area and integral to Ngāti Toa identity

Taranaki Whānui

Taranaki Whānui considers that Te Awakairangi is the oldest name for the Hutt River attributed to the Polynesian explorer Kupe. It was also known as Heretaunga in a later period. The origins of the streams flowing to Awakairangi are high in the Tararua Range. The stream and rivers lead down through Pakuratahi at the head of the Hutt Valley. Taranaki Whānui had interests at Pakuratahi as the trail linking Te Whanganui a Tara and the Wairarapa came through Pakuratahi and over the Rimutaka Range. Prior to the 1855 uplift Te Awakairangi was navigable by waka up to Pakuratahi and the river was navigable by European ships almost to Whirinaki (Silverstream)[13].

Taranaki Whānui travelled in the Hutt Valley largely by waka. There were few trails through the heavy forest of the valley. Many Taranaki Whānui kainga and pā were close to the river including at Haukaretu (Māoribank), Whakataka Pā (which was across the bank from what is now Te Marua), Mawaihakona (Wallaceville), Whirinaki, Motutawa Pā (Avalon), Maraenuku Pā (Boulcott), Paetutu Pā and at the mouth of the river, Hikoikoi Pā to the west and Waiwhetu Pā (Owhiti) to the east[14].

Te Awakairangi linked the settlements as well as being a food supply for the pā and kainga along the river. Mahinga kai were found along the river such as Te Momi (Petone) which was a wetland that held abundant resources of birds, tuna and other food sources. The river ranged across the valley floor and changed course several times leaving rich garden sites. Waka were carved from forest trees felled for that purpose close to the river[15].

Table 2: Taranaki Whānui site of significance in Belmont-Dry Creek KNE site[16]

Site of significance	Mana whenua values[17]
Te Awa Kairangi/Hutt River	Ngā Mahi a ngā Tūpuna: Te Awa Kairangi is the major river system for the valley of the Hutt. Its sources from the Tararua connect with the extensive stream systems that support this, the largest river in the takiwā of Te Ātiawa/Taranaki Whānui
	Te Mahi Kai: This river is still navigable by waka and supported extensive wildlife of fish, birds, plants and resources that sustained many iwi over the centuries. The podocarp forest supported by this river was the home for teeming flocks of birds and evidence of this is written about extensively by early settlers especially Charles Heaphy, a surveyor with the New Zealand Company
	Wāhi Whakarite: Along this river sites were maintained for rituals and ceremonies relating to the everyday activities of the iwi
	Te Mana o te Tangata: This river and its tributaries are significant as many pā were built on its banks and sustained a full way of life for whanau and provided extensively for manuhiri on the occasions required
	Te Manawaroa o te Wai: This river has been highly modified by settlers and this continues today. The use of the river to dump sewage and waste and the narrowing of its channel and the extensive changes to the delta at the mouth have caused iwi to lose their relationship with this most significant river
	Te Mana o te Wai: Te Awa Kairangi has much lore and its name and connection for the iwi who lived and moved on from this area mean the cultural history is a large one
	Wāhi Mahara: Like all rivers in the Te Ātiawa/Taranaki Whānui takiwā, this river is the place for wānanga; of note are the pā sites, the swamps and their uses for weaving dyes and the fisheries. The battles are all linked to the Te Ātiawa/Taranaki Whānui story

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

- make a small but valuable contribution to the overall expected PNRP outcomes including protecting native vegetation in the Hutt River catchment
- ensure people working in KNE sites understand the requirements of the Accidental Discovery Protocol
- endeavour to ensure that Ngāti Toa and Taranaki Whānui values for the site are protected

In addition, Greater Wellington will work on initiatives to achieve mutual benefit including the internship monitoring programme of the cultural health and wellbeing of KNE sites.

5.4. Stakeholders

The Friends of Belmont Regional Park community group is a stakeholder in the KNE site. This group has an interest in ensuring the KNE site is protected but aren't actively involved in biodiversity management. Greater Wellington keeps the group informed of Park management activities.

6. 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 areas of particularly intact vegetation typical of the historical ecosystem type. The ecological values of a site are used to prioritise how resources are allocated to manage KNE sites within the region.

Belmont-Dry Creek KNE site contains a small remnant of lowland broadleaf forest and a large surrounding area of regenerating broadleaf forest and manuka scrubland located in steep stream valleys and rolling hill country. The KNE site is part of an ecological connection or 'corridor' stretching from the Tararua Range in the north to Wellington City in the south[18]. The KNE site is located in the Wellington Ecological District[19].

The following ecological values of Belmont-Dry Creek are notable:

Threatened ecosystems: The Threatened Environment Classification system (LENZ)[20] is a broad classification system which shows how much indigenous vegetation remains within land environments, how much is legally protected and how past vegetation loss and legal protection are distributed across New Zealand's landscape. This KNE site contains areas that fall within the following categories (see Appendix 1, Map 3):

- Acutely Threatened (Environments with less than 10% indigenous vegetation remaining nationally); mostly found on hill tops and plateaus
- At Risk (Environments with 20 – 30% indigenous vegetation remaining nationally); mostly found on valley floors and lower slopes.

Threatened species: The KNE site provides habitat for one threatened bird species and three threatened freshwater fish species. Nationally threatened species are listed in Appendix 2 and regionally threatened species are listed in Appendix 3.

The Singers and Rogers (2014)[21] classification of pre-human vegetation indicates that the Belmont-Dry Creek KNE site was originally comprised of mostly tawa, kāmahi, podocarp forest (MF7). These forest types are characteristic of downland and hill country, predominantly inland. There is only about 22% of the pre-human extent of the MF7 forest type remaining in the Wellington region, making it a regionally At Risk ecosystem type[22].

The KNE site now consists of remnant and regenerating broadleaf forest on the valley floor and lower slopes of the main valley system, and mānuka scrubland on the higher rolling hill country. The remnant forest contains pukatea (*Laurelia novae-zelandiae*), mataī (*Prumnopitys taxifolia*) and kahikatea (*Dacrycarpus dacrydioides*) emerging over a tawa (*Beilschmiedia tawa*) canopy. Kōwhai (*Sophora microphylla*), kōtukutuku (*Fuchsia excorticate*) and tītoki (*Alectryon excelsus* subsp. *excelsus*) are also present. Hard beech (*Fuscospora truncata*) and black beech (*Fuscospora solandri*) are present on shallow soils of the ridge crests and spurs in the main valley and miro (*Prumnopitys ferruginea*) are common in the valleys in the west of the KNE site. The KNE site is the southern limit for beech in the western Hutt hills[23,24].

Older parts of the regenerating forest located on the lower slopes of the KNE site have been regenerating for around 50 years. The younger parts located on the upper slopes were retired from farming and native forest allowed to start regenerating on them around 20 years ago. Plants of special interest because they are locally rare are narrow leaved māhoe (*Melicytus lanceolatus*) and raukawa (*Raukaua edgerleri*)[25].

Belmont-Dry Creek KNE site and other KNE sites along the western Hutt hills provide an important ecological corridor between Hutt and Wellington cities, and north to the Akatarawa Forest and Tararua Range for bird species like tūī (*Prosthemadera novaeseelandiae*) and kererū (*Hemiphaga novaeseelandiae*). Other native bird species found in the KNE site include whitehead (*Mohoua albicilla*), bellbird (*Anthornis melanura*), grey warbler (*Gerygone igata*), silvereye (*Zosterops lateralis*), North Island fantail (*Rhipidura fuliginosa*) Australasian harrier, (*Circus approximans*) and black back gulls (*Larus dominicanus*). Of particular importance is the presence of at least one breeding pair of New Zealand falcon (*Falco novaeseelandiae*), and tomtit (*Petroica macrocephala*) are occasionally sighted, presumably dispersing from Keith George Memorial Park KNE site where they are more plentiful[26].

The New Zealand Freshwater Fish Database has records of longfin eel (*Anguilla dieffenbachii*), shortfin eel (*Anguilla australis*), banded kōkopu (*Galaxias fasciatus*) and redfin bully (*Gobiomorphus huttoni*) in Dry Creek. There are also historic records of inanga (*Galaxias maculatus*), common bully (*Gobiomorphus cotidianus*) and giant kōkopu (*Galaxias argenteus*) in the stream[27].

Ngahere gecko (*Mokopirirakau* 'southern North Island') and northern grass skink (*Oligosoma polychroma*) have been recorded in the adjacent Belmont Quarry[28] and are likely to be present within the KNE site.

7. Threats to ecological values at the KNE site

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

7.1. Key threats

The most significant threats to the ecological values at Belmont-Dry Creek KNE site come from ecological weeds and pest animals. Ecological weeds vary in density and distribution across the site. A very dense infestation of a range of woody weed species is present within one large but fairly discrete part of the KNE site; operational area A (see Appendix 1, Map 4). A range of woody, climbing and ground covering weed species are distributed widely throughout the rest of the KNE site, but at much lower densities.

There is a risk that the invasive ecological weed climbing asparagus (*Asparagus scandens*) could become widespread throughout the KNE site. Only a few individual plants of climbing asparagus have been found in the KNE site to date. However, the species is present in the nearby Kelson Bush KNE site and is widespread in Belmont-Speedy's KNE site.

If ecological weeds are left uncontrolled they will become increasingly dominant in the forest, will inhibit natural native plant regeneration and could cause native canopy plants to collapse.

Populations of possums (*Trichosurus vulpecula*) and rats (*Rattus* spp.) are likely to be at low levels in the KNE site as a result of the existing control. Numbers would readily increase though through reproduction and immigration if control was curtailed or not managed well.

It is likely that weasels (*Mustela nivalis*) and stoats (*Mustela erminea*), and possibly ferrets (*Mustela furo*), are present in the KNE site but possibly only in low numbers due to the effect of secondary poisoning; animals succumbing to toxic poisoning as a result of preying on or scavenging other animals that have previously consumed toxic bait, and the results of trapping that has started recently. Numbers may increase periodically as these species range widely and will migrate into the KNE site when breeding is prolific in the wider surrounding landscape.

Feral goats (*Capra hircus*) have frequently moved into the KNE site from adjoining farm land in the past, and further incursions are possible. Apart from one "Judas" goat (a goat fitted with a tracking collar which is retained in the KNE site to assist in the location of other goats that move into the KNE site), there are currently no feral goats present within the KNE site following several years of control operations.

While the key threats discussed in this section are recognised as the most significant, a number of other threats to the KNE site's values have also been identified. Table 3 presents a summary of all known threats to the Belmont-Dry Creek 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 operational activities.

Table 3: Summary of all threats to ecological values present at the Belmont-Dry Creek 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. Key weed species for control include pampas (*Cortaderia selloana*), tutsan (*Hypericum androsaemum*) and tradescantia (*Tradescantia fluminensis*), (see full list in Appendix 3)	Entire KNE site
EW-2	Woody weed species displace native vegetation, inhibit indigenous regeneration, and alter vegetation structure and composition. Key weed species include barberry (*Berberis glaucocarpa*), buddleia (*Buddleja davidii*) and cotoneaster (*Cotoneaster serotinus*), (see full list in Appendix 3)	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 (*Asparagus scandens*), Japanese honeysuckle (*Lonicera japonica*) and old man's beard (*Clematis vitalba*), (see full list in Appendix 3)	Entire KNE site
Pest animals		
PA-1	Possums (*Trichosurus vulpecula*) browse palatable canopy vegetation until it can no longer recover[29,30]. This destroys the forest's structure, diversity and function. Possums may also prey on native birds and invertebrates[31]	Entire KNE site
PA-2	Rats (*Rattus* spp.) browse native fruit, seeds and vegetation. They compete with native fauna for food and can reduce forest regeneration. They also prey on invertebrates, lizards and native birds[32,33]	Entire KNE site
PA-3	Mustelids (stoats[34,35] (*Mustela erminea*), ferrets[36,37] (*M. furo*) and weasels[38,39] (*M. nivalis*)) prey on native birds, lizards and invertebrates, reducing their breeding success and potentially causing local extinctions	Entire KNE site
PA-4*	Hedgehogs (*Erinaceus europaeus*) prey on native invertebrates[40], lizards[41] and the eggs[42] and chicks of ground-nesting birds[43]	Entire KNE site
PA-5*	House mice (*Mus musculus)* browse native fruit, seeds and vegetation, and prey on invertebrates. They compete with native fauna for food and can reduce forest regeneration. They also prey on invertebrates, lizards and small eggs and nestlings[44,45]	Entire KNE site
PA-6*	Feral, stray and domestic cats (*Felis catus*) prey on native birds[46], lizards[47] and invertebrates[48], reducing native fauna breeding success and potentially causing local extinctions[49]	Entire KNE site
PA-7*	Rabbits (*Oryctolagus cuniculus*) and hares (*Lepus europaeus*) graze on palatable native vegetation and prevent natural regeneration in some environments[50]	Entire KNE site

Threat code	Threat and impact on biodiversity in the KNE site	Operational area/location
PA-8*	Wasps (*Vespula* spp.) adversely impact native invertebrates and birds through predation and competition for food resources. They also affect nutrient cycles in beech forests[51]	Entire KNE site
PA-9*	Fallow deer (*Dama dama*) browse the forest understory and can significantly change vegetation composition by preferential browsing and preventing regeneration[52,53,54]	Entire KNE site
PA-10*	Feral pigs (*Sus scrofa*) root up the soil and eat roots, invertebrates, seeds and native plants preventing forest regeneration[55]	Entire KNE site
PA-11	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[56]	Entire KNE site
PA-12*	Brown trout (*Salmo trutta*) and rainbow trout (*Oncorhynchus mykiss*) prey on native fish and compete with them for food resources[57]	Entire KNE site
PA-13*	Eastern rosella (*Platycercus eximius*) parakeets are known to out-compete native red-crowned parakeets for nest-sites and are a vector of avian diseases. The continued presence of eastern rosella in the KNE site could limit the ability of kākāriki / red crowned parakeets, that are present within nearby KNE sites to establish functional populations within Belmont-Dry Creek KNE site[58,59]	Entire KNE site
Human activities		
HA-1	Agricultural practices on adjacent farmland and livestock breaching boundary fences can result in pugged soils, grazed native vegetation inhibiting regeneration, wildlife disturbance and increased nutrient content of soils and watercourses[60]	Adjacent farmland and KNE site boundary
HA-2	Recreational use such as tramping, camping, 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	Vicinity of camping ground and tracks
HA-3	Management activities such as track development, pest control and ecological monitoring can damage and destroy vegetation, and cause the accidental introduction of weed species through the carriage of seeds and plant fragments on machinery, equipment and clothing	Entire KNE site

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

The codes alongside each threat correspond to activities listed in the operational delivery schedule (Table 4), 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 4).

8. Objectives

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

The following objectives will guide the operational activities at Belmont-Dry Creek 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.

9. Operational activities

Operational activities are targeted to work towards the objectives above (Section 8) by responding to the threats outlined in Section 7. The broad approach is summarised, and specific actions, with budget figures attached, are set out in the operational delivery schedule (Table 4).

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

The broad approach to managing biodiversity values within the KNE site is to control the most threatening ecological weeds and pest animals to sufficiently low levels to maintain the native integrity of the remnant forest, enable effective regeneration and succession of the surrounding native bush and to support viable populations of native bird species. Some human activities that could have an impact on biodiversity values are also managed.

Available resources won't allow for all ecological weeds and pest animals to be controlled. However, the level of management that will be carried out will allow progress towards the above objectives.

9.1. Ecological weed control

The aim of ecological weed control in the KNE site is to protect the forest remnant from being transformed by colonising ecological weeds and to preserve the native dominance of the surrounding native bush as it continues to regenerate.

To achieve this a large nucleus of densely packed ecological weeds located within the site is being controlled (operational area A; see Appendix 1, Map 4). Reducing the size of this area is reducing the amount of weed seeds being produced and made available for dispersal by birds and wind into the more important parts of the KNE site. This work is also stopping the gradual expansion of this heavily infested area that would otherwise be occurring.

The very steep terrain in this area makes this work difficult and therefore slow. However, good progress has been made on reducing the density of weeds within portion of the area worked during the last three years and new sections of the area are being controlled each year. Return sweeps of previously controlled sections will be required during the term of this plan to control new weed plants and these return visits will also slow progress. The most common ecological weed species found in this area are woody species such as barberry, buddleia, cotoneaster, Darwin's barberry (*Berberis darwinii*) and hawthorn (*Crataegus monogyna*). A full list of the ecological weed species that have been prioritized for control in the KNE site can be found in Appendix 3.

A small amount of control work is undertaken within the rest of the KNE site; the forest remnant and surrounding regenerating native bush. Control work alternates between the northern and southern halves of this area each year (see operational areas B and C in Appendix 1, Map 4). This work targets maturing ecological weeds in these areas to prevent them seeding and therefore fuelling an increase in exotic dominance. The same woody species as found in operational area A, as well as climbers and ground covers such as Japanese honeysuckle, old man's beard, pampas and tutsan will be controlled throughout these areas.

A priority is made of controlling climbing asparagus when it is found in any part of the KNE site. This ecological weed species is currently uncommon in the site but would have a significant impact on the native vegetation if it was allowed to establish.

9.2. Pest animal control

Possums and rats are controlled throughout the KNE site through a programme of poisoning and trapping which commenced in 2007. In the regional park portion of the KNE site, both possums and rats are controlled by dispensing toxic anticoagulant baits from a network of bait stations. On the private land only possums are controlled by trapping using Timms traps (see Appendix 1, Map 5).

Mustelid control is undertaken across the KNE site through a network of DOC 200 style traps put in place in 2018. The purchase, installation and ongoing servicing of these traps up until June 2021 has been and will continue to be funded by the aggregate quarrying company GBC Winstone. This is a requirement of a legal agreement between GBC Winstone and Greater Wellington providing mitigation for environmental impacts of specific operations at Belmont Quarry, which is located adjacent to the KNE site.

Monitoring at comparable sites has shown that the above control regimes are likely to result in low levels of possums, rats and mustelids. Pest animal control operations in adjacent and nearby KNE sites (Keith George Memorial Park, Kelson Bush and Belmont-Speedy's) will help to reduce numbers of these pest animals across the landscape which will reduce the likelihood of reinvasion of these species into Belmont-Dry Creek KNE site.

Control of feral goats is undertaken in order to keep the KNE site free of goats. Feral goat control began in 2004 to reduce the browsing of seedlings which was limiting native regeneration. Goats are now controlled to zero density. As no goats have been found in the KNE site since February 2012, control operation are undertaken only every second year. A resident "Judas" goat fitted with a tracking collar is used to

attract any feral goats that move into the KNE site, which will then be tracked down via the Judas goat and shot by hunters.

Control of pigs or deer will only occur if significant sign of these animals is found and additional funding is available. Control of mice, hedgehogs and cats is not currently undertaken. However, some control of these species may be occurring through secondary poisoning or access to the bait stations and traps.

9.3. Park management

The Greater Wellington Parks department undertakes management activities in the KNE site as part of management of Belmont Regional Park. The following management activities and procedures are undertaken to help support biodiversity management.

Greater Wellington Parks department maintains fences on the boundary of the KNE site through the Parks department's asset management programme. This minimises the likelihood of fences failing and allowing stock to access the KNE site.

Risks to biodiversity values can occur during the construction and maintenance of assets. When carrying out such activities, Greater Wellington operational staff follow procedures, which may include assessments of environmental effects, to identify and avoid damage to biodiversity values such as plant and animal communities.

Biosecurity guidelines[61] are followed by all Greater Wellington personnel when entering and working in the KNE site in order to avoid the introduction and spread of ecological weeds. Procedures involve checking for and removing seeds and plant fragments from clothing, equipment and vehicles before entering the site.

The potential impacts on biodiversity values posed by recreational activities are managed through the implementation of the Greater Wellington Parks Network Plan. This plan limits the recreational activities that are permitted within the KNE site to mountain biking, horse riding and passive forms of recreation such as camping, picnicking, walking and running. These forms of recreation are not likely to impact on biodiversity values within the KNE site if they continue to be restricted to designated amenity areas and existing roads and tracks. The potential impacts of commercial activities are managed through the Greater Wellington Parks concession process.

10. Operational delivery schedule

The operational plan shows the actions planned to achieve the stated objectives for Belmont-Dry Creek KNE site, and their timing and cost over a three year period from 1 July 2018 to 30 June 2021. The budgets for the 2019/20 and 2020/21 years are indicative only and subject to change. Maps showing the weed control operational areas and pest control can be found in Appendix 1 (Map 4 and 5).

Table 4: Three year operational delivery schedule for Belmont-Dry Creek KNE site

Objective	Threat	Activity	Operational area	Delivery	Description/Detail	Target	Timetable & Resourcing		
							2018/19	2019/20	2020/21
1	EW-2	Ecological weed control	A	Greater Wellington Biosecurity department	Stump treat or basel spray woody ecological weeds listed in Appendix 3	Reduce distribution and density of main infestation of target species	$6,000	$6,000	$6,000
1	EW-1 EW-2 EW-3	Ecological weed control	B	Greater Wellington Biosecurity department	Stump treat or foliar spray woody, climbing and ground covering ecological weeds listed in Appendix 3	Reduce distribution and density of target species	Nil	$4,000	Nil
1	EW-1 EW-2 EW-3	Ecological weed control	C	Greater Wellington Biosecurity department	Stump treat or foliar spray woody, climbing and ground covering ecological weeds listed in Appendix 3	Reduce distribution and density of target species	$4,000	Nil	$4,000
1,2	PA-1 PA-2	Pest animal control	Entire KNE site	Greater Wellington Biosecurity department	Service bait stations and Timms traps at three monthly intervals to control possums and rats	Possums: < 5% RTC* Rats: < 10% TTI**	$21,300	$22,800	$21,300
1,2	PA-3	Pest animal control	Entire KNE site	Greater Wellington Biosecurity department	Service DOC200 traps at three monthly intervals to control mustelids	Mustelids: < 5% TTI**	$6,368†	$6,368†	$6,368†

Objective	Threat	Activity	Operational area	Delivery	Description/Detail	Target	Timetable & Resourcing		
							2018/19	2019/20	2020/21
1,2	PA-11	Pest animal control	Entire KNE site	Greater Wellington Biosecurity department	Control feral goats by ground hunting making use of a Judas goat: 3 days hunting	Operational results average less than 1 goat per hunter-day	$1,500	Nil	$1,500
1	HA-1	Park management	Boundary of KNE site	Greater Wellington Parks department	Maintain boundary fences to prevent access to the KNE site by livestock	No impact on the KNE site by livestock	††	††	††
1,2	HA-2, HA-3	Park management	Entire KNE site	Greater Wellington Parks, Biodiversity, Biosecurity & Environmental Science departments	Adhere to Greater Wellington best practice guidelines and policies aimed at protecting the natural environment while undertaking operational activities and managing the recreational and commercial use of the KNE site	Minimal impacts are imposed on biodiversity values by operational, recreational and commercial activities	Nil†††	Nil†††	Nil†††
						Total	**$29,800**	**$29,800**	**$29,800**

*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

**TTI = Tracking tunnel index. The control regime has been created to control rats/mustelids to this level but monitoring will not be undertaken. Experience in the use of this control method indicates this target will be met[62]

† Funded by GBC Winstone

†† This cost varies annually and cannot be predicted at this time. Funded by Greater Wellington Parks department

††† No operational resource is required to carry out this activity. Staff time only is required

11. Funding contributions

11.1. Budget allocated by Greater Wellington

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

Table 5: Greater Wellington allocated budget for Belmont-Dry Creek KNE site

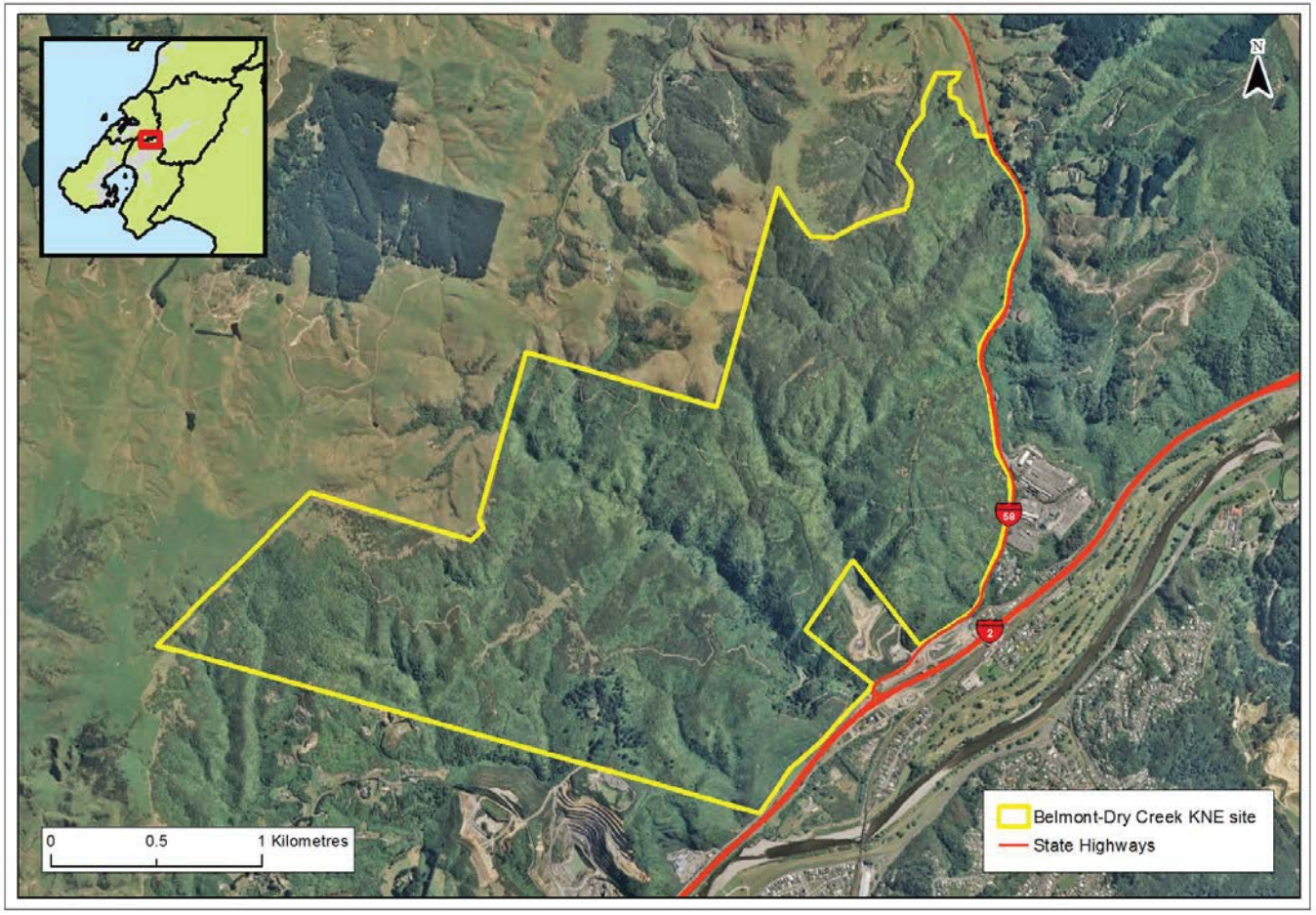
Management activity	Timetable and resourcing		
	2018/19	2019/20	2020/21
Pest plant control	$10,000	$10,000	$10,000
Pest animal control	$22,800	$22,800	$22,800
Total	**$32,800**	**$32,800**	**$32,800**

11.2. Budget allocated by GBC Winstone

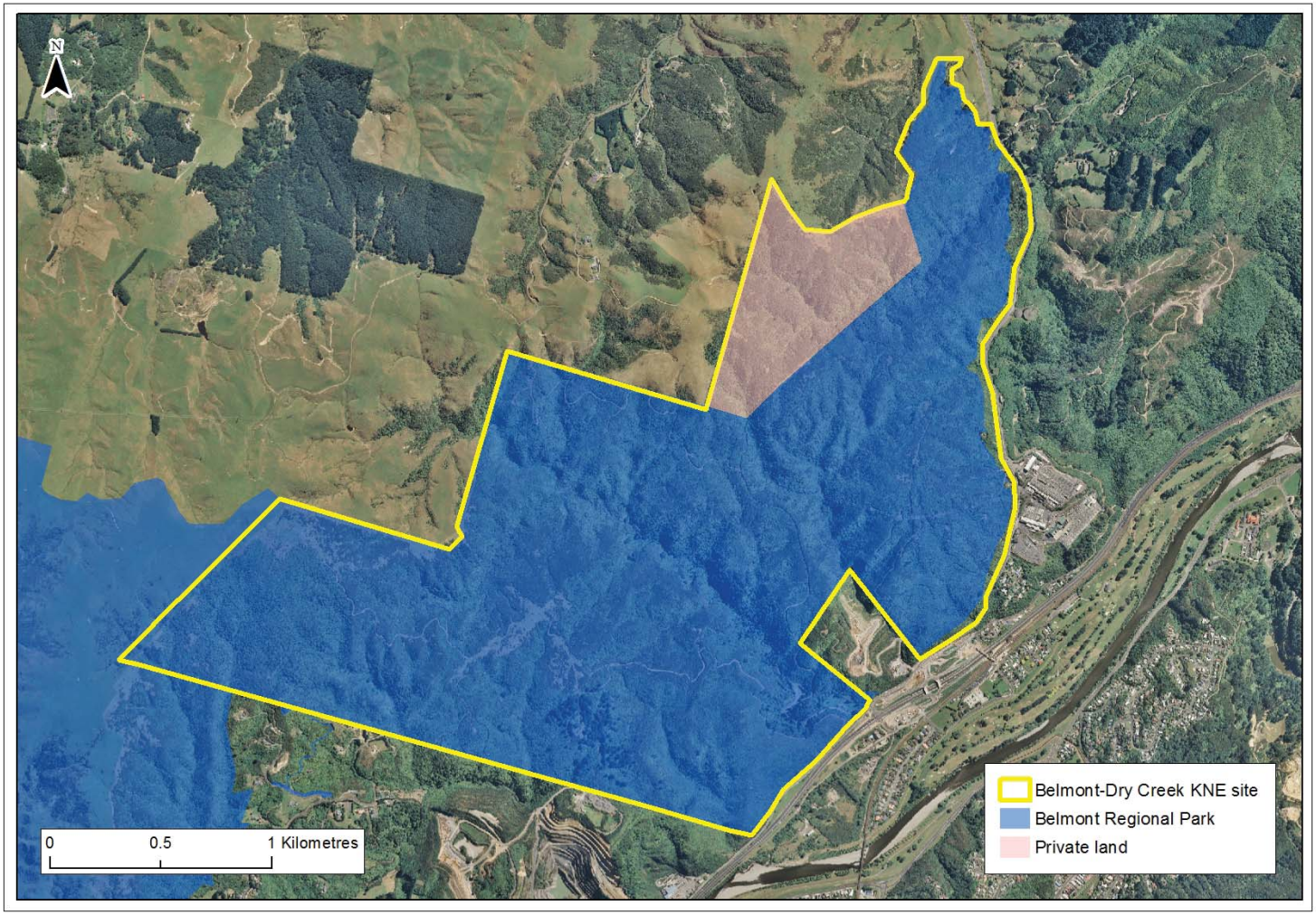
Table 6: GBC Winstone allocated budget for the Belmont-Dry Creek KNE site

Management activity	Timetable and resourcing		
	2018/19	2019/20	2020/21
Pest animal control	$6,368	$6,368	$6,368
Total	**$6,368**	**$6,368**	**$6,368**

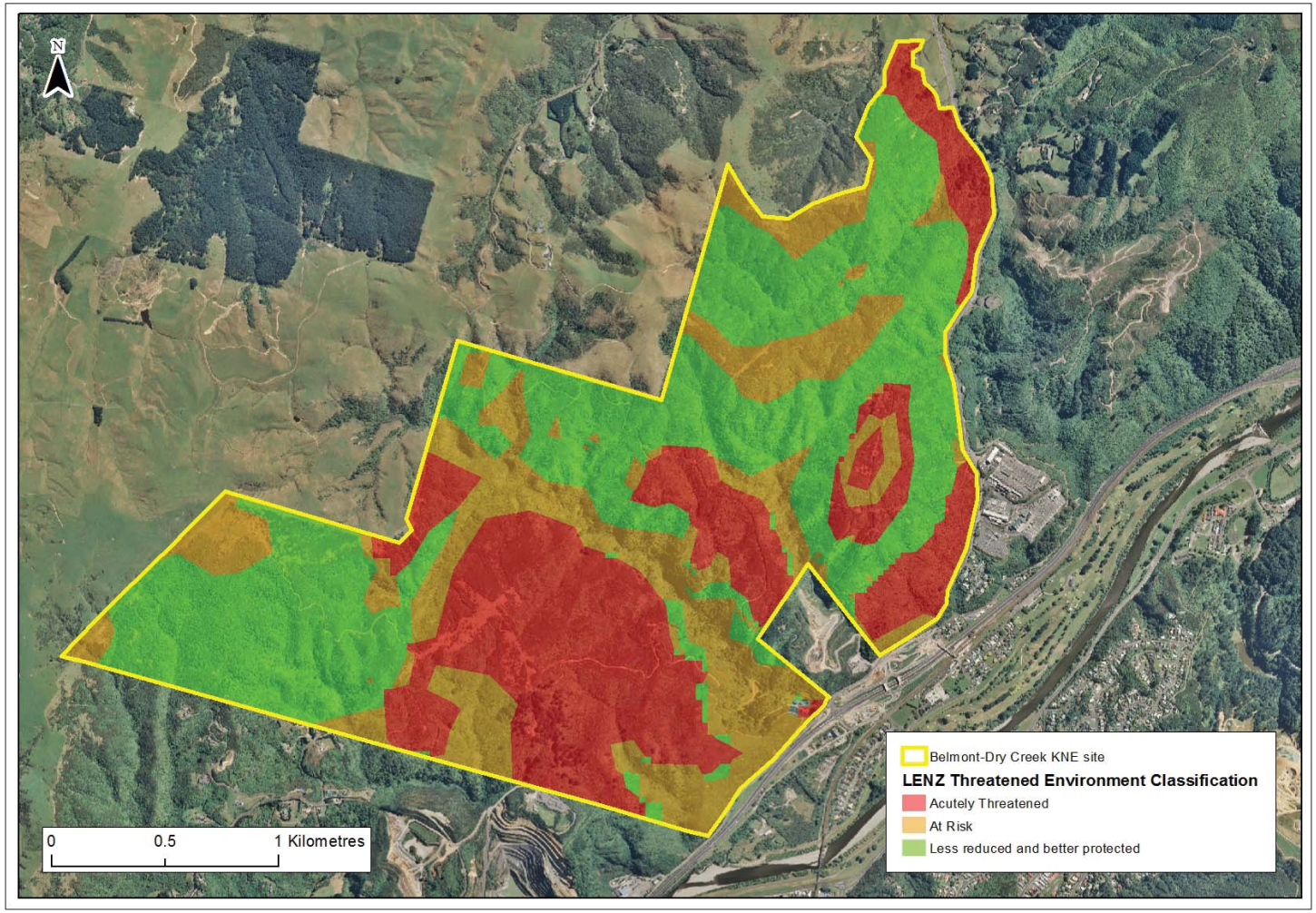
Appendix 1: Site Maps



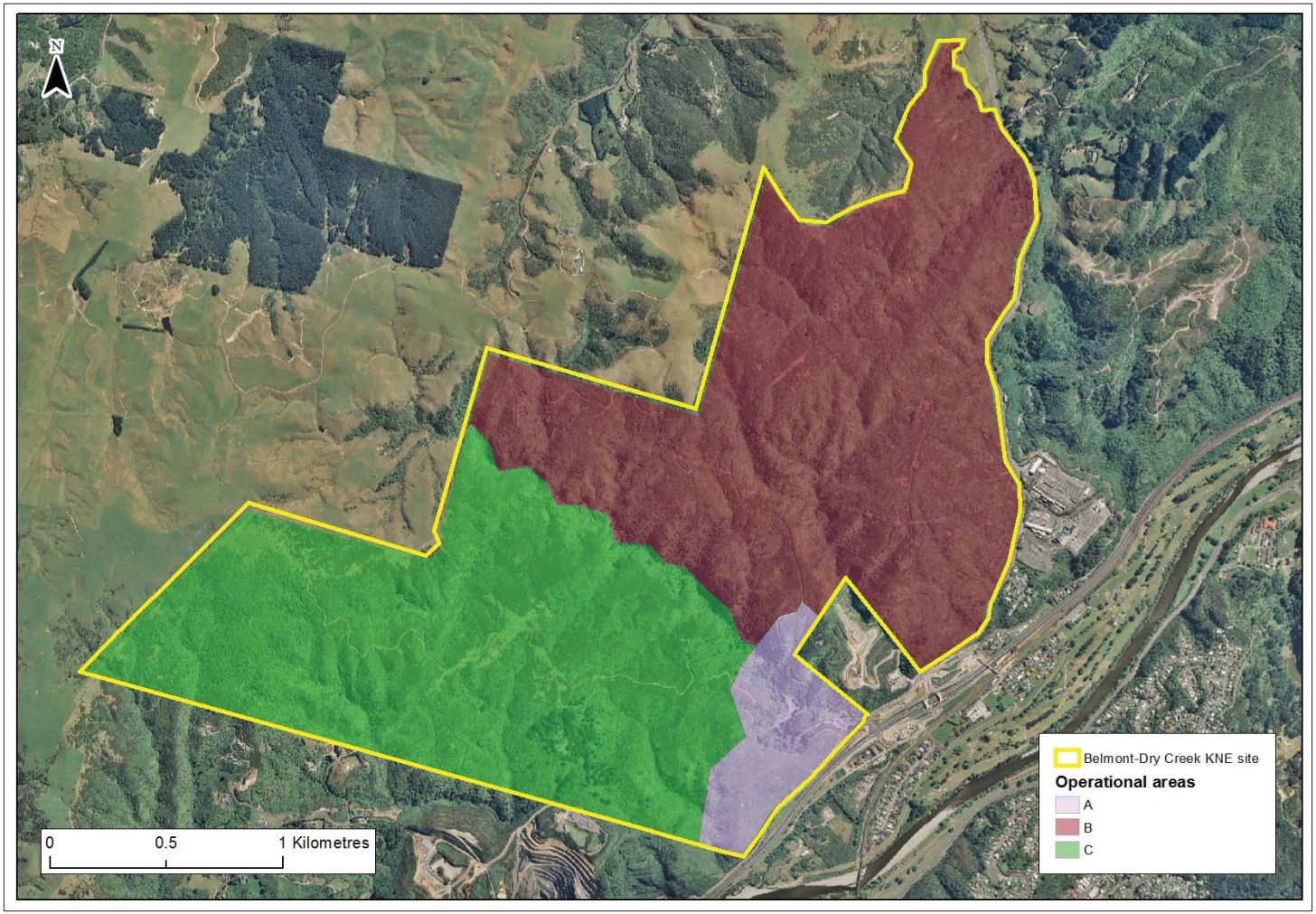
Map 1: The Belmont-Dry Creek KNE site boundary



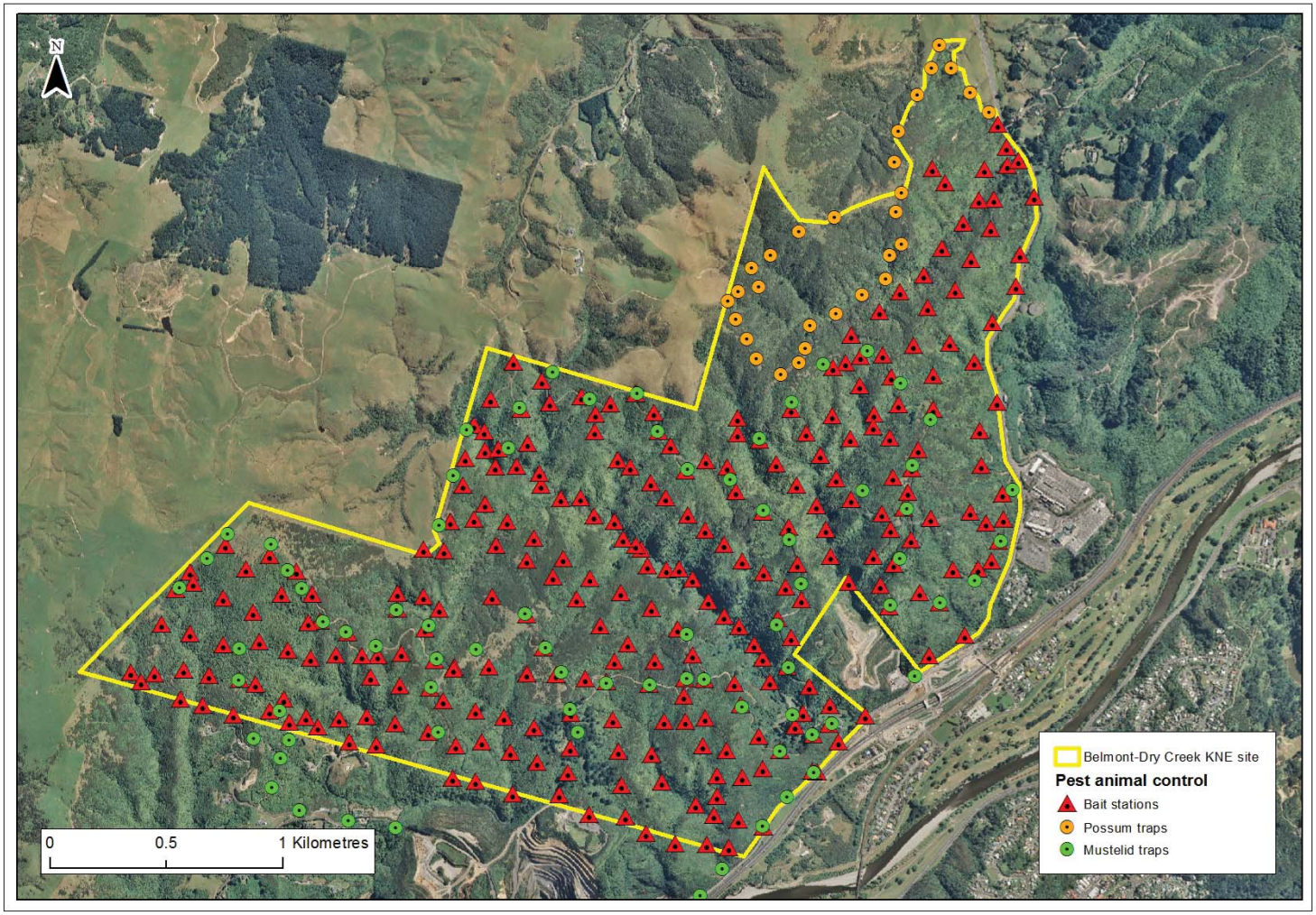
Map 2: Land tenure at Belmont-Dry Creek KNE site



Map 3: Land Environment New Zealand threat classifications for the Belmont-Dry Creek KNE site



Map 4: Operational areas for ecological weed control in Belmont-Dry Creek KNE site



Map 5: Pest animal control in Belmont-Dry Creek 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 (birds, plants, reptiles, etc) is assessed on a five-year cycle[63]. 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 7: Threatened species at Belmont-Dry Creek KNE site

Scientific name	Common name	Threat status	Source
Birds[64]			
Falco novaeseelandiae	New Zealand falcon	Threatened – Nationally Vulnerable	Ebird database http://ebird.org/content/newzealand/ (access 22/01/2014)
Freshwater fish[65]			
Anguilla dieffenbachii	Longfin eel	At Risk – Declining	NZ Freshwater Fish Database (2013)
Galaxias argenteus	Giant kōkopu	At Risk – Declining	Greater Wellington Regional Council, 2007. Belmont Regional Park Resource Statement
Gobiomorphus huttoni	Redfin bully	At Risk – Declining	NZ Freshwater Fish Database (2013)

Appendix 3: Ecological weed species

The following table lists key ecological weed species for control in the Belmont-Dry Creek KNE site.

Table 8: Ecological weed species prioritised for control in the Belmont-Dry Creek KNE site

Scientific name	Common name	Weed type
Asparagus scandens	Climbing asparagus	Climber
Berberis darwinii	Darwin's barberry	Woody
Berberis glaucocarpa	Barberry	Woody
Buddeja davidii	Buddleia	Woody
Clematis vitalba	Old man's beard	Climber
Cortaderia selloana	Pampas	Ground cover
Cotoneaster spp.	Cotoneaster	Woody
Crataegus monogyna	Hawthorn	Woody
Hypericum androsaemum	Tutsan	Ground cover
Ilex aquafolium	Holly	Woody
Lonicera japonica	Japanese honeysuckle	Climber
*Metrosideros excelsa**	Pohutukawa	Woody
Paraserianthes lophantha	Brush wattle	Woody
Pinus radiata	Pine	Woody
*Pittosporum crassifolium**	Karo	Woody
Senecio mikanioides	German ivy	Climber
Tradescantia fluminensis	Tradescantia	Ground cover

* Denotes a New Zealand native plant that is not local to the KNE site

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