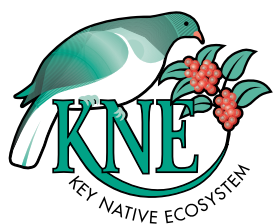
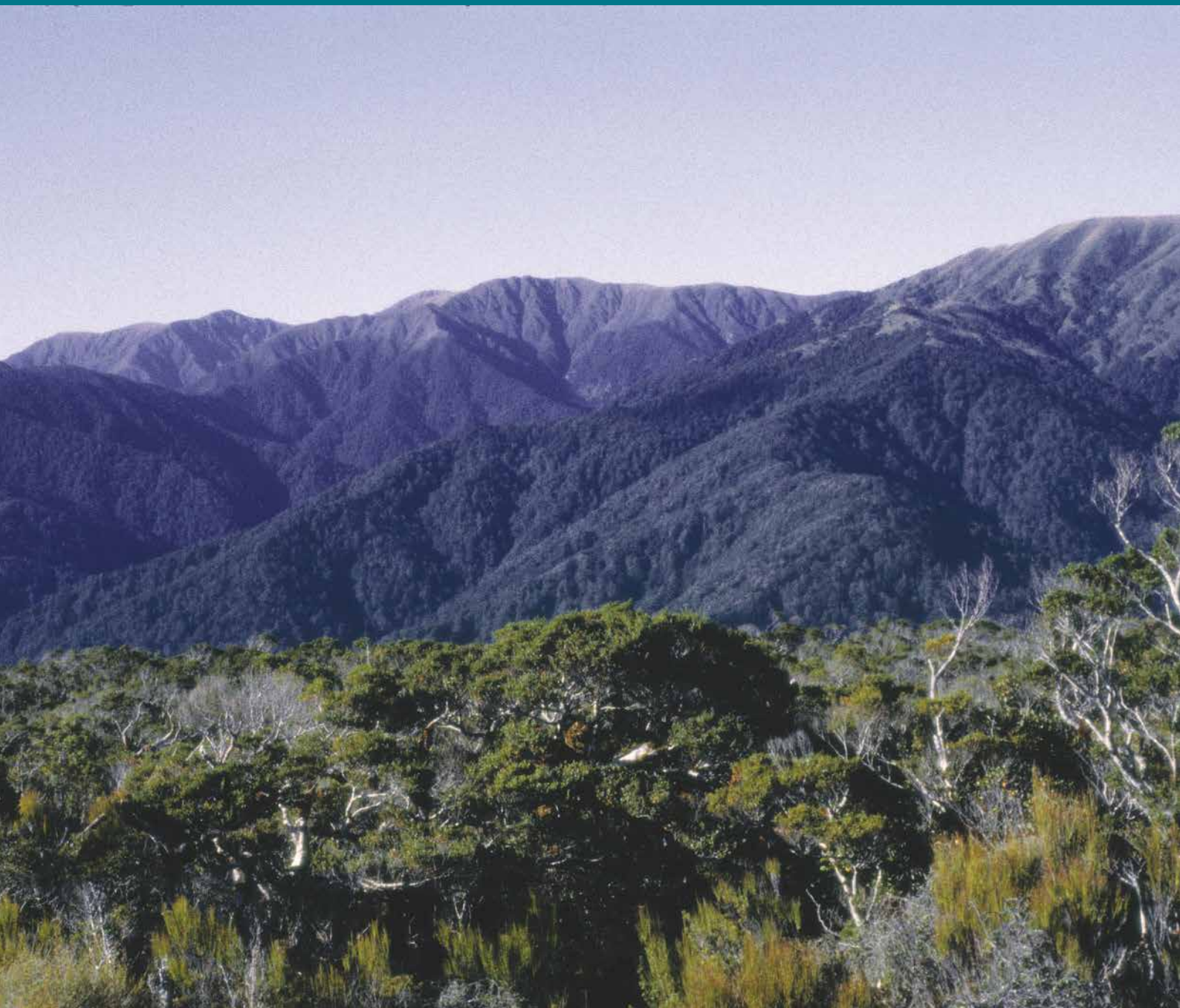


Key Native Ecosystem Plan for Hutt Water Collection Area

2016-2019



greater WELLINGTON
REGIONAL COUNCIL
Te Pane Matua Taiao



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1. Hutt Water Collection Area

The Hutt Water Collection Area is set aside and managed under the Wellington Regional Water Board Act 1972 for water collection purposes. Management of the area is also guided by the National Environmental Standards for Sources of Human Drinking Water (2008), drinking water standards, a water safety plan and a number of statutory and strategic plans. In 2016 an overarching management plan for the Hutt and Wainuiomata/Orongorongo Water Collection Areas¹ was developed to outline goals, objectives and actions to guide and inform the management of the water collections areas and operational plans, such as this Key Native Ecosystem (KNE) plan. The water collection area management plan identifies five goals:

1. *Maximise the **quality** of raw water and minimise the extent of water treatment required*
2. *Manage threats to water **supply** to maintain volumes of raw water*
3. *Maintain and enhance the significant **ecosystem and biodiversity values** of the water collection areas*
4. *Maintain the **cultural heritage** values of the water collection areas, including managed **recreational access***
5. *Maintain **collaborative working relationships** between management agencies and with others to achieve water quality, supply and biodiversity objectives*

These goals are relevant to this KNE plan as the outcomes of biodiversity management are a key component in the delivery of the Water Collection Management Plan's objectives. Optimum water quality is achieved via healthy aquatic and terrestrial ecosystems, and managing the key threats to water quality and supply also supports biodiversity objectives. For example, maintaining low numbers of pest animals such as deer and goats reduces the risk of water contamination by protozoa such as cryptosporidium and giardia (which they can carry) and also reduces the loss of vegetation cover that can contribute to soil erosion, thereby threatening water quality.

2. The Key Native Ecosystem programme

The Wellington region’s native biodiversity has declined since people arrived and the ecosystems that support it face ongoing threats and pressures. Regional councils have responsibility for maintaining indigenous biodiversity, as well as protecting significant vegetation and habitats of threatened species, under the Resource Management Act 1991 (RMA).

Greater Wellington Regional Council’s (GWRC) Biodiversity Strategy (2016)² sets a framework that guides how GWRC protects and manages biodiversity in the Wellington region to work towards the vision below.

GWRC’s vision for biodiversity
Healthy ecosystems thrive in the Wellington region and provide habitat for native biodiversity

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

Goal One
Areas of high biodiversity value are protected or restored

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

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

A site must be identified as ecologically significant using the above criteria and be considered sustainable for management in order to be considered for inclusion in the KNE programme. Sustainable for the purposes of the KNE programme is defined as: a

site where the key ecological processes remain intact or continue to influence the site and resilience of the ecosystem is likely under some realistic level of management.

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

KNE sites are managed in accordance with three-year KNE plans, such as this one, prepared by the GWRC's Biodiversity department in collaboration with the landowners and other stakeholders. These plans outline the ecological values, threats, and management objectives for sites and describe operational activities such as ecological weed and pest animal control. KNE plans are reviewed regularly to ensure the activities undertaken to protect and restore the KNE site are informed by experience and improved knowledge about the site.

3. Hutt Water Collection Area Key Native Ecosystem site

The Hutt Water Collection Area KNE site is located in the southern foothills of the Tararua Range approximately 13km north-east of Upper Hutt City and 13km south-east of Waikanae (see Appendix 1, Map 1). It encompasses the headwaters of Te Awa Kairangi/Hutt River including the catchments of the Eastern Hutt River, Western Hutt River and Kerekere Stream. The KNE site adjoins the Tararua Forest Park to the north and east, and Kaitoke Regional Park KNE site to the south.

The KNE site is approximately 8,740 hectares in size and is one of the largest forest areas containing original forest types in the Wellington region. Its management as a protected water supply area has resulted in site's condition being very good compared to other areas of similar habitat in the region. The terrain is mountainous and rugged, broken by multiple streams and narrow, steep-sided ridges. The hilltops are extremely exposed to the north-west and the south and have a reputation for high winds, fog and sudden weather changes. Most of the site is relatively remote with only very limited vehicle access and no formed walking tracks. These characteristics and proximity to Wellington's population make it an ideal site for water collection purposes.

4. Landowners, management partners and stakeholders

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

4.1. Landowner

All land within the KNE site is owned by or vested in GWRC and has been set aside exclusively for harvesting water for supply to the cities of Wellington, Porirua, Lower Hutt and Upper Hutt.

4.2. Management partners

Management partners are those that fund or have an active role in the implementation of the KNE plan or the management of the site. The management partners to this plan are Wellington Water Limited (Wellington Water) and GWRC's Parks, Biodiversity and Biosecurity departments, who operate under service level agreements with Wellington Water.

Wellington Water manages the water supply in accordance with the Hutt and Wainuiomata/Orongorongo Water Collection Areas Management Plan³. This plan identifies the broad scale management required to protect biodiversity values of the site which play a role in providing quality source water (e.g, a complete native forest structure). This KNE plan provides further detail of management activities being implemented to protect those biodiversity values. Wellington Water funds most of the management activities detailed within this KNE plan. They also maintain water supply assets and the associated infrastructure, including the section of road leading to a transmission repeater.

The Biodiversity department is the overarching lead department for GWRC 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 facilities such as the access roads, a suspension bridge and an emergency shelter.

4.3. Stakeholders

GWRC's Environmental Science department carries out environmental monitoring within the KNE site as part of the DOC's Project Kākā: Tararua Nature Recovery and other environmental monitoring programmes. The information provided by these monitoring programmes help to guide management decisions.

The KNE site is used by small numbers of recreational and commercial hunters, and trampers.

5. Ecological values

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

5.1. Ecological designations

Table 1, below, lists ecological designations at all or part of the Hutt Water Collection Area KNE site.

Table 1: Designations within the Hutt Water Collection Area KNE site

Designation level	Type of designation
Regional	<p>Parts of the KNE site are scheduled under GWRC's proposed Natural Resources Plan (PNRP) as Ecosystems and Habitats with Significant Indigenous Biodiversity Values. These are:</p> <ul style="list-style-type: none"> • A river with outstanding indigenous ecosystem values: Te Awa Kairangi/Hutt River (Schedule A1) • A wetland with outstanding indigenous biodiversity values: Maymorn Wetlands (Schedule A3) • Rivers with significant indigenous ecosystems: all streams and tributaries of Te Awa Kairangi/Hutt River (Schedule F1)
Other	<p>Parts of the KNE site is scheduled under GWRC's PNRP as:</p> <ul style="list-style-type: none"> • Ngā Taonga Nui a Kiwa: Te Awa Kairangi/Hutt River (Schedule B) <p>The entire KNE site is gazetted for water supply purposes.</p>

5.2. Ecological significance

The Hutt Water Collection Area KNE site is considered to be regionally important because:

- It contains **representative** ecosystems that were once more common in the region
- It contains ecological features that are **rare or distinctive** in the region
- It contains high levels of ecosystem **diversity**, with many ecosystem types represented within the KNE site boundary, including one naturally uncommon ecosystem
- Its **ecological context** is valuable at the landscape scale as it contains a variety of interconnected habitats and, provides core seasonal habitat for threatened indigenous bird species within the KNE site.

Representativeness

The vegetation types within the KNE site have remained largely unchanged since the time of European settlement so are highly representative of the original vegetation types⁴. The Singers and Rogers (2014)⁵ classification of pre-human forest vegetation indicates the KNE site would have comprised of a number of different forest types including kamahi, broadleaved, podocarp forest (MF8), red beech, podocarp forest (CLF9), red beech, silver beech forest (CLF10), and silver beech forest (CLF11).

The Threatened Environment Classification system⁶ indicates that most of the Eastern Hutt River terraces are in an environment type that is classified as At Risk. Nationally this type of environment has only 20-30% of its indigenous vegetation cover remaining (see Appendix 1, Map 2).

Rarity/distinctiveness

There are four wetlands present within the KNE site: Phillips Stream marsh, upper Eastern Hutt fen, Maymorn Ridge marsh and Maymorn Ridge bog. The latter two together constitute the Maymorn Wetlands that is scheduled as an outstanding wetland in the PNRP (see Appendix 1, Map 3). These wetlands are some of the most intact wetlands in the region due to their remote location and inaccessibility⁷. Wetlands are now considered an uncommon habitat type in the Wellington region with less than 3% remaining of their original extent⁸. The Maymorn Ridge bog is an example of a domed bog which is considered a naturally uncommon ecosystem type with a threat status of Endangered⁹.

New Zealand's national threat classification system¹⁰ lists two plant, six bird and five fish species as nationally Threatened or At-Risk within the KNE site. Nine plant species present have also been listed as regionally threatened. Nationally Threatened species are listed in Appendix 2 and regionally threatened species in Appendix 3.

Diversity

The KNE site is a very ecological diverse area with several different forest types, four wetlands, numerous major and minor watercourses, and sub-alpine and alpine floral associations present, making it very ecological diverse area.

Ecological context

The KNE site is one of the largest areas of original forest in the Wellington region supporting large populations of native birds, including breeding habitat for Threatened and At-Risk species. The KNE site is contiguous with other large areas of similar habitat. The KNE site contains all of the headwaters of Te Awa Kairangi/Hutt River providing a rare opportunity to carry out management at a catchment scale.

5.3. Ecological features

The KNE site lies within the Tararua ecological district¹¹ which is mainly characterised by:

- Steep, high, dissected hills and mountains, heavily faulted and broken by major rivers with steep hill slopes dropping to small river flats
- Triassic-Jurassic greywacke, argillite and bedded alternating greywacke and argillite geology, and steepland soils from shallow, stony and strongly leached greywacke to podzolised with low natural fertility
- Predominantly westerly winds with gale force strength common, low cloud covering the ranges for prolonged periods, and high rainfall.

Habitats (vegetation)

Vegetation on the valley floors is dominated by a canopy of hīnau (*Elaeocarpus dentatus*) and kāmahi (*Weinmannia racemosa*) with emergent rimu (*Dacrydium cupressinum*) and rātā (*Metrosideros robusta* and *M.umbellata*). At around 400m above sea level (asl) red beech (*Fuscospora fusca*) enters the forest mix and begins to dominate. At around 800m asl, red beech-silver beech (*Lophozonia menziesii*) forest is dominant, before silver beech dominates above 900m asl. The treeline is at around 1,100m asl.

Ridge-top sub-alpine plant communities are found near Renata and Alpha peaks. These peaks are on the KNE site's northern boundary. Stunted silver beech, leatherwood (*Olearia colensoi*) and *Dracophyllum filifolium* overtop the snow tussock *Chionochloa flavescens*, snowberry species (*Gaultheria* spp.), cushion grasses and sundew species (*Drosera* spp).

Ridge-top elfin forest is present on the main ridge-lines from Renata to Elder, Hells Gate to Omega and Maymorn to Pukeruru (see Appendix 1, Map 1). These areas are subject to cold winds, dense clouds, high rainfall and snow in winter. They have similar canopy dominants as in the ridge-top subalpine communities, but mountain flax (*Phormium cookianum*), haumakaroa (*Raukaua simplex*), ferns, coprosmas and many other species are also found. Wet turf is also frequently present.

Snowgrass areas and fellfields are found above the alpine scrub belt on Mt Alpha and Mt Aston ridge tops, and on Quoin Ridge. Leatherwood, porcupine scrub (*Melicytus alpinus*) and *Dracophyllum* spp. are present. Snowgrass species include *Chionochloa flavescens* and *C. conspicua*, while other common species include mountain astelia (*Astelia cockaynei*), daisy species (*Celmisia* spp), mountain buttercup (*Ranunculus insignis*) and *Gaultheria* spp.

No logging has occurred within the KNE site, but fires have altered the forest composition in patches. Although the general forest types have remained unchanged, their compositions have been significantly modified by the impacts of browsing feral goats (*Capra hircus*) and red deer (*Cervus elaphus*).

Species

Plants

Areas of vegetation identified as ecologically important include the alpine and sub-alpine plant associations; the tree fuchsia (*Fuchsia excorticata*) forests located in gully heads around Quoin Ridge, Alpha peak, on the Eastern slopes between Renata Forks and Hutt Forks; and areas of podocarp forest¹².

Other vegetated areas of ecological interest are the locations of past fires on Quoin and Marchant ridges. These areas have not yet recovered their original beech forest and so are of scientific interest as examples of unmodified natural succession.

Southern rātā, uncommon in the North Island, can be found on Maymorn Ridge and in the vicinity of Renata Hut and the old Dobson's Hut on Marchant Ridge. Northern rātā is plentiful.

Birds

All of the fifteen native forest bird species that have survived naturally in the Wellington region have been recorded in the KNE site. These include kākā (*Nestor meridionalis*), red and yellow crowned parakeet/kākāriki (*Cyanoramphus auriceps* and *C. novaezealandiae*), whitehead (*Mohoua novaeseelandiae*), rifleman (*Acanthisitta chloris*) and New Zealand falcon (*Falco novaeseelandiae*)¹³.

Reptiles

Ngahere gecko (*Mokopirirakau* “southern North Island”) is the only lizard species that has been recorded in the KNE site. However, it is likely that barking geckos (*Naultinus punctatus*) and northern grass skinks (*Oligosoma polychroma*) are also present, as these species have been recorded within 600m of the KNE site¹⁴.

Fish (including Kōura/freshwater crayfish)

Ten species of native fish have been recorded in the KNE site¹⁵. However, the large weir at Kaitoke appears to have restricted the range of all but two of these species, the shortjaw kōkopu (*Galaxias postvectis*) and kōaro (*G. brevipinnis*) to the lower reaches of the on Te Awa Kairangi/Hutt River.

Kōura (*Paranephrops planifrons*) are also known to be present.

6. 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.

6.1. Key threats

Pest animals, ecological weeds and human activities are or have the potential to adversely impact the ecological values of the KNE site the by association the water quality and supply. The most significant threats come from pest animals, in particular possums (*Trichosurus vulpecula*), feral goats, red deer, rats (*Rattus* spp.) and stoats (*Mustela erminea*).

Possums are managed to very low numbers across the water collection area by regular aerial control operations. This management is required because possums, if left uncontrolled will over-browse the canopy until their preferred plant species can no longer recover. Preferred species in the KNE site include northern rātā, southern rātā and tree fuchsia. Ongoing control of possums is required at regular intervals as they will reinvade the KNE site from surrounding areas where they are not managed. Without this management possum numbers will increase to levels that will affect forest vitality.

Feral goats, red deer and pigs are all present in moderate numbers and are inhibiting regeneration of the forest understory and contributing to risks of water contamination. It appears that feral goats and red deer have significantly modified the forest composition. Species palatable to goats and deer have declined and are in some cases now rare. It is likely that some plant species palatable to exotic browsers have become locally extinct. The feeding behaviour of feral pigs (ie, rooting up the forest floor in search of roots and invertebrates) disturb the soil causing sediment run off into watercourses.

Rats and stoats are currently present in moderate numbers. Both are reduced to extremely low densities immediately after aerial possum control operations, but rat densities increase to between 15% and 50% TTI (tracking tunnel index) and mustelid densities to between 10% and 35% TTI¹⁶ within eighteen months of aerial control operations. These species are likely to be impacting native bird, invertebrate and lizard populations.

The large weir within the KNE site on Te Awa Kairangi/Hutt River (approximately seven metres high) whilst an important part of the water supply infrastructure appears to be preventing the passage of most native fish species to very large areas of potential habitat. Seven species of native fish recorded below the weir have not been recorded in any other part of Te Awa Kairangi/Hutt River catchment above the weir. It appears the weir is too high and steep for most native fish species to climb.

The KNE site is notable for having very few and only small infestations of ecological weeds. However, these infestations will spread if left uncontrolled.

While the key threats discussed in this section are recognised as the most significant, a number of other threats to the KNE site's values have also been identified. Table 2

presents a summary of all known threats to the Hutt Water Collection Area 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 management activities.

Table 2: Summary of all threats to ecological values present at the Hutt Water Collection Area KNE site

Threat code	Threat and impact on biodiversity in the KNE site	Operational area/location
Ecological weeds		
EW-1	Woody weed species displace native vegetation, inhibit indigenous regeneration, and alter vegetation structure and composition. Key weed species present are gorse (<i>Ulex europaeus</i>) and Himalayan honeysuckle (<i>Leycesteria formosa</i>).	A, B
EW-2	Ground covering ecological weeds smother and displace native vegetation, inhibit indigenous regeneration, and alter vegetation structure and composition. Key weed species present is lotus (<i>Lotus pendunculatus</i>).	C
Pest animals		
PA-1*	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 ^{17,18} .	Entire KNE site
PA-2*	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 ^{19,20} .	Entire KNE site
PA-3*	Hedgehogs (<i>Erinaceus europaeus</i>) prey on native invertebrates ²¹ , lizards ²² and the eggs ²³ and chicks of ground-nesting birds ²⁴ .	Entire KNE site
PA-4	Possums (<i>Trichosurus vulpecula</i>) browse palatable canopy vegetation until it can no longer recover ^{25,26} . This destroys the forest's structure, diversity and function. Possums may also prey on native birds ²⁷ and invertebrates.	Entire KNE site
PA-5*	Mustelids (stoats ^{28,29} (<i>Mustela erminea</i>), ferrets ^{30,31} (<i>M. furo</i>) and weasels ^{32,33} (<i>M. nivalis</i>)) prey on native birds, lizards and invertebrates, reducing their breeding success and potentially causing local extinctions.	Entire KNE site
PA-6*	Feral cats (<i>Felis catus</i>) prey on native birds ³⁴ , lizards ³⁵ and invertebrates ³⁶ , reducing native fauna breeding success and potentially causing local extinctions ³⁷ .	Entire KNE site
PA-7	Feral 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 ³⁸ .	Entire KNE site
PA-8	Red deer (<i>Cervus elaphus</i>) browse the forest understory and can significantly change vegetation composition by preferential browsing and preventing regeneration ^{39,40,41} .	Entire KNE site

Threat code	Threat and impact on biodiversity in the KNE site	Operational area/location
PA-9	Feral pigs (<i>Sus scrofa</i>) root up the soil and eat roots, invertebrates, seeds and native plants preventing forest regeneration ⁴² .	Entire KNE site
PA-10*	Wasps (<i>Vespula</i> spp.) adversely impact native invertebrates and birds through predation and competition for food resources. They also affect nutrient cycles in beech forests ⁴³ .	Entire KNE site
PA-11*	Brown trout (<i>Salmo trutta</i>) and rainbow trout (<i>Oncorhynchus mykiss</i>) prey on native fish and compete with them for food resources ⁴⁴ .	Entire KNE site
PA-12*	Eastern rosella (<i>Platycercus eximius</i>) 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 red crowned parakeets to establish functional populations ^{45,46} .	Entire KNE site
Human activities		
HA-1	Recreational use such as hunting and tramping can cause the accidental introduction of weed species through the carriage of seeds and plant fragments on clothing, equipment and dogs.	Entire KNE site
HA-2	Road and track maintenance, the installation of structures, ecological monitoring and other management activities can all cause the accidental introduction of weed species through the carriage of seeds and plant fragments on machinery, equipment and clothing.	Entire KNE site
HA-3	Fire can be destructive to native flora and fauna and create conditions for pest plant invasion.	Entire KNE site
HA-4*	A large weir on Te Awa Kairangi/Hutt River within the KNE site is preventing or restricting the access of most native fish species to most of the habitat within the KNE site and may be preventing some migrating fish from completing their life-cycle.	At the lower end of Te Awa Kairangi/Hutt River within the KNE site
Other threats		
OT-1*	A lack of legal protection can leave a site at risk of future development or destruction and resources invested in the KNE site may be wasted. Whilst gazetted for water supply, no part of the KNE site is legally protected.	Entire KNE site

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

The codes alongside each threat correspond to activities listed in the operational plan (Table 3), and are used to ensure that actions taken are targeted to specific threats. A map of operational areas can be found in Appendix 1 (see Map 4).

7. Management objectives

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

The following objectives will guide the management activities at the Hutt Water Collection Area KNE site.

1. **To maintain a healthy terrestrial ecosystem for achieving optimum water quality and increased resilience to threats**
2. **To improve the structure* and function† of native plant communities**
3. **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 provision of food and habitat for animals.

8. Management activities

Management activities are targeted to work towards the objectives above (Section 6) by responding to the threats outlined in Section 5. The broad approach to management activities is described briefly below, and specific actions, with budget figures attached, are set out in the operational plan (Table 3).

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

The broad approach to managing biodiversity values within the KNE site is to control all ecological weeds and the most threatening pest animals to sufficiently low levels to enable effective regeneration and succession of the native forest cover and to support viable populations of native bird species. Some human activities that could have an impact on biodiversity values will also be managed. Available resources won't allow for all pest animals to be controlled. However the level of management that will be carried out will allow progress towards the above objectives.

8.1. Ecological weed control

The aim of ecological weed control is to protect the integrity and function of the native plant communities present in order to maintain a healthy terrestrial ecosystem. To achieve this all infestations of ecological weeds will be contained and controlled to stop them spreading into open areas such as river flats and slips. As there are currently only a few small infestations (see Appendix 1, Map 4, operational areas A, B and C), this approach may result in the complete elimination of all current infestations in the medium term. Apart from work identified as being undertaken the Parks department, all other ecological weed control will undertake by the GWRC Biosecurity department.

All identified ecological weeds will be controlled annually before they set seed. The weed seed bank in these areas will be reduced over time as existing weed seeds germinate and the resulting plants are controlled before seeding.

Ecological weed species that are present and will be controlled are gorse (operational areas A, B and C), Himalayan honeysuckle (operational area B) and lotus (isolated areas within operational area C). Lotus will be searched for in the vicinity of historic observations to confirm or effect the elimination of this species. Gorse control in operational area C, in the vicinity of the Eastern Hutt access road will be additional to that undertaken by the GWRC Parks department as part of their road side weed control programme. While the Parks department will control gorse on the immediate road edges, the Biodiversity department will fund control of all other gorse plants growing between the road edge and the bush margin.

8.2. Pest animal control

The aim of pest animal control is to reduce the impacts of mammalian browsers (possums, deer, pigs and goats) on native forest understory regeneration and native plant diversity and function. This will in turn maintain a healthy terrestrial ecosystem and improve the habitat for native birds including threatened species. Controlling possums and pigs will also reduce their predation of native birds and invertebrates.

Aerially-sown 1080

Possums will be controlled on a regular basis throughout the KNE site to keep the overall possum population density below 5% residual trap catch (RTC). This will be achieved by continuing the current cyclic use of aerially-sown 1080 (sodium fluoroacetate) toxic bait.

An aerial possum control operation was last carried out in August 2014. A subsequent operation will be carried out in this area when monitoring indicates that possum populations have grown to a level in the vicinity of 5% RTC or above, or the equivalent BMI (bite mark index). The results gained from monitoring carried out within the KNE site, as part of the Project Kākā: Tararua Nature Recovery will be used to provide this information. Past monitoring results have shown that a 5% RTC or above is likely to occur around five years after the last operation, so it is anticipated that the next operation will be required in 2019.

The aerially-sown 1080 operation will be carried out in winter 2019 with the operations running over two financial years. The planning and purchase of materials will be undertaken in the third year of this plan and the sowing of both the pre-feed and toxic baits in the first quarter of the following financial year (and beyond the time frame of this KNE plan). This timing will be used as it has been proven that poisoning operations are most effective when carried out around the middle of winter and will have the least disruption to Wellington Water's water supply activities.

An aerially-sown 1080 operation will also be carried out in the adjacent Kaitoke Regional Park KNE site simultaneously with this operation. Possum population monitoring will be conducted with the Kaitoke Regional Park KNE site to assess the effectiveness of the both 1080 operations.

Research and monitoring of rat and mustelid (ferrets, stoats and weasels) populations after past possum control operations has shown that these operations effectively control these species to very low levels. However this control is short lived with populations returning to pre-control levels within eighteen months⁴⁷. It is hoped that

native plants and animals will receive some benefit from these periods of reduced threats. No additional targeted rat or mustelid control will be undertaken in this operational area.

Hunting

Feral goats, pigs and deer will be culled annually using a combination of ground and aerial hunting, targeting areas most frequented by the different species. The target aim of the culling operations will be to reduce and keep populations to a level at which a professional hunter can find and destroy no more than one animal per eight hours of hunting on foot, or five animals per one hour of hunting from a helicopter. It is considered that populations at this level will have a negligible impact on native plant regeneration and survival. The annual budget allocated to this work allows for 28 days of ground based hunting combined with nine hours of aerial hunting and helicopter support, ie, ferrying hunters in and out of remote parts of the site.

8.3. Human activities

Biosecurity guidelines⁴⁸ are used by all GWRC personnel when entering and working in the KNE site. Procedures involve checking for and removing seeds and plant fragments from vehicles, equipment and clothing before entering the site. A condensed and more specific version of the guidelines will be developed by the Biodiversity department and distributed to recreational and commercial users of the KNE site. These guidelines are issued with permits and provided to other users when the opportunity arises.

To reduce the risk of uncontrolled fires occurring in the KNE site, the Hutt and Wainuiomata/Orongorongo Water Collection Area Management Plan⁴⁹ identifies that open fires and camping are not permitted. This policy is communicated to users through the site information brochure and signage.

9. Operational plan

The operational plan shows the actions planned to achieve the stated objectives for the KNE site, and their timing and cost over the three-year period from 1 July 2016 to 30 June 2019. The budget for the 2017/18 and 2018/19 years are indicative only and subject to change. A map of operational areas can be found in Appendix 1 (see Map 4).

Table 4: Three-year operational plan for the Hutt Water Collection Area KNE site

Objective	Threat	Activity	Operational area	Delivery	Description/detail	Target	Timetable and resourcing		
							2016/17	2017/18	2018/19
1,2	EW-1	Ecological weed control	A	GWRC Biosecurity department	Control gorse on true right of the Eastern Hutt River near the eastern end of the gut buster track.	All gorse plants are controlled prior to seeding	1,200	1,200	1,200
1,2	EW-1	Ecological weed control	B	GWRC Biosecurity department	Control gorse and Himalayan honeysuckle on the true left of the Eastern Hutt River from the Hutt Forks up-stream to about 500 metres north of the old hydrology tower.	All gorse and Himalayan honeysuckle plants are controlled prior to seeding	1,100	1,100	1,100
1,2	EW-1 EW-2	Ecological weed control	C	GWRC Biosecurity department	Control gorse and lotus on the bush margin in the vicinity of the Eastern Hutt access road (additional to the Parks department's roadside spraying programme).	All gorse and lotus plants are controlled prior to seeding	600	600	600

Objective	Threat	Activity	Operational area	Delivery	Description/detail	Target	Timetable and resourcing		
							2016/17	2017/18	2018/19
1,2,3	PA-4	Pest animal control	Entire KNE	GWRC Biosecurity department	Undertake planning of aerial 1080 possum control operation and purchase bait. (Actual operation will be carried out in the following financial year). This operation will only be carried out when the possum population has grown to a level in the vicinity of 5% RTC* or above, or the equivalent BMI†. The earliest the operation is likely to be carried out is July 2019.	Possums <5% RTC or equivalent BMI	Nil	Nil	115,000
1,2	PA-7 PA-8	Pest animal control	Entire KNE	GWRC Biosecurity department	Control goats and deer, targeting goat and deer preferred areas.	Maintain goat and deer populations to below 1 goat or deer culled per 8 hours of ground hunting or five animals per one hour of helicopter hunting	26,000	26,000	26,000
1,2	PA-9	Pest animal control	Entire KNE	GWRC Biosecurity department	Control pigs, targeting the most pig-preferred areas and at the time of year when they are most prevalent.	Maintain pig population to below 1 pig culled per 8 hours of ground hunting	4,500	4,500	4,500
1,2	HA-1	Ecological weed control	Entire KNE	GWRC Biodiversity & Parks departments	Distribute ecological weed biosecurity guidelines to all permit holders through the existing permit systems, and to tramping groups when opportunities arise.	Biosecurity guidelines distributed to all permit holders, and to other users when possible	Nil	Nil	Nil

Objective	Threat	Activity	Operational area	Delivery	Description/detail	Target	Timetable and resourcing		
							2016/17	2017/18	2018/19
1,2	HA-2	Human activities	Entire KNE	GWRC Parks, Biodiversity, Biosecurity & Environmental Science departments	Ensure pest plant biosecurity guidelines are adhered to while carrying out all management activities.	Guidelines available and adhered to in all cases	Nil	Nil	Nil
1,2,3	HA-3	Human activities	Entire KNE	GWRC Parks department	Continue to communicate policy of no open fires being allowed in the KNE site through the park brochure and signage.	No human induced wild fires occur	Nil	Nil	Nil
Total							\$33,400	\$33,400	\$148,400

*RTC = Residual Trap Catch. †BMI = Bite Mark Index.

10. Funding contributions

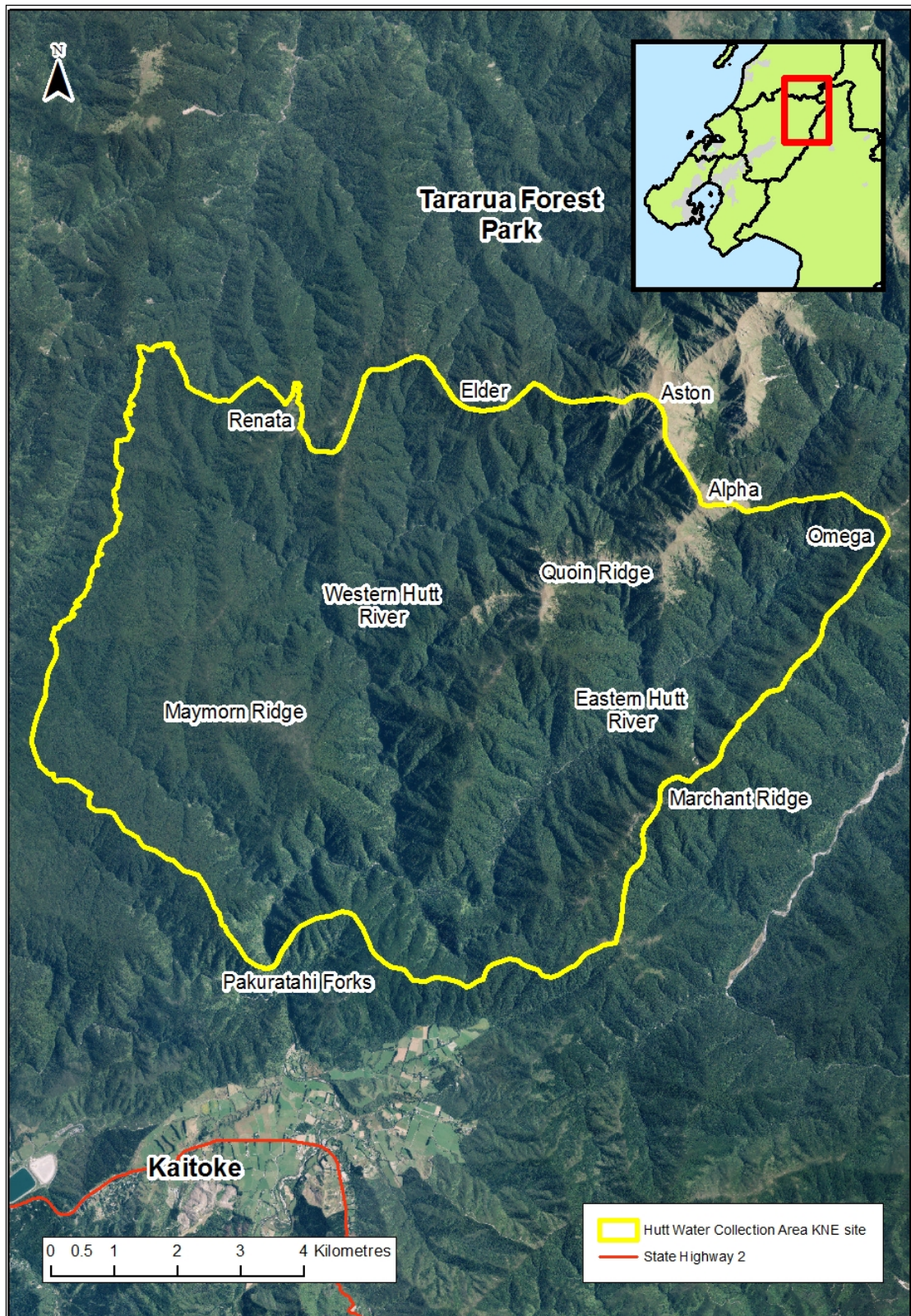
10.1. Budget allocated by Wellington Water Limited

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

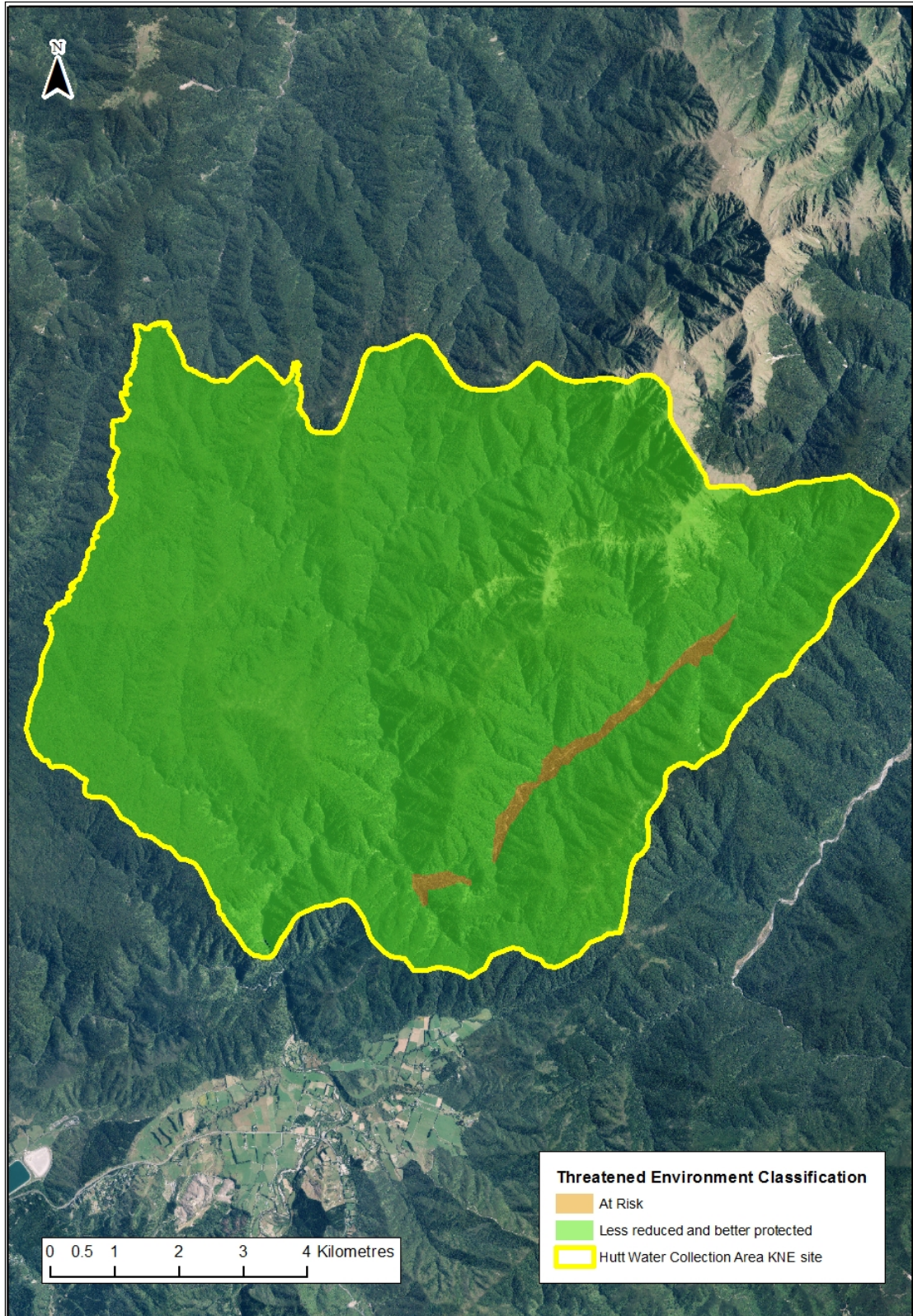
Table 5: Budget allocated to the Hutt Water Collection Area KNE site by Wellington Water Limited

Management activity	Timetable and resourcing		
	2016/17	2017/18	2018/19
Ecological weed control	\$2,900	\$2,900	\$2,900
Pest animal control	\$30,500	\$30,500	\$145,500
Total	\$33,400	\$33,400	\$148,400

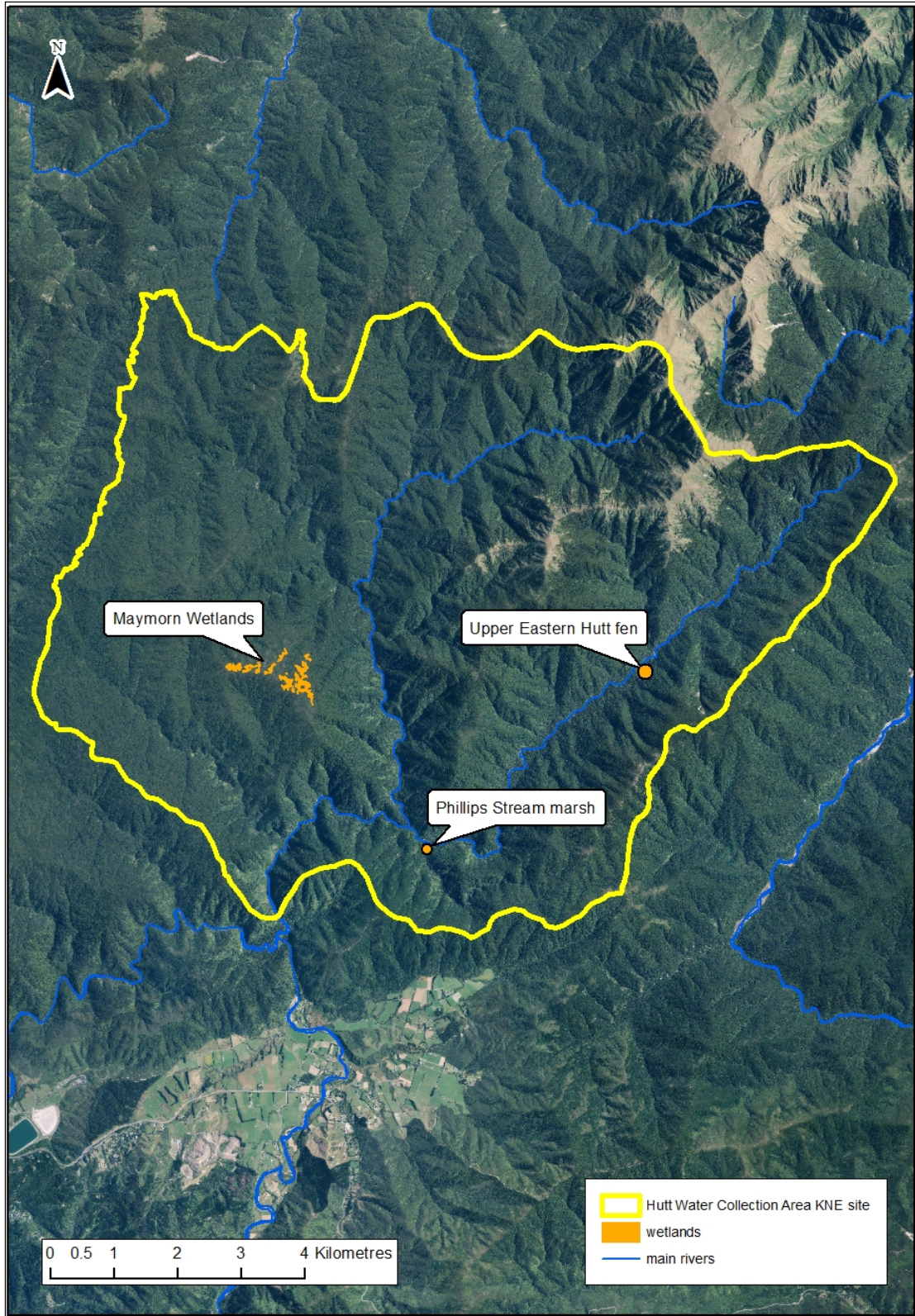
Appendix 1: Site maps

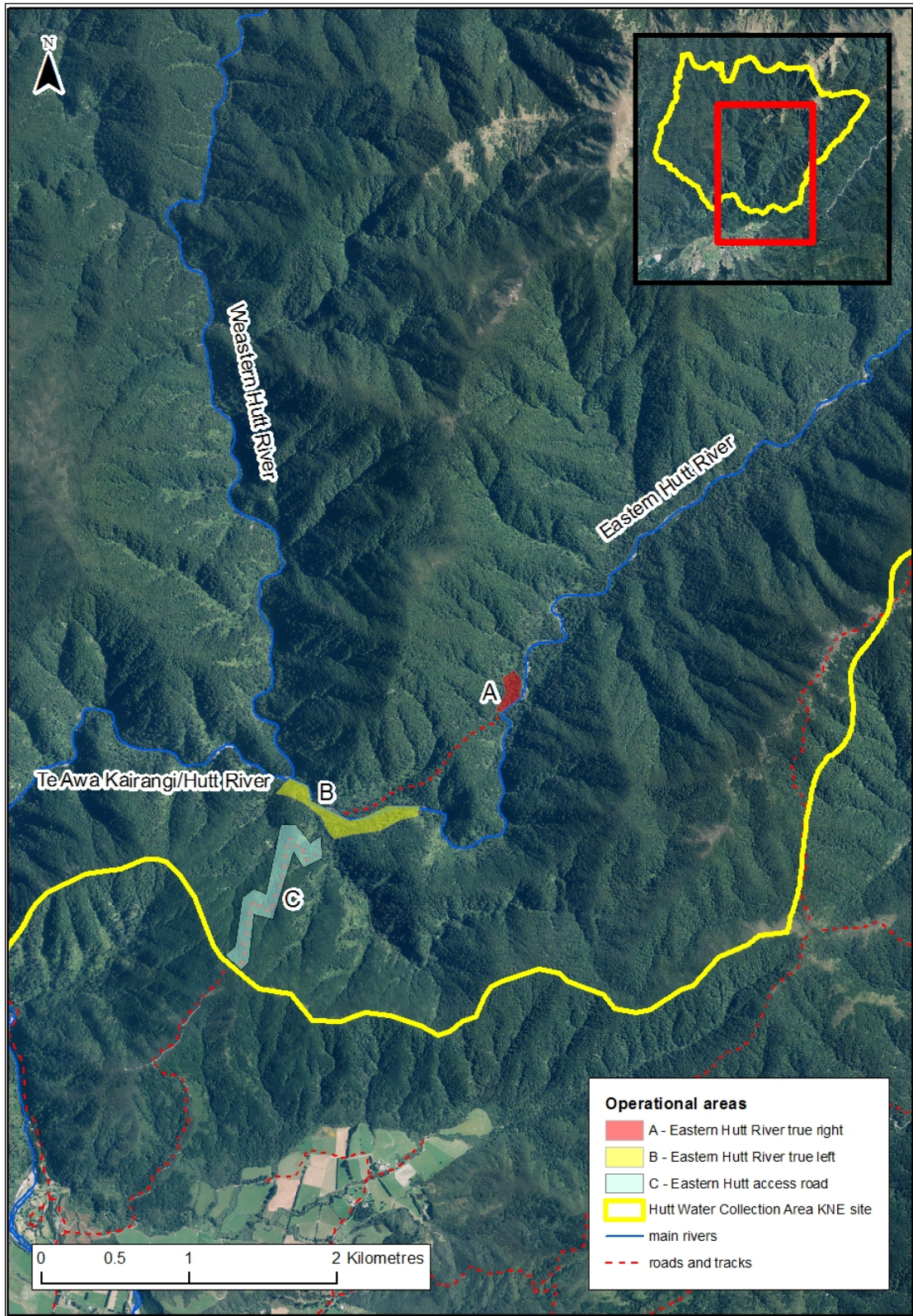


Map 1: The Hutt Water Collection Area KNE site boundary and major geographical features



Map 2: Land Environment New Zealand threat classifications for the Hutt Water Collection Area KNE site





Map 4: Operational areas in the Hutt Water Collection Area KNE site

Appendix 2: Nationally threatened species list

The New Zealand Threat Classification System lists species according to their threat of extinction. The status of each species group (plants, reptiles, etc) is assessed over a three-year cycle⁵⁰, with the exception of birds which are assessed on a five-year cycle⁵¹. 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: Threatened and At Risk species at the Hutt Water Collection Area KNE site

Scientific name	Common name	Threat status	Observation
Plants(vascular)⁵²			
<i>Brachyglottis kirkii</i> var. <i>kirkii</i>	Kirk's daisy	At Risk - Declining	GWRC 2008 ⁵³
<i>Plumatochilus tasmanica</i>	Greenhood orchid	Threatened - Nationally Vulnerable	GWRC 2008
Birds⁵⁴			
<i>Acanthisitta chloris</i>	Rifleman	At Risk - Declining	http://ebird.org/content/new-zealand/ (accessed 22/01/2014)
<i>Cyanoramphus novaeseelandiae</i>	Red-crowned parakeet	At Risk - Relict	http://ebird.org/content/new-zealand/ (accessed 22/01/2014)
<i>Eudynamis taitensis</i>	Long-tailed cuckoo	At Risk - Naturally Uncommon	http://ebird.org/content/new-zealand/ (accessed 22/01/2014)
<i>Falco novaeseelandiae</i>	New Zealand falcon	Threatened - Nationally Vulnerable	http://ebird.org/content/new-zealand/ (accessed 22/01/2014)
<i>Nestor meridionalis</i>	Kākā	Threatened - Nationally Vulnerable	http://ebird.org/content/new-zealand/ (accessed 22/01/2014)
<i>Phalacrocorax carbo</i>	Black shag	At Risk - Naturally Uncommon	http://ebird.org/content/new-zealand/ (accessed 22/01/2014)
Reptiles⁵⁵			
<i>Mokopirirakau</i> "southern North Island"	Ngahere gecko	At Risk - Declining	GWRC Reptile distribution database (accessed 2016)
Freshwater fish⁵⁶			
<i>Anguilla dieffenbachii</i>	Longfin eel	At Risk - Declining	GWRC 2008 ⁵⁷
<i>Galaxias brevipinnis</i>	Kōaro	At Risk - Declining	GWRC 2008

Scientific name	Common name	Threat status	Observation
<i>Galaxias divergens</i>	Dwarf galaxias	At Risk - Declining	GWRC 2008
<i>Gobiomorphus hubbsi</i>	Bluegill bully	At Risk - Declining	GWRC 2008
<i>Gobiomorphus huttoni</i>	Redfin bully	At Risk - Declining	GWRC 2008
Invertebrates 58			
<i>Paranephrops planifrons</i>	Northern kōura	At Risk - Declining	GWRC 2008

Appendix 3: Regionally threatened plant 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 2004-2010⁵⁹.

Table 7: Regionally threatened plant species recorded in the Hutt Water Collection Area KNE site

Scientific name	Common name	Threat status	Observation
Plants⁶⁰			
<i>Brachyglottis kirkii</i> var. <i>kirkii</i>	Kirk's daisy	Regionally critical	GWRC 2008 ⁶¹
<i>Cyathea cunninghamii</i>	Gully tree fern	Sparse	GWRC 2008
<i>Ileostylus micranthus</i>	Green mistletoe	Gradual decline	GWRC 2008
<i>Korthalsella lindsayi</i>	Leafless mistletoe	Sparse	GWRC 2008
<i>Peraxilla colensoi</i>	Scarlet mistletoe	Regionally critical	GWRC 2008
<i>Peraxilla tetrapetala</i>	Red mistletoe	Regionally critical	GWRC 2008
<i>Pimelea gnidia</i>	Pimelea	Data deficient	GWRC 2008
<i>Pittosporum cornifolium</i>	Tawhirikaro	Sparse	GWRC 2008
<i>Plumatochilus tasmanica</i>	Greenhood orchid	Regionally critical	GWRC 2008
<i>Raukawa edgerleyi</i>	Raukawa	Sparse	GWRC 2008

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