Key Native Ecosystem Operational Plan for Riversdale Coast

2024-2029

Contents

1. Purpose

The purpose of this five-year Key Native Ecosystem (KNE) operational plan for Riversdale Coast KNE site is to:

- Identify the parties involved in preparing and delivering the operational plan
- Summarise the ecological values of the site and identify the threats to those values
- Outline the vision and objectives that guide management decision-making
- Describe the operational activities undertaken to improve ecological conditions (eg, ecological weed control), who will undertake the activities and the allocated budgets.

KNE operational plans are reviewed every five 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 outlined in Section 2.

2. Policy context

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

Funding for the KNE programme is allocated under the Greater Wellington Long Term Plan (2021-2031)[2] and is managed in accordance with the Greater Wellington Biodiversity Strategy[3]. This sets a framework for how Greater Wellington protects and manages biodiversity in the Wellington region. Goal One of the Biodiversity Strategy - *Areas of high biodiversity value are protected or restored* - drives the delivery of the KNE programme.

Other important drivers for the KNE programme include the Natural Resources Plan for the Wellington Region (NRP)[4] and the Regional Pest Management Plan 2019-2039[5].

3. The Key Native Ecosystem programme

The KNE programme is a non-regulatory programme. The programme seeks to protect some of the best examples of original (pre-human) ecosystem types in the Wellington region. Greater Wellington has identified sites with the highest biodiversity values and prioritized them for management[6].

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

KNE sites can be located on private or publicly owned land. Any work undertaken on private land as part of this programme 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. Land managed by the Department of Conservation (DOC) is generally excluded from this programme.

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 commonplace	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 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.

4. Riversdale Coast Key Native Ecosystem site

The Riversdale Coast KNE site (60.8 ha) is closely associated with the Riversdale Beach township that is located on the east coast of the Wairarapa, approximately 40 km south-east of Masterton. The boundary of the KNE site runs parallel to Riversdale Beach along the coast and extends ~1km to both the North and South beyond the town (See Appendix 1, Map 1).

The KNE site is comprised of a variety of important coastal ecosystems including sand dunes, salt marsh and the lower reaches of the Motuwaireka Stream and estuary.

The KNE site is also important for a wide range of coastal and wetland bird species and is one of six known breeding sites for New Zealand dotterel (*Charadrius obscurus*) in the Wellington region[7]. The southern end of the KNE site is adjacent to the Homewood Coastal Plains KNE site. These KNE sites combined form an important habitat network for native flora and fauna.

5. Parties involved

There are several organisations and groups that play important roles in the care of the Riversdale Coast KNE site.

5.1. Landowners

The KNE site is predominantly public land owned and administered by Masterton District Council (MDC). The recreational areas of Riversdale Beach are managed by MDC under the Parks and Open Space Strategy (2021)[8]. The recreation spaces managed under this strategy that are within the KNE site are Riversdale Southern Reserve (37.15 ha) and Riversdale Northern Reserve and Beachfront (8.38 ha).

The Crown also has legal ownership over two areas of marginal strip in the KNE site at the Riversdale Recreation Reserve and Motuwaireka Stream mouth (~4 ha total), these are managed by the Department of Conservation (DOC). See Appendix 1, Map 2 for landowner areas.

5.2. Operational delivery

Within Greater Wellington, three teams are responsible for delivering the Riversdale Coast KNE operational plan.

- The Environment Restoration team leads the strategic planning, funding and coordination of biodiversity management activities and advice within the KNE site
- The Pest Plants and Pest Animals teams coordinate and implement ecological weed and pest animal control measures at the KNE site with funding from the Environment Restoration team's KNE programme budget.

Other organisations and groups involved in management of the KNE site are MDC, DOC, the Wairarapa branch of the Royal Forest and Bird Protection Society of New Zealand (F&B) and the Riversdale Beach Community Association (RBCA).

MDC funds and manages work for dune protection (eg, materials and installation of sand ladders, bollards and rope and signage) and restoration of the escarpment in the Southern Recreation Reserve. MDC also provides funds and support to the Environment Restoration team for KNE site-wide ecological weed control and restoration planting, and community-collaboration events. The partnership and relative contributions to the KNE site are subject to a Memorandum of Understanding between MDC and the Environment Restoration team that is updated periodically.

DOC manages land on behalf of the Crown and has been involved with planning and management of the dunes.

F&B works in partnership with the Greater Wellington Environment Restoration team to assist with managing the shorebird nesting habitat in the northern Riversdale dunes. They have erected semi-permanent fencing to protect this habitat and have assisted in erecting temporary fencing with materials supplied by

Greater Wellington during the nesting season outside this area. They also provide information about the nesting birds to residents and visitors to the area to educate and raise awareness.

RBCA work in partnership with the Greater Wellington Environment Restoration team and MDC to support the temporary fencing of breeding habitat during the breeding season, perform dune restoration planting and administer a community-led predator trap network.

5.3. Mana whenua partners

The area of the Riversdale Coast KNE site is significant to Rangitāne o Wairarapa and Ngāti Kahungunu ki Wairarapa iwi, who are mana whenua partners with Greater Wellington.

The area has been identified in the Natural Resources Plan for the Wellington Region (NRP)[9] as culturally important with particular reference to sea water (wai tai) recognising these areas where mana whenua lived and practiced māhinga kai and wāhi tapu (see Table 1).

The Statutory Acknowledgements from the Rangitāne Tū Mai Rā (Wairarapa Tamaki nui-ā-Rua) Claims Settlement Act 2017[10] provides further details of the associations that Rangitāne o Wairarapa have with the Coastal Marine Area.

Greater Wellington is committed to identifying ways in which kaitiakitanga can be strengthened by exploring opportunities for mana whenua partners to participate in the development or delivery of KNE operational plans.

Table 1: Mana whenua sites of significance in Riversdale Coast KNE site11

Sites of significance	Mana whenua values
Motuwaireka Stream to Waipupu	Mahinga kai and wāhi tapu

6. 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.

6.1. Ecological designations

Table 2, below, lists ecological designations at all or part of the Riversdale Coast KNE site.

Table 2: Designations at the Riversdale Coast KNE site

Designation level	Type of designation
Regional	Parts of the Riversdale Coast KNE site are designated under the NRP[12] as: • Inanga spawning habitat: Motuwaireka Stream (Schedule F1b) • Significant indigenous bird habitat: Riversdale beach and Motuwaireka Stream mouth (Schedule F2) • Significant indigenous biodiversity on the coast: Motuwaireka Stream mouth and estuary (Schedule F4) • Significant natural wetlands: Riversdale South Dunes (Schedule F3)
District	A section of the KNE site is included in DOC's Eastern Wairarapa Ecological District Recommended Areas for Protection: • Riversdale Southern Reserve is included in the Uruti Point Dunes (RAP 26)[13]

6.2. Ecological significance

The Riversdale Coast KNE site is considered to be of regional importance because:

- It contains highly **representative** ecosystems that were once typical or commonplace in the region,
- It contains ecological features that are **rare or distinctive** in the region,
- It contains high levels of ecosystem **diversity**, with several ecosystem types represented, including several naturally uncommon ecosystems,
- Its **ecological context** is valuable at the landscape scale as it contains a variety of inter-connected habitats, is part of an ecological corridor and provides core or seasonal habitat for 30 nationally threatened indigenous species.

Representativeness

The Singers and Rogers[14] classification of pre-human forest vegetation indicates the KNE site would have comprised two ecosystem types (WF1 – Titoki, ngaio forest and WF8 – kahikatea, pukatea forest). Both are considered Regionally Threatened: Critically Endangered as only 1.6% and 11.3% of the original extent of these ecosystem/forest types remains in the Wellington Region, respectively[15].

The Threatened Environment Classification system defines ecosystem and habitat threat categories nationally, based on percentage of indigenous cover remaining[16]. This system indicates that the entirety of the KNE site is classified as Critically Endangered because there is <10% indigenous cover remaining in these environment types in New Zealand[17].

The sand dune, estuary, lagoon and backdune habitats are well connected and form a regionally important range of typical and valuable coastal habitats.

Rarity/distinctiveness

Five naturally uncommon ecosystem types[18] are present within the KNE site that are classed as either Nationally Endangered or Nationally Vulnerable. The Nationally Endangered ecosystems present are active sand dunes, stable sand dunes, dune slacks and lagoons; and the Nationally Vulnerable ecosystem type present is estuaries.

Wetlands are now considered an uncommon habitat type in the Wellington Region with less than 3% remaining of their original extent[19].

Many of the plant, bird, fish and invertebrate species found within the KNE site are classified as nationally 'Threatened' or 'At Risk' through New Zealand's national threat classification system. Similar numbers of species found within the KNE site are also classified as regionally 'Threatened'. Appendices 2 and 3 contain lists of the nationally and regionally threatened species found within the KNE site.

Diversity

The KNE site contains a high level of ecosystem diversity with several ecosystems represented including active sand dunes, stable sand dunes, dune slacks, lagoons, estuaries and wetlands.

Ecological context

The KNE site is considered valuable at the landscape scale as it provides important seasonal or core habitat for several coastal and wetland bird populations in the region. The southern end of the KNE site is adjacent to the Homewood Coastal Plains KNE site. These KNE sites combined form an important habitat network for native flora and fauna.

6.3. Ecological features

The Riversdale Coast KNE site is located in the Eastern Wairarapa Ecological District[20].

Habitats and flora

Sand dune systems

Sand dune ecosystems are a significant part of the KNE site, encompassing the Riversdale northern dunes, Riversdale residential dunes and Riversdale Recreation Reserve foredunes (see Appendix 1, Map 3 for operational areas).

Most of the Riversdale northern dunes (located immediately north of the Motuwaireka stream estuary) are now well vegetated with native plants. The

foredunes contain spinifex (*Spinifex sericeus*) and scattered pīngao (*Ficinia spiralis*), the mid dune contains extensive low-growing mats of sand sedge (*Carex pumila*).

The Riversdale residential dunes are within a narrow strip immediately off the beach and contain spinifex and scattered pīngao in the northern quarter (the result of ongoing restoration efforts between MDC, Greater Wellington, DOC and the community). Marram (*Calamagrostis arenaria*) is dominant through the remainder of the area. Spinifex is still present along the front toe in this area in the wave splash zone where marram does not persist.

The foredunes in the Riversdale Recreational Reserve contain mainly spinifex and some planted pīngao, with marram more dominant southwards. Landward of the spinifex area, pīngao and wiwi (*Ficinia nodosa*) are common.

The back dunes in the Riversdale Recreational Reserve, which are 250 m wide in places[21], extend up to the base of a steeper escarpment and contain a mix of wiwi, taupata (*Coprosma repens*), bracken fern (*Pteridium esculentum*), pohuehue (*Muehlenbeckia complexa*), sand coprosma (*Coprosma acerosa*) and rank pastural grass. Towards the base of the escarpment, a few matagouri (*Discaria toumatou*) plants are present[22]. The escarpment itself is primarily grassland with some regenerating native plant species such as mahoe (*Melicytus ramiflorus*), taupata, karamu (*Coprosma robusta*) and ngaio (*Myoporum laetum*).

At the southern boundary of the KNE site, the sand has accumulated to form steep dunes vegetated by marram and spinifex. Areas of sand coprosma, sand daphne (*Pimelea villosa*) and wiwi are present.

Freshwater wetland systems

At the southern end of the KNE site is a large wetland (2ha) listed as significant in the NRP[23]. This wetland is vegetated with raupō (*Typha orientalis*), harakeke (*Phormium tenax*), toetoe (*Austroderia toetoe*), giant umbrella sedge (*Cyperus ustulatus*) and cabbage trees (*Cordyline australis*).

A dune swale (a lower-lying, often damp dune depression), containing raupo, harakeke and wiwi, runs behind the entire length of the Riversdale Recreation Reserve dunes and connects into the wetland area at the southern KNE site boundary.

Estuarine systems

The Motuwaireka Stream estuary, comprising of the lower reaches of the Motuwaireka Stream, areas of saltmarsh, and an ephemeral lagoon, has significant biodiversity values[24]. In the tidal reaches, three-square (*Schoenoplectus tabernaemontani*) lines the tidal banks, along with purua (*Bolboschoenus caldwellii*) and small areas of remuremu (*Selliera radicans*) coastal turf. The upper reaches of the estuary are more freshwater-dominated and contain mainly raupo.

The Motuwaireka Stream flows out over the beach following various routes depending on water level but often flows north to form an ephemeral lagoon[25,26]. Very high tides, storms and seepage contribute water to the lagoon and cause

seasonal variability in the salinity of the lagoon[27]. A thick bed of horse's mane (*Ruppia polycarpa*) flourishes along the landward edge of the lagoon[28].

Fauna

Birds

The KNE site provides habitat for a wide range of common and threatened native shore and wetland birds. Notable threatened bird species include New Zealand dotterel (*Charadrius obscurus*), banded dotterel (*Charadrius bicinctus*), black-billed gull (*Larus bulleri*), red-billed gull (*Larus novaehollandiae*), black-fronted tern (*Chlidonias albostriatus*), Caspian tern (*Hydroprogne caspia*), white-fronted tern (*Sterna striata*), New Zealand grebe (*Poliocephalus rufopectus*), spotless crake (*Zapornia tabuensis*), wrybill (*Anarhynchus frontalis*), South Island pied oystercatcher (*Haematopus ortidi*), pied stilt (*Himantopus himantopus*), New Zealand pipit (*Anthus novaeseelandiae*), eastern bar-tailed godwit (*Limosa lapponica*), fluttering shearwater (*Puffinus gavial*), royal spoonbill (*Platalea regia*), little black shag (*Phalacrocorax sulcirostris*), black shag (*Phalacrocorax carbo*) and northern little blue penguin (*Eudyptula minor*)[29].

Other more common species include variable oystercatcher (*Haemotopus unicolor*), paradise shelduck (*Tadorna vareigata*), southern black-backed gull (*Larus domincanus*) and white-faced heron (*Egretta novaehollandiae*).

Fish

The Motuwaireka Stream estuary is known to support common bully (*Gobiomorphus ortidianus*), shortfin eel (*Anguilla australis*), common smelt (*Retropinna retropinna*) and koura (*Paranephrops* spp.)[30]. The estuary is also suitable habitat for spawning inanga (*Galaxias maculatus*)[31].

Longfin eel (*Anguilla dieffenbachii*), koaro (*Galaxias brevipinnis*), shortfin eel and redfin bully (*Gobiomorphus huttoni*) have been recorded from further upstream[32]. All these species are diadromous, meaning they migrate between salt and fresh water during their lifetime, and therefore will pass through the estuary during their lifecycle.

Invertebrates

Katipo spiders (*Latrodectus katipo*) have been recorded at the dunes on the southern edge of the KNE site[33].

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 key threats to the ecological values at each KNE site. Key threats to the Riversdale Coast KNE site are discussed below and all known threats to the KNE site are summarised in Appendix 4.

7.1. Key threats

Ecological weeds are considered the primary threat to the ecological values of the KNE site as they are widespread throughout the KNE site, and they are known to outcompete and displace native plant species such as pīngao and spinifex. These native species perform an important function in dune ecosystems, binding sand together, thereby providing stability for the whole dune ecosystem. Marram is the primary ecological weed as it is the most widespread at the KNE site.

Other ecological weeds found in the KNE site include typical coastal exotics such as gazania (*Gazania* spp.), agapanthus (*Agapanthus praecox*), ice plant (*Carpobrotus edulis*), evergreen buckthorn (*Rhamnus alaternus*), wilding pine (*Pinus radiata*) and lupin (*Lupinus arboreus*).

There are several pest animal species present within the KNE site that have negative impacts on its ecological values by preying on native species or browsing on native vegetation. The main predatory pest animal threats are mustelids (*Mustela* spp.), hedgehogs (*Erinaceus europeaeus*) and pest cats (*Felis catus*). Rabbits (*Oryctolagus cuniculus*) are a considerable threat to dune restoration as they are present in high numbers and rabbit browsing prevents the natural regeneration of native species and the establishment of newly planted areas[34,35].

Recreation activities and access within the KNE site can damage the sand dunes and disturb wildlife, including nesting native birds. Both informal and managed track creation in the Riversdale Recreation Reserve has affected native vegetation, including some revegetation plots. Beach access tracks from individual properties across the main Riversdale residential dunes can increase erosion, while green waste dumping and garden escapees have caused the spread of weeds. Uncontrolled dogs can disturb breeding birds and their chicks affecting breeding success at the KNE site.

8. Vision and objectives

8.1. Vision

A thriving coastal environment with healthy ecosystem processes supporting and protecting a diverse range of native flora and fauna, which are under effective and sustained management to enhance their value and resilience to ecological pressures.

8.2. Objectives

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

The following objectives will guide the operational activities at the Riversdale Coast KNE site.

1. ***Maintain the ecological integrity of the Riversdale Recreation Reserve so that natural regeneration can occur.***
2. ***Manage and restore dune systems to increase their resilience to coastal erosion and climate change.***
3. ***Maintain and improve the ecological values of the dunes, estuary and wetlands.***
4. ***Protect wetland and shore bird species.***

9. Operational activities

Operational activities are targeted to work towards the objectives listed above (Section 8). 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 in Section 11 (Table 3).

The KNE site has been divided into three operational areas for management (see Appendix 1, Map 3). These are:

A. Riversdale northern dunes and lagoon (15.6ha)

B. Riversdale residential dunes (6.8ha)

C. Riversdale Recreation Reserve (38.4ha)

9.1. Ecological weed control

The aim of ecological weed control at the KNE site is to reduce the density and distribution of weeds to improve the structure and function of native plant communities. Each operational area has slightly varying requirements for weed control, though two main strategies will be implemented across the KNE site. These are broadly discussed below.

Control of ecological weeds is undertaken across the KNE site by Greater Wellington's Pest Plants team.

Marram control

Each year a progressive marram control regime will be undertaken in each of the operational areas to reduce the density and distribution of marram so that native planting and natural regeneration of the dunes can occur.

The approach of the progressive marram control regime is that each year marram will be completely controlled within a manageable area that will be planted later in the year with natives (see Section 9.3 and Appendix 5 for more information). Throughout the rest of the operational area maintenance marram control will be undertaken to prevent marram from further spreading in these areas and buffer marram back from any existing native vegetation so they are not in competition with marram and can further expand.

For this to be achieved each operational area has been divided into discrete management units to identify the areas that will undergo complete marram control or maintenance marram control. This process will start from one end of the dune system in each operational area and progress through the management units each year in a consistent direction.

Multi-species weed control

In each operational area multi-species weed sweeps will be undertaken annually through the dune, escarpment and wetland areas to target other ecological weeds that are present in these areas.

In the Riversdale Recreation Reserve, MDC undertakes annual control of Cape weed (*Arctotheca calendula*) on the mown area and along the tracks.

9.2. Pest animal control

The aim of pest animal control is to reduce the impacts that pest animals have on the native plants and animals that are found at the KNE site.

Predator Control

Predator control is undertaken in operational areas A and C to protect native shore and wetland birds, primarily New Zealand and banded dotterels and spotless crake, from predators. See Appendix 1, Map 4 for trap locations.

In operational area A (the main shore bird area) twenty DOC 250 kill-traps have been installed at 50m intervals. These traps are serviced by the Greater Wellington Pest Animals team monthly throughout the year except during the nesting season (September to February) when the traps are serviced fortnightly.

In operational area C there are four DOC 250 kill-traps that have been installed primarily to protect spotless crake. These traps are serviced by the Greater Wellington Pest Animals team on a fortnightly basis during the breeding season (September to February) and monthly through the rest of the year.

Predator Control Network Extension

The predator control network currently in place at the KNE site (Appendix 1, Map 4) is scheduled to be expanded in late 2024 to have a total of 53 traps installed throughout the KNE site (see Appendix 1, Map 5 for the extended predator control network). The aim of expanding the predator control network is to enhance the breeding and survival rate of the wetland and shore bird species by reducing predation pressures throughout the KNE site.

In operational area A, the expanded network will consist of four BT 200 kill-traps and twenty-six DOC 250 kill-traps. Twenty DOC 250 kills-traps will be placed in the main shore bird area at 50m spacings to intensively trap the main shore bird area. Ten traps will be placed at 150-200m spacings extending from the main shore bird area to act as a buffer and catch predators before they reach the more sensitive area.

In operational area B, the expanded trap network will consist of ten BT 200 kill-traps installed at 150-200m spacings to buffer and catch predators moving through this area before they reach wetland and shore habitats with native birds sensitive to predation.

In operational area C, the expanded trap network will consist of eighteen DOC 250 and five BT 200 kill-traps installed primarily to protect spotless crake in the wetland habitats.

All of the traps will be serviced monthly by the Greater Wellington Pest Animals team throughout the year except during the nesting season (September to February) where the twenty traps in the main shorebird area will be serviced fortnightly.

Rabbit Control

The aim of rabbit control is to reduce the grazing pressure on native plantings and any native regeneration to enhance dune restoration efforts and the establishment of native vegetation dominance in the dunes. Rabbit control by night shooting is undertaken annually by Greater Wellington's Pest Animals team to control rabbit numbers before and after revegetation activities.

9.3. Revegetation

The aim of revegetation work at the KNE site is to ensure the stability and function of the dune ecosystems (especially following weed control activities), and to improve and enrich habitat for native fauna.

Native plant species have been selected based on the species currently present on-site such as spinifex or pīngao, or from species likely to have been more widespread such as sand daphne and sand tussock (*Poa billardierei*). These will help stabilize sand dunes, improve and enrich habitats, provide an ongoing seed source and improve genetic diversity.

Dune planting is implemented annually by the Greater Wellington Pest Plants team in operational areas A and C. In operational area B a community planting event is organised each year in collaboration with MDC and the RBCA to undertake the dune planting in this area. Plants used in revegetation are eco-sourced from the Eastern Wairarapa Ecological District. See Appendix 5 for the revegetation plant list.

9.4. Habitat protection

The aim of habitat protection work is to erect fencing in the northern dune and lagoon areas of operational area A to protect the nesting habitats of several vulnerable shorebird species such as banded dotterel, New Zealand dotterel, pied stilt and variable oystercatcher that are known to nest and breed at the KNE site.

In the more stable areas of sand dune where nesting occurs, permanent fencing has been erected by F&B volunteers with materials supplied by the Environment Restoration team to keep vehicles and foot traffic away from these areas.

The Environment Restoration team has also been working with the RBCA and F&B volunteers to erect temporary fencing and signage during the breeding season to protect nesting sites outside of the permanently fenced breeding area from foot and vehicle disturbances. This fencing is taken down at the end of the breeding season as it is in dynamic areas of the beach and areas deemed important for recreational use.

9.5. Recreational areas management

This work is largely focussed on asset protection but is also valuable in helping protect restoration plantings and the existing dunes from any negative impacts associated with human access and use of the beach and dunes.

In and around the Riversdale residential dunes area (operational area B) MDC builds and maintains sand ladders to reduce impacts of recreational activities on dune

stability, installs bollards and rope to protect plantings and installs educational signage.

The Riversdale Recreation Reserve (operational area C) is a valuable asset for MDC and the Riversdale Beach community for recreation and accessible green space. MDC will continue to manage these values in this area.

10. Future opportunities

10.1. Community group or volunteer opportunities

There are additional opportunities where community groups or volunteers could be involved in environmental restoration activities at the KNE site. These include:

- Servicing the predator control network in place at the KNE site
- Advocacy for sand dune protection and restoration, weed control and protecting native species present in the KNE site
- Community-based rodent trapping within the Riversdale Beach township

11. Operational delivery schedule

The operational delivery schedule shows the actions planned to achieve the stated objectives for the Riversdale Coast KNE site, and their timing and cost over the five-year period from 1 July 2024 to 30 June 2029. The budgets for years 2025/26 to 2028/29 are indicative only and subject to change. Operational areas (see Appendix 1, Map 3) are also subject to change according to operational needs over the course of the operational plan.

Table 3: Five-year operational plan for the Riversdale Coast KNE site

Objectives	Activity	Operational areas	Intended 5-year outcome	Implementing party	Timetable and resourcing where allocated				
					2024/25	2025/26	2026/27	2027/28	2028/29
1, 2, 3	Ecological weed control: Control ecological weed species in operational areas throughout the KNE site	A, B and C	Reduction in abundance and distribution of target ecological weed species	GW Pest Plants team	$15,390	$16,170	$16,970	$17,820	$18,710
3, 4	Pest animal control: Implementing an extension to the pest animal control network	A and C	Sustained suppression of predator species to reduce predation pressures on native fauna (eg, mustelids <2% TTI*)	GW Pest Animals team	$5,000	-	-	-	-
3, 4	Pest animal control: Monthly servicing of traps and bait stations	A and C	Sustained suppression of predator species to reduce predation pressures on native fauna (eg, mustelids <2% TTI*)	GW Pest Animals team	$15,900	$17,100	$18,380	$19,760	$21,240
2, 3	Pest animal control: Night shooting undertaken before and after dune planting to improve survival of plants and allow more native establishment	A and C	Sustained suppression of rabbits and hares to reduce grazing pressures on native flora	GW Pest Animals team	$1,200	$1,290	$1,390	$1,490	$1,600

Objectives	Activity	Operational areas	Intended 5-year outcome	Implementing party	Timetable and resourcing where allocated				
					2024/25	2025/26	2026/27	2027/28	2028/29
2, 3	Revegetation: Coastal planting to improve dune health, structure and function	A, B and C	Established a robust vegetative community of sand binding plants in the dune systems	GW Pest Plants team and community volunteers	$7,000	$7,000	$7,000	$7,000	$7,000
1	Revegetation: Restoration planting of Recreation Reserve escarpment project	C	Established a robust vegetative community in the escarpment area of the Recreation Reserve	MDC	$6,000	$6,000	$6,000	-	-
3, 4	Habitat protection: Protect ground nesting birds by monitoring the permanent protective fencing and installing temporary fencing around nesting sites during nesting season	A	Ongoing protection of ground-nesting native birds	GW Environment Restoration team and community volunteers	$**	$**	$**	$**	$**
1, 3, 4	Recreational areas management: Protect restoration plantings and manage human impacts via sand ladders, bollards and rope and signage	B and C	Continued management of recreational activities, and advocacy, to reduce human impacts on ecological values	MDC	$3,000	$3,000	$3,000	$3,000	$3,000
Total					$53,490	$50,560	$52,740	$49,070	$51,550

*TTI = Tracking Tunnel Index. The control regime has been designed 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.
** Resourcing unspecified as costs will vary from year to year.

12. Funding contributions

12.1. Budget allocated by Greater Wellington

The budgets for the years 2025/26 to 2028/29 are indicative only and subject to change.

Table 4: Greater Wellington allocated budget for the Riversdale Coast KNE site

Management activity	Timetable and resourcing				
	2024/25	2025/26	2026/27	2027/28	2028/29
Ecological weed – control	$7,110	$7,470	$7,840	$8,230	$8,640
Pest animal control – network expansion implementation	$5,000	-	-	-	-
Pest animal control – network servicing	$15,900	$8,550	$9,190	$9,880	$10,620
Pest animal control – night shooting	$1,200	$1,290	$1,390	$1,490	$1,600
Revegetation	$5,000	$5,000	$5,000	$5,000	$5,000
Restoration planting escarpment project	-	-	-	-	-
Habitat protection – permanent and temporary fencing	$*	$*	$*	$*	$*
Recreational areas management	-	-	-	-	-
Total	**$34,210**	**$22,310**	**$23,420**	**$24,600**	**$25,860**

* Resourcing unspecified as costs will vary from year to year.

12.2. Budget allocated by Masterton District Council

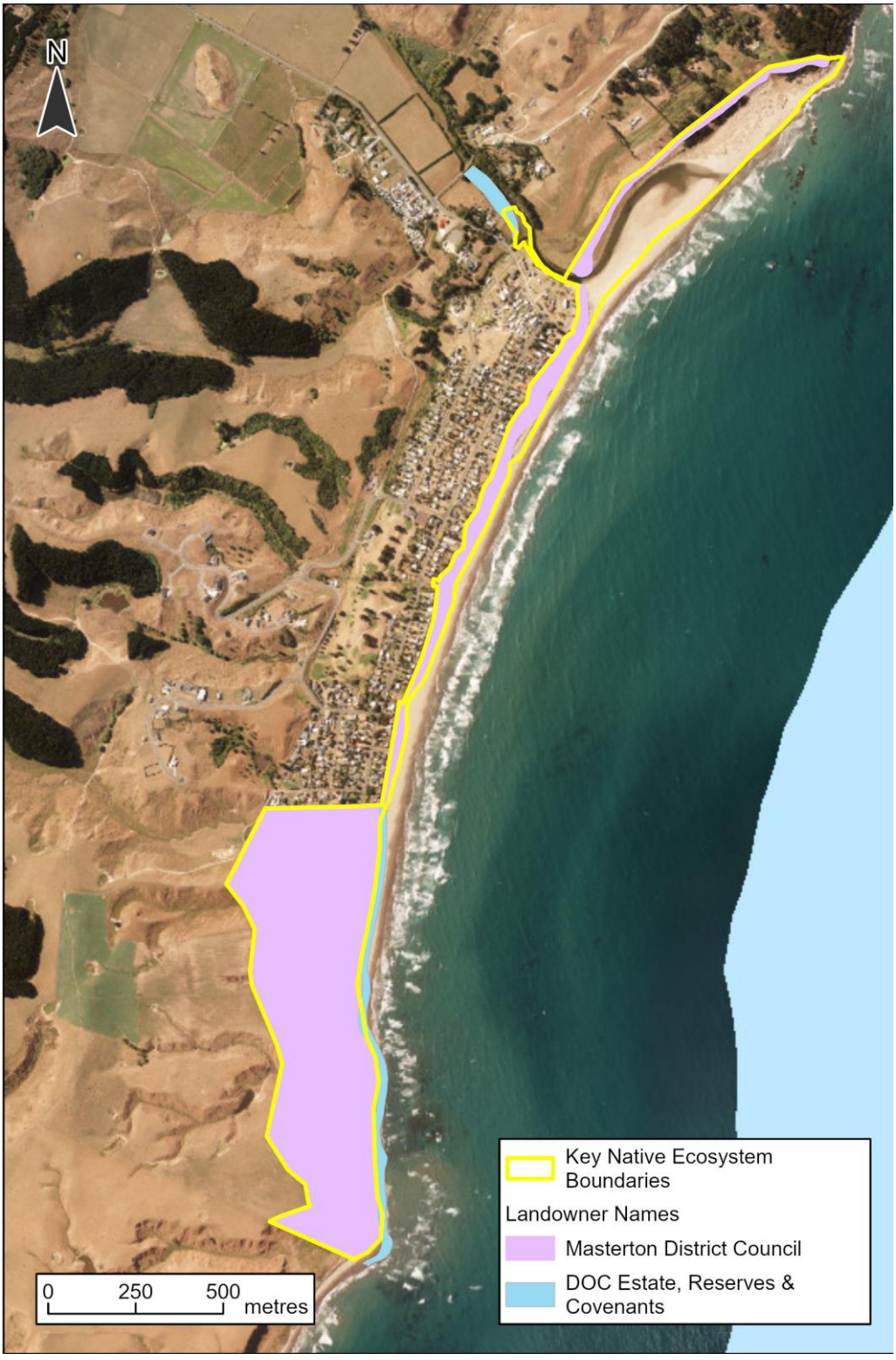
The budget is subject to confirmation through Masterton District Council ten-year planning process.

Table 5: Masterton District Council allocated budget for the Riversdale Coast KNE site

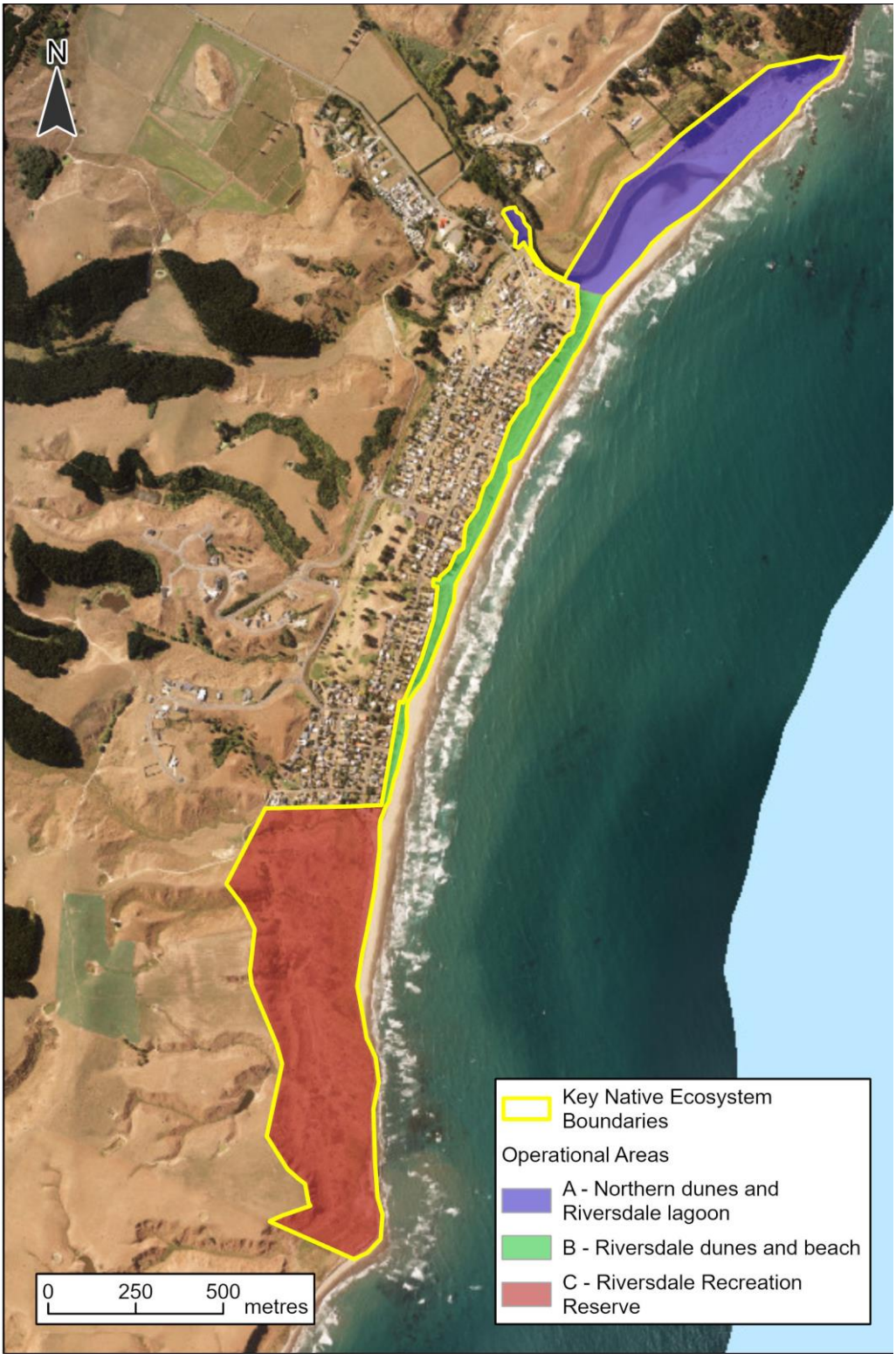
Management activity	Timetable and resourcing				
	2024/25	2025/26	2026/27	2027/28	2028/29
Ecological weed control	$8,280	$8,700	$9,130	$9,590	$10,070
Pest animal control – network expansion implementation	-	-	-	-	-
Pest animal control – network servicing	-	$8,550	$9,190	$9,880	$10,620
Pest animal control – night shooting	-	-	-	-	-
Revegetation	$2,000	$2,000	$2,000	$2,000	$2,000
Restoration planting escarpment project	$6,000	$6,000	$6,000	-	-
Habitat protection – permanent and temporary fencing	-	-	-	-	-
Recreational areas management	$3,000	$3,000	$3,000	$3,000	$3,000
Total	**$19,280**	**$28,250**	**$29,320**	**$24,470**	**$25,690**

Appendix 1: Riversdale Coast KNE site map

Map 1: The Riversdale Coast KNE site boundary map



Map 2: Landowners within the Riversdale Coast KNE site



Map 3: Operational areas in the Riversdale Coast KNE site

Map 4: Predator control network in the Riversdale Coast KNE site

Map 5: Extended predator control network in the Riversdale Coast KNE site

Map 6: Revegetation areas in the Riversdale Coast KNE site

Appendix 2: Nationally threatened species list

The following table lists nationally Threatened and At Risk species that are resident in, or regular visitors to, the Riversdale Coast KNE site.

The New Zealand Threat Classification System (NZTCS) lists species according to their threat of extinction. The status of each species group (plants, reptiles, etc) is assessed over a five-year cycle[36]. Species are regarded as Threatened if they are classified as Nationally Critical, Nationally Endangered or Nationally Vulnerable[37]. They are regarded as At Risk if they are classified as Declining, Recovering, Relict or Naturally Uncommon.

Table 6: Nationally Threatened and At Risk species at the Riversdale Coast KNE site

Scientific name	Common name	National threat status	Observation
Plants(vascular)[38]			
Coprosma acerosa	Sand coprosma, tātaraheke	At Risk - Declining	Eastern Wairarapa Ecological District report[39]
Ficinia spiralis	Golden sand sedge, pīngao	At Risk - Declining	Eastern Wairarapa Ecological District report
Pimelea villosa	Sand daphne, toroheke	At Risk - Declining	Eastern Wairarapa Ecological District report
Birds[40]			
Anarhynchus frontalis	Wrybill, ngutu pare	Threatened - Nationally Increasing	NZ eBird database[41]
Anthus novaeseelandiae	New Zealand pipit, pīhoihoi	At Risk - Declining	NZ eBird database
Calidris canutus	Lesser knot, huahou	At Risk - Declining	NZ eBird database
Charadrius bicinctus bicinctus	Banded dotterel, pohowera	Threatened - Nationally Vulnerable	NZ eBird database
Charadrius obscurus	New Zealand dotterel, tūturiwhatu	Threatened - Nationally Increasing	NZ eBird database
Chlidonias albostriatus	Black-fronted tern, tarapirohe	Threatened - Nationally Endangered	NZ eBird database
Elseyornis melanops	Black fronted dotterel	At Risk - Naturally Uncommon	NZ eBird database
Falco novaeseelandiae	New Zealand falcon, kārearea	Threatened - Nationally Increasing	NZ eBird database

Scientific name	Common name	National threat status	Observation
Haematopus finschi	South Island pied oystercatcher, tōrea	At Risk - Declining	NZ eBird database
Haematopus unicolor	Variable oystercatcher, tōrea pango	At Risk - Recovering	NZ eBird database
Hydroprogne caspia	Caspian tern, taranui	Threatened - Nationally Vulnerable	NZ eBird database
Larus bulleri	Black-billed gull, tarāpuka	At Risk - Declining	NZ eBird database
Larus novaehollandiae scopulinus	Red-billed gull, tarāpunga	At Risk - Declining	NZ eBird database
Limosa lapponica baueri	Eastern bar-tailed godwit, kuaka	At Risk - Declining	NZ eBird database
Phalacrocorax carbo novaehollandiae	Black shag, māpunga	At Risk - Relict	NZ eBird database
Phalacrocorax sulcirostris	Little black shag, kawau tūī	At Risk - Naturally Uncommon	NZ eBird database
Phalacrocorax varius varius	Pied shag, kāruhiruhi	At Risk - Recovering	NZ eBird database
Platalea regia	Royal spoonbill, kōtuku ngutupapa	At Risk - Naturally Uncommon	NZ eBird database
Porzana tabuensis tabuensis	Spotless crake, pūweto	At Risk - Declining	Cheyne J. 2013[42]
Poliocephalus rufopectus	New Zealand grebe, weweia	Threatened - Nationally Increasing	NZ eBird database
Puffinus gavia	Fluttering shearwater, pakahā	At Risk - Relict	NZ eBird database
Sterna striata striata	White-fronted tern, tara	At Risk - Declining	NZ eBird database
Freshwater fish[43]			
Anguilla dieffenbachia	Longfin eel, tuna	At Risk - Declining	NIWA freshwater fish database[44]
Galaxias brevipinnis	Kōaro	At Risk - Declining	NIWA freshwater fish database
Galaxias maculatus	Inanga	At Risk - Declining	NIWA freshwater fish database
Gobiomorphus huttoni	Redfin bully	At Risk - Declining	NIWA freshwater fish database
Invertebrates (Araneae - spiders)[45]			
Latrodectus katipo	Katipō	At Risk - Declining	Patrick, B. 2002[46]

Appendix 3: Regionally threatened species list

The following table lists regionally threatened species that have been recorded in the Riversdale Coast KNE site.

A methodology to create regional threat lists was developed by a collaborative group comprising representatives from DOC, regional councils and a local authority. The resulting regional threat listing methodology leverages off the NZTCS, but applies a species population threshold adjusted to the regional land area under consideration (relative to the national land area) for species that are not nationally threatened. The assigned regional threat status cannot be lower than that of the national threat status, but can be higher, (e.g., a Nationally Vulnerable species could be assessed as being Regionally Critical). Other assessments made in the regional threat listing process include identifying populations that are national strongholds and the use of regional qualifiers, such as natural or historic range limits.

Table 7: Regionally threatened species recorded in the Riversdale Coast KNE site

Scientific name	Common name	Regional threat status	Observation
Plants (vascular)[47]			
Coprosma acerosa	Sand coprosma, tātaraheke	Regionally Declining	Eastern Wairarapa Ecological District report[48]
Discaria toumatou	Matagouri	Regionally Endangered	Eastern Wairarapa Ecological District report
Ficinia spiralis	Golden sand sedge, Pīngao	Regionally Vulnerable	Eastern Wairarapa Ecological District report
Pimelea villosa	Sand daphne, toroheke	Regionally Endangered	Ogle, C. 1987[49]
Birds[50]			
Anas gracilis	Grey teal, tētē-moroiti	Regionally Recovering	NZ eBird database [51]
Anthus novaeseelandiae	New Zealand pipit, pīhoihoi	Regionally Vulnerable	NZ eBird database
Calidris canutus	Lesser knot, huahou	Regionally Critical	NZ eBird database
Charadrius bicinctus	Banded dotterel, pohowera	Regionally Vulnerable	NZ eBird database
Charadrius obscurus	New Zealand dotterel, tūturiwhatu	Regionally Critical	NZ eBird database
Elseyornis melanops	Black fronted dotterel	Regionally Vulnerable	NZ eBird database
Falco novaeseelandiae	New Zealand falcon, kārearea	Regionally Critical	NZ eBird database

Scientific name	Common name	Regional threat status	Observation
Haematopus unicolor	Variable oystercatcher, tōrea pango	Regionally Vulnerable	NZ eBird database
Hemiphaga novaeseelandiae	New Zealand pigeon, kererū	Regionally Recovering	NZ eBird database
Himantopus himantopus	Pied stilt, poaka	Regionally Vulnerable	NZ eBird database
Hydroprogne caspia	Caspian tern, taranui	Regionally Critical	NZ eBird database
Larus bulleri	Black-billed gull, tarāpuka	Regionally Critical	NZ eBird database
Larus novaehollandiae	Red-billed gull, tarāpunga	Regionally Vulnerable	NZ eBird database
Limosa lapponica	Eastern bar-tailed godwit, kuaka	Regionally Critical	NZ eBird database
Phalacrocorax carbo	Black shag, māpunga	Regionally Critical	NZ eBird database
Phalacrocorax melanoleucos	Little shag, kawaupaka	Regionally Vulnerable	NZ eBird database
Phalacrocorax varius	Pied shag, kāruhiruhi	Regionally Vulnerable	NZ eBird database
Porzana tabuensis tabuensis	Spotless crake, pūweto	Regionally Endangered	Cheyne J. 2013[52]
Sterna striata	White fronted tern, tara	Regionally Endangered	NZ eBird database
Freshwater fish[53]			
Anguilla dieffenbachia	Longfin eel, tuna	Regionally Declining	NIWA freshwater fish database[54]
Galaxias brevipinnis	Kōaro	Regionally Declining	NIWA freshwater fish database
Galaxias maculatus	Inanga	Regionally Declining	NIWA freshwater fish database

Appendix 4: Threat table

Appendix 4 presents a summary of all known threats to the Riversdale Coast KNE site including those discussed in section 7.

Table 8: Threats to the Riversdale Coast KNE site

Threat code	Threat and impact on biodiversity in the KNE site	Operational area/location
Ecological weeds		
EW-1	Ground covering ecological weeds smother and displace native vegetation, inhibit indigenous regeneration and alter vegetation structure and composition. Key species include marram (*Calamagrostis arenaria*), ice plant (*Carpobrotus edulis*), agapanthus (*Agapanthus praecox*) and kikuyu grass (*Pennisetum clandestinum*)	Entire KNE site
EW-2	Woody weed species displace native vegetation, inhibit indigenous regeneration and alter vegetation structure and composition. Key species include wilding pines (*Pinus radiata*), gorse (*Ulex europaeus*), coastal wattle (*Acacia sophorae*), lupin (*Lupinus arboreus*) and evergreen buckthorn (*Rhamnus alaternus*)	Entire KNE site
Pest animals		
PA-1	Mustelids (stoats[55,56] (*Mustela erminea*), ferrets[57,58] (*M. furo*) and weasels[59,60] (*M. nivalis*)) prey on native birds, lizards and invertebrates, reducing their breeding success and potentially causing local extinctions	Entire KNE site
PA-2	Hedgehogs (*Erinaceus europaeus*) prey on native invertebrates[61], lizards[62] and the eggs[63] and chicks of ground-nesting birds[64]	Entire KNE site
PA-3*	Rabbits (*Oryctolagus cuniculus*) and hares (*Lepus europaeus*) graze on palatable native vegetation and prevent natural regeneration in some environments[65]. Rabbits are particularly damaging in sand dune environments where they browse native binding plants and restoration plantings	Entire KNE site
PA-4*	Pest and domestic cats (*Felis catus*) prey on native birds[66], lizards[67] and invertebrates[68], reducing native fauna breeding success and potentially causing local extinctions[69]	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[70,71]	Entire KNE site
PA-6*	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[72,73]	Entire KNE site

Threat code	Threat and impact on biodiversity in the KNE site	Operational area/location
Human activities		
HA-1	Track creation can cause habitat loss and wildlife disturbance. Pest animals such as stoats are also thought to use track networks when colonizing new areas[40]. Mowing vehicles can spread seeds and fragments of weed species	Area C
HA-2	People and vehicles accessing the site (for recreation, work, or research purposes) can damage native vegetation, disturb native fauna, introduce the seeds of ecological weeds and increase erosion	Entire KNE site
HA-3	Uncontrolled dogs can disturb nesting birds and kill chicks and eggs of ground nesting birds	Entire KNE site
HA-4	Exotic species incidentally introduced from residential gardens and intentionally planted exotic species can out-compete indigenous species. Weeds include agapanthus (*Agapanthus praecox*), gazania (*Gazania rigens*), gorse (*Ulex europaeus*), pampas (*Cortaderia selloana*), blackberry (*Rubus fruticosus*), cape ivy (*Senecio angulatus*) and alyssum (*Lobularia maritima*)	Entire KNE site
HA-5*	Stock access from neighbouring farms (southern wetland and dune areas) impact native ecosystems by trampling and browsing plant species	Area C
HA-6*	Recreational vehicles such as 4WDs and motorbikes can cause damage to dune systems and disturbance of the native ecosystem	Entire KNE site
Other threats		
OT-1*	Climate change induced storm surges and sea level rise can lead to coastal erosion and habitat loss. Ecosystem functionality can be adversely affected, and populations of threatened species can be lost	Entire KNE site

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

Appendix 5: Revegetation plant list

Plants from the following table will be used in any revegetation planting as per Section 9.3.

Table 9: Revegetation plant list for use within the Riversdale Coast KNE site

Scientific name	Common name	Habitat type
Coprosma acerosa	Sand coprosma, tātaraheke	Dunes
Coprosma repens	Taupata	Dunes, wetlands, riparian margins
Cordyline australis	Cabbage tree, tī kōuka	Dunes (mid and back), estuaries, riparian margins
Discaria toumatou	Matagouri	Dunes, wetlands, riparian margins
od od Ficinia nodosa	Wiwi, knobby club rush	Dunes
Ficinia spiralis	Golden sand sedge, pīngao	Dunes
Olearia solandri	Coastal tree daisy	Dunes, wetlands, riparian margins
Ozothamnus leptophylla	Cottonwood, tauhinu	Dunes, wetlands, riparian margins
Phormium cookianum	Coastal flax, whararikī	Dunes (mid and back), wetlands, riparian margins
Phormium tenax	Swamp flax, harakeke	Dunes (mid and back), wetlands, riparian margins
Pimelea villosa	Sand daphne, toroheke	Dunes
Plagianthus divaricatus	Salt marsh ribbonwood	Estuaries, riparian margins
Poa billardierei	Sand tussock, hinarepe	Dunes
Poa cita	Silver tussock	Dunes
Spinifex sericeus	Spinifex, kōwhangatara	Dunes

References

[1] New Zealand legislation. 1991. Resource Management Act 1991.
[2] Greater Wellington Regional Council. Greater Wellington Regional Council Long Term Plan Ko Te Pae Tawhiti: 2021-2031.
[3] Greater Wellington Regional Council. 2016. Greater Wellington Regional Council Biodiversity Strategy. http://www.gw.govt.nz/assets/council-publications/Biodiversity-Strategy-2016.pdf
[4] Greater Wellington Regional Council. 2023. Natural Resources Plan for the Wellington Region, Te Tikanga Taiao o Te Upoko o te Ika a Maui. Operative Version – 28 July 2023.
[5] Greater Wellington Regional Council. 2019. Greater Wellington Regional Pest Management Plan 2019–2039. GW/BIO-G-2019/74
[6] Crisp P, Govella S, Crouch L. 2016. Identification and prioritisation of high value terrestrial biodiversity sites for selection within the Key Native Ecosystems Programme in the Wellington region. Greater Wellington Regional Council, GW/ESCI-T-16/93.
[7] McArthur N, Ray S, Crowe P, and Bell M. 2019. A baseline survey of the indigenous bird values of the Wellington region coastline. Client report prepared for Greater Wellington Regional Council, Wildlife Management International Ltd, Blenheim
[8] Masterton District Council. 2021. Parks and Open Spaces Strategy 2021. Retrieved from https://www.mstn.govt.nz/council/plans-and-strategies/strategies/parks-and-open-spaces-strategy.
[9] Greater Wellington Regional Council. 2023. Natural Resources Plan for the Wellington Region, Te Tikanga Taiao o Te Upoko o te Ika a Maui. Operative Version – 28 July 2023.
[10] Greater Wellington Regional Council. 2023. Natural Resources Plan for the Wellington Region, Te Tikanga Taiao o Te Upoko o te Ika a Maui. Final Operative Version - 28 July 2023. Schedule D3, P. 443.
[11] Greater Wellington Regional Council. 2023. Natural Resources Plan for the Wellington Region, Te Tikanga Taiao o Te Upoko o te Ika a Maui. Operative Version – 28 July 2023. Schedule C, P. 400.
[12] Greater Wellington Regional Council. 2023. Natural Resources Plan for the Wellington Region, Te Tikanga Taiao o Te Upoko o te Ika a Maui. Operative Version – 28 July 2023.
[13] Beadel SM, Bibby CJ, Perfect AJ, Rebergen AL, Sawyer JWD. 2004. Eastern Wairarapa Ecological District: survey report for the Protected Natural Areas programme. Dept of Conservation, Wellington Conservancy, unabridged. RAP26 Uruti Point Dunes, p101.
[14] Singers NJD, Rogers GM. 2014. A classification of New Zealand's terrestrial ecosystems. Science for Conservation No. 325. Department of Conservation, Wellington.
[15] Singers N, Crisp P, Spearpoint O. 2018. Forest ecosystems of the Wellington Region.
[16] Walker S, Cieraad E, Barringer J. 2015. The Threatened Environment Classification for New Zealand 2012: a guide for users. Landcare Research.
[17] Cieraad E, Walker S, Price R, Barringer J. 2015. An updated assessment of indigenous cover remaining and legal protection in New Zealand's land environments. New Zealand Journal of Ecology 39 (2): 309-315.
[18] Holdaway RJ, Wiser SK, Williams PA. 2012. Status assessment of New Zealand's naturally uncommon ecosystems. Conservation Biology 26: 619–629.
[19] Ausseil A-G, Gerbeaux P, Chadderton W, Stephens T, Brown D, Leathwick J. 2008. Wetland ecosystems of national importance for biodiversity. Landcare Research Contract Report LC0708/158 for Chief Scientist, Department of Conservation.
[20] McEwen M ed. 1987. Ecological regions and districts of New Zealand. 3rd edn in four 1:500 000 maps. New Zealand Biological Resources Centre Publication No. 5. Wellington, Department of Conservation.
[21] Boffa Miskell. 2010. Wairarapa Landscape Study 2010 Landscape Character Description Report August 2010.
[22] Sawyer JWD. 2004. Plant conservation strategy, Wellington Conservancy (excluding Chatham Islands), 2004–2010. Department of Conservation, Wellington. 91 pp.

[23] Greater Wellington Regional Council. 2023. Natural Resources Plan for the Wellington Region, Te Tikanga Taiao o Te Upoko o te Ika a Maui. Operative Version – 28 July 2023. Schedule F3, P. 529.
[24] Wildland Consultants. 2013. Field assessment of extent and significance of 42 wetlands in the Wellington region. Wildland Consultants Ltd Contract Report No. 2893. Prepared for Greater Wellington Regional Council, Hamilton. 190 pp.
[25] Williams G. 2001. Motuwaireka Lagoon, Riversdale. Hydraulic study of lagoon. Report prepared by G & E Williams Consultants Ltd for Wellington Regional Council.
[26] Todd M, Graeme C, Kettles H, Sawyer J. 2011. Estuaries in Wellington Hawke's Bay Conservancy (excluding Hawke's Bay and Chatham Islands Areas) - Current status and future management. Department of Conservation, Wellington. 275 pp.
[27] Williams G. 2001. Motuwaireka Lagoon, Riversdale. Hydraulic study of lagoon. Report prepared by G & E Williams Consultants Ltd for Wellington Regional Council.
[28] Todd M, Graeme C, Kettles H, Sawyer J. 2011.Estuaries in Wellington Hawke's Bay Conservancy (excluding Hawke's Bay and Chatham Islands Areas) - Current status and future management. Department of Conservation, Wellington. 275 pp.
[29] McArthur N, Lawson J. 2014. Coastal and freshwater habitats of significance for rare and threatened bird species in the Wellington Region. Greater Wellington Regional Council.
[30] NIWA. 2015. NZ Freshwater Fish Database. https.//www.niwa.co.nz/freshwater-and-estuaries/nzffd.
[31] Taylor MJ, Kelly GR. 2003. Inanga spawning habitats in the greater Wellington Region. Part 2 Wairarapa. NIWA Client Report No. CHC01/67. Prepared for the Greater Wellington Regional Council. 34 pp.
[32] NIWA. 2015. NZ freshwater fish online database: https://www.niwa.co.nz/our-services/online-services/freshwater-fish-database
[33] Patrick B. 2002. Conservation status of the New Zealand red katipo spider (Latrodectus katipo, Powell 1871). Science for Conservation 194. New Zealand Department of Conservation.
[34] R. Smith, Greater Wellington Regional Council, Personal observation 2013.
[35] Grove P. 2003. Coastal Dune Biodiversity – challenges for management. Royal New Zealand Institute of Horticulture conference proceedings 2003.
[36] Townsend AJ, de Lange PJ, Duffy CAJ, Miskelly CM, Molloy J, Norton DA. 2008. New Zealand Threat Classification System manual. Department of Conservation, Wellington. 36 p.
[37] Rolfe J, Makan T, Tait A. 2021. Supplement to the New Zealand Threat Classification System manual 2008: new qualifiers and amendments to qualifier definitions, 2021. Department of Conservation, Wellington.
[38] de Lange PJ, Rolfe JR, Barkla JW, Courtney SP, Champion PD, Perrie LR, Beadel SM, Ford KA, Breitwieser I, Schonberger, I, Hindmarsh-Walls R, Heenan PB, Ladley K. 2018. Conservation status of New Zealand indigenous vascular plants, 2017. New Zealand Threat Classification Series 22. Department of Conservation, Wellington.
[39] Beadel SM, Bibby CJ, Perfect AJ, Rebergen AL, Sawyer JWD. 2004. Eastern Wairarapa Ecological District: survey report for the Protected Natural Areas programme. Dept of Conservation, Wellington Conservancy, unabridged. RAP26 Uruti Point Dunes, p101.
[40] Robertson HA, Baird KA, Elliot GP, Hitchmough RA, McArthur NJ, Makan TD, Miskelly CM, O'Donnell CFJ, Sagar PM, Scofield RP, Taylor GA, Michel P. 2021. Conservation status of birds in Aotearoa New Zealand, 2021. New Zealand Threat Classification Series 36. Department of Conservation, Wellington.
[41]eBird. 2021. eBird: An online database of bird distribution and abundance [web application]. eBird, Cornell Lab of Ornithology, Ithaca, New York. Available: http://www.ebird.org . (Accessed: March 24, 2024).
[42]Cheyne J. 2013. Riversdale Wetland Bird Survey. Report prepared for Greater Wellington. WetlandWorks, Waipukurau.
[43] Dunn NR, Allibone RM, Closs GP, Crow SK, David BO, Goodman JM, Griffiths M, Jack CD, Ling N, Waters JM, Rolfe JR. 2018. Conservation status of New Zealand freshwater fishes, 2017. New Zealand Threat Classification Series 24. Department of Conservation, Wellington.

[44] Stoffels R (2022). New Zealand Freshwater Fish Database (extended). The National Institute of Water and Atmospheric Research (NIWA). Sampling event dataset https://doi.org/10.15468/jbpw92 accessed via GBIF.org on 2024-03-24.
[45]Sirvid, P.J.; Vink, C.J.; Fitzgerald, B.M.; Wakelin, M.D.; Rolfe, J.; Michel, P. 2020: Conservation status of New Zealand Araneae (spiders), 2020. New Zealand Threat Classification Series 34. Department of Conservation, Wellington. 33 p
[46] Patrick B. 2002. Conservation status of the New Zealand red katipo spider (Latrodectus katipo Powell, 1871). Science for Conservation 194. New Zealand Department of Conservation
[47] Crisp, P. 2020. Conservation status of indigenous vascular plant species in the Wellington region. Greater Wellington Regional Council. GW/ESCI-G-20/20.
[48]Beadel SM, Bibby CJ, Perfect AJ, Rebergen AL, Sawyer JWD. 2004. Eastern Wairarapa Ecological District: survey report for the Protected Natural Areas programme. Dept of Conservation, Wellington Conservancy, unabridged. RAP26 Uruti Point Dunes, p101.
[49] Ogle, C. 1987. Plant Checklist for Riversdale Beach Reserve and private land, immediately south of urban area. Accessed February 23 2024 via: https://www.nzpcn.org.nz/site/assets/files/0/13/115/riversdale_beach_reserve.pdf
[50] Crisp, P 2020. Conservation status of native bird species in the Wellington region. Greater Wellington Regional Council. GW/ESCI-G-20/75.
[51] eBird. 2021. eBird: An online database of bird distribution and abundance [web application]. eBird, Cornell Lab of Ornithology, Ithaca, New York. Available: http://www.ebird.org. (Accessed: March 24, 2024).
[52] Cheyne J. 2013. Riversdale Wetland Bird Survey. Report prepared for Greater Wellington. WetlandWorks, Waipukurau.
[53] Crisp, P, Perrie A, Morar, S. 2022. Conservation status of indigenous freshwater fish in the Wellington region. Greater Wellington Regional Council. GW/ESCI-T-22/02.
[54] Stoffels R (2022). New Zealand Freshwater Fish Database (extended). The National Institute of Water and Atmospheric Research (NIWA). Access via: www.GBIF.org.
[55] 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.
[56] King CM, Murphy EC. 2005. Stoat. In: King CM ed. The handbook of New Zealand mammals. Oxford University Press. Pp. 261–287.
[57] 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.
[58] Clapperton BK, Byron A. 2005. Feral ferret. In: King CM ed. The handbook of New Zealand mammals. Oxford University Press. Pp. 294–307.
[59] King CM. 2005. Weasel. In: King CM ed. The handbook of New Zealand mammals. Oxford University Press. Pp. 287–294.
[60] 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.
[61] 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.
[62] 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.
[63] 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.
[64] 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.
[65] Norbury G, Flux JEC. 2005. Brown hare. in: King CM ed. The handbook of New Zealand mammals. Oxford University Press. Pp. 151–158.
[66] 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.

[67] 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.
[68] 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.
[69] Gillies C, Fitzgerald BM. 2005. Feral cat. In: King CM ed. The handbook of New Zealand mammals. Oxford University Press. Pp. 308–326.
[70] Ruscoe WA, Murphy EC. 2005. House mouse. In: King CM ed. The handbook of New Zealand mammals. Oxford University Press. Pp. 204–221.
[71] 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.
[72] 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.
[73] Innes JG. 2005. Ship rat. In: King CM ed. The handbook of New Zealand mammals. Oxford University Press. Pp. 187–203.

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