NATURE-BASED PERFORMANCE

ASSESSMENT OF WIND FARMS

Prepared for Meridian Energy Limited

19 March 2025

Boffa Miskell

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OVERVIEW

A Nature-based Performance (NbP) assessment has been conducted of Meridian Energy's operational wind farms across New Zealand to measure their performance in achieving no-net biodiversity loss, or better.

Aligning with key nature-related deliverables required by the Dow Jones Best in Class Index and Taskforce for Nature-related Financial Disclosures, the NbP process sought to assess the nature-related impacts and benefits generated by Meridian operations. Referencing credible evidence sources, including from assessment of environmental effect reports, consent condition implementation reporting, and supported by anecdotal evidence from site operators, a determination has been made of a wind farm's nature-based performance. For nature-related impacts and dependencies identified at a wind farm site, a rating of no net-loss or net-positive impact for biodiversity values was provided.

KEY FINDINGS

MERIDIAN WIND FARMS ACHIEVE NO NET-LOSS

Overall, with sufficient evidence and information available, all of Meridian's established operational wind farms were determined to achieve at minimum a no net-loss rating across all measured biodiversity values, with West Wind Farm and Te Uku Wind Farm contributing net-positive impacts for biodiversity. The recently constructed Harapaki Wind Farm is the only exception to this, with the lack of time since construction and ongoing monitoring data insufficient to providing an assessment rating for wetland values.

To improve Meridian's overall wind farm nature-based performance towards contributing net-positive impacts, additional opportunities are recommended by working with the landowners, farm managers, and community groups active at Meridian wind farms. At many sites, further protection and restoration of existing remnant native vegetation present at sites offers opportunities to improve positive biodiversity impacts. However, any further 'voluntary' restoration activities (such as pest control or planting) need to be sufficiently measured to include in a nature-based performance assessment.

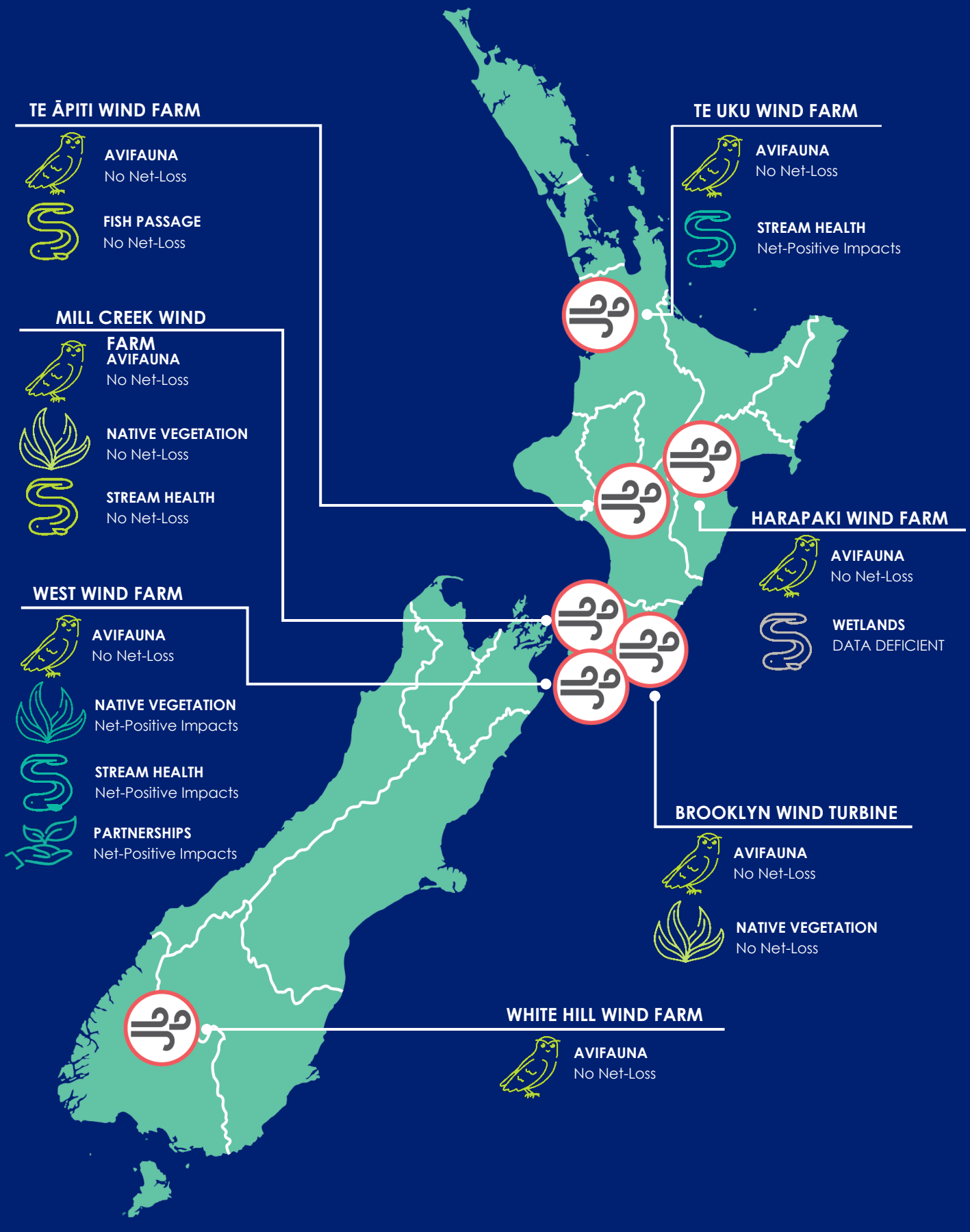
NATIVE VEGETATION

With the majority of Meridian's wind farms being developed in generally modified (improved pasture) landscapes, in most cases the disturbance to native vegetation biodiversity values is no more than minor, with any significant site remediation or enhancement efforts contributing to net-positive impacts. These net-positive impacts are evident at West Wind Farm and Te Uku Wind Farm, where significant planting of native trees and riparian planting has improved native vegetation landcover.

AVIFAUNA

Considering the habitat ranges of some native birds and bats, all operational wind farm sites contain 'critical biodiversity' within their site boundary with a diversity of native avifauna species present. However, with windfarm and turbine design being consistent with international recommendations for minimising bird strike, all operational sites were deemed to generate no net-loss to avifauna. This has been quantified through pre-construction and post-construction avifauna monitoring at the majority of sites, required by resource consent conditions.

WIND FARM NATURE-BASED PERFORMANCE



1.0 INTRODUCTION

Meridian Energy's purpose '*Clean Energy for a Fairer and Healthier World'* implicitly puts environmental sustainability at the centre of decision making. To meet the renewable energy generation needs of today without compromising the environmental, social, and economic needs of future generations, Meridian must measure and address the impacts of their operations on the environment over time.

For Meridian to assess its Biodiversity Commitment to ensure no net-loss of biodiversity, and pursuing efforts to achieve net-positive impacts, an organisation-wide nature-based performance measurement is required.[1] Measurement of nature-based performance allows for Meridian to acknowledge its impacts and dependencies on the natural environment and track the progress of its nature-based actions and partnerships.[2]

The purpose of this report is to summarise the outcomes of Meridian's first assessment of the nature-based performance of its operational wind farms in New Zealand. The key outcomes are:

- **LOCATE** the proximity and/or exposure of operational wind farms with areas of critical biodiversity importance [3]
- **EVALUATE** the biodiversity-related impacts and/or benefits present at operational wind farms and the outcomes of interventions to avoid, mitigate, or offset impacts
- **ASSESS** the nature-based performance of operational wind farms against no-net loss and net-positive impact criteria
- **IDENTIFY** any recommended actions to improve nature-based performance at operation wind farms or fill any information gaps to improve nature-based performance assurance

This summary report is supported a comprehensive Nature-based Performance Excel Workbook and GIS Dashboard to provide a transparent evidence basis for assessment outcomes.

1.1 SCOPE OF ASSESSMENT

The scope of the nature-based performance assessment focuses on Meridian's operational wind farms. These have been selected as the nature-related impacts and dependencies for these will span both construction and operation. Additionally, with post-construction monitoring for aspects such as bird strike or native vegetation reinstatement being conducted over a number of years following construction, these sites will most likely will have a robust evidence-base from which net-loss or positive impacts can be assessed.

The 'operational site' of a wind farm was determined to span its 'area of influence', including Meridian land holdings, leased land, access easements, and other area necessary for the operation, maintenance, and access of the wind farm.

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[1] **No Net-Loss** is defined as the point at which project related impacts on biodiversity are balanced by measures taken to avoid and minimize the projects impacts, to undertake on-site restoration, and offset significant residual impacts on an appropriate geographical scale.

Net-Positive Impact is defined as a target for project outcomes in which the impacts on biodiversity caused by the project are outweighed by the actions taken to avoid and reduce such impacts, rehabilitate affected species/landscapes, and offset any residual impacts.

[2] Meridian Energy Biodiversity Commitment (meridianenergy.co.nz)

[3] **Critical Biodiversity** is defined as sites containing globally or nationally important biodiversity, including species classified as critically endangered, endangered, or vulnerable on the IUCN Red List - endemic species – Internationally recognised areas (e.g., World Heritage Sites, Ramsar Wetlands). Nationally important biodiversity can include legally protected areas, habitats, and species.

1.2 MATERIAL IMPACTS & DEPENDENCIES

The material impacts and dependencies for Meridian's wind energy production were identified using the ENCORE tool (Exploring Natural Capital Opportunities, Risks and Exposure).[4] Wind farm dependencies on nature were assessed against the core provisioning and regulating ecosystem services, critical to the function and productivity of wind energy production. The impacts on nature were assessed against the pressures of wind energy production against the five drivers of nature change.

Table 1: Material impacts of nature of Meridian's wind farms, rated between Very High (VH), High (H), Moderate (M), Low (L), and Very Low (VL)

PRESSURE	RATING	DESCRIPTION
Area of land use	H	Construction of onshore wind farms leads to modification of terrestrial ecosystems.
Disturbances (e.g. light and noise)	M	Wind energy production can cause disturbances like noise pollution from wind turbines. This can disrupt or negatively affect species populations in localised areas such as altering migration patterns.
Volume of water used	L	Wind energy production does not directly use water to generate electricity. However, it may be used for cooling bearings and other components as required.
Generation and release of solid waste	VL	Wind energy production can generate large volumes of solid waste, such as discarded composite turbine blades once at the end of their lifespan.
Emission of toxic pollutants	VL	Maintenance activities of wind energy production can cause soil and water pollution from oil or other waste products.

Table 2: Material nature dependencies of Meridian's wind farms rated between Very High (VH), High (H), Moderate (M), Low (L), and Very Low (VL)

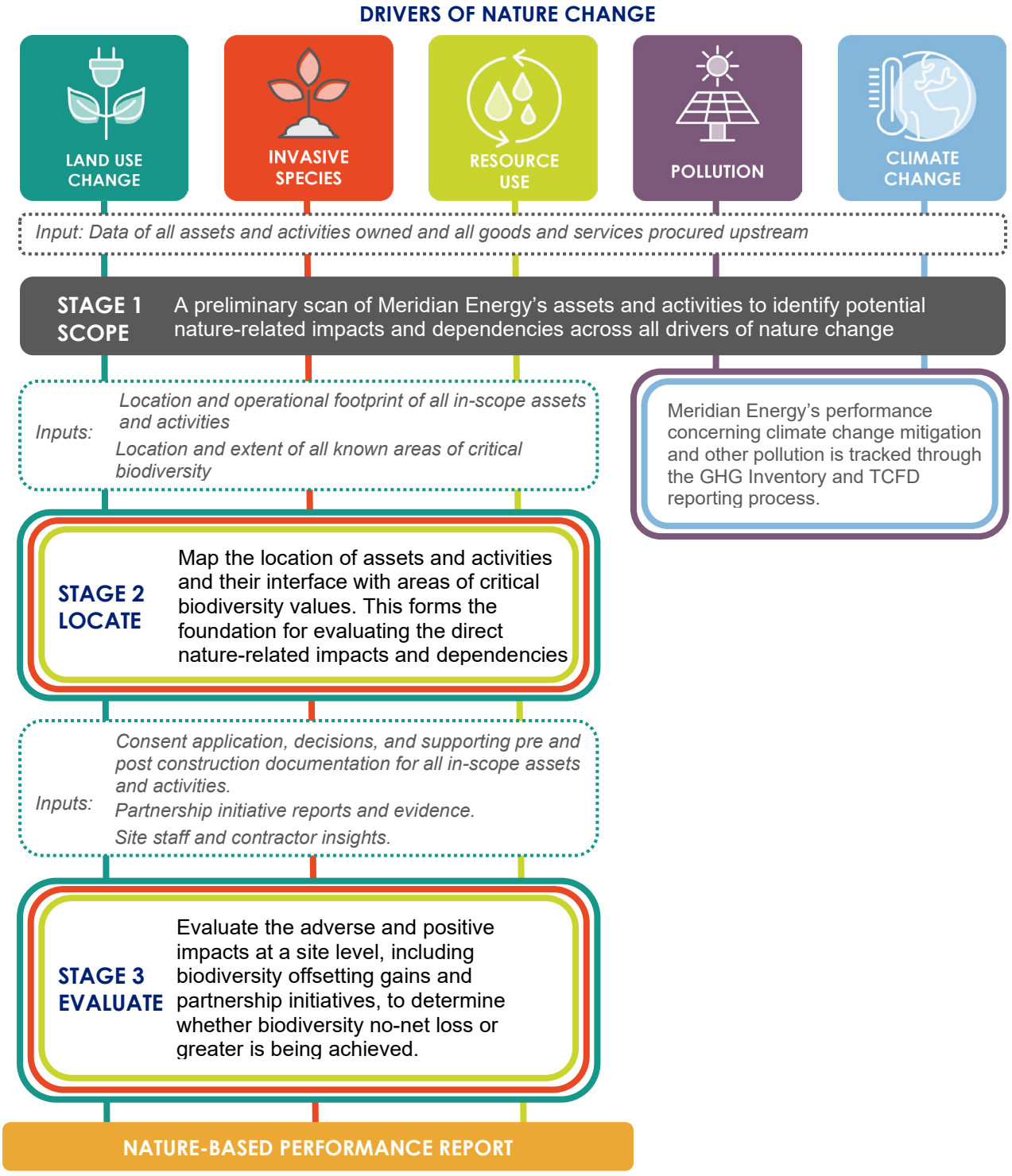
DEPENDENCY	RATING	DESCRIPTION
Global climate change mitigation	VH	Wind energy production facilities depend on global climate regulation to maintain a steady climate and to reduce the frequency and intensity of major climate events that could damage assets.
Flood protection and mitigation	H	Wind energy production is dependent on flood mitigation ecosystem services to protect infrastructure from flooding.
Local climate regulation	M	Ecosystems regulate the microclimate in the locations of wind farms, increasing their productivity, reducing maintenance costs, and extending longevity of the facilities and infrastructure.
Soil and sediment retention	M	Wind energy provision is dependent on soil and sediment retention to provide a stable substrate, erosion control, and mitigate landslide
Water flow regime regulation	M	Wind energy production is dependent on water flow regulation to ensure enough water to use in cooling systems
Storm mitigation	M	Wind energy production is dependent on storm mitigation services to protect wind farm sites and other infrastructure from the impacts
Noise attenuation services	M	Wind energy production depends on the ecosystems providing noise attenuation, such as landscaping and natural sound barriers that can act as a noise barrier, reducing the impact of noise pollution.
Water supply and storage	VL	Water may be used in cooling systems of wind energy production to prevent overheating

[4] ENCORE is maintained and continuously improved by Global Canopy, the United Nations Environment Programme Finance Initiative (UNEP FI), and the United Nations Environment Programme World Conservation Monitoring Centre (UNEP-WCMC)

2.0 NATURE-BASED ASSESSMENT APPROACH

The Nature-based Performance Framework (NbP Framework) is scoped as a decision support tool, developed to provide an overview of the nature-related impacts and benefits generated by Meridian's operations in relation to a biodiversity no net-loss or net-positive impact target.

The NbP Framework approach is structured to align with key deliverables required by the Dow Jones Best in Class Index and Taskforce for Nature-related Financial Disclosures (TNFD). Additionally, the Environmental Institute of Australia and New Zealand Inc. (EIANZ) guidelines for Ecological Impact Assessment is applied in the evaluation stage of this assessment to determine whether Meridian's positive and adverse impacts demonstrate biodiversity no net-loss. The use of EIANZ guidelines supports alignment with New Zealand common practice for ecological assessments and ensures terminology and definitions in this assessment are consistent with national policy direction. The structure of the NbP Framework is shown below.



2.1 EVIDENCE BASE

The assurance of outcomes from the nature-based performance assessment depends upon the availability of credible and well-founded evidence. This includes evidence from primary sources of biodiversity-related consent condition information, alongside the evidence of mitigation outcomes and biodiversity monitoring required at a site. Acknowledging that adverse biodiversity-related effects may have also been avoided during early site design, or previously unconsidered adverse effects may have occurred during construction of new sites, additional information not included in consent condition information can be provided to support assessment of Meridian's performance.

Where evidence is unable to be provided to support an assessment outcome, this will be noted as an information gap or data deficient. All information gaps that contribute to the assessment of nature-based performance will be collated and recommended for fulfilment as data improvement projects.

All relevant information extracted from evidence sources to support nature-based performance assessment outcomes will be detailed in the Nature-based Performance Excel Workbook, with source documents cited. This ensures any claims of no net-loss or net-positive impacts are based upon a transparent and credible evidence base to avoid allegations of over-stating Meridian's benefits or 'green washing'.

2.2 ASSESSING NO NET-LOSS

Aligning with the Environmental Institute of Australia and New Zealand Inc (EIANZ) guidelines for Ecological Impact Assessment, in particular the criteria for describing magnitude of effect and criteria for describing levels of effects, the identified biodiversity-related impacts and mitigation actions are assessed in relation to biodiversity no net-loss through the following means:

- **VERY HIGH ADVERSE EFFECTS** should be assessed as to whether they exceed 'limits to offsetting'. Net-biodiversity loss is the likely outcome
- **HIGH ADVERSE EFFECTS** may be able to be mitigated, but the bar will be set very high and net- biodiversity gain must be the goal, as the outcome is often less certain
- **MODERATE ADVERSE EFFECTS** can typically be mitigated using known and proven methods but will require careful design and follow-through monitoring to assume no net-loss has been achieved
- **LOW ADVERSE EFFECTS** should be easily mitigated using good design, with evidence provided to assume no net-loss
- **VERY LOW ADVERSE EFFECTS** may or may not require mitigation, and there should be no barriers to achieving no net loss

Each wind farm site is assessed to identify and measure the net-impacts on biodiversity from operational activities at this point in time (i.e. within the financial year the assessment is conducted). Impacts are evaluated based on the magnitude of the potential impact, the significance of the potential impact, and the performance of the avoidance and mitigation measures implemented.

As this assessment primarily seeks to evaluate Meridian's performance of avoiding or mitigating impacts on biodiversity from its operations and other activities or improving biodiversity values, other biodiversity values that are present at a site but not impacted by Meridian are not considered in the assessment. These wider unaffected biodiversity values present on sites are acknowledged in the Meridian Energy Nature-based Performance GIS Dashboard 'Critical Biodiversity Sites' information.

WIND FARM ASSESSMENT

3.0 WEST WIND FARM

LOCATION:	Wellington
TYPE:	Onshore wind farm
FORM:	62 wind turbines
CONSENTED:	2007
COMMISSIONED:	2009
OPERATIONAL AREA:	4,359 ha
PROXIMITY TO CRITICAL BIODIVERSITY:	Within operational site boundary

Table 3: Nature-based performance overview table for West Wind Farm

IMPACT TYPE	CONDITIONS MET	NATURE-BASED PERFORMANCE		
		NO-NET LOSS	NET-LOSS	DATA DEFICIENT
Avifauna	✓	✓		
Invasive weed species	✓	✓		
Fish passage & stream health	✓	✓		
Landscape restoration partnerships	-	✓		

✓ *Meets condition of consent* ✓ *No net-loss is achieved* ✓ *Net-positive impacts observed* ✗ *Net-loss observed*

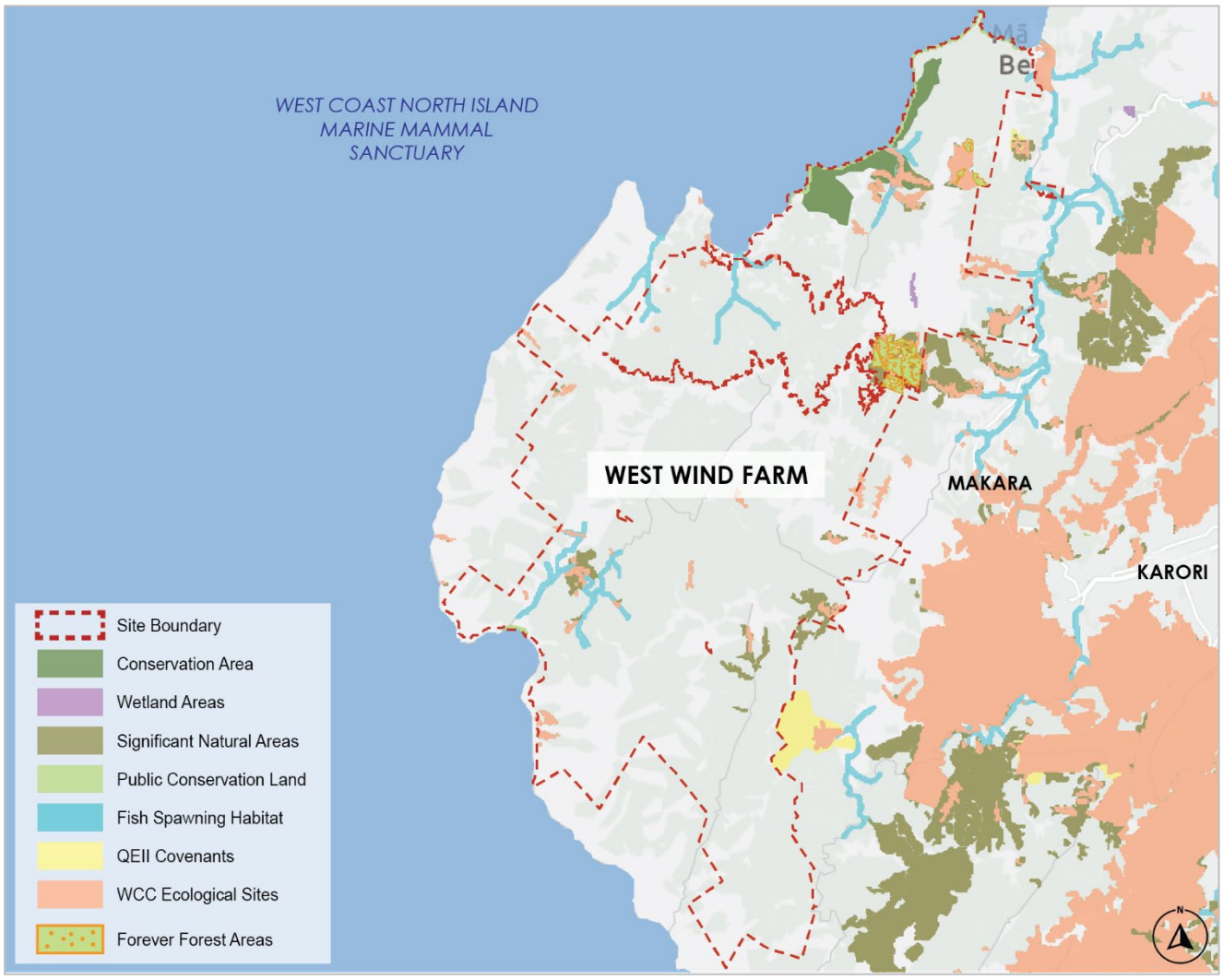


Figure 1: West Wind Farm with known biodiversity areas of importance shown.

3.1 INTERFACE WITH NATURE

Comprising of 62 wind turbines with the capacity to generate up to 142.6 megawatts of renewable electricity, the West Wind Farm is located in Mākara, west of Wellington city, along the western coast of the lower North Island of New Zealand. Being developed entirely on private farmland (with the northern farm being owned by Meridian), the landscape has been intensively farmed in the past, with exotic pastoral species dominating the landscape; however much of the southern area has been allowed to revert to woody shrublands and scrub vegetation.

Within the operational site boundary of West Wind, several locations of 'critical biodiversity' are present. This includes 48 'ecological sites' identified by Wellington City Council, namely consisting of native bush remnants of Karaka, Hīnua, and Tawa located primarily around Oteranga Steam, Ōpua Bay, and numerous inland gullies across the site. Redfin Bully and Koaro fish spawning habitats have been identified by Ministry for Primary Industries in Oteranga Stream and tributaries flowing into Ōpua Bay. Additionally, the operational site is contained within the 'Capital Kiwi' project area, with an extensive mustelid trap network operating across the site to support the restoration of a large-scale kiwi population within the Wellington Region.

Coastally, the operational site neighbours the West Coast North Island Marine Mammal Sanctuary; established in 2008 and expanded southwards along the south Wellington coast in accordance with the Hector's and Māui Dolphin (Nationally Vulnerable and Nationally Critical) Threat Management Plan.

Culturally, the West Wind Farm interfaces with a number of archaeological sites, with multiple Pā sites, midden sites, possible urupā located across the landscape, concentrated around Oteranga Bay/Stream, Ōpua Bay, and Te Ikaamaru Bay. The remains of the Albion Gold Mining Company Battery and Mine are also found near Oteranga Bay, dating from 1883.

3.2 NATURE IMPACTS AND DEPENDENCIES

3.2.1 FISH PASSAGE & STREAM HEALTH

For aquatic biodiversity, fish spawning habitats were identified within the operational site as noted, with the additional presence of inanga in the lower Oteranga Stream and Banded Kōkopu seen in the western Oteranga Tributaries. Consent conditions required extensive monitoring of stream quality and fish populations throughout construction of the windfarm and for two years following. A detailed plan was prepared and certified. It included adaptive management of sediment management devices. The final ecological restoration and recovery report concluded no adverse effects, beyond negligible short-term discharges, resulting in neutral effects or slight positive at the scale of the catchment.

Additionally, conditions required extensive monitoring of Oteranga Stream, both during and post construction for two years, including adaptive management of habitat formation. The final report concluded long term positive effects / net-positive impacts at the scale of the catchment. Fish population in the Oteranga Stream were observed to have increased from three to seven taxa over the past five years and fish abundance continues to improve with juvenile recruitment increasing the resident populations. It was noted that there has been a general decline in aquatic health indices within the Oteranga, however this may be due to seasonal variability, or the reintroduction of livestock following construction and is not associated with the operational activity of the windfarm.

3.2.2 AVIFAUNA

For terrestrial biodiversity, exotic pastoral species were observed to dominate the landscape, with the lack of significant native species across the majority of the site suggesting construction and post-construction monitoring should be focused on key areas of native bird activity. The greatest diversity and abundance of native birds were in the Makara Farm with a number of native species largely or entirely confined to this area. They include tūī, kererū, red-billed gull, paradise shelduck, white-faced, pied shag, and little shag.

Original wind farm design had turbines positioned closer to the water, north of the built site. However, due to the presence of the largest pied-shag colonies remaining in the lower North Island, these turbines were removed during subsequent design stages as advised by the project ecologist to avoid potential impacts on pied-shag. Additional planned turbines were also removed to the west of the built site in the location of identified sub-alpine shrubs to avoid impacts.

Conditions required three years post-construction monitoring of bird collision mortality was carried out, a detailed plan was prepared and certified. The annual results were provided to the Department of Conservation for comment. Two sea-bird mortalities of a sooty shearwater and a fairy prion were recorded in the first year of monitoring. However post-construction data has supported the predictions of both the Assessment of Environmental Effects (AEE) and the baseline study with regards to the species most likely to collide with turbines and the levels of mortality resulting from such collisions. That is, that some bird strike of common (mostly introduced) species was likely to occur from time to time, but that occasional losses of these common species would not have a significant effect upon the local populations of these birds. The final report concluded despite occasional collision mortalities, no population level effects (neutral or no net-loss at the scale of the population) for any native species was observed.

3.2.3 INVASIVE WEED SPECIES & FOREVER FOREST RESTORATION

In respect to vegetation management and rehabilitation of the West Wind site following construction, a preliminary weed survey was conducted in 2009, concluding the site was clear of invasive weed species indicating good site management of invasive and exotic pests. This included observing that no weeds have been introduced by vehicle arrivals, no weeds had been imported to the site with gravels, top-soils, or hydro-mulch mixes, and no weeds have been spread across the site (beyond their current distributions) as a result of operations.

Consent conditions for rehabilitation of the site required the identification of a 35-hectare area to be fenced with a stock proof fence and measures taken to remove plant and animal pests. The area was to be located where native vegetation regeneration is occurring to mitigate the permanent loss of native flora from roading and turbine sites. Incorporated within Meridian's 'Forever Forests' programme, existing remnants of native vegetation has been protected at the western extent of the site in the gullies surrounding Makara stream and Terewhiti stream to support approximately 30-hectares of natural forest regeneration to occur. Additionally, the existing stands of native vegetation surrounding the West Wind Service Buildings located on Opau Road has been supplemented with the planting of 5,000 stems of native trees across approximately five hectares.

With a 90% survival rate from planted natives supporting the passive regeneration of native vegetation within the area, over 19,460 natives have been registered into the New Zealand Emissions Trading Scheme to date generating 1,612 NZU / 1,612 tCO_2 removed from the atmosphere (as of April 2024).

3.2.4 LANDSCAPE RESTORATION – PARTNERSHIP INITATIVES

The West Wind operational site is contained within the ‘Capital Kiwi’ project area, with an extensive mustelid trap network operating across the site to support the restoration of a large-scale kiwi population within the Wellington Region. As the largest landowners in the ‘Capital Kiwi’ project area, Meridian have been an early supporter and enabler of the project. Since its establishment, Meridian has supported ‘Capital Kiwi’ with hosting onsite workshops and trap building days, setting traplines at West Wind, conducting monitoring and maintenance of trap lines by Meridian staff volunteers, and supporting kiwi translocations. The ‘Capital Kiwi’ project is a recipient of Meridian’s Power Up West Wind community fund.

Meridian also supports the Mākaracarpas Society: with the Mākara Ōhāriu Catchment revegetation programme, supporting planting & pest control activities over a number of years from 2010. Last year the group’s riparian and wetland programme supported 27 properties, representing around $100,000 of cash or in-kind contributions from a variety of sources, with just over $12,000 of that coming from Meridian’s Power Up fund. Over the last four years, the programme has received almost $59,000 from the West Wind and Mill Creek funds. The funding has helped support the fencing of over 3000 metres of waterways and the planting of over 24,000 native plants.

Following an extensive pest eradication programme, the Mākaracarpas Society project was granted a permit to release up to 250 kiwi south-west of Mākara on land that hosts Meridian’s West Wind farm and borders the Mill Creek wind farm. The community now boasts a population of over 130 kiwi and in 2023 welcomed the first kiwi chicks successfully hatched in the wild.

As an active participant and enabler of local landscape restoration efforts, through Capital Kiwi and the Mākaracarpas Society, Meridian is contributing the net-positive outcomes for local biodiversity values present at West Wind.

Figure 2: Capital Kiwi release. Source: Capital Kiwi

4.0 BROOKLYN WIND TURBINE

LOCATION:	Wellington
TYPE:	Onshore wind farm
FORM:	One wind turbine
CONSENTED:	2014 (latest turbine replacement)
COMMISSIONED:	1993
OPERATIONAL AREA:	39 ha
PROXIMITY TO CRITICAL BIODIVERSITY:	Within operational site boundary

Table 4: Nature-based Performance overview table for Brooklyn Wind Turbine.

IMPACT TYPE	CONDITIONS MET	NATURE-BASED PERFORMANCE		
		NO-NET LOSS	NET-LOSS	DATA DEFICIENT
Avifauna	✓	✓		
Native vegetation	✓	✓		

✓ *Meets condition of consent* ✓ *No net-loss is achieved* ✓ *Net-positive impacts observed* ✗ *Net-loss observed*

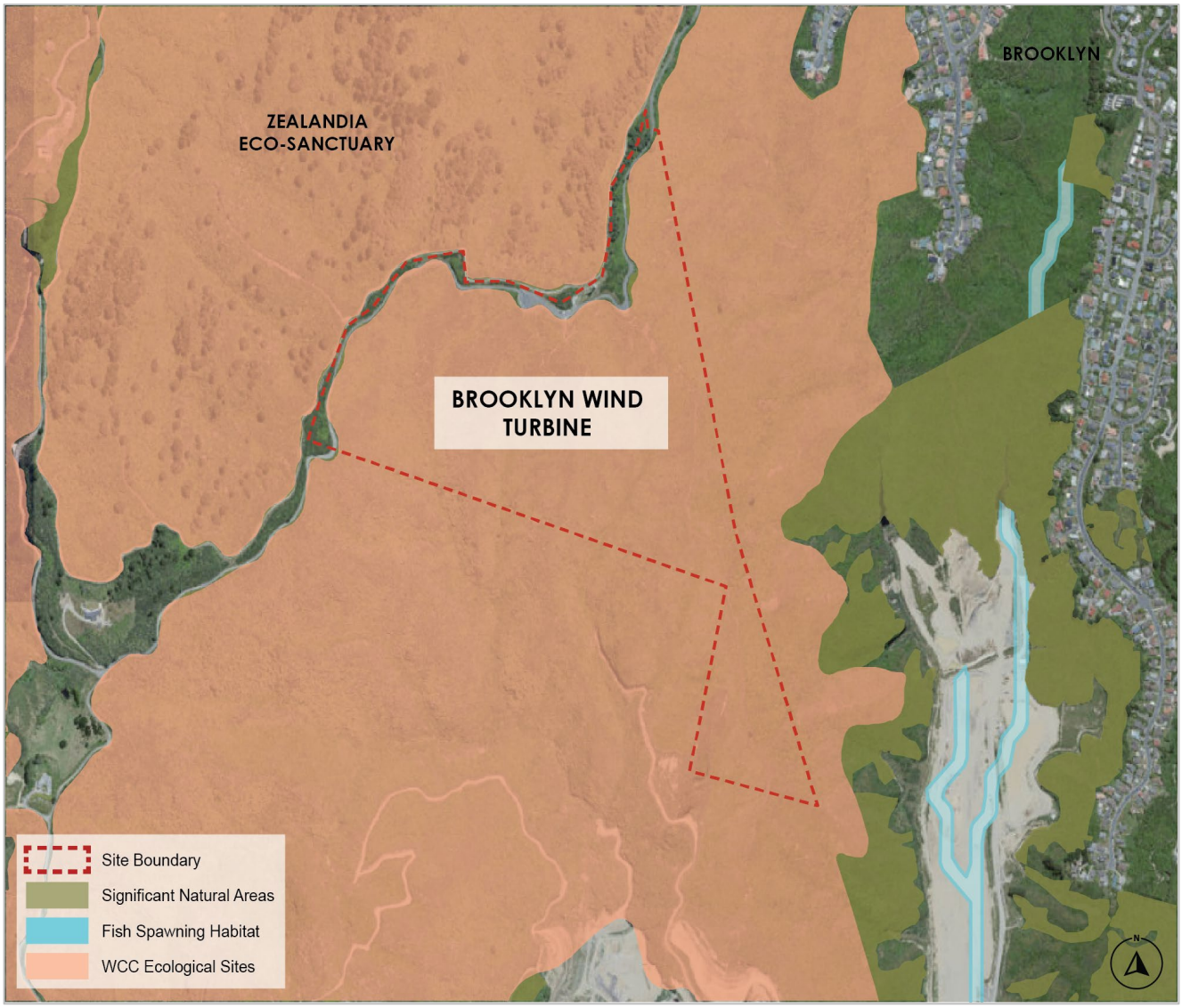


Figure 3: Brooklyn Wind Turbine with known biodiversity areas of importance shown.

4.1 INTERFACE WITH NATURE

Located on the Te Kopahau ridge line, 2 km north of Hawkins Hill and 0.8 km south of the Polhill Summit, the singular Brooklyn wind turbine generates enough renewable electricity to power approximately 490 homes. The original turbine was established in this location in 1993, becoming part of Meridian's network in 1999 when the company was established. The original aging turbine was subsequently replaced by Meridian in 2016.

The operational site of Brooklyn wind turbine both contains and sits adjacent to locations of 'critical biodiversity'. The 39-ha land parcel on which the Brooklyn Wind Turbine is located, is within the Carey Gully Significant Natural Area (SNA) (identified in SCHED8 of the Proposed District Plan), and Carey Gully ecological site. The turbine itself is outside of these mapped areas. The gully comprises of mostly regenerating native and exotic vegetation, sometimes with manuka dominating otherwise mahoe and mixed broadleaf species. The surrounding scrub comprises manuka ridges, mahoe-rangiora gullies, gorse-tauhinu-manuka and Coprosma propinqua.[5]

The operational site is contained within the 'Capital Kiwi' project area, with an extensive mustelid trap network operating across the site to support the restoration of a large-scale kiwi population within the Wellington Region. The operational site also boarders the Zealandia Eco-Sanctuary, with the pest-exclusion fence and predator removal begun in1998, after the establishment of the original Brooklyn turbine. Several Threatened and At-Risk native species have been translocated to Zealandia since its establishment, predominantly avifauna. Apart from flightless species, movement of both translocated and naturally occurring avifauna occurs across the Zealandia fence, including several Threatened and At-Risk species. In partnership with Zealandia, Meridian funded the purchase of two electric shuttle buses for the ecosanctuary and associated charging infrastructure, enabling the ecosanctuary to reduce its gross greenhouse gas emissions.

4.2 NATURE IMPACTS AND DEPENDENCIES

4.2.1 AVIFAUNA

Baseline monitoring for the site found no avifauna carcasses (or other sign of mortalities) around the platform of the existing turbine, nor were any birds observed colliding with the turbine during monitoring sessions. The results of the avifauna monitoring confirm that the location of the turbine on a high point on a ridgeline, is an area with low usage by resident birds and birds moving to other sites to forage. The findings of the 2012 baseline monitoring supported the observations of an earlier 2007 ecological assessment, where only a single blackbird carcass was detected, presumed to have been a bird strike. Given that the majority of native avifauna movements are occurring away from the turbine site, no mitigation action was required for the replacement Brooklyn turbine. Accordingly, with the magnitude of bird strike being assessed as at most negligible, the Brooklyn wind turbine is considered to generate no net-loss to avifauna.

Consent conditions require recording and reporting of any evidence of bird strikes.[6] There has been no records of bird strike recorded since construction of the replacement turbine.

[5] SCHED8 – Ngā Wāhi Taiao Matua, Significant Natural Areas

[6] Consent Condition 16, Resource Consent 295035

4.2.2 NATIVE VEGETATION

Consent conditions require that the Brooklyn wind turbine site is to be landscaped in accordance with a landscape plan submitted to and approved by Council.[7]

Anecdotal evidence from Meridian states that it was agreed with Council that the site should be reinstated with grass (which was the pre-existing landcover prior to replacement) due to extreme wind speeds at the site and challenging shrub growing conditions. Given the turbine replacement conducted by Meridian occurred within the historically modified turbine foundation area, no additional native vegetation was impacted or adversely effected by the Meridian.

Figure 4: Brooklyn wind turbine with Zealandia Eco-Sanctuary pest-proof fence in view. Source: Meridian Energy

[7] Consent Condition 6, Resource Consent 295035

5.0 MILL CREEK WIND FARM

LOCATION:	Wellington
TYPE:	Onshore Wind Farm
FORM:	26 wind turbines
CONSENTED:	2012
COMMISSIONED:	2014
OPERATIONAL AREA:	2,281ha
PROXIMITY TO CRITICAL BIODIVERSITY:	Within operational site boundary

Table 3: Nature-based performance overview table for Mill Creek Wind Farm

IMPACT TYPE	CONDITIONS MET	NATURE-BASED PERFORMANCE		
		NO-NET LOSS	NET-LOSS	DATA DEFICIENT
Avifauna	✓	✓		
Native vegetation	✓	✓		
Fish passage & stream health	✓	✓		

✓ *Meets condition of consent* ✓ *No net-loss is achieved* ✓ *Net-positive impacts observed* ✗ *Net-loss observed*

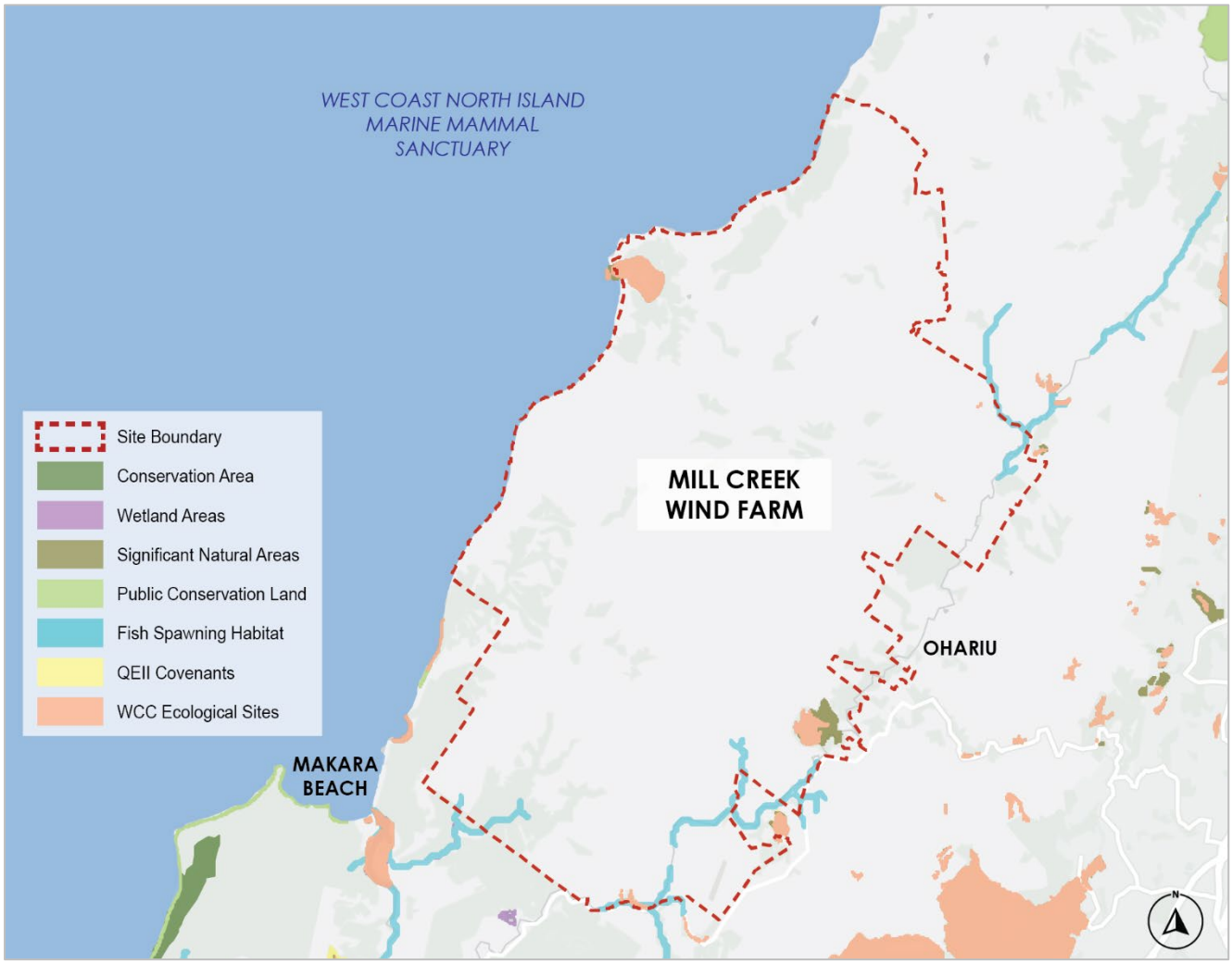


Figure 5: Mill Creek Wind Farm with known biodiversity areas of importance shown.

5.1 INTERFACE WITH NATURE

Mill Creek Wind Farm consists of 26 turbines which generate up to 59.8 megawatts of renewable electricity. The 2,281-ha operational site is located on privately owned farms, northwest of Wellington near Ōhāriu Valley. Whilst limited, there areas of 'critical biodiversity' are located within the Mill Creek operational site.

The site's landscape is predominantly improved pasture with almost no original vegetation cover remaining, or areas of significant vegetation and habitats of native fauna. There are however small areas of regenerating scrub, particularly within the gullies and steep slopes at the southern end of the operational site. There are no large waterbodies or rivers within the operational site, with all large streams that cross the site flowing south towards the Makara Estuary. The estuary itself, is considered to be of regional significance as a significant habitat for native fauna.

Although comparatively small, within the operational site boundary there are four Significant Natural Areas (identified in SCHED8 of the Proposed District Plan), seven ecological sites identified by Wellington City Council, and fish spawning habitat areas (identified by Ministry for Primary Industries) for Redfin Bully and Banded Kōkopu. The site western boundary neighbours the West Coast North Island Marine Mammal Sanctuary (DOC), and several protected natural areas, covenanted forest remnants, and recreation reserves are located on the margins of the operational site.

The Mill Creek site is contained within the 'Capital Kiwi' project area, with an extensive mustelid trap network operating across the site to support the restoration of a large-scale kiwi population within the Wellington Region.[8]

5.2 NATURE IMPACTS AND DEPENDENCIES

5.2.1 AVIFAUNA

Avifauna present across the operational site was assessed by both the New Zealand Ornithological Society (OSNZ) and Boffa Miskell in 2007 to provide a baseline of bird species present locally. Overall, exotic species such as seed feeding finches, starlings, and sparrows dominate the operational sites open country. A few native bird species such as the harrier hawk, pipit, paradise shelduck are also present across the sites open country, with other species including fantail, grey warbler, tūī, and kingfisher also seen or heard within the few bush remnants.

Coastally, threatened bird species, including reef heron, Caspian tern, white fronted tern, little black shag, and pied shag were recorded along the sites west coast. Except for the black shag and little black shag which are sometimes seen in the Ohariu Valley, the wind farm turbines are considered to be sufficiently distant from the coast and from Makara Estuary that these coastal species are unlikely to be affected.

When assessed against the generic risk factors for avifauna (from wind farms), Mill Creek was assessed as presenting low risk to avifauna, with no adverse effects on avifauna requiring mitigation. Consent conditions require the recording and reporting of any bird strikes, however there is no record of any bird strikes at present.[9] Accordingly, the Mill Creek Wind Farm is considered to generate no net-loss to avifauna.

[8] Meridian partnership outcomes with Capital Kiwi and the Mākaracarpas Society are detailed in the West Wind Farm assessment and subsequently excluded here. However, benefits may be attributed to both sites.

[9] Consent Condition 39, Resource Consent 176538

5.2.2 NATIVE VEGETATION

As noted, the site's landscape is predominantly improved pasture. Accordingly, vegetation clearance required as part of the construction and operation of the Mill Creek wind farm occurred predominantly on improved pasture (98% of the 44-ha construction footprint). As such, the only native vegetation directly affected by the construction and operation of the wind farm was expected to be small areas of regenerating *Juncus* rush-land in wet pastures and small communities of highly modified browse-resistant native species. These species are common locally and are not representative of original vegetation.

Resource consent conditions require replanting of exposed areas to be replaced with 'like for like' vegetation.[10] The site was identified as having very low ecological diversity due to a long history of vegetation clearance and intensive pastoral farming. As a result, the replacement vegetation mentioned in consent conditions was largely replacing pasture with pasture as per the Construction Environmental Management Plan. With like for like replacement of pasture achieved, highly unlikely that the Mill Creek Wind Farm has generated a net-loss of native vegetation biodiversity value.

5.2.3 FISH PASSAGE & STREAM HEALTH

While limited waterbodies and streams are present at the site, fish spawning habitat and freshwater communities are evident, particularly within Ohariu Stream and Mill Creek. However, the AEE concludes that adverse effects from the sites construction and operation are likely minor, localised and can be adequately mitigated with appropriate culvert design and riparian controls. There are various consent conditions requiring fish passage inspections and the provision of fish passage during construction and operation of Mill Creek.[11] The Inspection Report (Morphum Environmental Ltd, 2014) recommended further monitoring and assessment of culverts along Ohariu Stream to determine whether any remediation is required for fish passage. Accordingly, the Construction Environmental Management Plan was further reviewed by the project ecologist to ensure fish passage through all watercourse structures was operating sufficiently. Each fish passage was subsequently assessed and certified by Council, likely causing no-net loss.

Resource consent conditions required the enhancement of ecological values of Makara Stream and Estuary through riparian planting. Email correspondence from Greater Wellington Regional Council (21.09.2018) suggests there was limited success of replanting due to stream bank erosion, plants being washed away, and presence of gorse. However, a number of plants are now established on-site, and a covenant was put on the land and riparian areas restored, providing further protection for the area. Resource consent conditions also required construction monitoring of stream health. The following reports suggest that the construction of Mill Creek had no significant impacts on sedimentation rates and stream health:

- The Deposited Sediment Monitoring Results, July 2013 (Boffa Miskell Limited) concludes that: *The results of monitoring at all sites currently affected by construction within the Mill Creek project area did not exceed the allocated deposited sediment triggers; therefore, there is no further action required.*
- The Makara Estuary Monitoring: Post-Construction Phase Surveys Spring 2015 (eCoast Ltd) summaries that: *despite the challenges of trying to monitor the impacts of the wind farm develop in an estuary that is influenced by a range of impacts, it is our opinion that the Mill Creek wind farm development has had no significant impacts on the sedimentation rates and the health of the Makara Estuary.*

[10] Consent Condition 38, Resource Consent 176538

[11] Land Use Consents 26777, 27383, 27383, and 31846

6.0 TE ĀPITI WIND FARM

LOCATION:	Manawatū
TYPE:	Onshore wind farm
FORM:	55 turbines
CONSENTED:	2003
COMMISSIONED:	2004
OPERATIONAL AREA:	1,249 ha
PROXIMITY TO CRITICAL BIODIVERSITY:	Within operational site boundary

Table 4: Nature-based performance overview table for Te Āpiti Wind Farm

IMPACT TYPE	CONDITIONS MET	NATURE-BASED PERFORMANCE		
		NO-NET LOSS	NET-LOSS	DATA DEFICIENT
Avifauna	✓	✓		
Fish passage	✓	✓		

✓ *Meets condition of consent* ✓ *No net-loss is achieved* ✓ *Net-positive impacts observed* ✗ *Net-loss observed*

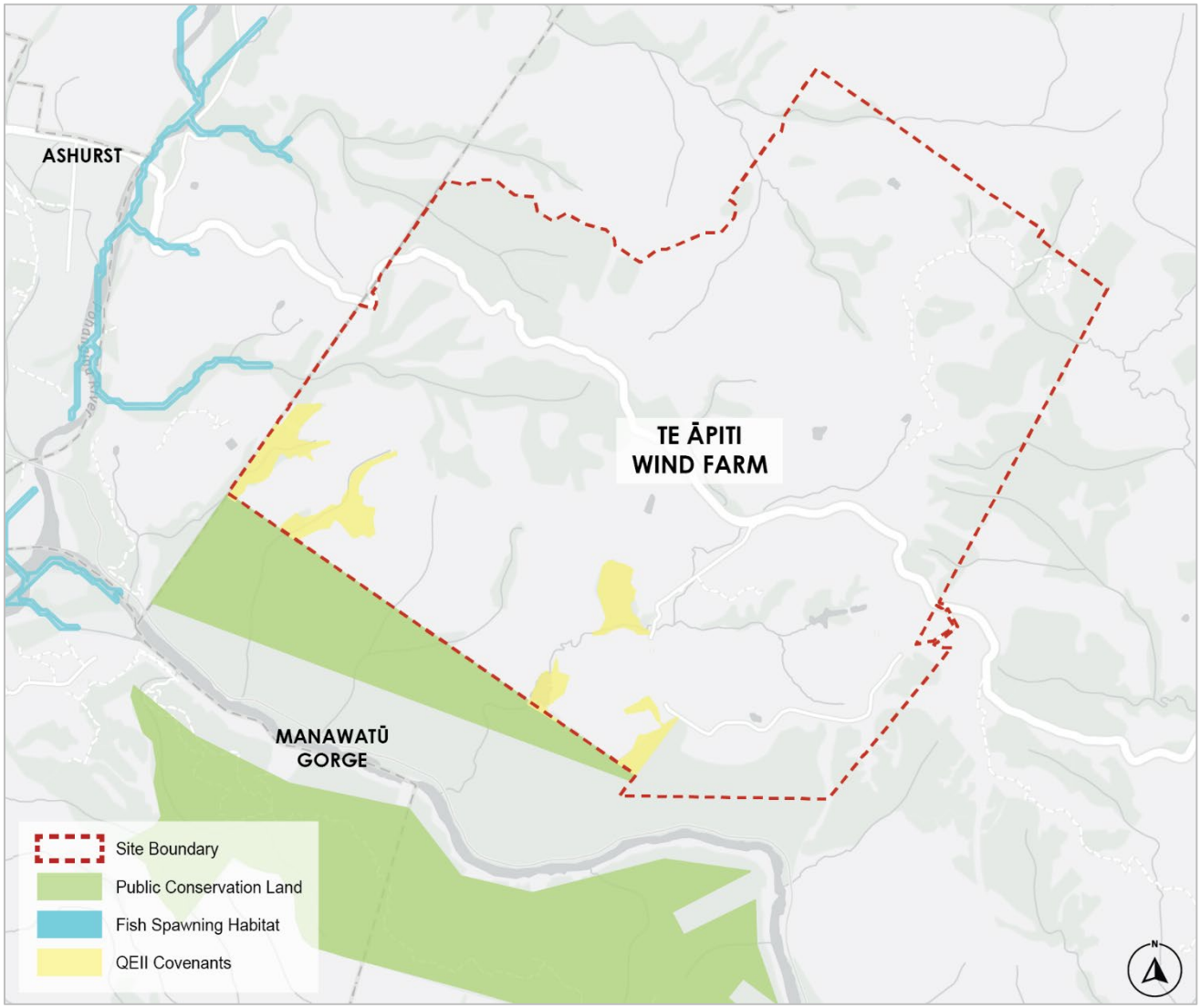


Figure 6: Te Āpiti Wind Farm with known biodiversity areas of importance shown.

6.1 INTERFACE WITH NATURE

Te Āpiti Wind Farm is situated to the north of the Manawatu gorge, approximately 20 km east of Palmerston North City. Consisting of 55 turbines located on 1,249-ha of farmland owned by four separate landowners (including Meridian), Te Āpiti can generate up to 90.75 megawatts of renewable electricity.

The operational site contains areas of 'critical biodiversity' both within its boundaries and within the immediate vicinity. The site lies between two significant conversation areas, the Ruahine Forest Park to the north and the Manawatū Gorge Scenic Reserve to the south. The turbines are typically located on improved pasture on ridgelines with fingers of native bush extending up gullies between them. The bush varies from kanuka scrub to remnant podocarp broadleaved forests. There are also areas of plantation pine, and abundant farm ponds of varying size within the wind farm footprint. The turbines are located at varying distances from native bush margins, with the closest turbines being located 75m from Manawatū Gorge Scenic Reserve (DOC Public Conservation Land).

There are three QEII National Trust Land Covenants within the operational site boundary. These forest remnants have a similar composition to the Manawatū Gorge Scenic Reserve, with the canopy dominated by tawa and rewarewa with occasional tall podocarps such as totara and rimu, and the sub-canopy dominated by mahoe, pigeonwood, lacebark, lemonwood, supplejack and hīnua. Additionally, RECAP and the Milson Scout Group conduct community pest control in areas within the operational site, targeting mustelids, possums, rats, and hedgehogs.[12]

Farming of sheep and beef continues in the pasture beneath each turbine. Many farm gullies contain small patches of young regenerating native vegetation typically dominated by mahoe, kanuka, putaputaweta, and cabbage tree over toetoe, Carex, and Juncus species.

6.2 NATURE IMPACTS AND DEPENDENCIES

6.2.1 AVIFAUNA

The types of avifauna found at the Te Āpiti site are consistent with a largely pastoral environment with bush fragments and pine windbreaks. Exotic bird species are the most abundant across the operational site open country, particularly seed feeding finches, starlings, and sparrows. Most native species, such as tūī, bellbird, silvereye, and grey warbler, are confined to the remnant bush fragments and pine forests. The exceptions to this are the harrier hawk, pipit, pukeko, paradise shelduck, and the recent New Zealand colonisers, spur winged plover and welcome swallow. None of these species are considered Threatened.

As stated in the Te Āpiti Wind Farm AEE (Boffa Miskell Limited, 2003), there is a high degree of confidence that the wind farm will not result in mortality of significant avifauna species. The windfarm and turbine design are consistent with international recommendations for minimising bird strike, and no additional mitigation action is considered necessary.

Consent conditions require the recording and reporting of any bird strikes.[13] A Report on Avian Mortality at Te Āpiti Wind Farm, October 2009 (Boffa Miskell Limited) states that the level of mortality calculated is highly unlikely to affect local populations of the species killed. All affected species are abundant at this site regionally and nationally. Therefore, while some bird mortality has been observed, this is not considered to affect the local or national population. Based on the EIANZ guidelines this effect is considered negligible (as there is negligible effect on the known pollution) generating no net-loss of avifauna values at the scale of the population.

[12] Meridian has supported these community groups through it's Power Up community funding. However, no information is available to determine the use or benefits of the funding.

[13] Consent Condition 13, Resource Consent 01-0800

6.2.2 FISH PASSAGE

During wind farm construction, it was proposed that a large area near Cook Road be set aside for material storage and assembly area. This would require levelling of up to 4-ha of the site and the culverting of up to 200 metres of stream. The watercourse was a typical farm stream incised into a basin of grazed pasture with low natural value but likely provides habitat for some species of birds and invertebrates.

Consent conditions require that the downstream rock riprap is placed in such a way to avoid being a barrier for fish passage.[14] However, since construction, this area has been significantly modified by the NZTA highway project, with the former material storage area now used by the highway project team. Relating to the stream alterations Meridian had conducted, the NZTA project has designed the upstream culverts from the highway was such that they do not allow for fish passage so as not to trap and isolate anything which could migrate up. The outlet from the dam is into a stream diversion was created for the highway project. This diversion was designed with fish passage in mind and includes the strategic placement of rocks and logs to create low flow zones to enable fish passage within the effected stream.

Monitoring has been carried out in accordance with the NZTA's resource consent conditions placed on the highway project. This will include additional monitoring and verification post construction. The level of monitoring to-date has likely exceeded the consented requirements now that the biodiversity in the dams is better understood with the project Kaitiaki taking a great interest in the health of the catchment and the biodiversity contained within. Anecdotally, local Kaitiaki have found considerable sized tuna in the Meridian dams.

Figure 7: Te Āpiti Wind Farm, Manawatū. Source: Jondaar.

[14] Consent Condition 14, Resource Consent 103022

7.0 TE UKU WIND FARM

LOCATION:	Waikato
TYPE:	Onshore wind farm
FORM:	28 turbines
CONSENTED:	2008
COMMISSIONED:	2010
OPERATIONAL AREA:	2,169 ha
PROXIMITY TO CRITICAL BIODIVERSITY:	Within operational site boundary

Table 5: Nature-based performance overview table for Te Uku Wind Farm

IMPACT TYPE	CONDITIONS MET	NATURE-BASED PERFORMANCE		
		NO-NET LOSS	NET-LOSS	DATA DEFICIENT
Avifauna	✓	✓		
Stream health	✓	✓		

✓ *Meets condition of consent* ✓ *No net-loss is achieved* ✓ *Net-positive impacts observed* ✗ *Net-loss observed*

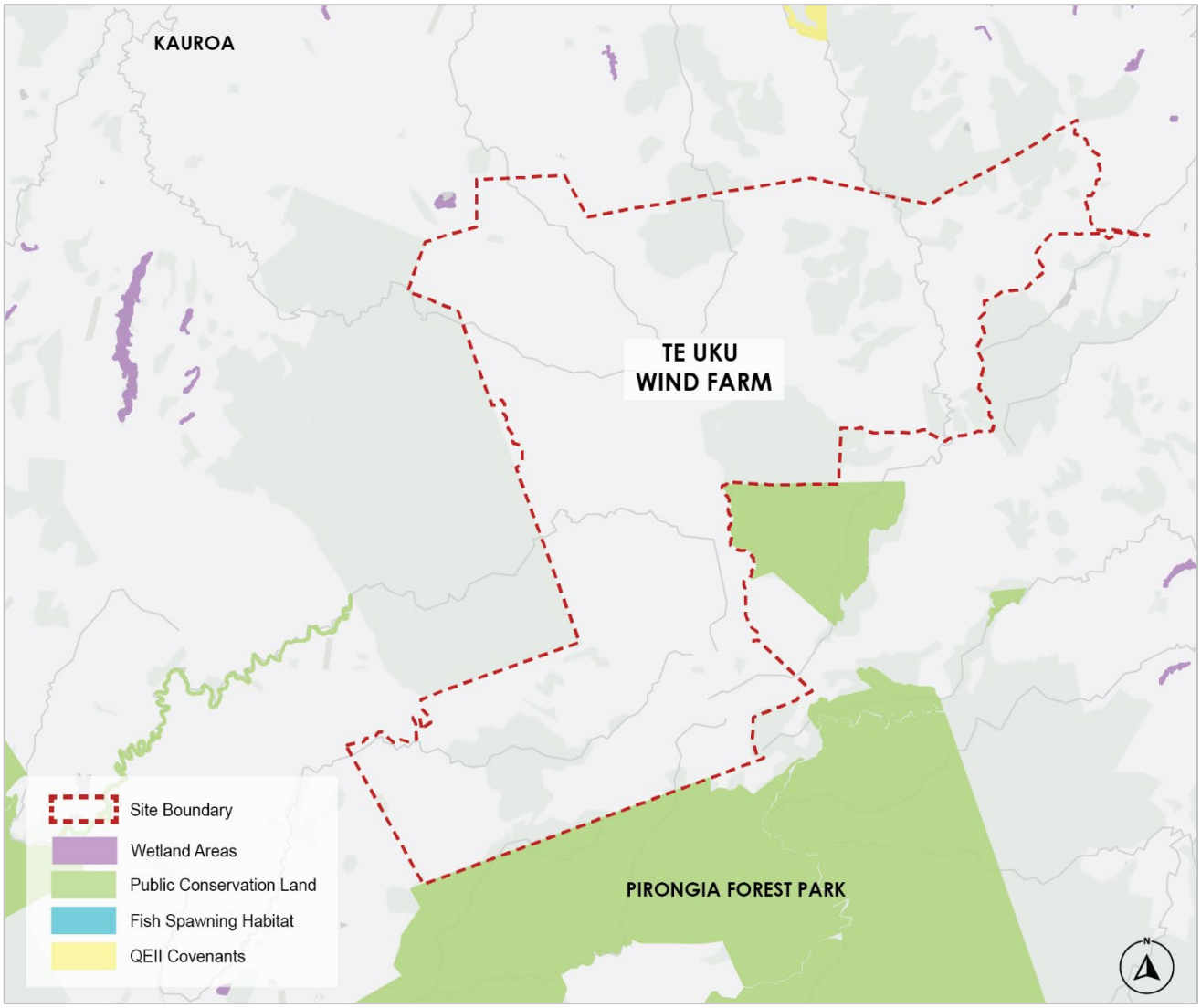


Figure 8: Te Uku Wind Farm with known biodiversity areas of importance shown

7.1 INTERFACE WITH NATURE

Comprising of 28 turbines capable of generating 64.4 megawatts of renewable electricity, the Te Uku Wind Farm is located south-east of Raglan, near the western coast of the North Island. Situated across 2,169-ha, the operational site is comprised predominantly of improved pasture, with areas of native forest, scrubland, and wetland habitats sparsely scatted throughout.

While no formally identified or protected conservation areas exist within the operational site, the site is situated between Mount Pirongia and Mount Karioi. These two areas contain the largest areas of native vegetation coverage in the Kawhia Ecological District, most of which is protected within the Pirongia Forest Park, administered by the DOC. However, despite this close proximity, no endangered, rare, threatened, or vulnerable native vegetation species or communities were found within the operational site.

Within the operational site, only the small sedge/toetoe seepage wetland area is considered to be of Regional Ecological Significance. With these wetland habitat types not widespread within the Kawhia Ecological District, these areas are considered to be ecologically significant as an under-represented habitat type.

7.2 NATURE IMPACTS AND DEPENDENCIES

7.2.1 AVIFAUNA

During the ecological assessment (Kessels & Associates Ltd. 2007), thirty-two bird species were identified as being present within the operational site vicinity, with another three species likely present but not recorded. The predominant bird species found were common grassland passerines and wetland species including sparrows, yellow hammer, pipit, skylark, Australian magpie, chaffinch, swallow, spur-winged plover, and paradise shelduck. The most common species found within the adjacent bush habitats were grey warbler, fantail, tūī, kererū, and morepork, and local land managers reported New Zealand falcon being present.

Falcon monitoring in 2009-10 found no falcon nests or falcon sightings within 1 km of the operational site. Due to the absence of falcon nests within 1 km of the wind farm over the past two breeding seasons, it was recommended that population monitoring be reduced to five days for the 2010/2011 breeding season, and if no falcon nests were located during the 2010/2011 breeding season it was recommended that population monitoring cease and future effort focus on strike monitoring. Long-tailed bat monitoring in 2009-10 considered there was a moderate risk of bat mortality at Te Uku Wind Farm. Although, the risk of bat mortality is reduced given that bat activity levels at the site are low and because bat activity is greatest at low wind speeds (around the start-up velocity of the turbines). However, given the national decline of the species, ongoing monitoring was recommended.

Consent conditions required avifauna population and strike monitoring programmes and reporting.[15] Inspection of trees proposed to be removed during construction, showed there was no indication that bats were roosting in the potentially affected trees, concluding that the trees could be removed with no further consideration of native bats / no-net loss.

Various post-construction avifauna and bat monitoring has been conducted between 2011 and 2013 for Te Uku. The results from the monitoring are clear that there have been no bat strikes recorded at Te Uku Wind Farm. However, the reporting states further monitoring is proposed for other avifauna. The remains of three birds were found during monitoring, including two Not Threatened native species (Australasian harrier and silvereye). Despite these limited mortalities, post-construction monitoring suggests no population level effects (neutral or no net-loss at the scale of the population) for any native species was observed at site.

[15] Conditions 6.2 - 6.7, Resource Consent LUC0252/06

7.2.2 STREAM HEALTH

As noted in the ecological assessment (Kessels & Associates Ltd. 2007), no significant streams or wetlands would be directly affected by the wind farm development or operation. There was the risk that sediments from road works and turbine site construction could enter waterways and adversely effect aquatic biodiversity. However, this risk was considered no more than minor provided standard best practice construction methods were implemented.

Consent conditions required in-stream monitoring.[16] The Te Uku Wind Farm Monitoring Report 2012-23 (Morphum Environmental Ltd) found that there did not appear to have been any more that minor adverse effects on the freshwater environment during construction. The actions taken overtime to reduce stock access to stream edges appears to be having a positive impact in some waterways, achieving no-net loss of freshwater biodiversity values.

Additionally, Meridian led the planting of approximately 40,000 native plants in two wetland areas on the Te Uku Wind Farm to help improve downstream water quality. As such, this volume of planting is expected to contribute net-positive impacts to stream health and biodiversity values, both within the operational site and downstream.

Figure 9: Te Uku Wind Farm, Waikato. Source: itravelNZ

[16] Condition 16, 21 -26. Schedule One of 116241, 116242, 116689, and 116690

8.0 WHITE HILL WIND FARM

LOCATION:	Southland
TYPE:	Onshore wind farm
FORM:	29 turbines
CONSENTED:	2004
COMMISSIONED:	2007
OPERATIONAL AREA:	2,258 ha
PROXIMITY TO CRITICAL BIODIVERSITY:	Within operational site boundary

Table 6: Nature-based performance overview table for White Hill Wind Farm

IMPACT TYPE	CONDITIONS MET	NATURE-BASED PERFORMANCE		
		NO-NET LOSS	NET-LOSS	DATA DEFICIENT
Avifauna	✓	✓		

✓ *Meets condition of consent* ✓ *No net-loss is achieved* ✓ *Net-positive impacts observed* ✗ *Net-loss observed*

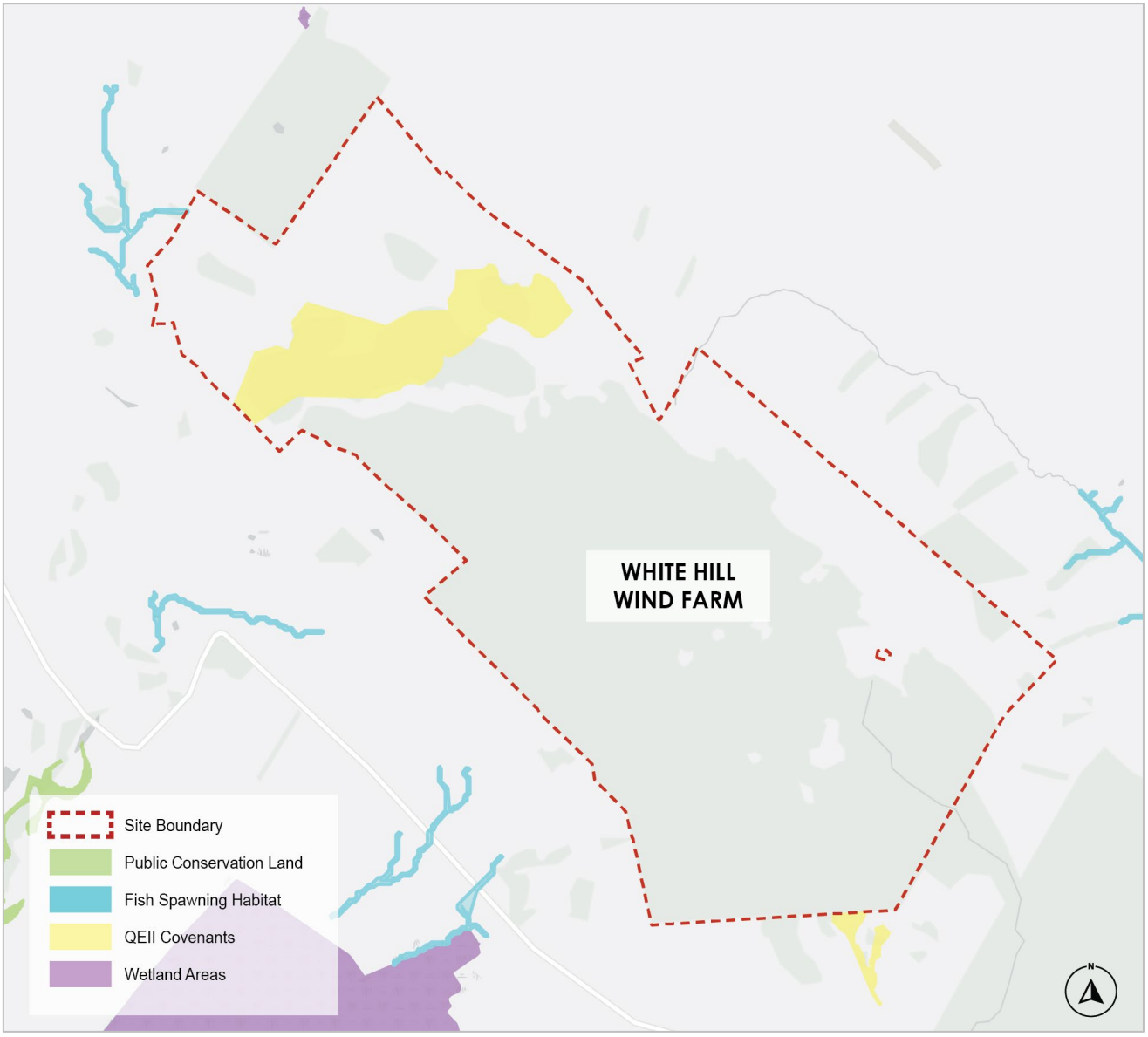


Figure 10: White Hill Wind Farm with known biodiversity areas of importance shown.

8.2 INTERFACE WITH NATURE

White Hill Wind Farm, located near Mossburn and Lumsden in Southland, consists of 29 turbines that can generate up to 58 megawatts of renewable electricity. With an area of 2,258-ha, the operational site is dominated by Douglas Fir plantation forestry. The remainder of the site (namely the north-western area) consists of red tussock grassland, with pockets of grey shrublands and small areas of silver beech remnants.

The tussock grassland area of White Hill had been recognised as a Recommended Area for Protection in the Taringatura Ecological District and subsequently protected under QEII National Trust Covenant. To the south of the operational site, approximately 2 km away, Castle Downs Wetland and Reserve is a protected area administered by DOC.

The streams found within the operational site are generally ephemeral and likely contain only a few fish species. Although upland bully may be present in the more permanent flowing stream areas on the site. To avoid and minimise any sediment runoff into waterways during construction of the wind farm, almost all roads, turbine platforms, and deposit sites were located in the upper reaches of gullies some distance from the streams. Assessment of ecological effects considered the potential construction effects to be no more than minor.

8.3 NATURE IMPACTS AND DEPENDENCIES

8.3.1 AVIFAUNA

Consent conditions required the recording and reporting of any bird strikes.[17] There is no reporting of any bird strikes during the wind farms operation.

Conditions also required the monitoring of Falcon populations before and after the wind farm construction.[18] White Hill Wind Farm Falcon Monitoring conducted between 2005-17 found that two pairs of falcons were recorded using the White Hill site prior to any wind farm developments. Two pairs continued to use the site during construction and for seven of the following eight years. Both pairs evidently courted, mated, defended and foraged from their nest territory, with a pair successfully raising a fledgling to adulthood in four of the nine years monitored. The monitoring strongly suggested that the fledglings successfully fed independently around the wind farm site and then left the site to find new territory, as would be expected (Boffa Miskell Ltd. 2017). Accordingly, the White Hill Wind Farm is considered to generate no net-loss to avifauna.

[17] Condition 11, Resource Consent 04/282

[18] Condition 12, Resource Consent 04/282

9.0 HARAPAKI WIND FARM

LOCATION:	Hawkes Bay
TYPE:	Onshore Wind Farm
FORM:	41 wind turbines
CONSENTED:	2019
COMMISSIONED:	2024
OPERATIONAL AREA:	1,238 ha
PROXIMITY TO CRITICAL BIODIVERSITY:	Within operational site boundary

Table 7: Nature-based performance overview table for Harapaki Wind Farm

IMPACT TYPE	CONDITIONS MET	NATURE-BASED PERFORMANCE		
		NO-NET LOSS	NET-LOSS	DATA DEFICIENT
Avifauna	✓	✓		
Wetlands	-			✗

✓ *Meets condition of consent* ✓ *No net-loss is achieved* ✓ *Net-positive impacts observed* ✗ *Net-loss observed*

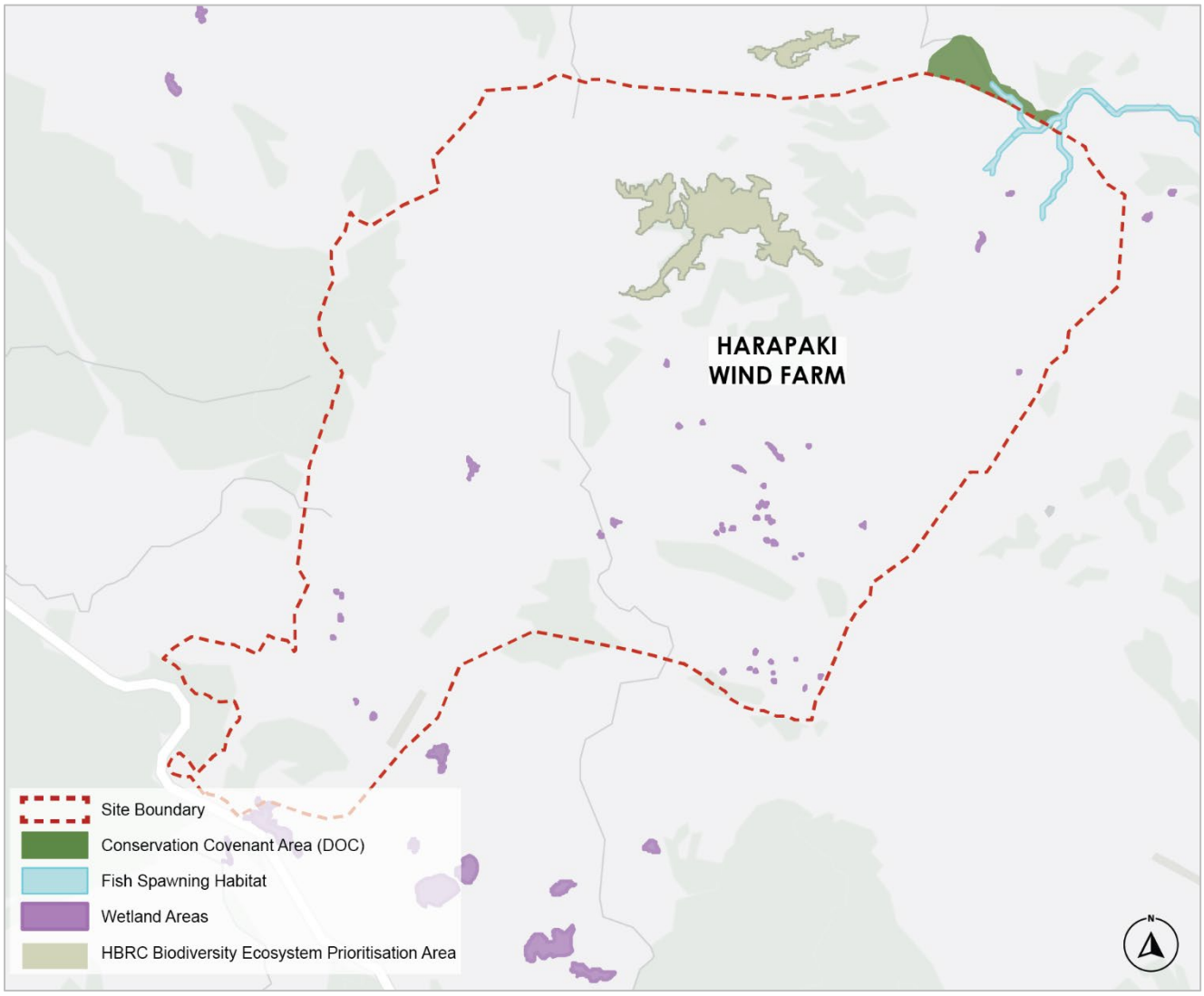


Figure 11: Harapaki Wind Farm with known biodiversity areas of importance shown.

9.1 INTERFACE WITH NATURE

Harapaki Wind Farm is New Zealand's second largest wind farm, consisting of 41 turbines, capable of generating 176 megawatts of renewable electricity. The 1,238-ha operational site is located within the Maungaharuru Range, in the Hawkes Bay, northwest of Napier.

Located within the Maungaharuru Ecological District, the sites landscape is predominantly improved pasture, with grazing occurring for several decades prior to constructions. The site does contain areas of remnant indigenous vegetation and habitat, comprising of a mix of Rimu, Broadleaf, Manuka, and indigenous scrub species. One of the most significant remnant areas of indigenous vegetation is identified by Hawkes Bay Regional Council as a Biodiversity-Ecosystem Prioritisation Area.

Numerous wetlands have been identified across the operational site in line with National Policy Statement for Freshwater Management (NPS-FM) and the National Environmental Standards for Freshwater (NES-F). The areas surveyed (and those similar in the wider landscape) are small, modified wetland features which have opportunistically been colonised by common wetland species and do not represent an indigenous representative wetland.

Rimu Station Conservation Covenant Area boarders the northern extent of the Harapaki operational site. Approximately 1 km northeast of the operational site is the Poutiri Ao ō Tāne, Predator Free Hawkes Bay project. Begun in 2011, the project aims to support native species to return to and flourish within the Maungaharuru-Tūtira catchment. One of many project highlights has been successfully reintroducing kōrure/mottled petrel and tītī/Cook's petrel to the most inland site in the world, enabled through extensive predator control across the catchment.[19]

9.2 NATURE IMPACTS AND DEPENDENCIES

9.2.1 AVIFAUNA

Under consent conditions, Meridian is required to undertake a baseline survey covering three seasons prior to construction and then monitor key populations of wildlife during construction and after the wind farm is completed for a further three years.[20]

Initial avifauna baseline monitoring in 2007 identified NZ falcon and kereru as the two species requiring ongoing monitoring. Records suggested that at least one and perhaps two pairs of bush falcon utilise the site. Movement of birds strongly related to the limestone escarpments and forest remnants. Following the baseline survey, Meridian optimised the wind farm layout, turbine numbers, and turbine models. Throughout this process, ecological assessments were conducted to determine the potential effects of a revised design. Overall, the final wind farm layout resulted in a 55% reduction in number of turbines distributed across the sites, along with the movement of some remaining turbines. This has been assessed as having had a positive ecological outcome.

During the three-year period of construction bird monitoring, a diversity of native species was observed, including, falcon / karearea and kereru. In general, native bird abundances were low. This low abundance reflects the limited habitat availability for native species on site. The observations of a number of falcon / karearea and kereru suggest that construction works have not resulted in these species being displaced from site. A further three years post-construction monitoring is now required along with bird strike reporting to ensure operation of Harapaki Wind Farm continues to achieve no-net loss for avifauna values.

[19] Poutiri Ao ō Tāne | Predator Free Hawke's Bay

[20] Condition 23 & 25,RMA20190211, RMA20190212

9.2.2 WETLANDS

As part of the construction of Harapaki Wind Farm, Meridian is consented to undertake the removal of 'natural wetland' features to accommodate the construction of the wind farm and its associated roading, when avoidance is not possible. However, the values and the magnitude of the effect this results in a very low level of ecological effect and can be termed "less than minor". An opportunity to construct a wetland was identified to account for any natural wetland effects during construction, not because the value and extent of the natural wetlands affected require such an approach, but because of Meridian's commitment to pursue a "no net loss of biodiversity" approach. As reflected in consent conditions, Meridian is required to construct a wetland at the windfarm site, with an area of no less than 900m^2 and comprised of appropriate endemic and indigenous wetland species.[21]

The area identified for wetland construction is approximately 965m^2 located directly south-east of the wind farm substation. Prior to restoration, the area was dominated by improved pasture, grazed for several decades prior, with *juncus edgariae* spread throughout. The prosed wetland creation area is considered to have Negligible ecological value - it is not representative of the historic state of the area or of a natural indigenous narrow gully wetland, and its function within the context of the landscape currently provides little ecological benefit.

The restoration plan detailed in the Harapaki Biodiversity Offset Management Plan (BOMP) used four indigenous community types – Raupō, Reedland, Sedgeland, and Kahikatea. It is noted that, whilst the wetland was constructed, the wetland design had been modified and subsequently damaged since establishment. Following an inspection of the site in October 2024 by Hawkes Bay Regional Council, a suitably qualified and experienced ecologist conducted a site assessment in March 2025. Further work is now required to update and revise the BOMP wetland design to accommodate some practical changes to the layout, include further planting specifications for dry areas, and requirements for infill planting of the rest of the feature where needed. It will also be recommended that further ongoing maintenance is done as some plants would benefit from releasing/ mulching. A lack of initial maintenance of the site may be the reason for the absence of woody plant specimens within the area. Until further wetland restoration and maintenance work is completed, the no net-loss or net-positive impacts performance of constructed wetland is unable to be considered.

[21] Condition 21, AUTH-127352-01, AUTH-127449-01 and AUTH-127450-01

10.0 INTERFACE WITH NATURE OVERVIEW

Table 8: Meridian Wind Farm sites interface with known biodiversity areas of importance as of April 2025

Site Proximity		Fish Habitat	Wetland Area	Covenant Area	Conservation Area	Significant Natural Area
WEST WIND	*Within Site Boundary*	✓	✓	✓	✓	✓
	Within 2km of Boundary	✓	✓	✓	✓	✓
BROOKLYN	*Within Site Boundary*	-	-	-	-	✓
	Within 2km of Boundary	✓	-	✓	-	✓
MILL CREEK	*Within Site Boundary*	✓	-	-	-	✓
	Within 2km of Boundary	✓	✓	✓	✓	✓
TE ĀPITI	*Within Site Boundary*	-	-	✓	-	-
	Within 2km of Boundary	✓	✓	✓	✓	-
TE UKU	*Within Site Boundary*	-	-	-	-	-
	Within 2km of Boundary	✓	✓	✓	✓	-
WHITE HILL	*Within Site Boundary*	-	-	✓	-	-
	Within 2km of Boundary	✓	✓	✓	✓	-
HARAPAKI	*Within Site Boundary*	✓	✓	-	-	✓
	Within 2km of Boundary	✓	✓	✓	✓	✓

11.0 OUTCOMES SUMMARY

Table 9: Overview of Meridian Energy Wind Farm nature-based performance

	IMPACT TYPE	CONDITIONS MET	NATURE-BASED PERFORMANCE		
			NO-NET LOSS	NET-LOSS	DATA DEFICIENT
WEST WIND	Avifauna	✓	✓		
	Invasive weed species	✓	✓		
	Fish passage & stream health	✓	✓		
	Landscape restoration partnerships	-	✓		
BROOKLYN	Avifauna	✓	✓		
	Native vegetation	✓	✓		
MILL CREEK	Avifauna	✓	✓		
	Native vegetation	✓	✓		
	Fish passage & stream health	✓	✓		
TE ĀPITI	Avifauna	✓	✓		
	Fish passage	✓	✓		
TE UKU	Avifauna	✓	✓		
	Stream health	✓	✓		
WHITE HILL	Avifauna	✓	✓		
HARAPAKI	Avifauna	✓	✓		
	Wetlands	-			✗

Appendix: Management Plans

1.0 Biodiversity Management Plans

This section contains information about the biodiversity management plans delivered by Meridian Energy Limited for all seven wind farm sites, which all contain or operate in close proximity to critical biodiversity. Required under resource consent conditions, the management plans listed detail the programs in place to protect and restore threatened species and habitats potentially impacted by wind farm operations.

Table 5: Biodiversity Management Plans for Meridian Energy Wind Farm sites

FOCUS	MANAGEMENT PLAN ACTIONS	REFERENCE
	WEST WIND FARM	
Avifauna Management Plan	• Undertake a baseline avifauna survey covering four seasons (of the year) prior to construction. The baseline survey shall be completed to assist in detailed design of West Wind. • Monitor key populations of avifauna (including but not limited to species such as falcon, kaka, kereru and bat) during construction and for a further three years after the wind farm is completed. • Record and report any evidence of bird and bat strikes. Should a bird or bat species that is normally critical, nationally endangered, nationally vulnerable or in serious decline as listed in New Zealand Threat Classification System be found injured or dead at the site, the Department of Conservation (DOC) is to be notified immediately, and the bird or bat provided to the DOC or its nominated agent for autopsy or rehabilitation.	Resource Consent W059 2007 (131428) Condition 44, 45, 46
Vegetation Management Plan	• A Site Environment Management Plan will be followed for all revegetation and rehabilitation activities including: ○ identification of soil resources to be used for rehabilitation; ○ identification of the vegetation types to be used on a plan or schedule; ○ identification of a 35ha area, to be fenced with a stock proof fence, and details of reasonable measures to be taken to remove plant and animal pests; ○ the control of goats; ○ a programme for revegetation and maintenance activities; ○ the desired percentage of surface cover to be achieved to reduce the adverse effects from sediment-laden stormwater run-off; ○ identification of weed management activities to be undertaken; and ○ identification of treatments of exposed rock cuttings that are to be used.	Resource Consent W059 2007 (131428) Condition 53

Fish Passage & Stream Health Management Plan	• Prepare and implement a monitoring plan for the Oteranga or Ohau Stream and tributaries to assess the effects of the stream modifications and structures from the wind farm construction and operation.
	• Implement a monitoring plan for baseline monitoring of streams. Monitoring parameters and methods shall include:
	  ○ pH
	  ○ temperature
	  ○ turbidity
	  ○ suspended solids
	  ○ dissolved oxygen
	  ○ fish surveys
	  ○ macroinvertebrate community index (MCI) calculations.
		Resource Consent WGN 060001 (24564, 24565 & 24566)
		Condition 8, 11

BROOKLYN WIND TURBINE		
Avifauna Management Plan	• Record and report any evidence of bird strikes. Should a bird species that is nationally endangered, nationally vulnerable or in serious decline be found injured or dead at the site the Department of Conservation is to be notified immediately, and the bird provided for autopsy or rehabilitation. Note, over the course of the avifauna monitoring, no avifauna carcasses (or other sign of mortalities) were found during the searches around the platform of the existing BWT. Nor were any birds observed colliding with the turbine during the monitoring.	Resource consent 295035 Condition 16
Vegetation Management Plan	• The Wind Turbine Site is to be landscaped, prior to the operation of the turbine, in accordance with the landscape plan submitted to and approved by the Compliance Monitoring Officer, in conjunction with the Reserves Planner. The landscape planting once established shall be maintained in good condition, to the original specifications set out in the landscape plan.	Resource consent 295035 Condition 6
MILL CREEK WIND FARM		
Avifauna Management Plan	• Record and report any evidence of bird and bat strikes. Should a bird or bat species that is normally critical, nationally endangered, nationally vulnerable or in serious decline as listed in New Zealand Threat Classification System be found injured or dead at the site, the Department of Conservation (DOC) is to be notified immediately, and the bird or bat provided to the DOC or its nominated agent for autopsy or rehabilitation.	Resource Consent 176538 Condition 39

Vegetation Management Plan	• The plant species used in rehabilitation shall be consistent with the species in the immediate vicinity of the exposed area, replacing 'like with like'. The re-vegetation and rehabilitation of exposed areas shall be in accordance with the requirements of the relevant Environmental Management Plan. • Ensure that the plants and seeds for any indigenous revegetation work carried out in regard to the proposed development shall be eco-sourced, and where practicable, this shall be from within the wind farm site. • Ensure that any area exposed by earthworks are re-grassed or as soon as practicable	Resource Consent 176538 Condition 38

Fish Passage Management Plan	• Prior to undertaking any works authorised by this consent, the consent holder shall engage an appropriately qualified ecologist to determine which tributaries of the Ohariu Stream, where works authorised under this consent are to be carried out, would benefit from fish passage being provided.
	• If any fish are stranded due wind farm construction works, Meridian shall ensure that these are placed back in the active flowing part of the channel as soon as practicable.
	• Ensure that fish passage is maintained during, and on completion of, the construction works.
	• Engage an appropriately qualified ecologist to undertake the following:
	  ○ an inspection of the culverts one year after instalment; and
	  ○ an inspection of the culverts four years after instalment; and
	  ○ if fish passage is found to be restricted during the inspection, inspections shall be continued to be undertaken annually until the ecologist is satisfied that fish passage is continually being provided for.
	• Remediate two existing perched culverts within a tributary of the Hawkins Stream to enable fish passage throughout the culvert structures. This may include, but not be limited to, undertaking the following works:
	  ○ installing fish ramps; and/or
	  ○ removing and re-embedding the existing culvert or a new culvert structure to an appropriate grade and depth below the stream bed.
		Land use consent 26777, 27383, 26848, 31846

Stream Health Management Plan	• Register a covenant in favour of Wellington Regional Council for the purpose of enhancing the ecological values of the Makara Stream and Estuary, by undertaking riparian planting. The covenant shall relate to 5. 79 hectares of land contained within Certificate of Title WN7D/340 (Lot 1 DP 30935). As a part of enhancing this land Meridian intends to consult with stakeholders who are interested in improving the ecological values along the Makara Stream and Estuary. Mitigation planting shall be carried out in general accordance with Greater Wellington's Mind the Stream - A guide to looking after urban and rural streams in the Wellington Region 2004.	Land use consent 27383, 27384, 27386 and 27387, 27388, Discharge permit 27385,

	• Prepare a Baseline Aquatic Monitoring Plan and provide a Baseline Aquatic Monitoring Plan Report ("the BAM PR") by an appropriately qualified and experienced ecologist. • Prepare a Construction Aquatic Monitoring Plan and provide a quarterly Construction Aquatic Monitoring Report ("the CAMR") prepared and submitted by a suitably qualified, experienced and independent ecologist. • Engage an appropriately qualified and experienced estuarine ecologist to prepare and submit a Makara Estuary Baseline and Construction Monitoring Plan ("the MEBCMP")	Resource Consent WGN080368[31846]
TE APITI WIND FARM		
Avifauna Management Plan	• Record and report any evidence of bird and bat strikes. Should a bird or bat species that is normally critical, nationally endangered, nationally vulnerable or in serious decline as listed in New Zealand Threat Classification System be found injured or dead at the site, the Department of Conservation (DOC) is to be notified immediately, and the bird or bat provided to the DOC or its nominated agent for autopsy or rehabilitation	Resource Consent 01-0800 Condition 13
Fish Passage Management Plan	• Ensure that the downstream rock riprap is placed in such a way that there is no drop out of the culvert to ensure fish passage is not impeded, that the works once completed do not result in any barrier to fish passage and that existing fish passage is provided for at the site. Note, since construction, this area has been significantly modified by the NZTA highway project, with the former material storage area now used by the highway project team. Relating to the stream alterations Meridian had conducted, the NZTA project has designed the upstream culverts from the highway was such that they do not allow for fish passage so as not to trap and isolate anything which could migrate up. The outlet from the dam is into a stream diversion was created for the highway project. This diversion was designed with fish passage in mind and includes the strategic placement of rocks and logs to create low flow zones to enable fish passage within the effected stream	Resource Consent 103022 Condition 14
TE UKU WIND FARM		
Avifauna Management Plan	• Prepare and submit to the Waikato District Council Environmental Services Group Manager for approval, an Ecological Management Plan. • Population and strike monitoring programmes: Meridian shall develop and commence population and strike monitoring programmes for the wind farm site. The monitoring programmes shall be designed, and implementation supervised by, a suitably qualified ecological expert • Any trees to be removed shall first be inspected by a suitably qualified person to determine whether they hold active Bat roosts (nests). No trees with active Bat roosts (nests) shall be removed until nests are confirmed vacant by the suitably qualified person.	Resource consent LUC0252/06 Condition 6.1, 6.2, 6.3, 6.4, 6.5, 6.6, 6.7

	• Strike monitoring programmes: The strike monitoring programmes shall be designed, and implementation supervised by, a suitably qualified ecological expert.
	• During the third month after the commencement of any avifauna monitoring and quarterly thereafter for three years from the wind farm being operational, Meridian shall prepare and a report setting out:
	  ○ The monitoring records for the previous three months.
	  ○ The specific outcomes of the monitoring completed; and
	  ○ A summary of the monitoring tasks proposed for the following three months.	

Stream Health Management Plan	• In-stream health monitoring shall be designed, and implementation supervised by, a suitably qualified ecological expert. Note, Overall, there do not appear to have been any more than minor adverse effects on the freshwater environment as a result of the Te Uku Wind Farm Development. Actions taken to reduce stock access to stream edges appear to be having a positive impact at some sites. The results of all Te Uku TSS and turbidity monitoring indicate that all relevant Waikato Regional Council consent conditions were met. Additionally, 40,000 native plants were planted in two wetland areas on Te Uku wind farm to help improve downstream water quality.	Schedule One of 116241, 116242, 116689, 116690
WHITE HILL WIND FARM		
Avifauna Management Plan	• Record and report any evidence of bird strikes. Should a bird species that is nationally critical, nationally endangered, nationally vulnerable or in serious decline be found injured or dead at the site, the Department of Conservation is to be notified immediately, and the bird provided for autopsy or rehabilitation. • Undertake monitoring of Falcon populations at the wind farm site before and after the wind farm construction. The methodology used shall include a baseline survey to establish the current Falcon population and behaviour. The monitoring shall be reviewed after three years. If the monitoring shows the turbines are having no effects on fledging success, or Falcons are not using the site, then monitoring can cease on written notice from the applicant to Council	Resource consent 04/282 Condition 11, 12
HARAPAKI WIND FARM		
Avifauna Management Plan	• Undertake a baseline survey covering three seasons prior to construction and shall then monitor key populations of wildlife during construction and after the wind farm is completed for a further three years. ○ An initial baseline survey shall determine the range of wildlife species, both bird, bat and invertebrate, that require ongoing monitoring during and after construction.	Resource Consent RMA20190211 RMA20190212 Condition 23, 25

	○ If the surveys indicate that significant adverse effects may be caused by construction or operation of the wind farm or any individual turbine, the consent holder shall report on reasonable methods to avoid or minimise those effects. Possible measures may include protection and enhancement of habitat, or the provision of physical setback ○ Monitoring of effects on indigenous fauna shall include the three-year period immediately after the wind farm becomes fully commissioned. • Should a bird species listed in the Department of Conservation's most current threat classification system as Threatened or At Risk at the time of the post-construction monitoring be found injured or dead at the site, the Director General of Conservation and the Hastings District Council is to be notified immediately and the bird provided to the Director General of Conservation or its nominated agent for autopsy or rehabilitation.	
Freshwater Management Plan	• Prepare a monitoring and maintenance plan of the structure that is sufficient to ensure that its provision for the passage of fish does not reduce over its lifetime. The plan for that monitoring and maintenance shall include: ○ how the monitoring and maintenance will be done, ○ the steps to be taken to avoid any adverse effects on the passage of fish; ○ the steps to be taken to ensure that the structure's provision for the passage of fish does not reduce over its lifetime. ○ information must be provided every six years for the purposes of reassessing the structure's effect on the passage of fish, or each time a significant natural hazard affects the structure for the life of the windfarm.	Resource Consent - Land Use AUTH-127352-01, AUTH-127449-01 and AUTH-127450-01 Condition 48
Wetland Management Plan	• Provide to a 'Discovery Protocol Guidelines' document created by a suitably qualified and experienced ecologist. This shall include, but is not limited to, descriptions of potential landforms, surface water expanses, vegetation, and wetland formations and features which can be used to assist in the identification of 'potential wetlands' which may be encountered during the roading and associated civil works construction. • Construct a wetland at the windfarm site, with an area of no less than 900 m2 and comprised of appropriate endemic and indigenous wetland species as a means of offsetting the loss of natural wetlands resulting from construction and operation of Harapaki Wind Farm • Develop a Biodiversity Offset Management Plan (BOMP) prepared by a suitably qualified and experienced ecologist. The BOMP should include, but not be limited to: ○ Site plan(s) of the wetland which include: ○ the overall hydrological layout; and,	Resource Consent - Land Use AUTH-127352-01, AUTH-127449-01 and AUTH-127450-01 Condition 12, 21, 23, 24

	○ the location of any necessary structures (see Advice Note VII); and, ○ A vegetation layout plan. ○ An assessment of the existing ecological value of the proposed wetland site, ○ An animal and plant pest management plan for the wetland and its immediate surroundings, ○ A wetland construction plan, including (but not limited to): ○ An overview of the structures to be installed associated with the operation of the wetland, ○ Sediment and erosion controls; and, ○ Best practice guidelines for the construction works. ○ An overview of how the consent holder will provide opportunities for the iwi and hapū represented by Maungaharuru-Tangitū Trust, the iwi and hapū represented by Hineuru Trust, and any other relevant community groups, to be involved in the planning and establishment efforts of the wetland. ○ An overview of the operation, management, and maintenance requirements of the wetland, and a summary of how these requirements will be met for the operational life of the windfarm ○ g) Identification of the person responsible for ensuring the successful operation, management, and maintenance of the wetland. • A suitably qualified and experienced wetland ecologist shall undertake an assessment of plant survival and establishment three years after initial restoration activities in accordance with established ecological restoration practices.	
Vegetation Management Plan	• Exposed areas of soil that may result in sediment entering water must be stabilised using hydroseeding methods. Ground cover shall be established by sowing in a grass/legume seed mix or by other methods, within six months following the completion of the earthwork's activity, and again as needed to establish an erosion resistant ground cover within twelve months of the land disturbance ceasing. • Develop an Operational Management Plan (OEMP) to be implemented by Meridian. All operational wind farm activities shall be undertaken in accordance with the OEMP. The OEMP shall include, but not be limited to: ○ Plant and animal pest management within areas of indigenous vegetation and significant habitats of indigenous fauna. ○ Monitoring of effects on wildlife in accordance with the BOMP	Resource Consent - Land Use AUTH-127352-01, AUTH-127449-01 and AUTH-127450-01 Condition 8, 42

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