Puke Kapo Hau - Mahinerangi Wind Farm Stage 2

Avifauna Management Plan

Prepared for Tararua Wind Power Limited

October 2025

Boffa Miskell

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For any information regarding this report please contact:

Stephen Fuller | Ecology | info@boffamiskell.co.nz

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Cover Photo: Looking from the western side of MWF Stage 2 toward the Lammermoor Ranges. © BML

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1. Introduction

1.1. Project Overview

Tararua Wind Power Limited ("TWP"), a fully owned subsidiary of Mercury NZ Limited, is progressing Stage 2 of the Mahinerangi Wind Farm which is to be known as "Puke Kapo Hau" ("the Project", "Puke Kapo Hau" or "MWF Stage 2"). The MWF is located on the eastern foothills of the Lammermoor Range, situated approximately 5 km north of Lake Mahinerangi and approximately 50 km west of Dunedin.

The consented Wind Farm Site is approximately 1,723ha in area, within which the "Windfarm Development Area" is located and is where all physical works are to occur (See Map 1, page 4).

Resource consents for the MWF were granted by the Environment Court in 2009. Stage 1 of the wind farm is located in the southern western corner of the Wind Farm Site. It was commissioned in 2011 and contains 12 Vestas V90-3MW turbines.

The 2009 conditions recognised that falcon[1] was the primary species of concern. Condition 27 required the consent holder to undertake a monitoring programme to monitor falcon in the vicinity of the MWF for two summers prior to the first turbine becoming operational and for two years after the wind farm is operational. Condition 26 required two years of bird carcass monitoring. Comprehensive surveys of falcon were carried out between 2008 and 2012 when the monitoring was completed (Golder Associates Ltd, 2012). Similarly 2 years of bird strike monitoring was completed (Golder Associates Ltd, 2013).

Tararua Wind Power Ltd (TWP) now wishes to advance Stage 2 of the wind farm and the potential effects on avifauna resulting from Stage 2 were assessed in the Ecological Impact Assessment (EcIA) (Boffa Miskell Ltd, 2025b). As part of the assessment carried out for Stage II, additional site investigations were carried out in January and February 2025. These confirmed that falcon were still present and active across the Windfarm Development Area. It also identified ground nesting of South Island pied oystercatcher (pied oystercatcher) was occurring in parts of the Windfarm Development Area (Boffa Miskell Ltd, 2025b) including within Stage 1.

This Avifauna Management Plan outlines the methods required to address the potential effects on falcon and pied oystercatcher resulting from the construction and operational phases of Stage 2 of the MWF.

Documents that provide information relevant to this management plan include:

- Mahinerangi Wind Farm: Avifauna Assessment (Boffa Miskell Ltd, 2025b).
- Mahinerangi Wind Farm: Pest Animal Management Plan (Boffa Miskell Ltd, 2025a).

1.2. Conditions of Consent

Variation to Land Use Consent RM1409 contains three conditions relating to the management and monitoring of avifauna. Condition 25D requires preparation of an Ecological Monitoring and Management Plan which specifies:

[1] It is noted that the consent conditions reference the New Zealand falcon (falcon). However, it is recognised that there are three forms of the New Zealand falcon (Falco novaeseelandiae novaeseelandiae), each with a different conservation status. At MWF site the relevant form is the Eastern variant which has a conservation status of Threatened - Nationally Vulnerable (Robertson et al., 2021) and regional conservation status of Regionally Vulnerable (Jarvie et al. 2025) .

25D Ecological Monitoring and Management Plan

ii) For Stage 2, the Consent Holder shall ensure that ecological monitoring and management of the Mahinerangi Wind Farm Stage 2 is undertaken in accordance with the requirements of the following Management Plans:

c) Avifauna Management Plan.

Condition 26 details the objectives of the Avifauna Management Plan as follows:

Avifauna

26 The Consent Holder shall ensure that the construction of the Puke Kapo Hau - Mahinerangi Wind Farm Stage 2 is undertaken in accordance with the requirements of the Avifauna Management Plan prepared by Boffa Miskell Limited that forms Part C of the Puke Kapu Hau Mahinerangi Wind Farm Stage 2 – Fast-Track Approvals Act Application dated DD MM 2025 and in accordance with condition 27.

i) The objective of the Puke Kapo Hau - Avifauna Management Plan (AviMP) is to describe the methodological approach to minimise actual or potential adverse effects on falcon and pied oystercatcher resulting from of the construction and operation of the Stage 2 of Mahinerangi Wind Farm.

ii) In order to achieve the objective established in Condition 26 i, as a minimum the AviMP must contain the following details:

a) Pre-construction and construction monitoring measures for falcon and pied oystercatcher including surveys and timing, necessary construction buffers and reporting requirements; and

b) Operational monitoring of falcon, including surveys, GPS tracking and reporting requirements.

Advice Note:

With respect to mitigation/predator control to support falcon and pied oystercatcher, the Mammalian Pest Control Plan identifies the areas/habitat to be targeted, target pest species, types of control tools and timings for control methods. Refer to conditions 28 and 28A.

Condition 27 details the requirements of Falcon Monitoring as follows:

27. The consent holder shall undertake monitoring of the New Zealand Falcon for Stage 1 and 2 as follows:

i) The consent holder shall initiate a programme to monitor New Zealand Falcon, in the vicinity of the Mahinerangi Wind Farm. The monitoring programme shall commence

at least two summers prior to the first turbines associated with Stage 1 of the wind farm becoming operational, and, for Stage 2 the summer prior to construction commencing, and continue for two years after each stage becomes operational. Any subsequent monitoring will be determined after the results of the first two years of operational monitoring are evaluated.

***Advice Note**:*

Some monitoring in accordance with this condition has been undertaken prior to the implementation of this resource consent.

ii) The monitoring programme for each stage shall include, but not be limited to, the following:

a) Identification of any New Zealand Falcon nesting sites inside and within 3 km outside the boundaries of the Mahinerangi Wind Farm.

b) Monitoring, during the breeding season (i.e., spring and early summer), any visits by New Zealand Falcon to the Mahinerangi Wind Farm site and the occupancy of the identified nesting sites. As a minimum, monitoring shall be undertaken during three consecutive days of fine conditions, at least three times throughout the breeding season.

c) A record of New Zealand Falcon bird strike as monitored in accordance with Condition 27, attached to this resource consent.

d) A record of all incidental observations of New Zealand Falcon within the Mahinerangi Wind Farm site.

Advice Note:

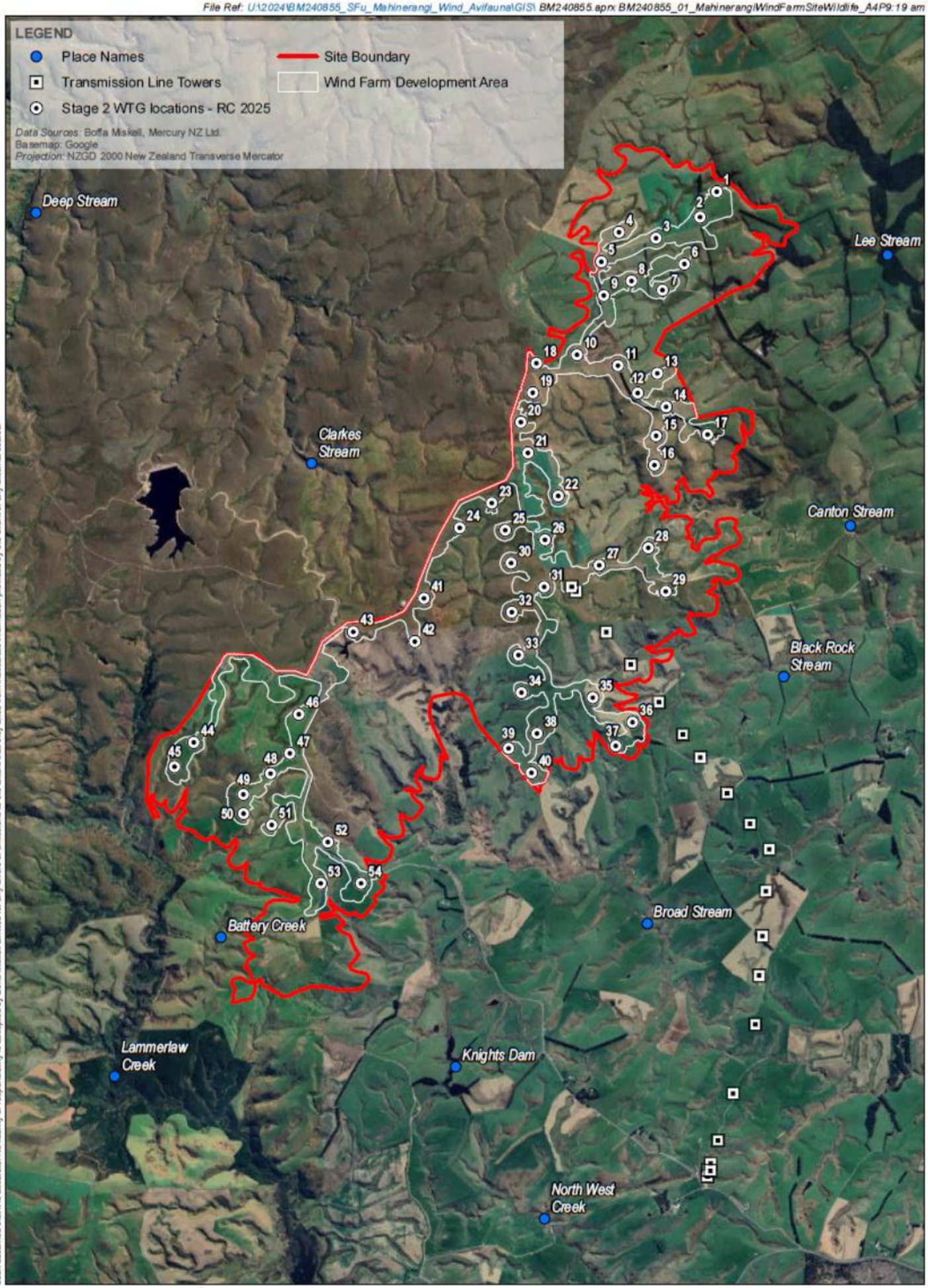
For Stage 2, the falcon monitoring programme shall include, but not necessarily be limited to, relevant matters identified in the Avifauna Management Plan, that forms Part C of the Mahinerangi Wind Farm Stage 2 – Fast-track Approvals Act Application dated DD MM 2025.

Condition 28 details the requirements for mammal pest control for the protection of nest sites within the Site. This is detailed in the Mammalian Pest Control Plan (Boffa Miskell Ltd, 2025a).

Finally, Condition 25D contains a requirement for vehicle movement as follows:

(b) A requirement that all contractors shall be required to ensure that all vehicles shall, as far as is practicable, be confined to formed access routes and the active construction zone (see Condition 25E(vi)).

This is relevant to ground nesting birds.



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MAHINERANGI WIND FARM

The Mahinerangi Wind Farm Site

Date: 01 October 2025 | Revision: 0

Plan prepared for Mercury NZ Limited by Boffa Miskell Limited

Project Manager: [redacted] | Drawn: LJa | Checked: SFu

Map 1

1.3. Eastern Falcon at Mahinerangi

The eastern variant of the falcon has a conservation status of Threatened - Nationally Vulnerable and a regional conservation status of Regionally Vulnerable (Jarvie et al. 2025). Historically up to 5 pairs have occupied territories which overlap the MWF site.

These falcon were monitored within and adjacent to MWF for six consecutive breeding seasons starting with pre-construction surveys in 2006/2007, 2007/2008 and 2008/2009, followed by construction surveys in 2009/2010 and 2010/2011, and then surveys in the 2011/2012 breeding season post commissioning of the windfarm. During these surveys, the number of pairs observed ranged between one pair (2006/2007) and five pairs (2011/2012). The monitoring included nest searches within 5 km of MWF, assessing breeding success for all known pairs, and the fitting of radio transmitters and radio tracking of four falcon between 24 January and 24 April 2012.

Falcon territories and nest site locations from surveys between 2006 and 2012 and then observations from surveys over two weeks in January and February 2025 provide useful context to guide monitoring required as part of Stage 2 of MWF and detail on these surveys findings is provided in Appendix B and C.

1.4. Pied Oystercatcher at Mahinerangi

The South Island Pied Oystercatcher (pied oystercatcher) has a conservation status of At Risk - Declining and a regional conservation status of Regionally Vulnerable (Jarvie et al. 2025). Small numbers of these birds breed within both the operational Stage 1 Mahinerangi windfarm, and within the Stage 2 Windfarm Development Area.

In farmland their preference is to nest on bare earth and areas of gravels and excavated ground, more so than in pasture. For this reason pied oystercatcher are seen nesting on the stony margins of roads and tracks, and in paddocks recently ploughed for crops. Construction activities that create areas of fresh earth can be attractive to breeding pairs looking for nest sites.

The majority of pied oystercatcher nesting activity occurs in September, October and November. Once hatched, chicks are independent and can feed themselves within 1 to 2 days and nest protection can be relaxed at this point. Protection of the chicks continues by both parents until their flight feathers are grown, and they are fledged and able to fly (6 weeks). Over this period adults and juveniles walk between foraging sites, and both adults and juveniles can be at risk from vehicles.

2. Predator Control

Introduced mammalian predators are known to be having a significant impact on falcon breeding success throughout New Zealand. Falcon often nest on the ground, which makes them particularly vulnerable to predation (Seaton et al., 2009). The main predators of falcons are hedgehogs, feral cats and mustelids (namely stoats) with possums and rats also being of concern. Of these, stoats are considered one of the most dangerous predators for falcons, as they appear to target offspring from eggs through to independence (Kross et al., 2013; Sanders & Maloney, 2002).

Pest control within Stage 1 of the MWF was implemented as part of Consent Condition 28 and control within Stage 1 will continue and be expanded to include Stage 2 with the details of the areas/habitat to be targeted, target pest species, types of control tools and timings for control all detailed in the Mammalian Pest Management Plan (Boffa Miskell Ltd, 2025a).

3. Construction Monitoring

3.1. Eastern Falcon

3.1.1. Overview of Nest Surveys and Buffers

Falcon are known to be affected by human activity while nesting and rearing chicks, and this disturbance can occur within 200 m of the nest for some activities (Seaton et al., 2009), and up to 500 m away for heavy construction activity (Horikoshi pers.com). This distance will vary based on visibility, terrain, the type of activity, and the degree to which the birds are habituated to existing farm operations. For this reason, ongoing surveys of breeding activity and the location of active nests both within the Windfarm Development Area and up to 500 m from the boundary of the Windfarm Development Area will be carried out each spring during construction by a suitably qualified and permitted raptor ecologist.

If a falcon nest is located which is within the Windfarm Development Area or up to 500 m from the boundary of the Windfarm Development Area, then the raptor ecologist will commence a breeding survey of that nest and provide advice on the need for a nest buffer and the duration that the buffer is required to be in place to ensure protection of the nest and chicks from disturbance. Further detail on the implementation of buffers and their duration are detailed in Section 3.1.4.

3.1.2. Survey Search Effort & Timing

Falcon egg laying typically occurs in October and November followed by incubation (approx. 33 days) and rearing of chicks to fledging (35 to 45 days). If the first nest attempt fails, the pair may attempt to breed again in November/December and a shorter monitoring survey in January will be required if this occurs. Nest surveys will be carried out as follows:

- September – Pre-breeding / courtship / early nesting. A field survey of up to 7 days.
- October and November – Nest surveys / trail cam setup. A field survey of up to 10 days.
- December – Hatching and fledging. A field survey of up to 10 days.
- January – If a pair produces a late nest there may be a requirement to check in January. A survey of up to 5 days.

Ongoing nest monitoring will enable the TWP to be updated as to the ongoing requirement for, and extent of a buffer. Once the falcon chicks have fledged, or the if the nest fails, the specified buffer can be removed, and construction activities that were managed by the nest buffer, can commence within this area.

3.1.3. Nest Survey Methods

Falcon surveys undertaken each spring during the construction period will broadly involve using three methods to locate falcon and potential nest sites that are within the Windfarm Development Area or up to 500 m from the boundary of the Windfarm Development Area, and then the potential installation of a trail camera at identified nest sites to monitor nest success. The application of these methods will be determined by the falcon expert taking into account any potential effects on birds at various stages of the breeding cycle. These surveys will only be undertaken during good weather conditions, when falcons are more active and more easily observed.

If any falcon nests are located, the stage of nesting (i.e. pre-laying, incubation, brooding) will be recorded, along with GPS co-ordinates and a photo. The Site Manager will be notified, and construction activities identified that will cease within the identified nest buffer (see Section 4.1.4) until the chicks have fledged, or the nest has failed at which stage the specified buffer will be removed.

To minimise nest disturbance, surveys using call-playback and trapping will not be conducted during wet weather, cold conditions or strong winds. All call-playback activities and nest searches using the nest flashing method will be limited to a maximum duration of 10 minutes. When active nests are confirmed, they will be observed using binoculars or a spotting scope from a distance that ensures the incubating or brooding birds remain undisturbed.

Broadcasting Surveys

The broadcasting method involves broadcasting recorded falcon territory-defence calls using a portable speaker for 10-20 seconds (call-playback) or a shorter period if a response is detected, followed by observation for 10 to 30 minutes. Falcon calls will be broadcast from an elevated and open location with high visibility of the entire focused area, close to the perimeter of forest and vegetation such as scrub and native grass.

During the survey, observers will listen for the characteristic “kek kek kek,” and whine calls of breeding falcons. Other bird species such as spur-winged plovers and Australian magpies are known to be vocal when falcons are nearby, and large flocks of finches will flush into the air when attacked. These signs of potential falcon activity will also be closely monitored. If a falcon responds, the observers will attempt to track the falcon to establish if the falcon is nesting.

Stationary Observation Surveys

The stationary observation method will be used when a falcon is not detected by broadcasting call-playback in areas identified as suitable falcon breeding habitats. Not all territorial falcons respond to call-playback, as it largely depends on individuals and their breeding phases (Horikoshi, personal observations). Success in detecting falcon by call-playback is particularly low during the incubation phase when a member of a pair is away, and an incubating individual remains at its nest (Horikoshi, personal observations). The stationary observation approach involves searching for falcon from a high-visibility location, using either sight or sound, with observation periods ranging from 30 minutes to several hours. If a falcon responds, the observers will attempt to track the falcon to establish if the falcon is nesting.

Nest Flashing

The nest flashing method may be used alongside the call playback or the stationary observation methods. This technique involves walking around a potential falcon breeding site while making noise, such as clapping or vocalizing, to encourage nesting falcon to reveal themselves. If a falcon responds, the observers will attempt to track the falcon to establish if the falcon is nesting.

Trail Cameras for Nest Monitoring

For any active falcon nest that is located an attempt will be made to monitor the nest using a motion activated trail camera. A single camera will be installed at each nest for the duration of the nesting period. Any attempt to install a nest camera will take account of the safety of the field team and potential disturbance to the nest falcon.

Trail cameras will be positioned at least 2.5 - 5 m from the nest to ensure a clear view of the nest and its contents, to limit the disturbance to nesting falcon and chicks, and to record any mammalian predators approaching the nest-scrape area. The cameras will provide information on when eggs are laid, chicks are hatched, chicks fledge and if adults are returning to the nest to feed chicks. The cameras will also monitor whether any nest mortality occurs and to determine if this was a result of nest predation. All this information will be recorded and logged, and each nest location will be given a unique identifier and mapped.

The batteries in the cameras will be changed fortnightly (or as required) and will be conducted when adult falcon are not present at the nest. If the SD cards are full, they will also be changed when the batteries are changed. Upon each collection of the SD cards, the trail camera footage will be analysed by a suitably qualified ecologist.

3.1.4. Establishing a Nest Buffer

If an active falcon nest is identified during construction which is located within the Windfarm Development Area or up to 500 m from the boundary of the Windfarm Development Area, then the raptor ecologist will determine the required extent of a nest buffer. This will take into account terrain, visibility, the type of activity likely to be carried out within 500 m of the nest, and the degree to which the birds are already habituated to existing farm operations. The size of the nest buffer will be no less than 200 m and potentially up to 500 m from the nest site to the area of activity.

The raptor ecologist will also determine the duration that the nest buffer will remain in effect based on the stage of breeding of each pair, noting that the key period of concern is the period from the commencement of egg laying through to fledging, a period of approximately 70 to 80 days from commencement of laying. The nest location and the size of the buffer will be recorded with GPS co-ordinates and a map and the details provided to the Site Manager.

A nest buffer is not required for vehicle movements on operational farm tracks, internal roading completed outside the breeding season, or the public Eldorado Track. If nesting occurs in close proximity to these tracks the nest has been established in an area of existing traffic, and it can be assumed that the birds are habituated to that activity.

3.2. Pied Oystercatcher

3.2.1. Overview

Small numbers of pied oystercatcher have been recorded nesting within the MWF Site including within the Stage 1 windfarm area. Pied oystercatcher begin prospecting for potential nest sites in August and September and the bulk of nesting activity occurs between September to November. Most juveniles will have fledged by December, and then by the end of January breeding is complete and the birds migrate north.

Disturbance of pied oystercatcher breeding and the risk to fledglings from being struck by vehicles (Sagar et al., 2000, 2002) are considered to be the main risks to this species from the development of MWF Stage 2. Minimising these risks requires monitoring and potentially several management measures to be implemented from the commencement of construction during the pied oystercatcher breeding season. These measures are discussed in Section 3.2.2 below.

If, despite site management, a pied oystercatcher nest is located which is within the Windfarm Development Area or up to 20 m from the boundary of the Windfarm Development Area, then the Project Ecologist will implement several measures to protect the nest including establishing nest

buffers to protect of the nest from disturbance. These nest protection measures are discussed in Section 3.2.3.

3.2.2. Proactive Management Measures and Timing

Pied oystercatcher often prospect and set up breeding territories before or during the early stages of the earthworks season (August and early September) and this is the key period to implement proactive management measures to deter pied oystercatcher breeding within the Windfarm Development Area. There is a short window of time to implement these management measures and the earlier the birds are detected, the more options are available and the better the chance of deterrence. Typical pied oystercatcher prospecting behaviour includes pairs exhibiting aggressive postures with their head back or forward, vocalising, as well as chasing other birds from an area.

Relevant to the management of pied oystercatcher, useful guidance on management measures for deterring nesting by another species of shorebird (northern New Zealand dotterel) and has been developed by NZTA with input from the Department of Conservation and Auckland Regional Council (Bannock 2012).[2] The NZTA Guidance outlines measures which enable work to progress without adversely affecting ground nesting dotterel. The NZTA Guidance has informed the measures outlined in this management plan.

Potential management methods to deter pied oystercatcher establishing breeding territories within the Stage 2 Windfarm Development Area include:

- Driving through the site regularly with an ATV, if prospecting pied oystercatcher are observed the ATV driver will stop the ATV and approach the pied oystercatcher on foot encouraging them to move away and only creating a low level of disturbance.
- Walking dogs on a leash during daylight hours through the Stage 2 Windfarm Development Area at the time when pied oystercatcher are first arriving to MWF and prospecting nest sites to create a low level of disturbance.
- Allow grass to grow long within the Stage 2 Windfarm Development Area to reduce sight lines for pied oystercatcher (limits their ability to spot predators and danger at distance) which lowers the value of the area as a suitable nesting location.
- Constructing lines of silt fencing in areas where pied oystercatcher are observed prospecting. This reduces sight lines and lowers the value of the area as a suitable nesting location.

It is expected that non-ecological staff will be used to carry out these deterrence activities. If this is the case, all staff involved in these activities will be trained by the project ecologist/ornithologists, the training to include minimising stress to the birds of the proposed activities. The NZTA Guidance (Bannock 2012) will form the basis of this training.

Monitoring will be initially supervised by the project ecologist/ornithologist until such time as they are confident in the project teams capabilities in undertaking the deterrent activities. Survey Search Effort & Timing

The bulk of pied oystercatcher nesting activity occurs between September to November, and this is the key period to undertake nest surveys and for nest buffers to be implemented. Pied oystercatcher surveys will be undertaken each year over this period during the construction period. Surveys will involve the Project Ecologist driving across the Stage 2 Windfarm Development Area one day per week. The aim of the surveys is to observe pied oystercatcher and locate any active pied oystercatcher

[2] Guidance in Relation to New Zealand Dotterels on NZTA Land (New Zealand Transport Agency, 2012).

nest sites that are within the Stage 2 Windfarm Development Area or up to 20 m from the boundary of the Stage 2 Windfarm Development Area.

Ongoing nest monitoring will enable the Site Manager to be updated as to the ongoing requirement for a buffer. As soon as the pied oystercatcher nest has been deserted (i.e. the chick has fledged), or if the nest fails, the specified buffer can be removed, and works can commence within this area.

3.2.3. Establishing a Nest Buffer

If a pied oystercatcher nest is located within the Stage 2 Windfarm Development Area or up to 20 m from the boundary of the Stage 2 Windfarm Development Area during the construction period, then the following actions will be taken:

- The nest location will be recorded by GPS and a photo taken to help identify the exact location,
- The Site Manager will be notified of the nest location,
- A 20 m buffer will be established around the nest site. The buffer is to be maintained until the chick has hatched and left the nest, typically 24-28 days from laying.

Nests adjacent to existing roads and farm access tracks

A nest buffer is not required for vehicle movements over existing operational farm tracks, internal roading completed outside the breeding season, or the public Eldorado Track. If nesting occurs near to these tracks the nest will have been established in an area of existing traffic, and the birds will be habituated to that activity.

However, where an active nest site is located the following is still required:

- Static signage will still be installed (no flags or tape) to ensure the nest is visible to construction crew and so can be avoided.
- Stopping and exiting vehicles at or near the identified nest sites will be restricted, and
- Vehicles will be confined to formed tracks as far as practicable, as already required by conditions.

  "25D i) b) … all contractors shall be required to ensure that all vehicles shall, as far as is practicable, be confined to formed access routes and the active construction zone".

Nests Within 20 m of the Stage 2 Windfarm Development Area

Where a nest is located outside the Stage 2 Windfarm Development Area but within 20 m of it, a nest buffer of 20 m will be implemented, and the buffer will be demarcated by a single wire fence on tread-in standards set up around the boundary of the buffer. The nest will not be approached on foot, and wherever possible stopping and exiting vehicles within the buffer will be restricted.

The Project Ecologist will demarcate the nest buffer, and works will not occur within this area until the Project Ecologist confirms that either the nest has failed, or the chick has left the nest, at which point the buffer will no longer be in effect.

Nests Within the Stage 2 Windfarm Development Area

Where a nest is found within the Stage 2 Windfarm Development Area, a nest buffer of 20 m will be demarcated by a single wire fence using tread-in standards set up around the boundary of the buffer. No works will occur within this buffer until the Project Ecologist confirms that either the nest has failed, or the chick has left the nest, at which point the buffer can be removed, and access and construction works within this area can commence.

Communication and staff training

Identification and avoidance of pied oystercatcher nest sites will form part of contractor induction and vehicle operators working on the site will be made aware that juveniles will be moving about the site with their parents typically from October through to late December and are particularly naive during this period and are at risk of being run over. Any juvenile pied oystercatcher deaths that are a result of a collision with a vehicle or construction machinery will be reported by the consent holder to the Department of Conservation within 24 hours of becoming aware of the discovery.

3.3. Reporting

An annual monitoring report will be produced within three months of completion of each falcon and pied oystercatcher breeding season monitoring during the construction phase of Stage 2 of MWF. The report will summarise the methods and results of the falcon and pied oystercatcher monitoring and will include the following details:

- The locations of any nest sites (GPS co-ordinates and maps);
- Whether buffer zones were implemented and if so for long;
- Dates eggs were laid, when chicks hatched and if they fledged;
- Any nest mortality that occurred, the likely cause, and any evidence if this was a result of nest predation.

The annual report will be provided to the Clutha District Council and Department of Conservation.

4. Operational Monitoring Programme

4.1. Falcon Surveys

4.1.1. Overview

Condition 27 required comprehensive falcon monitoring to identify any nests within 5 km of the wind farm site, determine breeding success, record any bird strike and record incidental observations for two years after MWF becomes operational. The final monitoring report for falcon monitoring undertaken for Stage 1 (Golder 2013) noted that falcon pairs which nest on the outer edge of the 5 km buffer zone have very little use of the MWF area and recommended that future monitoring focus efforts on nesting falcon within 3 km of the Windfarm Development Area. Based on the monitoring and recommendations, Condition 27 has been varied to require falcon monitoring to identify any nests within 3 km of the wind farm site, determine breeding success, record any bird strike and record incidental observations for two years after Stage 2 becomes operational.

Once the final turbine within Stage 2 becomes operational the falcon monitoring program will commence and will be carried out for the following two falcon breeding seasons by a suitably qualified and permitted raptor ecologist. This monitoring will include the following:

- Identification of any falcon nesting sites within the Windfarm Development Area and within public land up to 3 km from the boundary of the Windfarm Development Area.
- Capture of falcon and the attachment of leg bands and GPS monitors to allow monitoring of activity within the wind farm site.

- A record of any falcon turbine strike observed during the survey or recorded by the GPS monitor.
- A record of all incidental observations of falcon within MWF.

4.1.2. Nest Surveys

Nest surveys undertaken during Operational Monitoring to determine falcon breeding success will be undertaken over two falcon breeding seasons following the final turbine within Stage 2 becoming operational. Operational Monitoring for falcon will follow the same methods, search effort and timing for Construction Monitoring outlined in Sections 4.1.2 and 4.1.3. The key difference being that Operational Monitoring will include surveys to locate active falcon nests within the Windfarm Development Area and within public land up to 3 km from the boundary of the Windfarm Development Area, and for Operational Monitoring there is no requirement to establish buffers around any located falcon nests.

Nest surveys undertaken during Operational Monitoring will include recording any visits by falcon to the MWF site and the occupancy of the identified nesting sites.

4.1.3. GPS Tracking

Scope and Timing

Attempts will be made to capture and install leg bands and GPS transmitters on falcon for two breeding season following commissioning of the wind farm. Adults will be captured as the priority, and juvenile falcon if the opportunity presents itself. The surveys will be conducted by a suitably qualified and permitted raptor ecologist.

Birds within 3 km of the windfarm (See Map 2, page 15) will be targeted for GPS tracking, with a focus on the breeding pairs closest to MWF including the Broad Stream pair, along with any other falcon detected nesting within 500 m of the Project Envelope during the construction nest surveys.

The use of GPS transmitters will assist in validating the collision risk modelling that has been carried out in terms of the frequency of turbine interactions, avoidance behaviours, and to reconfirm that displacement is not of concern. The transmitters will also allow location of any bird that has died so that cause of death can be established. All reasonable efforts will be made to locate carcasses of dead falcon fitted with GPS transmitters that have switched to mortality signal.

The capture and handling of falcon and the fitting of transmitters to adult and or juvenile falcon requires a Wildlife Approval under section 42(4)(h) of the Fast-track Approvals Act 2024, the relevant details for this application are listed in the Effects Assessment, Appendix I.

The timing of transmitter installation will be at the discretion of the raptor ecologist, considering the potential effects on birds at different stages of the breeding cycle and the health and safety risk of working on steep terrain.

Trapping and Radio-Transmitting Methods

Attempts to trap adults and any fledged chicks will be made by hand, or using noose hat or bal-chatri traps, to enable transmitter attachment. Transmitters will be attached to back feathers via a custom baseplate, tape glue and cable tie. The transmitters used will either be:

Lotek PP VHF 75s

- Standard weight: 3.5 g
- Size (L x W x H): 25 mm x 14 mm x 7 mm
- Antennae length: 5 cm GPS antenna, 18 cm VHF antenna; OR

Lotel Pin-Point Cell Solar 5G-2-30 (depending on availability)

- Standard weight: 8.6 g
- Size (L x W x H): 23 mm x 21 mm x 15 mm
- Antennae length: 5 cm GPS antenna, 9.6 cm GSM

All key morphometric data, the sex and age class of falcon, the GPS co-ordinates of the nest/capture location (and nest unique identifier), the transmitter number and any other relevant information will be recorded and saved electronically and entered into a spreadsheet after each falcon trapping session.

Falcon movements will be tracked remotely (physical in the field radio-tracking surveys will not be required) and the transmitters will include a mortality switch which will send an alert if a mortality has occurred.

To minimise stress to trapped falcon, they will be hooded as soon as they are captured with standard raptor hoods. Adults will be trapped once their chicks are at least 14 days old to prevent disturbances that could lead to nest failure. Fledglings will be caught and transmitted once they have fledged from the nest to ensure they are sufficiently mature for transmitter attachment.

The raptor ecologist will conduct fortnightly visual checks of transmitted birds to make sure the birds / transmitters remain functional. This will continue until the transmitter is shed during the post breeding moult. If any issues arise, the raptor ecologist will, if necessary, re-capture the individual/s and remedy any issues with transmitters, including removing the transmitter if required. The transmitters will be moulted off (i.e., come off when the feathers they are attached to are moulted) and then located using the VHF component of the transmitter.

Monitoring Radio-Transmitted Falcon and Detection of Dead Falcon

A data review of falcon movements will be conducted remotely twice daily and will occur via cellular network download with one download between 7-10 am and the second between 3-6 pm. In the event that a mortality switch on a falcon transmitter is activated and the carcasses is located or an adult or juvenile falcon is found injured or deceased by anyone within the Windfarm Development Area(e.g. by Tararua Wind Power Ltd staff, or contractors), then the consent holder shall notify the Department of Conservation within 24 hours of becoming aware of the discovery, the carcass will be photographed and sent to Wildbase Pathology (Massey University, Palmerston North wildlife diagnostic services) for necropsy to determine cause of death where possible.

Falcon carcasses found incidentally or through tracking birds where a mortality switch on a falcon transmitter is activated will be recorded and logged with all required information set out in the Falcon Mortality Record Datasheet in Appendix 1.

If an injured falcon is found, advice shall be sought immediately from the Department of Conservation Area Office (Invercargill) on 03 211 2400, or if after hours, on the emergency hotline (0800 DOC HOT or 0800 362 468) with regard to capture and care of the bird.

4.1.4. Incidental Observations

In the event that an adult or juvenile falcon is found deceased during Operational Monitoring, the process to be followed and the required information to be recorded is detailed in Section 5.

All incidental falcon observations will be recorded during the Operational Monitoring surveys within MWF, of particular interest are observations of any falcon activity within the Stage 1 and 2 turbine areas of MWF. Key things to be collected for incidental observations of falcon are as follows:

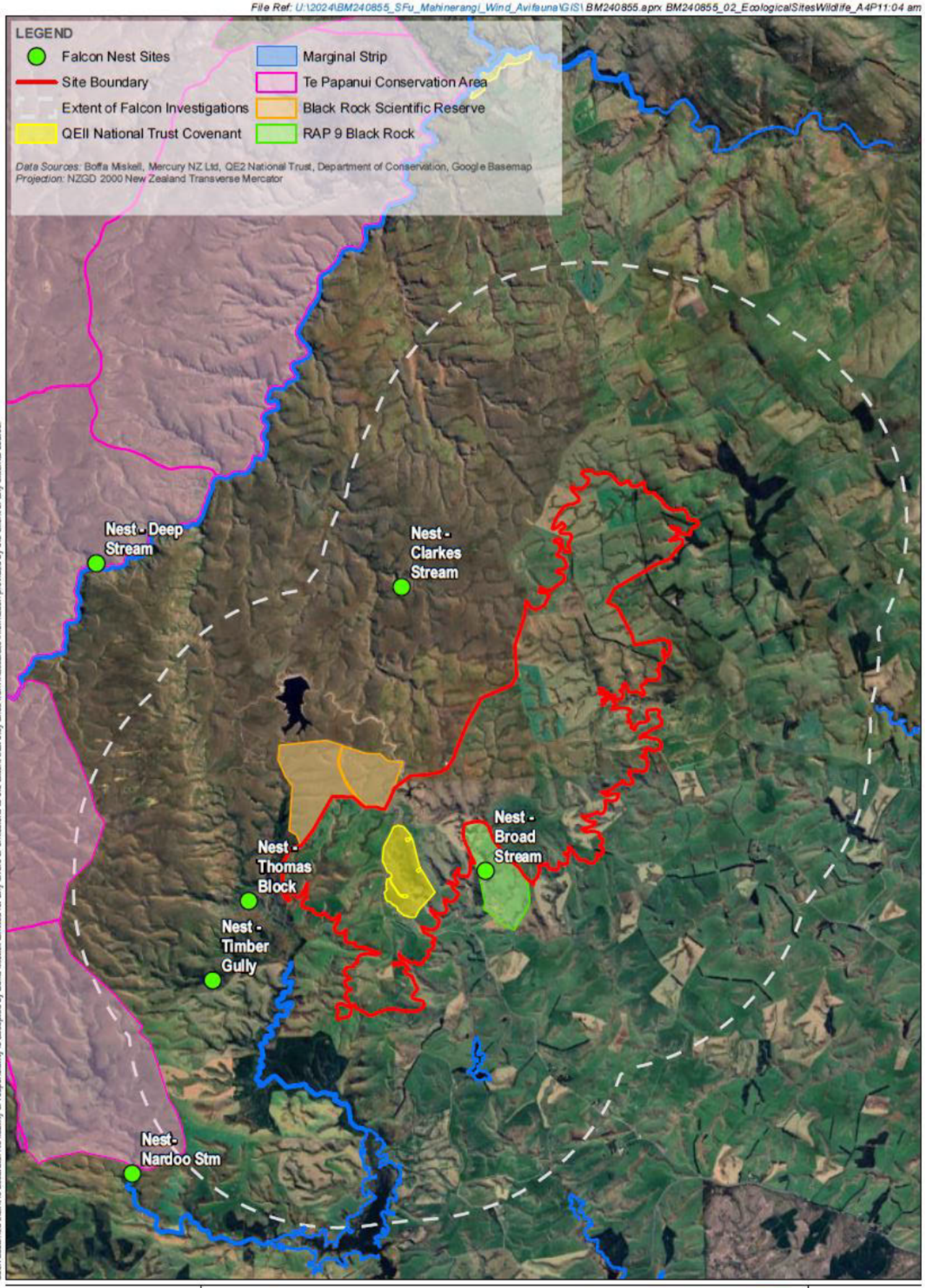
- GPS location of falcon observations and where possible a map showing the flight path of individual birds, especially locations relative to nearest turbines.
- Gender and age class (i.e. juvenile or adult) of falcon.
- Behaviour of individuals.

4.1.5. Reporting

A falcon monitoring report will be produced within three months of completion of each falcon breeding season. All falcon data related to trapping and transmitter fitting must be entered into the FALCON database within one week of collection. Each falcon monitoring report will be provided to the Clutha District Council and Department of Conservation.

The report will summarise the methods and results of the falcon monitoring conducted using cameras and during fortnightly nest surveys, incidental falcon observations and any dead falcon found within MWF and will include the following:

1. The locations of any nest sites (GPS co-ordinates and maps).
2. Dates eggs were laid, when chicks hatched and if they fledged.
3. Any nest mortality that occurred, the likely cause and any evidence if this was a result of nest predation.
4. All key morphometric data, the sex and age class of any falcon observed.
5. Mapping of the movements of any incidental falcon observations.
6. Any dead falcon found on site and key information collected as outlined in Section 5.
7. All incidental observations of falcon within MWF and within public land up to 3 km from the boundary of the Windfarm Development Area.



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Project Manager: [redacted]

MAHINERANGI WIND FARM

Ecological Sites

Date: 01 October 2025 | Revision: 0

Plan prepared for Mercury NZ Limited by Boffa Miskell Limited

Drawn: LJa | Checked: SFu

Map 2

5. Detection of Dead Falcon

In the event that an adult or juvenile falcon is found injured or deceased either by the survey team during the Construction or Operational nest monitoring or incidentally by anyone within the Project Site (e.g., TWP staff, contractors etc.) during the Construction or Operational phases of the MWF then the following actions will be taken:

- Record all required information as set out in the Falcon Mortality Record Datasheet in Appendix A.
- The consent holder shall notify the Department of Conservation within 24 hours of becoming aware of the discovery.
- The carcass will be photographed and sent to Wildbase Pathology (Massey University, Palmerston North wildlife diagnostic services) for post-mortem examination to determine cause of death.
- All information recorded in the Falcon Mortality Record Datasheet, and the outcome of the post-mortem examination will be included in the annual falcon monitoring report if the carcass is found during the construction or operational falcon monitoring period. If a falcon carcass is found after the completion of the operational monitoring period, then all information recorded in the Falcon Mortality Record Datasheet, and the outcome of the post-mortem examination will be provided in a memo to the Clutha District Council.

6. Detection of any other Dead Native Bird

In the event that any native bird with a conservation status of threatened or at-risk is found deceased by anyone within the Project Site (e.g., TWP staff, contractors etc.) where the cause of death is undetermined and may be related to the operational wind farm, then the following actions will be taken:

- The carcass will be photographed and sent to Wildbase Pathology (Massey University, Palmerston North wildlife diagnostic services) for post-mortem examination to determine cause of death.
- The outcome of the post-mortem examination will be included in the Environmental Monitoring Plan and Report provided annually to the Clutha District Council.

7. Potential Mitigation Program

7.1. Falcon

The pest control currently being carried out in Stage 1 of the windfarm, and the expansion of that pest control to cover Stage 2, was established to offset any residual effects on falcon nesting near the windfarm site. Monitoring of nesting success and the GPS tracking (as detailed in section 4) is to confirm the modelling and analysis, and the predicted benefit of the pest control.

Condition 27. iv) sets out the actions required in the event that monitoring of falcon identifies breeding failure as a result of the wind farm operation, as follows:

> *27. iv) If the monitoring undertaken in accordance with conditions (i) to (iii) for Stage 1 and (i) or (ii) for Stage 2 above, identifies breeding failure of New Zealand Falcon as a result of the operation of the Mahinerangi Wind Farm, then the consent holder shall develop a*

mitigation programme and continue monitoring as determined appropriate after consultation with the consent authority and Department of Conservation.

Advice Note:

For Stage 2, the falcon mitigation programme shall include, but not necessarily be limited to, relevant matters identified in the Avifauna Management Plan, that forms Part C of the Puke Kapo Hau - Mahinerangi Wind Farm Stage 2 – Fast-Track Approvals Act Application dated DD MM 2025.

In the event that breeding failure of New Zealand Falcon is identified as a result of the operation of the Mahinerangi Wind Farm through monitoring undertaken under condition 27, then the following action(s) may be taken.

- Targeted pest control during breeding season at active nest sites within 3km of the Project Site; and
- Continued breeding surveys for a further period sufficient to determine effectiveness of pest control.

7.2. Pied Oystercatcher

The pest control currently being carried out in Stage 1 of the windfarm will be expanded to cover Stage 2. This will directly benefit any pied oystercatcher nesting within the site and is considered sufficient mitigation for any minor effects on this species of windfarm construction and operation.

8. References

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9. Appendix

Appendix A: Falcon Mortality Record Datasheet

Mahinerangi Wind Farm Date..... **Time**..... **Page Number**.....

ID Number (see key):		
ID procedure (see key):		
GPS co-ordinates of carcass location		
Species:		
Age: U = unknown, I = Immature, A = Adult		
Sex: U = unknown, F = Female, M = Male		
Carcass condition (see key)		
Detailed description of carcass: Visibility of carcass to searcher Vegetation carcass found in		
Other Notes: Current and past weather Number of photos		

KEY

ID Number: Unique Identifier: yy.mm.dd_carcass number

ID Procedure: The identification procedure should be recorded as Observer ID, Collected, or Photographed (if one of the latter two, identification may take place sometime after the carcass has been found). Carcass condition should be recorded according to following:

Carcass Condition:

1 = Injured or dying (report immediately to DOC).

2 = Whole carcass – Intact, is not badly decomposed, and shows little or no sign of being scavenged.

3 = Scavenged – An entire carcass showing signs of being fed upon by a predator or scavenger or a dismembered carcass (portions) in one location (e.g. wings, skeletal remains, legs, pieces of skin etc).

4 = Feather spot – 10 or more feathers at one location indicating predation or scavenging.

5 = Decomposed – Carcass showing signs of decomposition.

Weather Observations at time of carcass discovery				
Visibility				
0.	Fine / sunny	3.	Heavy cloud	
1.	Partly cloudy	4.	Mist / fog	
2.	Overcast	5.	Rain	
Cloud Cover (as % of sky)				
Precipitation				
0.	None	3.	Light	
1.	Dripping foliage	4.	Moderate	
2.	Drizzle	5.	Heavy	
Temperature				
0.	Freezing (<00C)	3.	Mild (11-16)	
1.	Cold (0-5)	4.	Warm (16-22)	
2.	Cool (5-11)	5.	Hot (>220C)	
Wind Strength				
0.	Calm	3.	Fresh wind	
1.	Light breeze	4.	Strong wind	
2.	Moderate breeze	5.	Near gale	
Wind Direction (N, S, E, W, NE, SE, NW, SW)				
Other				

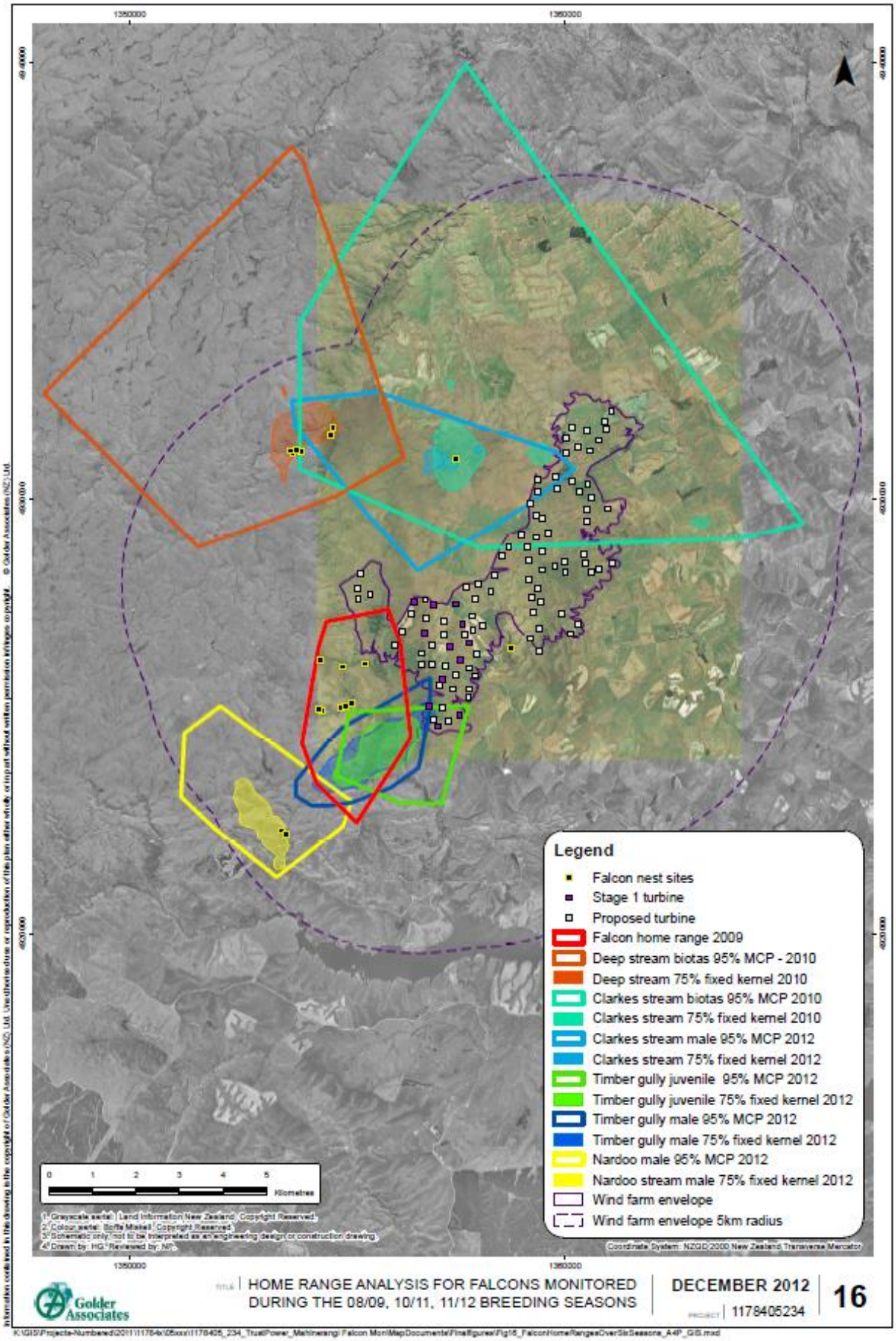
Appendix B: Falcon Territories Identified from Surveys of MWF between 2006 and 2012

The five falcon territories recorded during surveys for MWF between 2006 to 2012 are summarised below to provide some context that may assist in ongoing monitoring.

- *Deep Stream Pair:* An initial nest survey conducted on 1 December 2011 located an abandoned nest approximately 100 m upstream from the 2007 – 2008 nest site near the confluence of Barbours Stream and Deep Stream. The male of this pair was confirmed as the same individual from the previous season, identified by an operational radio transmitted fitted in December 2010. The female falcon was observed; however, her identity could not be confirmed due to the absence of visible leg bands. Subsequent monitoring on 28 February 2012 recorded two juveniles at the same confluence, indicating successful re-nesting following the failure of the initial nest attempt. Although the precise location of the second nest was not identified, the presence of juveniles near the confluence suggests that it was situated in close proximity.
- *Thomas Block pair:* A pair of falcons was initially observed near the 2010 Thomas Block nest site on 31 October 2011, exhibiting behaviours indicative of the commencement of breeding activity. However, by 30 November 2011, only the female falcon remained present, with no nest or male bird observed. Efforts to capture the female between 30 November and 2 December 2011 for transmitter attachment were unsuccessful and despite extensive observation efforts, no sightings of the male were made during this period. Further observations on 28 February and 5 March 2012 indicated that the female exhibited behaviours typical of a non-breeding individual, including the absence of nest defence or food solicitation behaviours, and there was no evidence of juveniles. Additionally, the female was observed ranging over a wide area, consistent with a non-breeding status. The most plausible explanation for these observations is that the male likely died early in the breeding attempt, sometime between 31 October and 30 November 2011.
- *Clarkes Stream pair:* A pair of falcons was observed copulating on schist tors on 22 and 30 November 2011 near the 2010 Clarkes Stream nest site. Despite these breeding displays, no nest was located during the 2011 season. On 30 November 2011, the male falcon was successfully trapped and confirmed to be the same individual tracked during the 2010–2011 season, as he was still carrying the radio transmitter fitted in December 2010. This transmitter was removed and replaced with a new device for the 2012 tracking season. During the subsequent tracking period (January to April 2012), no signs of nesting activity or juveniles were recorded within the Clarkes Stream area.
- *Nardoo Stream pair:* Nest searches conducted during the 2011–2012 breeding season identified a pair of falcons nesting in Nardoo Stream gully on 7 November 2011. On this date, the pair exhibited defensive behaviour (i.e. “kekking”) when observers surveyed the previous year’s nest site. The female was also noted to have a visible brood patch, indicating active nesting. However, shortly after this observation, the pair ceased defending the nest area and did not exhibit alarm behaviour in the presence of people. Additionally, the female was observed undertaking hunting flights, which would be atypical for an incubating female. The male falcon was captured on 29 November 2011, and a transmitter was fitted. At the time of capture, the pair did not appear to be actively nesting. Subsequent radio tracking on 25 January 2012 documented the presence of a juvenile in the Nardoo Stream area. Further, “whining” calls—indicative of juvenile food begging—were periodically detected during radio tracking from January to April 2012. These observations suggest that a second breeding attempt likely occurred in late November or December 2011, which was ultimately successful.

- *Timber Gully pair:* The first visit to the Timber Gully area during the 2011–2012 breeding season occurred between 28 and 30 September 2011, during which a pair of falcons was observed along with a nest scrape. On 29 November 2011, the male falcon was captured and fitted with a transmitter. This male was unbanded and had no previously attached transmitter, confirming that he was not the same individual tracked in prior years from this general area. During this November visit, both the male and female displayed defensive behaviours around the nest area, and one chick was observed within the nest. The juvenile was subsequently captured and fitted with a transmitter on 2 February 2012.
- *Broad Stream pair:* The falcon pair previously documented at Broad Stream was not located during the 2011–2012 breeding season. It is therefore concluded that no falcons nested in the Broad Stream area during this period. Furthermore, none of the falcons captured and fitted with radio transmitters in November and December 2011 bore the leg bands associated with the Broad Stream pair from 2009. This suggests that the original pair either perished or abandoned the wider Mahinerangi Wind Farm area.

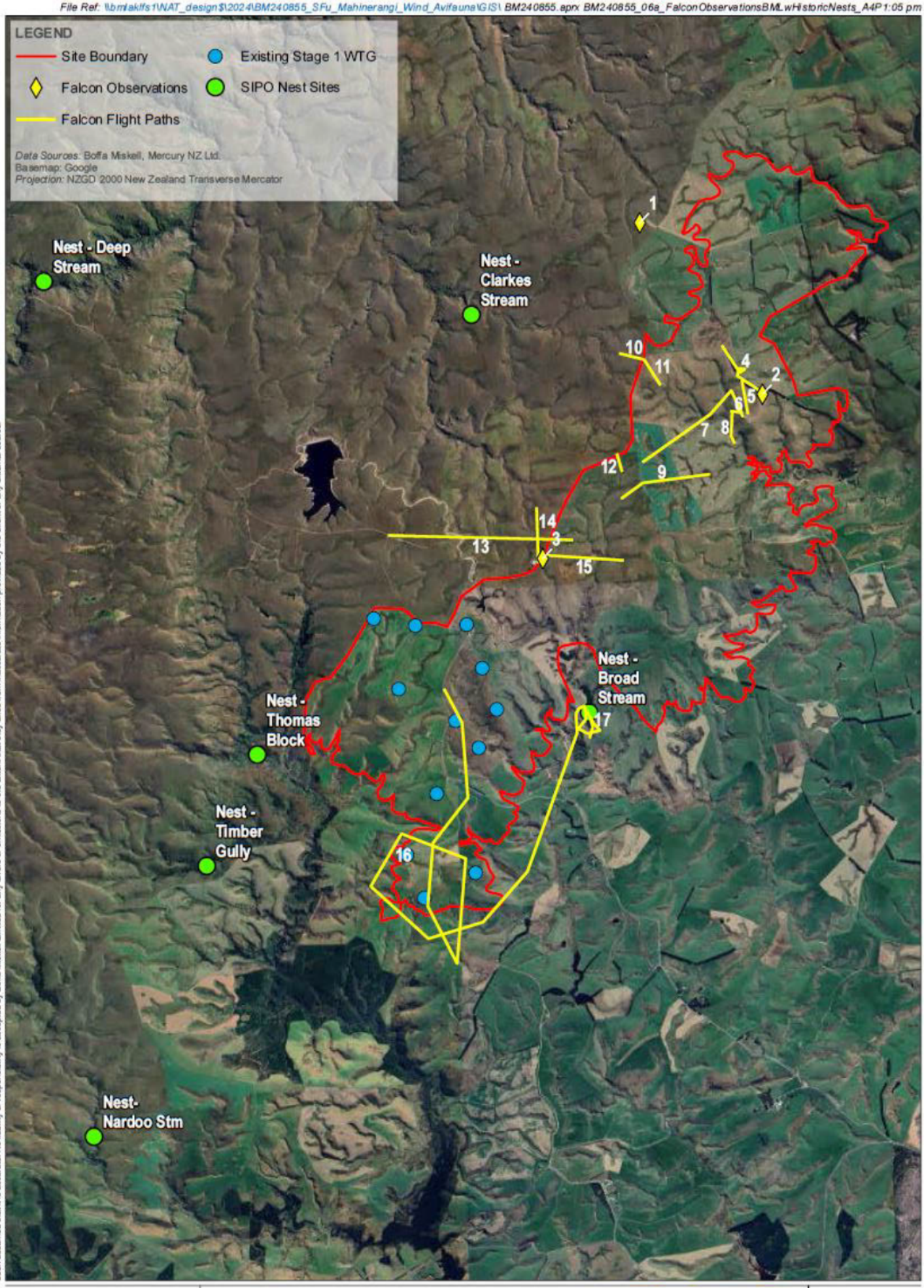
Figure 1: Falcon home range analysis and nest sites' 2009 to 2012 (Source - Golder Associates Ltd, 2012).



Appendix C: Results of falcon surveys; January and February 2025

Based on the distribution of brief falcon observations made in January and February 2025 (Map 2 below), two territories may still be occupied from those recorded by the 2009 to 2013 surveys. One of the observations was of a pair of adult falcon that were observed once within the native forest in Broad Stream, just outside the MWF Site, suggesting a local breeding pair.

Falcon were observed traversing and occasionally hunting within the Wind Farm Development Area, including the area occupied by the Stage 1 turbines. They were also seen moving to and from the tussock grasslands to the west of the Project Site.



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MAHINERANGI WIND FARM

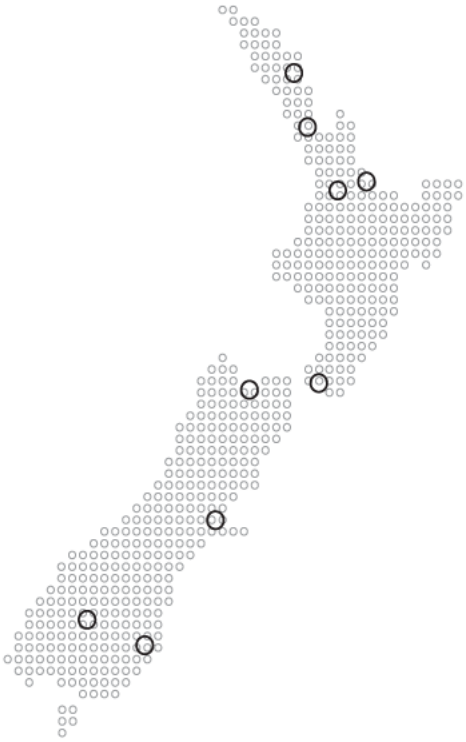
Falcon observations and historic nest sites

Date: 13 June 2025 | Revision: 0

Plan prepared for Mercury NZ Limited by Boffa Miskell Limited

Project Manager: [redacted] | Drawn: LJa | Checked: SFu

Map 3



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