7. ASSESSMENT OF ENVIRONMENTAL EFFECTS

7.1 OVERVIEW

In accordance with Schedule 5 (clauses 5(4), 6 and 7) of the FTAA, this section provides an assessment of the actual and potential environmental effects associated with the proposed construction, operation and maintenance of Stage 2 of Puke Kapo Hau.

TWP has commissioned a series of comprehensive technical assessments to evaluate the actual and potential environmental effects of the project. These assessments have examined both the effect of the change in conditions of the existing land use consent, and the actual and potential effects associated with the new land use or regional consents that are required.

Given that an existing land use consent is already in place for a wind farm on site, the relevant assessment of environmental effects for the variation application is concerned with the effects of the changes proposed to the consent conditions. It does not revisit matters that have been previously assessed and determined as part of the existing consent.

The technical assessments that support the assessment of environmental effects are referenced in sections 7.2 to 7.19 below as appropriate and included in Part B (Technical Reports) of these application documents.

The relevant actual and potential environmental effects of Stage 2 of Puke Kapo Hau are considered to be:

Section 7.2	Positive effects
Section 7.3	Landscape, natural character and visual effects
Section 7.4	Effects from shadow flicker and blade glint
Section 7.5	Noise effects
Section 7.6	Avifauna effects
Section 7.7	Terrestrial ecology effects
Section 7.8	Natural inland wetland effects
Section 7.9	Aquatic ecology effects
Section 7.10	Stormwater discharge, erosion and sedimentation effects
Section 7.11	Other construction and operational effects

Section 7.12 Traffic effects

Section 7.13 Heritage effects

Section 7.14 Cultural effects

Section 7.15 Aviation effects

Section 7.16 Climate change effects

Section 7.17 Natural hazard effects

Section 7.18 Conclusion

Section 7.19 Management and monitoring measures proposed

7.2 POSITIVE EFFECTS

An Economic Assessment of Stage 2 of Puke Kapo Hau has been prepared by NZIER (2025) and is provided in Part B.01 of this substantive application.

The assessment concludes that the construction and operation of the project will generate a range of significant economic benefits at the local, regional, and national levels (including contributing to New Zealand's climate change initiatives). These include:

- Contributing approximately 549 GWh of electricity per annum and providing for improved electricity diversity and security of supply;
- Contributing to the increase in electricity generation capacity required to support the electrification of the economy (including light vehicle transport and industrial process heat);
- Displacing greenhouse gas emissions from thermal generation by 600,000 tCO2-e annually by conserving hydro storage so that it can be used to displace peak thermal generation use, thus helping New Zealand meet its emission reduction targets in the Government's second Emissions Reduction Plan;
- The BESS which will allow for the controlled supply of electricity during peak periods - up to 60 MWh for two hours at a time; and
- Avoiding transmission losses by reducing the import of electricity from further away.

Puke Kapo Hau will also provide stimulus to local economic activity in the construction phase and operational phases. NZEIR (2025) estimates the main direct effects of the project on the local region would be:

- Injection of around $220 million expenditure during construction (over approximately three years), of which about $73 million would be economic value added for the region;
- Up to an additional 200 FTE jobs during peak construction (on average 75 FTE jobs per year for three years during construction) and 8 to 10 FTE jobs per year for the operation of the wind farm once it is commissioned;
- The construction activity for the BESS adds a further 10% to the expenditure and employment metrics above; and
- Rental income for the owners of land that is used for Stage 2 of Puke Kapo Hau.

Overall, the construction and operation of Stage 2 of Puke Kapo Hau will generate significant and noticeable benefits to the local, regional and national economies – and fully aligns with the Government's energy and climate change objectives for the New Zealand economy.

7.3 LANDSCAPE, NATURAL CHARACTER AND VISUAL EFFECTS

The Landscape and Visual Assessment by Isthmus (2025) is provided in Part B.02 of this substantive application.

Isthmus (2025) assesses the landscape, natural character and visual effects of the proposed variation of the existing consent conditions (i.e. the effects of the proposed changes compared to the effects of the approved activity), and of the proposed new consents (i.e. the new transmission line and associated infrastructure).

Included in their assessment are photo-simulations of the Puke Kapo Hau from various locations in the surrounding environment, which have been utilised to inform the landscape and visual assessment.

7.3.1 Effects of Proposed Variation

The proposed changes to the existing consent conditions that are relevant to landscape and visual effects include the increase in the maximum size of the turbines, the reduction in the maximum number of turbines, changes to some of the approved civil engineering components (i.e. hardstand size, road widths, SFD), shifts to the centre of the CZ (nominal turbine locations) in some instances, and changes in the extent of exclusions constraints to the wind turbine CZ.

7.3.1.1 Effects on Amenity Values

As previously noted, the existing consent provides for up to 100 turbines with a maximum height of 145 m, whereas the proposed variation seeks to limit the wind farm to an additional

44 turbines that are up to 165 m in height (i.e. in addition to the 12, 125 m turbines constructed as part of Stage 1).

Dominance

Dominance (in this context) is a function of relative size and proximity with respect to the viewer. Noting that the wind turbines reach to varying heights because of the undulating terrain, the proposed changes in size (i.e. height) of the turbines will have few adverse effects with respect to dominance for the following reasons:

- Public proximity to the turbines is limited to the end of Eldorado Track which is a no-exit, unsealed, local road. Other than to access the Black Rock Scientific Reserve, the Deep Stream Hydro-Electric Power Scheme, or the walking track to Te Papanui Conservation Park, the likely reason for driving to the end of this road would be to visit the wind farm (with part of the attraction being to experience the scale and movement of the turbines). All turbines are dominant at close quarters; and
- The wind farm is sufficiently distant from formed public roads and non-participating dwellings that the increase in the size of the turbines would have very low effects on dominance.

Scale

Turbines are typically seen in a scale relationship with the broad landscape because of the absence of other scale references. In this instance, the consented wind farm is visually anchored by the expansiveness and apparent mass of the slightly domed peneplain landform.

The 20 m increase in wind turbine height will have 'very low' effect in this context. The wind farm will continue to be anchored by, and in scale with, the broad landscape. In addition to remaining in scale with the landscape, the wind farm's layout will also continue to conform to the pattern of the peneplain crest and fingers.

Rural Character

The Environment Court considered Puke Kapo Hau to be appropriate in its rural setting. That decision also recognised that the landscape character includes existing energy generation infrastructure.

The proposed changes in consent conditions will have no further effect on rural character. The farming activities that underpin rural character will continue beneath the turbines – such that the wind farm will remain appropriate in this setting.

Aesthetic Coherence

Aesthetic coherence (in this context) includes consideration of the consistency of appearance between turbines across the wind farm. The main factor in this respect is rotor diameter. Differences in height are less perceptible because turbines are installed at different elevations in response to undulating topography.

The 20 m increase in turbine height will be perceptible from some locations but will have a 'very low' degree of effect on aesthetic coherence given that the 'realistic consented Stage 2' that was applied for assessment purposes and 'proposed Stage 2' have the same rotor diameter. The wind farm will continue to be anchored by, and in scale with, the broad landscape.

There will be some adverse effects on aesthetic coherence associated with the potential introduction of larger turbines to the wind farm. Such effects will be 'low' and confined to the southern end of the wind farm where the Stage 1 and Stage 2 turbines will be interspersed (i.e. the area around the 'south spur' with the main viewing audiences in that area being the Mahinerangi Fishing Village and along Eldorado Track).

Wind Turbine Numbers and Locations

Full development of the wind farm in accordance with the proposed variation to the consent conditions will comprise fewer and larger turbines (compared with the 100 turbines contemplated under the existing land use consent). As such, the proposal to remove 34 of the approved turbine locations would have positive effects on amenity values and landscape values. The most significant benefits are:

> The removal of the four wind turbine locations on the southwestern spur (i.e. the Thomas Block). The positive effects of this include avoiding an area with higher natural landscape values and increasing the separation between the wind farm and Lammermoor Range by approximately 1 km; and

> The removal of Turbines 29 and 30. This will increase the setback of the wind farm from Black Rock Runs Road by approximately 500 m.

Public and Private Views

Potential effects on public views will continue to be confined to roads and properties in the surrounding rural setting, and from the natural areas on the Lammermoor Range (including from Te Papanui Conservation Area).

Isthmus (2025) includes a detailed assessment against eight representative public views, with photo simulations provided to illustrate the proposed changes. The analysis

demonstrates that the proposed changes in consent conditions for Stage 2 of Puke Kapo Hau would have 'low' adverse effects on the views from two public viewpoints (being the Eldorado Track and Eldorado Track opposite Tarndale Farm) and 'very low' adverse effects on the remaining six public viewpoints.

The settlement density surrounding the wind farm site is low, with most dwellings on non-participating properties being well separated from turbines. Effects of the proposed changes on the amenity values of private views from dwellings within 6 km of the wind farm are tabulated within the assessment in Isthmus (2025), with photo-simulations provided. The assessment demonstrates that the proposed changes to the wind farm would have 'low' adverse effects on the views from dwellings on two properties (the crib on the Thomas Block, and 'Tarndale' Eldorado Track) and 'very low' adverse effects with respect to all other dwellings.

The changes in height between the turbines may be perceptible from some of the closer dwellings but is unlikely to be pronounced given that the perception of wind turbine height varies in response to the undulating terrain, and that the rotor diameter would be the similar for a 'realistic consented Stage 2' development under the existing consent and what is proposed as part of the variation.

More importantly, any perceived differences will not affect landscape character and values. There will be no change to such factors as dominance, the scale relationship of the wind farm with the broad landscape, the consistency between the wind farm and the landform, the appropriateness of the wind farm in terms of landscape character, and aesthetic coherence amongst the turbines.

7.3.1.2 Effects on natural landscape values (associated with changes to civil engineering components)

TWP is seeking to relocate the centre of the CZ (nominal turbine locations) in 13 instances, refine the exclusions of most of the CZ, increase the area of individual permanent hardstands from 1,400 m^2 to 1,855 m^2, and to construct internal access roads with a 5.5 m carriageway and localised widening to 9.5m on some bends.

The proposed changes will have, at most, 'low' adverse effects and some positive effects on natural landscape values - having regard to such factors as landform, vegetation, and water bodies. The reasons being:

- The relocation of the centres of CZ are localised in each case. They vary between 10 m and 160 m and have been made to match the proposed civil works with site conditions and ecological values. The layout retains the same overall pattern of development for the wind farm as the existing land use consent;

- The CZ will retain the same 100 m radius. The proposed revisions to the CZ exclusions will ensure that works (as under the existing consent) will be located on the peneplain surface in areas of pasture and will avoid gullies;
- While some CZ contain drifts of tussock amongst the pasture, this situation is consistent with what is authorised under the existing consent. At the same time, the removal of four wind turbine locations on the southwestern spur (the 'Thomas Block') and one in the QEII covenant area will have positive effects by avoiding the main area of high-quality snow tussock;
- The larger area of each permanent hardstand (1,855 m^2 vs 1,400 m^2) will be offset by fewer turbines; and
- Earthworks will also be reduced by the proposed change to the width of the internal access roads (with localised widening only to 9.5m). The reduction in wind turbine numbers will also reduce the length of internal access roads required within the project site.

7.3.1.3 Effects on the Outstanding Natural Landscape Values of the Lammermoor Range

As previously noted, the Lammermoor Range is an outstanding natural landscape. The parts of the range in Dunedin City are already scheduled as outstanding natural landscape in the Dunedin District Plan and, while the parts of the range in Clutha District are not scheduled, Isthmus (2025) considers that they would qualify as outstanding (and have proceeded on the presumption that the range is outstanding).

For the avoidance of doubt, the project site does not meet the criteria for outstanding natural landscape status.

The proposed changes will have positive effects on the qualities and characteristics of the Lammermoor Range, and no adverse effects, for the following reasons:

- The northern two thirds of the wind farm are approximately 3.8 km from the edge of the outstanding natural landscape, separated by the clear demarcation of the scarp and differentiated in elevation and landscape character. In context, the proposed 20 m increase in turbine height will be barely perceptible in the landscape compared to the turbines that could realistically be established as part of Stage 2 under the existing land use consent; and
- The southwest corner of the wind farm is close to the Lammermoor Range with the nearest approved wind turbine location approximately 150 m from the toe of the scarp. There will be positive effects on the qualities and characteristics of the outstanding natural landscape from the removal of the wind turbine locations in this area. It will

increase the separation distance to the outstanding natural landscape by approximately 1 km, better differentiate the wind farm by locating the nearest turbines in farmland rather than the tussock on the Thomas Block, and provide clearer demarcation by locating the nearest turbines on the opposite side of Lammerlaw Creek (which is a natural boundary).

7.3.2 Effects from Proposed New Consents

This subsection assesses the landscape and amenity value effects of the activities associated with the new regional consents, as well as the effects associated with the transmission line and ancillary infrastructure (including the BESS, substation and O&M Facility).

7.3.2.1 Lee Stream Tributary – Effects on Natural Character

The layout of Stage 2 of Puke Kapo Hau largely avoids the gullies and watercourses by following what is essentially an inverse pattern along the crests of the peneplain and its fingers. There is only one location where the internal access road network crosses a stream (a headwater tributary of Lee Stream) to access the northern spur. In that instance, the crossing point is next to an existing farm track and culvert.

Taking all biophysical and perceptual factors together, Isthmus (2025) considers that the Lee Stream tributary has 'moderate' natural character. While the stream retains natural characteristics and qualities, there are equally widespread human induced modifications.

The works will entail realigning the existing farm track approaches, constructing a larger fill embankment, and replacing the existing culvert with a longer culvert. While the track and culvert will be larger than the existing farm track, there will be little effect on perceptual aspects of natural character of the stream and its margins. The stream will continue to appear a natural feature within a modified farmland setting, acknowledging that such perceptions will be limited to those working the land given that there is no public access or visibility.

Effects on biophysical aspects of natural character will be addressed through the culvert design and the proposed stream restoration and rehabilitation. SLR – Aquatic (205) considers the replacement culvert will have positive effects on natural processes. The fencing and replanting of the gully site and associated waterway upstream of the Lee Stream tributary for some 50 m will have positive effects on perceptions of natural character in addition to the benefits for biophysical aspects.

Overall, Isthmus (2025) concludes that the natural character of the tributary of Lee Stream will be preserved and enhanced.

7.3.2.2 Wetland 43 – Effects on Natural Character

There is also one location where the internal access road network will intersect perched wetlands at a saddle on the peneplain. The existing farm track and access route in the consented layout traverse one of the wetlands. The proposed design for Stage 2 of Puke Kapo Hau relocates the existing farm track approximately 50 m to the true saddle which would have a slightly better fit with topography and minimise effects on natural hydrology. The existing farm track embankment and culvert is to be removed.

The wetland area is centred on an overgrown drainage channel, and the natural drainage is affected by the existing farm track and is affected by grazing and pugging. The extent to which the wetland retains natural character mainly relates to biophysical aspects. The wetland is considered to have a 'low-moderate' natural character due to the existing level of modifications.

The realigned track will occupy a footprint of approximately 8 to 10 m wide and an area of approximately 320 m^2 within the wetland (plus the encroachment within the 10 m wetland buffer). The existing farm track, with its culvert and low embankment across the wetland, will be removed and the area rehabilitated following construction of the new alignment.

While there will be some disturbance during construction, the proposed works will have a positive effect on natural character. The alignment with the true saddle, and removal of the existing farm track, will return the hydrology to more natural patterns. The saddle realignment, rather than following the fence line, will also appear slightly more aligned with the topography.

SLR – Aquatic (2025) recommends wetland and aquatic compensation to address effects on this wetland. The fencing and replanting proposed will integrate with rehabilitation of the stream.

Overall, Isthmus (2025) concludes that the natural character of Wetland 43 will be preserved and enhanced.

7.3.2.3 Development Constrained Area D

The area in the vicinity of Turbine 23 and 25 was identified in the consented layout confirmed by the Environment Court as 'Development within a Constrained Area D'. It is a neck between two gully heads containing wetlands.

The proposed internal access road network for Stage 2 of Puke Kapo Hau crosses the middle of the neck on the alignment of the existing farm track and through an area already modified by drainage. The formation for the 5.5 m carriageway will be narrower than that for a potential 12 m carriageway provided for under the existing land use consent.

For these reasons, there will be no additional effects on natural character.

7.3.2.4 Effects relating to New District Consents

Substation

The site of the proposed substation is flat, in pasture and adjoins a wind farm access road – minimising the earthworks required to form a platform.

The site is in an unobtrusive location within a saddle in the middle of the project site. It is 2.5 km from the nearest road (Black Rock Runs Road) and setback approximately 700 – 800 m beyond Turbines 28 and 29.

Isthmus (2025) concludes that any effects on the natural landscape or amenity values will therefore be 'low'.

BESS

The BESS and firefighting water tank are located on the peneplain, in the centre of the project site, and adjacent to the substation and O&M Facility. The location is unobtrusive, on flat terrain, in an area of pasture, and is well separated from public roads (approximately 2.6 km) or non-participating dwellings (also approximately 2.6 km).

Isthmus (2025) concludes that any adverse effects on natural landscape or amenity values will be 'very low'.

Operations and Maintenance Facility

The existing land use consent provides for an 'Operations and Maintenance Compound' adjacent to Eldorado Track. As part of this current project, resource consent is being sought to construct an O&M Facility in a more central location within the project site - near Turbine 32. Access to the O&M Facility will be directly from the adjacent wind farm road.

The indicative civil design depicts a platform in shallow cut on its rear southwestern side and low fill batters on its front northeastern side.

The location of the O&M Facility is appropriate with respect to natural landscape features. In this regard, it is on the peneplain surface and in an area of improved and rough pasture. It is also an unobtrusive location, distant from formed public roads (approximately 2.7 km) and dwellings (approximately 4.2 km from the nearest dwelling on a non-participating property).

For these reasons, Isthmus (2025) considers the O&M Facility will have 'very low' adverse effects on natural landscape and amenity values.

Transmission Line

The transmission line corridor is aligned across fingers of the peneplain southeast of the substation to span a headwater gully of the Black Rock Stream, and then across the plateau that forms the watershed between Black Rock Stream and Broad Stream – approximately midway between Black Rock Settlement Road and Eldorado Track. The corridor then turns south to span Broad Stream and follows a spur to the grid access point adjacent to Eldorado Track.

The indicative transmission line design is approximately 6 km long and will use steel poles rather than pylons (i.e. lattice towers). The poles will be up to 45 m high to the earth-wire peak. While they will be larger than those typically used for local distribution along rural roads, poles are generally considered to have a more ordinary and less obtrusive appearance than pylons. Using taller poles means that the additional height is offset by fewer poles and longer spans.

The consent would provide for up to a total of 25 poles. This includes15 poles (P1-P15) for the transmission line itself, two poles at the substation, and up to eight poles at the tie-in to the National Grid line. The P1-P15 spans are typically between 370 – 450 m, with one short span of 300 m and one long span (across Broad Stream) of 680 m.

Gullies and wetlands that fall within the transmission line corridor will be spanned by the conductors. The corridor will be accessed from existing farm tracks (some of which may be upgraded), without the need for additional stream crossings.

The transmission line will be remote from public roads except where it approaches the grid access point at Eldorado Track. The grid access point will be at Tower 196 on the HWB-ROX-A 110 kV line, which is approximately 110 m from Eldorado Track (beyond the stockyards of 'Thornicroft' Farm). Isthmus (2025) concludes that the transmission line and the grid connection arrangement (being a double hard tee rather than a switch station) will have 'low' landscape effects.

The transmission line will skirt the rear boundaries of the farms at 555 Black Rock Settlement Road, 1876 Mahinerangi Road, and 256 Eldorado Track and will be relatively distant from the dwellings on those properties. There will be 'very low' adverse effects on views from the dwellings at 555 Black Rock Settlement Road and 1876 Mahinerangi Road, and 'low' adverse effect on views from 256 Eldorado Track.

Natural Character Effects on Wetlands

The transmission line corridor will be accessed from existing farm tracks (some of which may be upgraded) without the need for additional stream crossings. Wetlands are avoided,

although there are three instances where the access tracks will be within 10 m of wetlands. In these instances, Isthmus (2025) concludes that adverse effects on the natural character of the wetlands will be 'very low'. The reasons for this are:

> The wetlands located close to the access tracks have 'low-moderate' natural character and the tributary valley has been drained and the wetlands grazed. The wetlands have the appearance of wet rough pasture;

> The works will not physically impact on the wetlands. They will entail unobtrusive trimming of the subgrade and reconstruction of the pavement surface only. Any adverse effects on the natural character of the wetlands will be 'very low'; and

> The spur access track to indicative Pole P9 has a small encroachment (approximately 15 m^2) within 10 m of Wetland T16. The wetland has 'low-moderate' natural character considering the modified nature and the farmland setting of improved pasture. There will be no direct impact. The buffer infringement is very small and is due to avoiding adjacent rock outcrops. Any adverse effects on the natural character of the wetlands will be 'very low' in degree.

7.4 EFFECTS FROM SHADOW FLICKER AND BLADE GLINT

Shadow flicker is analysed in the Shadow Flicker Assessment prepared by DNV (2025), within Part B.03 of this application. This report also considers blade glint effects. The findings of this report are summarised below.

For the purpose of this assessment, DNV (2025) has considered the combined impacts of Stage 1 of Puke Kapo Hau with Stage 2.

7.4.1 Shadow Flicker Effects

When comparing the expected shadow flicker extents for the realistic consented layout to the proposed configuration for Stage 2 of Puke Kapo Hau (including the existing turbines as part of Stage 1), the proposed configuration results in a reduction in effects - with one fewer dwelling expected to experience shadow flicker. In this regard, Dwelling 24 (i.e. the crib on the Thomas Block) is no longer impacted by the proposed configuration for Stage 2, due to the fact that turbines have been removed from the block of land.

The shadow flicker effects for all other dwellings remain unchanged, and any dwellings that are potentially impacted by shadow flicker from the consented and proposed configurations for Stage 2 are participating dwellings.

Shadow flicker mitigation is not required given that shadow flicker effects have reduced beyond those consented.

7.4.2 Blade Glint Effects

Blade glint involves the regular reflection of the sun off rotating turbine blades. The reflectiveness of the surface of the blades is also important. Blade glint is not generally an issue with modern turbines given the blades are coated with a non-reflective paint.

Condition 18 of the existing land use consent requires a neutral off-white or light grey, low reflectivity colour system - and no changes are sought to that condition. As such, blade glint effects are appropriately mitigated and will not be altered by Stage 2 of Puke Kapo Hau.

7.5 NOISE EFFECTS

A Noise Effects Assessment of Stage 2 of Puke Kapo Hau has been prepared by Marshall Day (2025) (refer to Part B.04). The assessment also considers any operational and construction noise effects resulting from the new proposed transmission line and associated infrastructure.

In terms of the management of construction noise in accordance with conditions 31, 32 and 33 of the existing land use consent, Marshall Day (2025) recommend that reference to NZS 6801 and NZS 6802 be updated from the outdated versions referenced in the consent to the current standards (namely NZS 6801:2008 Acoustics – Measurement of Environmental Sound and NZS 6802:2008 Acoustics – Environmental Noise).

The recommended changes will have no material effect on the outcomes to be achieved via Stage 2 of Puke Kapo Hau.

Marshall Day (2025) also recommended that descriptors in condition 35 and 36 are updated from L_{95} to L_{90}. This change has no material effect on the outcomes to be achieved but aligns the criteria with those of the current standard NZS 6808:2010 Acoustics – Wind Farm Noise. The L_{95} descriptor is referenced in the outdated version of this standard from 1998.

The key findings of Marshall Day (2025) are summarised in the sections below.

7.5.1 Operational Noise Effects

7.5.1.1 Stage 2 Turbines

The proposed turbines as part of Stage 2 of Puke Kapo Hau will be larger than the consented turbines.

Despite their increased size, Marshall Day (2025) concludes that the operational noise levels of the proposed turbines will remain comparable to the existing turbines at the wind farm – and, most importantly, within the consented noise limits. In this regard, the modelling indicates that the cumulative noise from the existing turbines and proposed wind

turbine layout will comply with the lower design noise limits of 35 or 40 dBA $_{L90}$, as required by conditions 35 and 36.

The key findings of Marshall Day (2025) as it relates to impacts on noise sensitive receivers are:

> Predicted noise levels for the existing turbines and proposed turbine layout have either negligible or beneficial effects at all receivers (compared to the consented layout). Five receivers are predicted to experience lower noise levels, while the remaining receivers will experience a difference of less than 0.1 dBA;

> Noise levels at all nearby receivers are within the lower design limits of the consent conditions (35 or 40 dBA $_{LA90}$), with most sites experiencing turbine noise levels more than 10 dBA below ambient noise levels.

Overall, the proposed changes to the noise environment associated with the establishment of Stage 2 of Puke Kapo Hau are considered reasonable, as the noise effects remains either unchanged or less for the surrounding community compared to the effects authorised by the existing consent.

7.5.1.2 New Transmission Line and Associated Infrastructure

A condition is proposed on the new land use consent which will manage any operational noise from all 'non-turbine activities' in accordance with relevant noise standards - similar to condition 34 of the existing land use consent for Puke Kapo Hau.

The primary noise source from each of the 32 containers comprising the BESS is expected to be the cooling fans, which are typically installed on top of the units. While the specific BESS model has not yet been selected, a sound power level of 95 dBA (Lw) per container has been used for assessment purposes. Modelling by Marshall Day (2025) indicates that the predicted noise contribution from the BESS at all nearby receivers will be negligible and would be able to comply with the relevant noise standards.

The operation of a transmission line typically does not generate noise. However, under high wind conditions, the glass insulators on the poles can potentially produce a tonal sound, which may cause annoyance to nearby receivers. To minimise this potential effect, composite insulators are used on the transmission poles, as they are less likely to generate tonal noise. A condition is proposed in this regard (refer to the conditions in Part E).

7.5.2 Construction Effects

All construction activities, including the new transmission line route, are at least 900 m from the nearest non-participating dwellings.

The loudest activity associated with construction (concrete cutting) is predicted to reach only 43 dBA at the closest receiver, well within the daytime limits and still compliant with the night-time noise limit of 45 dB $_{LAeq}$.

Condition 33 currently limits concrete batching to daytime only (6.30 am to 8 pm Monday to Friday, and 7.30 am to 6 pm Saturday). Concrete batching is proposed to be undertaken without time restrictions (i.e. 24 hours a day Monday to Sunday) to enable concrete pours. This means that an amendment to the existing consent conditions will be required.

In order to understand the effects of concrete batching and concrete pouring activities, the noise levels from these activities at the closest dwellings have been assessed by Marshall Day (2025).

The concrete batching plant will be located at least 2,000 m from the nearest receiver, with predicted noise levels of up to 27 dB $_{LAeq}$, readily complying with both day and night-time limits in condition 33. While a noise level of 27 dB $_{LAeq}$ may be audible at times, this noise level is not likely to cause adverse acoustic effects on closest dwellings. The noise source is broad band, not containing any tones or other special audible characteristics that could lead to annoyance. In addition, an external noise level of 27 dBA would result in an internal noise level of less than 15 dBA even with windows open for ventilation. These levels are well below the most stringent noise criteria recommended by the World Health Organisation and are not considered to cause adverse effects.

Overall, the existing consent conditions (conditions 31 - 33), with minor amendments, remain relevant and appropriate to manage construction works associated with Stage 2 of Puke Kapo Hau. In addition, a Construction Noise Management Plan will be implemented for Stage 2 to ensure construction work remain in accordance with NZS 6803:1999.

7.6 AVIFAUNA EFFECTS

An assessment of the actual and potential adverse effects of Stage 2 of Puke Kapo Hau on avifauna has been undertaken by Boffa Miskell (2025) (refer to Part B.05 – Avifauna Assessment). The findings of this report are summarised below.

7.6.1 Context of the Avifauna Assessment

Boffa Miskell (2025) includes a review of all previous investigations at the wind farm site that led to the consenting of Puke Kapo Hau in 2011. The purpose was to confirm that these earlier investigations were complete and to consider the findings in terms of the changes being proposed to turbine layout and design as part of Stage 2.

The original ecological assessment for this site identified one species, being the falcon, as being of concern. That assessment concluded that the risk to this species was low, but any minor effects could be offset by appropriate predator control. Predator control was included in the conditions of the existing land use consent (and is being undertaken by TWP).

The existing land use consent conditions also required pre and post-construction monitoring. The pre and post construction monitoring was carried out over five years. The monitoring concluded that falcon were not displaced by the wind farm, that they continued to hunt around, and within, the wind farm site (Stage 1 specifically), and they continued to breed and fledge chicks in the surrounding territories.

Bird strike monitoring was also carried out as part of the post-construction monitoring. Collisions did occur with other species which were of common and widespread species found within pastoral landscapes. Specifically, there were no collisions of falcon or South Island Pied Oystercatcher ("**SIPO**"), both of which are judged to have high avoidance of turbines and a low risk of collision.

Boffa Miskell (2025) also reviewed whether there have been any changes at the wind farm site or to the local avifauna since consent was granted that may change the results of the earlier assessment. The assessment concluded that there have been no changes of note to the farming operations, or the presence and distribution of vegetation and habitats, within and around the project site. There have also been no obvious changes to the species occupying the project site or the nearby lakes and wetlands.

The conservation status of several species has, however, changed since the original land use consent was granted, and this was considered in the avifauna assessment.

Additional site investigations were then carried out in January and February 2025. These confirmed the falcon are still present and utilising habitat within and around the Stage 1 and Stage 2 areas, including potentially using at least two of the same territories. The investigations also found that there have been no changes to the presence of other native species within the project site, and little mixing of species on this pastoral landscape with those that occupy the lakes and wetlands to the south and west.

Boffa Miskell (2025) did identify the presence of breeding SIPO, a species which was not threatened in 2006, and which now has a conservation status of at risk - declining. Breeding of this species was not observed during the earlier ecological assessment. The protection of nests, chicks and adults has been considered as part of the avifauna assessment.

7.6.2 Key Avifauna Species – Puke Kapo Hau Stage 2

Boffa Miskell (2025) considers that the falcon remains a key species of concern. In addition, the nesting of SIPO within the wind farm site requires consideration as part of construction works.

Boffa Miskell (2025) considers that the other species with a conservation status are unlikely to be affected by the wind farm, as they are habitat limited and only appear on site rarely or are known to occur locally but are unlikely to utilise habitat within the wind farm site. Therefore, Boffa Miskell (2025) has focused on effects on the falcon and SIPO.

The primary risks to falcon and SIPO are considered to be:

> Disturbance of nest sites by construction activities;

> Electrocution from new transmission lines (falcon only); and

> Potential collisions with turbines.

7.6.3 Potential Effects on Falcon

7.6.3.1 Potential Effects during Construction

There are no known nest sites that sit in close proximity of the proposed turbine locations for Stage 2. Currently the closest known nest site is in Broad Stream - approximately 385 m from the wind farm site and 400 m from Turbine 39 in the Stage 2 layout.

Ongoing surveys of breeding activity and the location of active nests will be carried out each spring during construction. If a nest is located within 500 m of construction works, the falcon expert will assess the risk, determine the appropriate nest buffer extent which will be no less than 200 m from the nest. The falcon expert will also advise on the duration that the buffer will need to be in place to ensure protection of the nest and chicks from disturbance.

Overall, with the implementation of appropriate monitoring and site management it is considered that effects can be avoided on nesting falcons and juveniles.

7.6.3.2 Potential Effects during Operation

Based on post construction monitoring at this and other sites, Boffa Miskell (2025) considers it unlikely that the prey species of falcon will be reduced by the construction of Stage 2 of Puke Kapo Hau. It is not considered that falcons will be displaced their foraging or breeding areas once Stage 2 is operational.

There is no evidence to date of collision mortality of falcon at New Zealand wind farm sites where post construction monitoring has been conducted (including at Puke Kapo Hau), and where falcon have been present.

Following extensive monitoring at Puke Kapo Hau, the final monitoring report concluded:

> *"The study found no evidence of adverse effects on the falcons from any of the identified potential impacts: collision, disturbance, displacement, or electrocution."*

To provide further confidence that the risk to falcon is very low, analysis of the new turbine layout for Stage 2 shows that the changes proposed will provide increased separation between turbines and falcon activity by raising the turbine blade and reducing turbine numbers. However, the threat status of the species warrants the continued generation of data to refine and support this analysis and collision risk. For these reasons, post construction studies required by condition 27 of the existing land use consent will be repeated.

In addition, Consent 28 of the existing land use consent requires implementation of a pest mammal control programme to provide for any residual effect on falcon – which is already in place and will continue.

Boffa Miskell (2025) also notes that there is an increased knowledge of the risks and new techniques for monitoring and management of those risks. Some amendments are proposed to the Ecological Management and Monitoring Plan ("**EMMP**") to respond both to the results of the previous falcon monitoring and current knowledge of falcon. Importantly, Boffa Miskell (2025) advise that condition 26 is no longer an effective monitoring tool and can be removed from the existing consent conditions. The condition covers all bird strike for all species of bird which is considered to be not only onerous, but ineffective in monitoring falcon.

Boffa Miskell (2025) is satisfied that condition 27 and 28 remain the more appropriate and effective method for monitoring falcon and therefore should be retained. An Avifauna Management Plan ("**AviMP**") (Part C.14) has also been developed.

7.6.3.3 Potential Effects from Transmission Lines

The new transmission line requires consideration of the electrocution risk to falcon.

Ways to insulate transmission poles have been identified and guides have been developed. These modifications have been used successfully by several lines companies within the South Island in recent years and are proven effective. These line modifications have been reviewed by TWP, and it has been confirmed that the aspects of transmission line design that create risk for falcon will not be present.

Both the White Hill Wind Farm and Puke Kapo Hau have transmission lines within the project sites. At White Hill no interactions or collisions were recorded between falcon and the transmission line despite there being multiple sightings of falcon flying over, or in close proximity to, the transmission line over multiple years. At Puke Kapo Hau the pre and post-construction falcon studies concluded that *"given the small area occupied by masts and transmission lines relative to the spatial scale at which falcons use the landscape, the risk is expected to be low"*.

Based on this information, it is concluded that collision with transmission lines is a very low risk for falcon, and no mitigation is considered necessary.

7.6.4 Potential Effects on South Island Pied Oystercatchers

7.6.4.1 Potential Effects during Construction

Disturbance of breeding is considered to be the main risk to SIPO from the development of Stage 2 of Puke Kapo Hau. In this regard, SIPO are more likely to nest on excavated ground, and areas of bare earth and gravels, than on pasture.

The majority of SIPO 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 come in 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.

The AviMP will ensure nesting sites are monitored and protected from construction activity. This is discussed further in Section 7.6.5 below.

7.6.4.2 Potential Effects during Operation

SIPO has been breeding in small numbers within the Stage 1 area of Puke Kapo Hau. These birds appear habituated to the operation of the wind farm and to normal farming activity. Boffa Miskell (2025) concludes that this suggests that any birds that nest within Stage 2 will also be tolerant of these same activities.

No collisions of SIPO were observed at this site during bird strike monitoring for Stage 1 of the wind farm, and no mortalities have been observed by staff within the wind farm since then. Boffa Miskell (2025) also notes that one other wind farm (Waipipi) has seasonal movements of SIPO through the site. The fourth year of post-construction collision monitoring has been completed and there have been no mortalities of this species to date.

Boffa Miskell (2025) concludes that the risk of turbine collision for SIPO is very low. If collisions do occur, they are likely to be rare. Considering the size of the national population (which is estimated to lie somewhere between 100,000 and 110,000), rare losses of one or several birds over the life of the wind farm will not have a population level effect on the species.

7.6.4.3 Potential Effects on Oystercatcher – Transmission Lines

This species is not at risk of electrocution as it is not a perching bird.

7.6.5 Management Plans and Consent Conditions

As set out above, specific changes are proposed to the existing land use consent conditions relating to the ongoing monitoring of avifauna, as are changes to the EMMP and the introduction of a new AviMP. These management plans are discussed below.

7.6.5.1 Ecological Management and Monitoring Plan

As part of the existing land use consent (Condition 25D), an EMMP provides a framework for the individual ecological management plans and sets out the practices and procedures to be adopted to ensure that all resource consent conditions relating to ecological monitoring and management were complied with. The certified EMMP remains relevant for Stage 1.

The current conditions and the scope of the certified EMMP has been reviewed by SLR, Boffa Miskell and Blueprint Ecology, with an updated EMMP prepared for Stage 2 of Puke Kapo Hau (refer to Part C.08). Specific to avifauna, the EMMP covers management, monitoring and reporting of construction effects of SIPO, and subsequent monitoring of potential operational effects on falcon.

7.6.5.2 Avifauna Management Plan

The AviMP has been prepared by Boffa Miskell and is provided in Part C.14 of this substantive application. The objective of the AviMP is to minimise actual or potential adverse effects on falcon and SIPO resulting from of the construction and operation of the Stage 2 of Puke Kapo Hau.

The AviMP outlines the methods required to address the potential effects on falcon and SIPO and covers the following:

Falcon:

> Construction monitoring and reporting

- The ongoing surveys and monitoring of falcon breeding activity and the location of active nests both within the Wind Farm Development Area and up to 500 m from the boundary of the Wind Farm Development Area will be retained and carried out each spring during construction by a suitably qualified and permitted raptor ecologist;
- Nest Protection - Should an active nest be found within the Wind Farm Development Area or up to 500 m from the boundary of the Windfarm Development Area, then the raptor ecologist will commence a breeding survey and provide advice on the need for a nest buffer and duration to ensure protection of the nest and chicks from disturbance.

- Operational monitoring programme
  - Post construction falcon monitoring detailed in condition 27 will be repeated for Stage 2 of Puke Kapo Hau;
- Pest control management
  - There may still be some residual risk to falcon and the current pest control will continue to be carried out as required by the existing land use consent conditions of consent (Condition 28);
- Detection of dead falcon; and
- Potential mitigation programme.

South Island Pied Oystercatcher:

- Discouraging nesting in proximity to construction activity;
- Establishing a buffer if nests are established;
- Managing risks when chicks become independent;
- Ongoing nest protection; and
- Reporting.

7.7 TERRESTRIAL ECOLOGY EFFECTS

SLR (2025) assesses the terrestrial ecology effects of the project (refer to Part B.06 – Vegetation, Wetland and Terrestrial Invertebrate Assessment) and is summarised below.

7.7.1 Survey Methodology

Approximately 75% of the layout of Stage 2 of Puke Kapo Hau and 98% of the transmission line corridor include exotic pasture and/ or cropping areas. However, indigenous vegetation,

including snow tussock grassland, are present within the area where construction activities may occur.

The approach to assessing terrestrial vegetation within the project site involved detailed surveys as follows:

> Confirming the baseline context for vegetation removal / retention established under the existing land use consent;

> Identifying the nature, location and scale of vegetation changes associated with the variation to consent conditions, and potential new areas of disturbance associated with the transmission line corridor and ancillary infrastructure;

> Assess vegetation values and sensitivities, including indigenous communities, threatened species and ecological functions – including around buffer areas from the internal access road network and hardstands;

> Considering the spatial extent of effects (i.e. modifications to CZ locations and tracking changes); and

> Evaluate cumulative or consequential impacts such as fragmentation, erosion, or vulnerability to weeds and pests.

7.7.2 Indigenous Vegetation Clearance Effects

As noted above, indigenous vegetation clearance has already been authorised under the existing land use consent and ecological compensation for the whole of Puke Kapo Hau has been provided in the form of a 59.2 ha QEII covenant area. This area has been actively managed in accordance with condition 14 of the existing land use consent and over the past 15 years has subsequently developed into indigenous vegetation dominated by dense snow tussock grassland and golden Spaniard. As a result, the area now comprises high-quality snow tussock vegetation and associated habitat values. See Figures 7.1 and 7.2 below – noting that the layout for Stage 2 has removed the consented turbine locations from the Scrappy Pines Block.

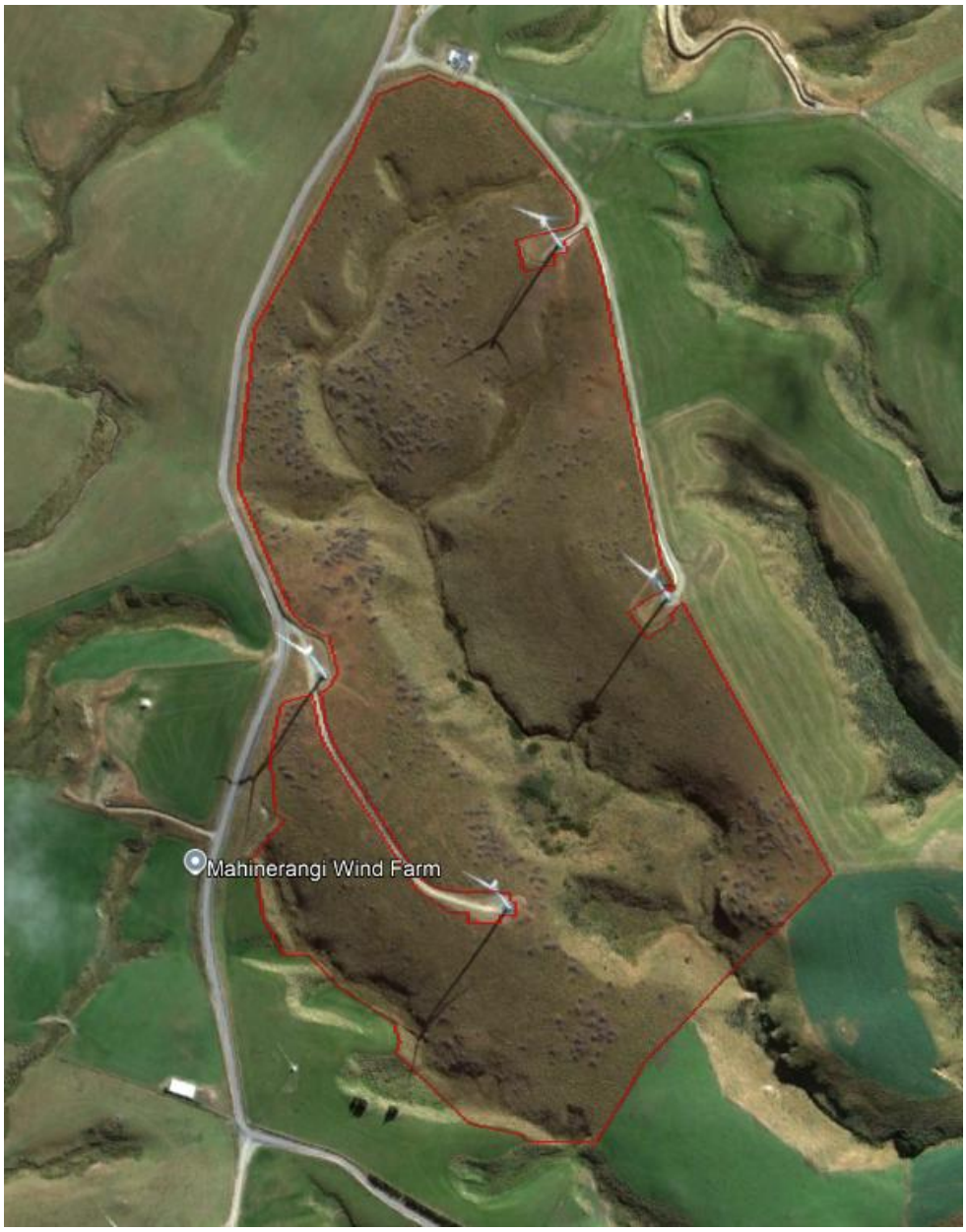


Figure 7.1: The "Scrappy Pines Block" (red) in 2013 showing the extent of felled wilding pines

Figure 7.2: Snow Tussock vegetation and associated habitats in the "Scrappy Pines Block" (2025)

Importantly, this compensation area has been established with Stage 2 of the wind farm in mind and provides a strategic and forward-looking response to compensating for vegetation clearance and disturbance to lizard habitat in the Stage 2 Wind Farm Development Area.

Although much of the indigenous vegetation clearance required for Stage 2 is authorised by way of the existing land use consent, there are some limited additional clearances associated with the changes proposed to the layout of the wind farm and the new activities proposed. SLR (2025) concludes that the Stage 2 layout will result in less potential clearance of snow tussock grassland, indigenous shrublands and wetlands. The reduction is due to a change in the CZ layout and a new configuration of SFD areas which avoid wetlands, as well as a reduction in the number of turbines and roads. In addition, the Thomas Block which contains high-quality snow tussock grassland will be completely avoided.

In respect of the transmission line corridor, 2 m^2 of snow tussock grassland and 1,222 m^2 of rough pasture with scattered snow tussocks will be cleared during construction of access tracks and erection of the transmission line pole structures.

SLR (2025) concludes that these effects will be minimal and sufficiently mitigated through the existing Scrappy Pines Block and the proposed wetland compensation site.

7.7.3 Loss or disturbance of threatened plant species

SLR (2025) has identified the transmission line corridor contains the at-risk wetland plant species *Epilobium chionanthum*. Although not identified in the 2025 surveys undertaken by SLR, *Carex tenuiculmis* had tentatively been identified within the wind farm site of Puke Kapo Hau.

To minimise actual or potential adverse effects on these at-risk plant species, a Carex Tenuiculmis and Epilobium Chionanthum Management Plan ("**C&EMP**") has been developed (refer to Part C.17).

The C&EMP requires:

- Identification of the presence of species within affected wetlands prior to works;
- Identification and pre and post-construction works monitoring to be undertaken;
- Guidance on collecting seed and propagating seedlings;
- Guidance on translocating to the Scrappy Pines Block and the wetland compensation site; and
- Bi-annual monitoring of new populations to ensure that the plants have been successfully established.

SLR (2025) concludes that with the implementation of these measures that the construction of Stage 2 of Puke Kapo Hau and the transmission line corridor will suitably avoid effects on threatened plant species.

7.7.4 Lizards

Blueprint Ecology (2025) (refer to Part B.08 – Lizard Assessment) assesses the actual and potential effects of Stage 2 of Puke Kapo Hau on lizards, and is summarised below.

Blueprint Ecology (2025) assesses lizard species and habitats known or predicted to be present in the Stage 2 Wind Farm Development Area and the transmission line corridor, and have used the same underlying vegetation clearance data set from SLR to assess the actual and potential adverse effects of Stage 2 of Puke Kapo Hau on the identified lizard values.

7.7.4.1 Lizard Species Potentially Affected

Tussock skink are classified as 'at risk' and are of high ecological value. In contrast, McCann's skink is classified as 'not threatened', is ubiquitous across the Otago Region and of low relative ecological value. Given the value of Tussock skink and their confirmed presence within the project site, this species was the focus of this assessment.

Blueprint Ecology (2025) found that:

> Tussock skink occupy a relatively narrow range of habitats (occurring in tussock lands, rough pastures, open shrublands and wetlands; and

> The vegetation clearance results in a loss of 14 ha of low quality, 14 ha of moderate quality, and 700 m^2 of high-quality habitat that is suitable for Tussock skink.

The assessment concludes that the loss of a very small scale of high value habitat and 28 ha of 'low to moderate' habitat is considered to be a 'low' magnitude of effect, which results in a 'low' level of effect. Importantly, the amended layout avoids the best habitats for lizards that have been consented for development, including the Thomas Block and Scrappy Pines Block QEII covenant area.

Nevertheless, the clearance of indigenous vegetation will result in the loss of some suitable lizard habitat. In order to maintain indigenous biodiversity values, ecological compensation in the form of habitat enhancement / creation is proposed. A mitigation ratio of at least 1:1 is proposed to ensure that residual effects on lizard populations are appropriately compensated and that broader biodiversity outcomes are upheld.

The loss of 14 ha of low quality, 14 ha of moderate quality, and 700 m^2 of high-quality habitat has been redressed in advance through the implementation of 59.2 ha of high-quality habitat within the Scrappy Pines Block QEII covenant area. Blueprint Ecology (2025) considers that this provides excellent habitat for lizards and offsets the effects of the loss of habitat at a 2:1 ratio (inclusive of effects from Stage 1 of the wind farm) such that there is a long-term positive effect with regards to lizard habitat values.

The Scrappy Pines Block QEII covenant area also offers additional high-quality lizard habitat, which means that there are sufficient resources for relocated lizards and consequently the carrying capacity of the site is expected to be very high and much greater than the existing population levels. In addition to the increase in suitable habitat, ongoing predator control has been undertaken, and it has been demonstrated that up to a four-fold increase in lizard numbers can be achieved in areas subject to intensive mammalian predator control.[26] The predator control programme is to be enlarged for Stage 2 as detailed in the Mammalian Pest Management Plan.

Furthermore, TWP is proposing a wetland compensation site. The site will be fenced and the land retired and legally protected by a restrictive covenant or similar legally binding mechanism, and over time this area will provide further high-quality habitat for lizards.

[26] Reardon et al., 2012; Norbury et al., 2022.

The averted loss of habitat associated with the proposed changes to the Stage 2 layout will directly balance the loss of habitat associated with the new consent works, and no further consideration of offsetting/ compensation is required.

7.7.4.2 Lizard Management Plan

To minimise adverse effects to lizards during construction, a Lizard Management Plan ("**LMP**") has been prepared (refer to Part C.15) which follows good practice guidance (DOC 2019). Wildlife approvals are also sought to handle, salvage, relocate and incidentally kill lizards in order to enable to undertake vegetation clearance and earthworks within the project site and these are addressed in Section A.12 (Approvals Relating to the Wildlife Act 1953).

The purpose of the LMP is to describe the methodological approach to the salvage of lizards prior to earthworks and vegetation clearance; the relocation of these lizards to a suitable site; and the management of this release and relocation site thereafter.

The LMP includes:

- Salvage operations required before vegetation clearance in moderate and high-quality habitats;
- Deploying a minimum of 600 artificial cover objects (lizard traps) within the best habitats for lizards and checking these a minimum of five times (2,000 checks);
- Salvage to occur October–April in suitable weather (≥12°C, low wind/rain);
- Methods the project herpetologist will take to ensure no viable lizard habitat remains;
- Lizards to be relocated within 2 hours of capture to the release site;
- Relocating lizards to the Scrappy Pines Block QEII covenant area;
- Predator control (including details of trapping and baiting) to continue for 3 years post release;
- Post-release monitoring focusing on population establishment and spread. Annual monitoring for 3 years using artificial cover objects; and
- Reporting requirements (compliance and monitoring).

This management approach will ensure that lizards are relocated, and any residual effects associated with lizard injury / death during construction of the wind farm will be negligible.

Overall, following the implementation of the LMP, and with the new habitat provision as outlined above, Stage 2 of Puke Kapo Hau and the transmission line will provide for positive effects on the Tussock skink.

7.7.5 Bats

Habitat NZ (2025) undertook comprehensive acoustic monitoring surveys during valid periods of likely high bat activity and in locations that included major habitat features expected to be used by bats (if they were present within the project site).

The monitoring surveys yielded zero bat passes, with the site representing low quality bat habitat. In addition, there are no recorded bat observations within a 50 km radius of the project site.

The above findings, taken together, provide evidence that the project site is not utilised by long-tailed bats or lesser short-tailed bats for roosting, foraging or commuting purposes. As such, Stage 2 of Puke Kapo Hau will have no effects on bats.

Refer to Part B.09 - Native Bat Assessment for further detail.

7.7.6 Terrestrial Invertebrates

SLR (2025) notes that the major potential impact of wind farms on terrestrial invertebrates is through habitat loss and fragmentation.[27] Different aspects of the wind farm construction and operation can impact invertebrate species differently. Impacts can also differ between the life stages of the same species.

SLR (2025) consider that existing agricultural modifications are likely to have already changed invertebrate diversity and abundance at the wind farm site and further agricultural operations are likely to continue. For these reasons, impacts on terrestrial invertebrates from the variations to the land use consent and new activities are expected to be minimal.

Any adverse effects on invertebrates will be appropriately mitigated through rehabilitation of the construction works. This will include:

> The creation of stable landforms to establish vegetation cover (which may include pasture) and erosion-resistant surfaces that have characteristics that favour growth of sustainable plant communities and manage run off and sediment generation;

[27] Elzay et al. 2017, Weschler and Tronstad 2024.

- Rehabilitation and monitoring of snow tussock grassland within the Scrappy Pines Block QEII covenant area and wetland and aquatic compensation sites as set out in the Wetland and Aquatic Compensation Plan ("**WACP**") as set out in Part C.11;
- Rehabilitation and monitoring of waterbodies subject direct effects;
- Weeds control; and
- Ensuring that the land occupied by construction buildings and areas utilised for hard stand areas or stormwater bunds are re-contoured and rehabilitated back to pasture.

The details of this are within the Rehabilitation Management Plan ("**RMP**") as set out in Part C.09.

7.7.7 Weed Introduction Effects

There is potential for weed introduction to the project site on vehicles or in construction materials.

Condition 25D of the existing land use consent states that woody weeds will be managed according to the Woody Weed Management Plan ("**WWMP**") as set out in Part C.16. The objective of the WWMP is to set out the procedures and methods to control the spread of woody weeds within the project site (and the transmission line corridor) and describe the monitoring methods to demonstrate how the conditions consent will be met.

Of note, the WWMP sets out the requirements regarding vehicle use, vehicle hygiene, sourcing of weed-free construction materials, prompt revegetation of bare earth following earthworks, and weed monitoring and control. Therefore, the adverse effects of weeds on existing terrestrial ecological values are likely to be very low.

7.8 NATURAL INLAND WETLAND EFFECTS

The NPS-FM sets out the national direction for the management of natural inland wetlands. Subpart 3 contains provisions that regulate activities in or affecting wetlands, including restrictions on the loss of extent or values (Clause 3.22), exceptions for specified infrastructure (Clause 3.22(1)(b)), and the requirement to demonstrate functional need where such activities are proposed (Clause 3.22(1)(a)). The NPS-FM also prescribes an effects management hierarchy (Clause 3.21), which requires adverse effects to be addressed in a particular manner. Those provisions are reflected in the NES-F and in particular Regulation 45.

As identified by SLR (2025) within Part B.06, the project involves direct effects to natural inland wetlands (works within or within 10 m of wetland) and indirect effects (works within 100 m of a wetland).

This section first identifies the direct and indirect effects of the project on wetlands, before addressing the matters that must be considered under the NPS-FM.

7.8.1 Direct Effects on Wetlands

There are two instances where there is a functional need for the works associated with the wind farm (tracks or associated earthworks) to be located within a wetland and it is not practicable to avoid doing so. These relate to the installation of a culvert in the Lee Stream Tributary / Wetland 20 and where an existing farm track is to be replaced with a new track crossing through (and perpendicular) to Wetland 43.

In total, approximately 476 m^2 (0.05 ha) of natural wetlands will be directly affected by track works.

7.8.1.1 Wetland 20 – Lee Stream Tributary

SLR (2025) estimates 154 m^2 of wetland will be lost to construct a road crossing and install the Lee Stream Tributary culvert.

It is important to note that there is an existing farm track which crosses the stream immediately downstream of the works site which also contains an existing culvert. Works in this area was contemplated under the existing land use consent, and it is identified as "Development within Constrained Area D" on Site Development Layout Map BMP W07190/1. The existing track crossing location is only suitable for light vehicles and does not provide a suitable vertical geometry for heavy vehicle construction traffic.

The functional need for this work is discussed in section 7.8.4.2 below.

In this respect, the existing farm track and culvert will be removed and replaced and the stream habitat remediated. The exotic wetland plant species currently present in the wetland will naturally colonise the site post works.

To the northwest and upstream of the existing culvert, the wetland is located in and alongside a small waterway surrounded by grazed pasture. The waterway has been previously channelised with piles of sediment located along the stream edge. Wetland vegetation was dominated by the exotic jointed rush (80% cover), but four obligate wetland species were also present. Grazed pasture encroaches on the wetland on all sides (as illustrated in Figure 7.3 below).

Figure 7.3: Wetland 20 - Upstream of the Existing Farm Track Crossing and Culvert

The location of Wetland 20 is shown in Figure 7.4 below:

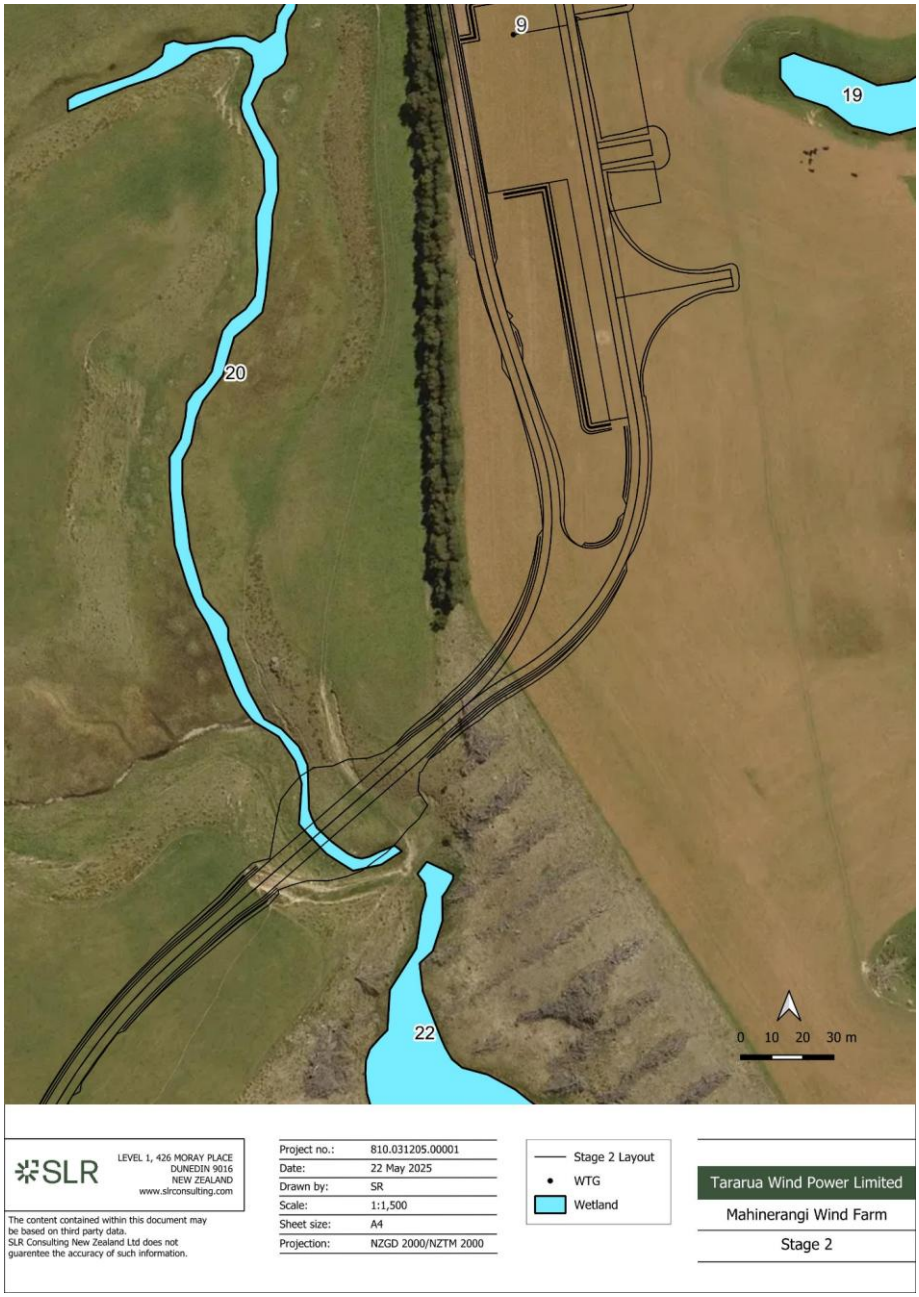


Figure 7.4: Location of Wetland 20 to the South of Turbine 9

7.8.1.2 Wetland 43 – South of Turbine 20

SLR (2025) estimates that 322 m^2 of wetland will be lost at this site due to track construction. The wetland is already severed by an existing farm track. However, it is not practicable to utilise the track as it does not provide a suitable vertical geometry and is too narrow.

The functional need for this work is discussed in section 7.8.4.2 below.

Immediately to the east of the existing track, the vegetation has a high cover of exotic pasture species, but the presence of an indigenous sedge, several facultative wetland species, and peaty wetland soils indicates the presence of a wetland. Further to the east, the cover of tall rushes and the presence of sphagnum moss and other associated species indicates the wetland extends further downstream. This indicated by the arrow in Figure 7.5 below.

Figure 7.5: Wetland 43 - Located East of the Existing Farm Track

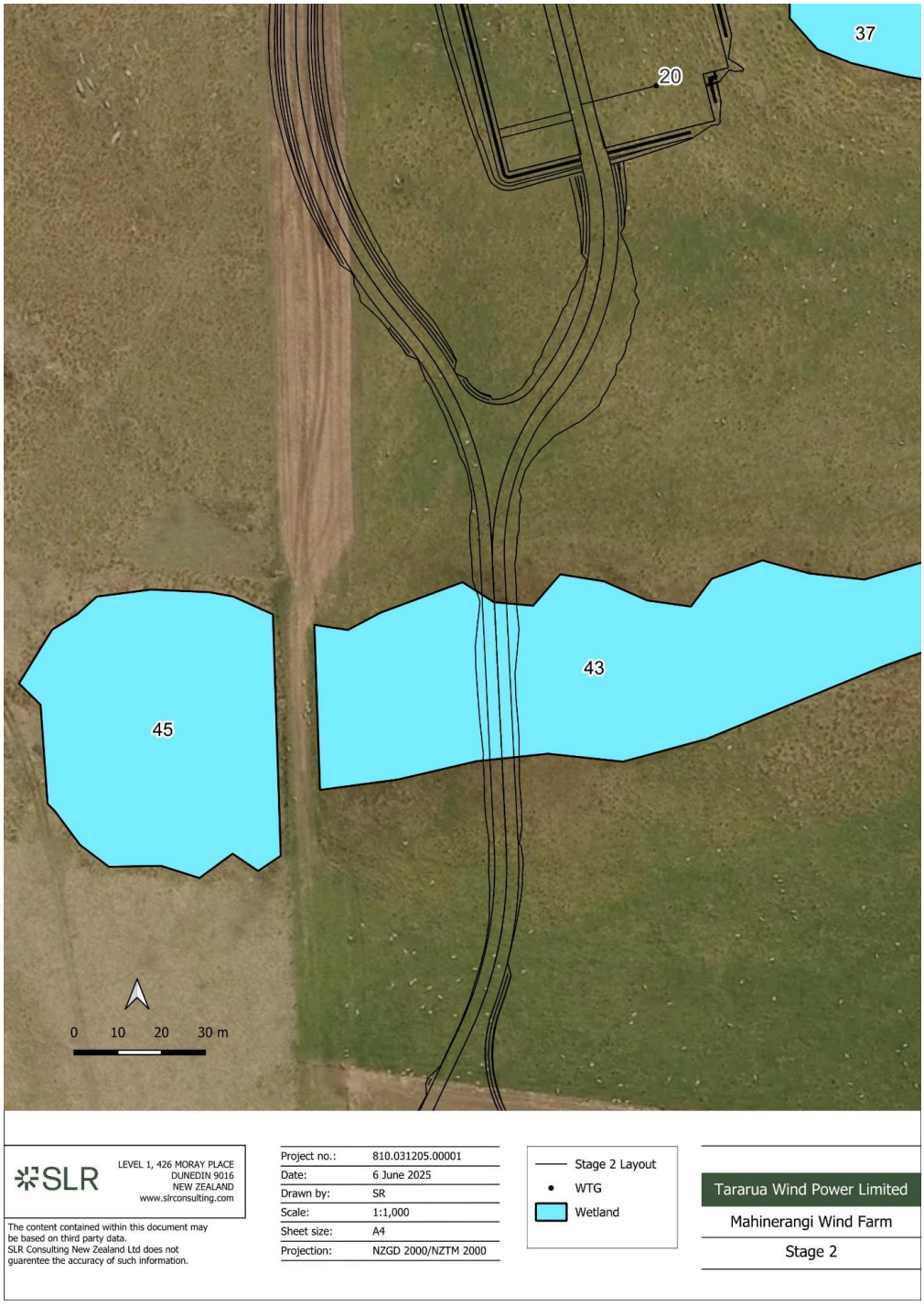


Figure 7.6: Location of Wetland 43 to the South of Turbine 20

7.8.2 Effects on Wetlands within 10m of works

There are three instances where there is a functional need for works associated with the wind farm (tracks or associated earthworks) to be located within 10 m of a wetland and it is

not practicable to avoid doing so. These relate to tracks to Turbines 5, 25 and 26 (and Wetlands 15, 68 and 69) and a crane platform fill batter north of Turbine 20 (Wetland 43).

There are three instances where there is a functional need for works associated with the transmission line (tracks or associated earthworks) to be located within 10 m of a wetland and it is not practicable to avoid doing so. These relate to tracks near Wetlands T15, T26, T27, T28 and T30. These occurrences are shown in Figures 7.7 and 7.8 below.

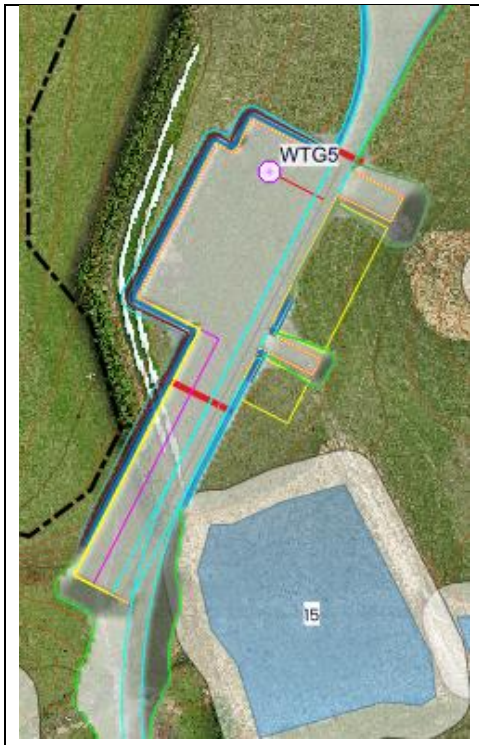
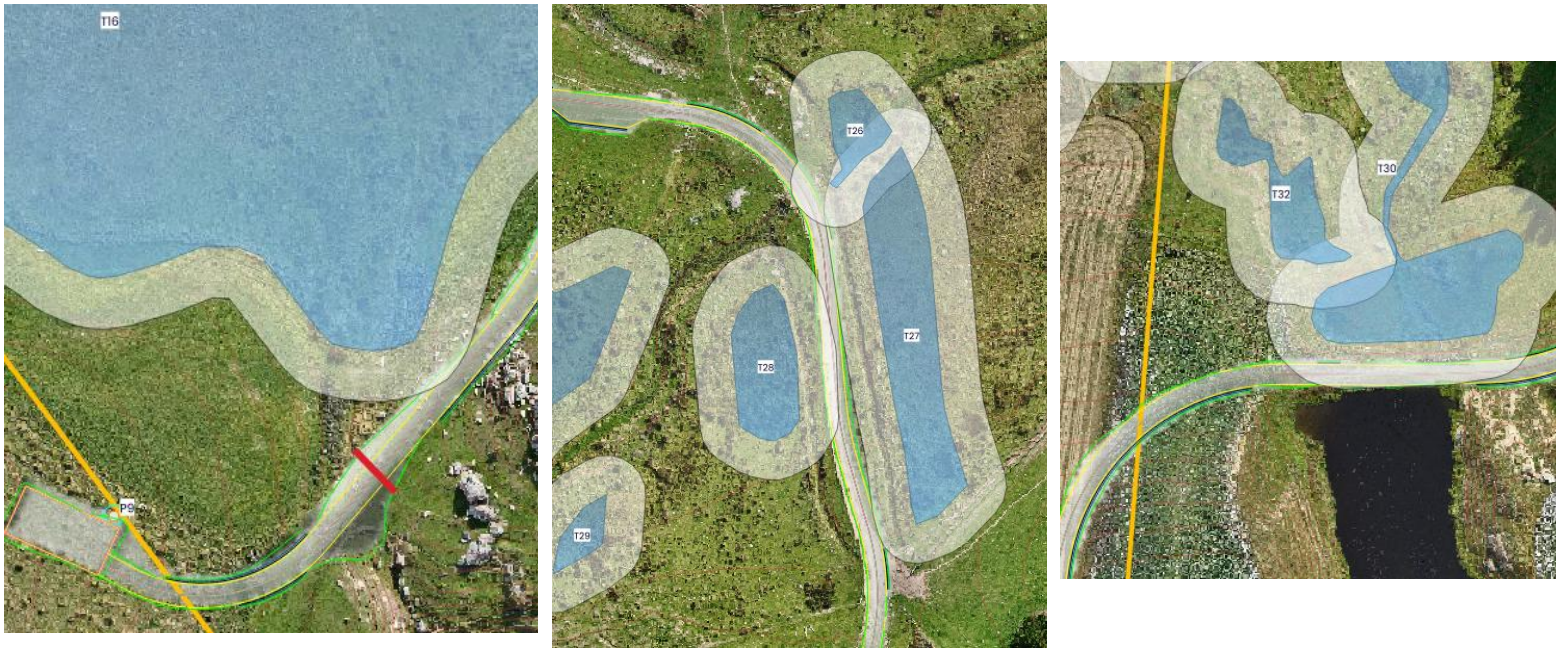
		
Wetland 15 – Turbine 5 track	Wetlands 68 and 69 – Turbines 26 and 26 track	Wetland 37 – Crane platform/batter

Figure 7.7: Three occurrences of functional need for the works associated with the wind farm to be located within 10 m of a wetland



Wetland T16 | Wetlands T26, T27, T28 | Wetland T30

Figure 7.8: Three occurrences of functional need for the works associated with the transmission line to be located within 10 m of a wetland

It is noted that there are no wetlands within or within 10 m of the BESS, concrete batching plant, O&M Facility, substation, site compound, SFD areas, or CZ.

7.8.3 Indirect Effects on Wetlands

SLR (2025) estimates that 32.91 ha of natural wetlands are found within 100 m of works sites for Stage 2 of Puke Kapo Hau and transmission line corridor. Many of these are in gullies, where works are avoided.

The potential indirect effects on wetlands within 100m of the proposed construction works include changes to wetland hydrology and sedimentation. However, the implementation of high-quality erosion and sediment control measures (as provided for through the Earthworks Management Plan ("**EMP**") in Part C.02), will ensure that sedimentation effects on these wetlands are mitigated.

The potential for hydrological effects on wetlands within 100 m of the proposed construction was assessed by assessing the location of planned drainage culverts in relation to roads, turbine platforms, wetland location, and local topography. The culverts and the design of the roading network and turbine platforms is such that any rainwater and runoff throughout the site will be directed back into downslope wetlands within the same catchment area. It is therefore considered that the hydrology of all wetlands will be maintained.

Wetland monitoring will be undertaken in accordance with the Wetland Monitoring and Management Plan ("**WMMP**") provided in Part C.11. The WMMP describes the actions required to ensure that natural wetlands located within 100 m of works are not adversely affected by construction activities. This monitoring will ensure that any unanticipated effects on the hydrological function of wetlands in proximity to the wind farm construction works will be identified and the appropriate remedial actions undertaken.

7.8.4 NPS-FM

Clause 3.22 (b) of the NPS-FM outlines that the loss of wetland extent is to be avoided, except where the regional council is satisfied that:

(i) the activity is necessary for the purpose of the construction or upgrade of specified infrastructure; and

(ii) the specified infrastructure will provide significant national or regional benefits; and

(iii) there is a functional need for the specified infrastructure in that location; and

(iv) the effects of the activity are managed through applying the effects management hierarchy;

These matters are discussed in turn, within the following subsections.

7.8.4.1 Specified Infrastructure

The project is for the purpose of constructing specified infrastructure that provides significant regional and national benefits. These benefits are outlined within Section A.03 (Introduction) of this substantive application.

7.8.4.2 Functional Need

A functional need (as defined in the NPS-FM) means "*the need for a proposal or activity to traverse, locate or operate in a particular environment because the activity can only occur in that environment*". The functional need for access tracks/crossings is described below:

Table 7.1: Functional Need Test for Wetlands

Wetland	Purpose of Works	Functional Need for Location
Direct Effects of Access Tracks on Natural Inland Wetlands		
20	An existing culvert and farm track crossing will be replaced with a new culvert and track crossing located approximately 25 m to the northwest.	As identified on BMP W07190/1 of the land use consent, the crossing of Wetland 20 at the Lee Stream Tributary is unavoidable. The existing track crossing location is only suitable for light vehicles and does not provide a suitable vertical geometry for heavy vehicle construction traffic. The proposed new crossing location provides the required vertical alignment for the track route and optimal alignment of the proposed stream culvert.
43	An existing farm track is to be replaced with a new track crossing through (and perpendicular) to the wetland.	Wetland 43 is already severed by an existing farm track. However, it is not practicable to utilise the track as it does not provide a suitable vertical geometry and is too narrow. The new crossing will be more centrally located on the ridgeline which will provide the required vertical alignment for the track route. Being centrally located on the ridgeline supports the overland flow path of the wetland as it naturally falls to the east and west – so there is no effect on wetland hydrology.
Effects on Works within 10 m of Natural Inland Wetlands		
15	Proposed access track will be located within 10 m of wetland extent.	Proposed track and temporary Turbine 5 hardstand area is threaded through narrow gap between Wind Farm Site Boundary and Wetland 15 – so not possible to maintain the 10 m setback. Culverts will be installed to maintain wetland hydrology.

Wetland	Purpose of Works	Functional Need for Location
68 and 69	Proposed Track will be located within 10 m of wetlands.	The proposed track is threaded through narrow gap between Wetlands 68 and 69 – so not possible to maintain the 10 m setback. Culverts will be installed to maintain wetland hydrology.
37	Turbine 20 Auxiliary Crane platform fill batter located within 10 m of wetland.	Due to the presence of wetlands to the north and south, no other suitable land is available to accommodate the required fill batter. Therefore Turbine 20 has been situated/orientated to make best use of the terrain and area between wetlands. Runoff will sheet flow across the platform – so wetland hydrology will be unaffected.
T16	Proposed access track within 10 m of wetland.	The track cannot move any further to the southeast due to significant rock exposures. Very minor encroachment into the 10 m buffer.
T26, T27, T28	Proposed access track within 10 m of wetland.	Proposed access track threaded through narrow gap between adjacent wetlands – follows existing farm track. Minimal earthworks required – minor trimming of subgrade and pavement construction only.
T30	Proposed access track within 10m of wetland.	Follows an existing access track. Minimal earthworks required minor trimming of subgrade and pavement construction only.

7.8.4.3 Effects Management Hierarchy

Regulation 45(6) of the NES-F requires the effects management hierarchy (as defined in the NPS-FM) be applied. Clause 3.22(2)(b) of the NPS-FW requires a demonstration of how each step in the 'effects management hierarchy' will be applied to any loss of wetland values.

In implementing the effects management hierarchy to manage effects on wetlands as a first priority, TWP has sought to avoid effects, and where avoidance is not practicable, TWP will minimise and remedy these effects. Following the implementation of these measures, some more than minor residual effects will remain, and TWP is proposing to compensate for these effects. Offsetting is not proposed. The details of this are summarised below.

Avoidance of Effects

The proposed design avoids direct impacts on all natural inland wetlands except at two locations where the access roading cannot practicably avoid them. Avoidance of these two wetlands is not practicable for the reasons set out in the functional needs assessment in Table 7.1 above.

Minimisation and Remediation of Effects

Measures to minimise adverse effects on natural inland wetlands have included:

> Refining the construction design based on the identified ecological values in order to avoid adverse effects. This has included relocation of CZ and SFD boundaries and roading;

> Limiting physical disturbance works to only the extent necessary to enable construction of the required infrastructure;

> Undertaking works in accordance with the erosion and sediment controls in the EMP to reduce any potential deposition of sediment in downstream wetlands; and

> Maintaining surface water flows to the same wetlands that would have received those waters prior to works by way of roadside drains and culverts and retention of natural contours where possible.

Offsetting

Biodiversity offsetting is not proposed for wetlands, as it is not possible to create like-for-like wetlands to replace those lost due to the difficulty in creating peat bogs and a lack of available gully sites within the wind farm site (all available sites already have wetlands).

Compensation

It is proposed to compensate for the loss of 154 m^2 of Wetland 20 and 322 m^2 of Wetland 43, a total area of 0.05 ha. The WACP (refer to Part C.11) details the wetland compensation site. The objectives of the WACP are set out in Part A.08 (Management Plan Structure) of this substantive application.

The wetland compensation site (“**WCS**”) is located adjacent to the transmission line corridor (refer to Figure 7.9) The site will be fenced and the land retired and legally protected by a restrictive covenant or similar legally binding mechanism.

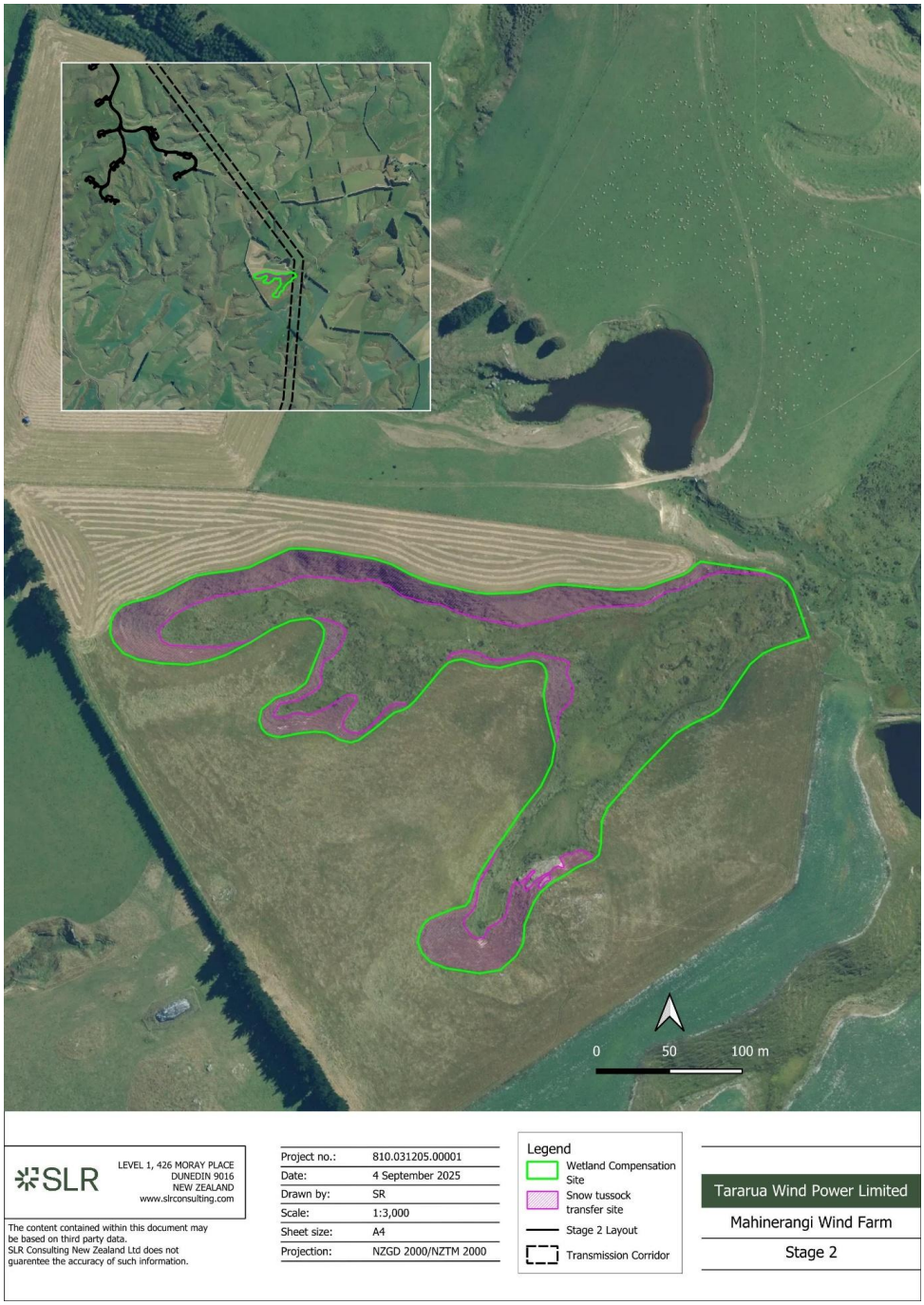


Figure 7.9: Proposed Wetland Compensation Site

The proposed WCS comprises a shallow gully system containing wetlands that are similar to the wetlands directly affected by the proposed works. The wetlands are fed by surface water flowing into the gully from the surrounding peneplain surface and two farm dams via overflow culverts. Due to the presence of peaty soils and regular rainfall, the wetlands remain wet for most or all of the year, as indicated by the presence of a range of obligate wetland species including extensive areas of sphagnum bog.

Like all wetlands within the project site, the wetland is modified by exotic plant species and the presence of farm stock which graze and trample the vegetation and increase nutrient levels. Channelisation of the stream path has occurred within the wetland and there is a vehicle track with a culvert on the northeastern boundary of the wetland compensation site. A small rock outcrop is present in the southern part of the site.

Exotic grassland dominates the vegetation on gully walls within the compensation site, but patches of narrow-leaved snow tussock and golden speargrass (*Aciphylla aurea*) are present in a few areas as well as the at-risk plant species *Carex tenuiculmis*. Other wetland species such as pūrei (*Carex secta*), rautahi (*Carex coriacea*), and rushes (*Juncus* spp.) are also present and likely to recover and spread once stock are removed.

The WCS contains an estimated 1.4 ha of wetland habitat (over a 5.7 ha site), over 29 times more than the 0.05 ha of wetland directly affected at the two identified locations that cannot be avoided. In addition, the site contains 1.5 ha of exotic grassland on gully walls, which is more than the 1.3 ha required by the RMP (Part C.10). The gully walls will be used to transfer of snow tussocks sourced from works areas and planted with a minimum of 550 eco-sourced plants including flax, hebe, toetoe, broom and shrubs.

The measures proposed within the wetland compensation site are set out in Table 7.2 below.

Table 7.2: Measures proposed within the Wetland Compensation Site

Measure	Details	Benefits
Fencing	The fence will be located at the top of the gully wall, and set back from the edge of the wet area/gully bottom by at least 10 m. The fence will be permanent and comprise wooden posts and wire strands and be adequate to exclude cattle and sheep, similar to existing fences in the vicinity. Gates or stiles may be installed to aid access for planting and maintenance activities.	> Protection of any existing population of Carex tenuiculmis. > Removal of a direct source of nutrient inputs from stock. > Recovery of soils from disturbances caused by stock. > Allows formation of vegetative buffer to wetland.
Woody weed monitoring and control	Pest plant control will comply with the Woody Weed Management Plan (Part C.15). All pest plants listed in the Otago Regional Pest Management Plan 2019-2029 and any other woody weed species should be controlled prior to snow	> Preventing displacement of existing and planted snow tussock grassland by exotic shrubland.

Measure	Details	Benefits
	tussock transfer and for four years after construction and rehabilitation has been completed, or for such a period until these species cease colonising the areas disturbed by the construction activity.	> Maintenance of and improvements in indigenous biodiversity.
Snow Tussock direct transfer	Snow tussock direct transfer will be undertaken according to the requirements outlined in the RMP (Part C.09).	> Increasing vegetation cover, which will buffer the wetland habitats from surrounding land uses. > Increasing indigenous cover and biodiversity. > Increasing the extent of protected habitat for indigenous terrestrial invertebrates. > Providing additional habitat for lizards.
Additional Planting	Planting of range of eco-sourced indigenous plant species in wetland and on riparian margins.	> Increasing vegetation cover, which will buffer the wetland habitats from surrounding land uses. > Increasing indigenous cover and biodiversity. > Increasing the extent of protected habitat for indigenous terrestrial invertebrates. > Providing additional habitat for lizards.
Legal Protection	The wetland compensation site will be protected by an appropriate legal mechanism.	To ensure the wetland compensation persists for the long term and at least the life of the wind farm.
Monitoring	The transferred snow tussocks will be monitored according to the RMP (Part C.10).	To ensure compensation area is functional.

Measure	Details	Benefits
	The fence will be monitored for breaches on an annual basis. To illustrate the works undertaken and inform review and reporting purposes, photographs will be taken at the compensation sites prior to works and then, at a minimum, following fence construction, and at 1- and 2-years following snow tussock transfer/planting.	

With all the effects management measures proposed as part of this application, there will be a net gain in wetland values while allowing for specified infrastructure to be built (which will have significant national and regional benefits).

7.9 AQUATIC ECOLOGY EFFECTS

SLR – Aquatic (2025) (refer to Part B.07 – Ecological Assessment: Aquatic Ecology) assesses the effects of the project on aquatic habitat and fauna and is summarised below.

Construction activities undertaken, including management of water at the works sites, will be undertaken away from watercourses due to the design of Puke Kapo Hau components to avoid watercourses. There is an exception for one works site in the Lee Stream tributary where avoidance of the watercourse is not practicable due to the construction of a longer culvert (to replace an existing shorter culvert).

Other construction and operational effects on aquatic ecology are largely managed through design layout, stormwater management and erosion and sediment control and these matters are detailed at Section 7.11 below.

7.9.1 Effects on Aquatic Ecology - Lee Stream Tributary Culvert

As previously noted, the installation of the new culvert in the Lee Stream tributary is the only component of Stage 2 of Puke Kapo Hau that cannot avoid works within a watercourse. This tributary contains Eldon's galaxias. The Otago RPS 2021 determines that this stream is 'significant' given the presence of this species.

To manage adverse effects on aquatic ecology, the project will implement best practice construction methods including timing of construction; erosion and sediment controls; water quality monitoring; fish salvage of galaxias; and design which allows for fish passage.

In addition, compensation is provided for habitat loss. Each of these is discussed in turn in the subsections below.

7.9.1.1 Culvert Construction Methodology

Implementing best practice construction methodologies will minimise the impact of culvert construction on waterbodies as far as practicable. In this case, the temporary stream diversion works during culvert installation will be relatively straight forward and low impact when using a construction methodology/sequence as envisaged below:

Phase 1:

> As far as is practical undertake works during dry/low flow periods where no significant rain is forecasted;

> Construct diversion bunds to divert clean water runoff away from the working area;

> Construct non-erodible dams (using sandbags or similar) at the upstream and downstream end of the culvert. Form temporary/isolated stream diversions to direct stream flow around bunded areas. Downstream dam to feature a T-bar decant to drain the works area if required to keep the area dry from groundwater/water leakage;

> Offline from stream - construct culvert, wingwalls, riprap aprons, place riprap within the culvert as per design;

> Place and compact backfill material around the culvert to the soffit levels of the pipe/s; and

> Remove diversion bunds, and upstream and downstream dams - allowing flows to pass through the new culvert.

Phase 2:

> Install silt fences around the base of the fill embankment;

> Continue with backfill over the culvert and forming of the fill embankment;

> Form sediment control measures for approach tracks (e.g. drop out pits) and commence earthworks to form the tracks;

> Existing farm track crossing and culvert to be removed and area remediated (undertake works during low-flow dry period); and

> Stabilize the earthworks area and remove sediment controls.

7.9.1.2 Sedimentation Effects

Construction works and installation of the new Lee Stream tributary culvert in accordance with the construction methodology outlined above, and in combination with erosion and sediment control measures as set out within the EMP will avoid or minimise any adverse ecological effects relating to potential sedimentation of the waterbody.

Monitoring of suspended sediment concentrations in the water column and deposited sediment cover on the stream bed is proposed in the stream upstream and downstream of the culvert immediately prior to instream works commencing, during the culvert installation works, and following completion of the installation works.

A Water Quality Monitoring Plan ("**WQMP**"), provided in Part C.09, has been prepared to outline requirements of a water quality monitoring programme to demonstrate the effectiveness of site-specific erosion, stormwater and sediment control measures during culvert installation on the Lee Stream.

Given the above, it is considered that potential sedimentation effects will be appropriately avoided and / or minimised during construction works.

7.9.1.3 Fish Salvage

During culvert construction, the stream will be temporarily diverted and disturbance of the bed of the watercourse will be required.

Given the presence of Eldon's galaxias in the stream, recovery of galaxias is proposed from the new culvert site prior to works commencing and relocating them to suitable habitats. The preferred release site for salvaged galaxias is in the lower reaches of the true right branch of the stream, upstream of the existing culvert. Upon release, galaxias shall be distributed over, at minimum, a similar length of stream as they were caught.

Details of fish salvage are provided in the Native Fish Recovery Plan ("**NFRP**") provided in Part C.13. The objective of the FRP is to minimise actual or potential adverse effects on Eldon's galaxias within the stream reach that will be impacted by the culvert works and demonstrate how the conditions of consent will be met.

Installation of the culvert will ideally be undertaken during dry / low flow periods between January and March, which will avoid the spawning period for Eldon's galaxias (October to November) and subsequent hatching of eggs about a month or so later. As Eldon's galaxias are non-migratory and therefore do not undertake extensive migrations as part of their life cycle, the temporary diversion of water around the works site will not adversely affect the fish present in the stream.

7.9.1.4 Fish Passage

Clause 3.26(1) of the NPS-FM requires that every regional plan must include the following policy objective:

> *"The passage of fish is maintained, or is improved, by instream structures, except where it is desirable to prevent the passage of some fish species in order to protect desired fish species, their life stages, or their habitats."*

Fish passage will be provided for at the new culvert, with civil engineering design undertaken in line with fish passage best principles from the New Zealand Fish Passage Guidelines Version 2.0. The design will preserve the current grade of the stream, and the culvert will be embedded in the streambed material such that the natural streambed can establish through the culvert.

In addition, the culvert will comply with Regulation 70 of the NES-F, which provides for the placement, use, alteration, extension, or reconstruction of a culvert as a permitted activity, provided specified conditions are met. These conditions include requirements relating to culvert dimensions, placement, and fish passage. Compliance with these conditions ensures that the structure maintains or improves fish passage and avoids adverse effects on the bed and flow of the stream.

Accordingly, the new culvert will provide positive fish habitat effects with natural bed substrate distributed along the base of the culvert and substrate to be shaped to ensure a deeper, low flow channel is maintained to avoid creating low flow barriers for Eldon's galaxias.

7.9.1.5 Reduction in Habitat

Given the length of the new culvert compared to the shorter existing culvert, any reduction in habitat will be compensated for as detailed in Section 7.9.2.2 below.

7.9.2 NPS-FM

Clause 3.24(1) of the NPS-FM requires every regional council to include a policy in its regional plan that states:

> *"the loss of river extent and values is avoided, unless the council is satisfied that:*
>
> *(a) there is a functional need for the activity in that location; and*
>
> *(b) the effects of the activity are managed by applying the effects management hierarchy."*

7.9.2.1 Functional Need

As identified on BMP W07190/1, the crossing of the Lee Stream tributary is unavoidable in order to provide access to the wind farm.

The existing track crossing location is only suitable for light vehicles and does not provide a suitable vertical geometry for heavy vehicle construction traffic. The proposed new crossing location provides the required vertical alignment for the track route and optimal alignment of the proposed stream culvert.

7.9.2.2 Effects Management Hierarchy

Avoidance of Effects

The design of Stage 2 of Puke Kapo Hau avoids direct impacts on rivers and streams, except at the Lee Stream tributary where the access roading and associated culvert reconstruction cannot practicably avoid it (and as discussed in the subsection above). Avoidance is not practicable for the reasons set out in the functional needs assessment above.

Minimisation and Remediation of Effects

Measures to minimise and remediate adverse effects on the Lee Stream tributary have included:

- Limiting the culvert length and footprint to the minimum extent necessary;
- Fish will be salvaged and translocated prior to instream works;
- Fish passage will be provided through the length of the culvert installed and include a natural bed substrate to provide similar/better habitat than currently present, with meandering channels along the base of the culvert; and
- Best practice guidelines for culvert installation and sediment / erosion control to be followed.

It is noted that there is also habitat provided by the Scrappy Pines Block QEII covenant area. This covenanted area is fenced, planted with snow tussock and protects stream habitats for Eldon's galaxias and freshwater crayfish.

Compensation

A minimum of 50 m of stream length at the downstream end of the tributary is required to be fenced as compensation for adverse effects on aquatic values. A WACP (Part C.11) provides details on the aquatic compensation site. The objectives of the WACP are to compensate for biodiversity and habitat loss and that cannot be avoided, minimised or remedied; and to ensure no net loss of ecological values.

The aquatic compensation site is proposed near Turbine 9 in an upper tributary of the Lee Stream (Figure 7.10).

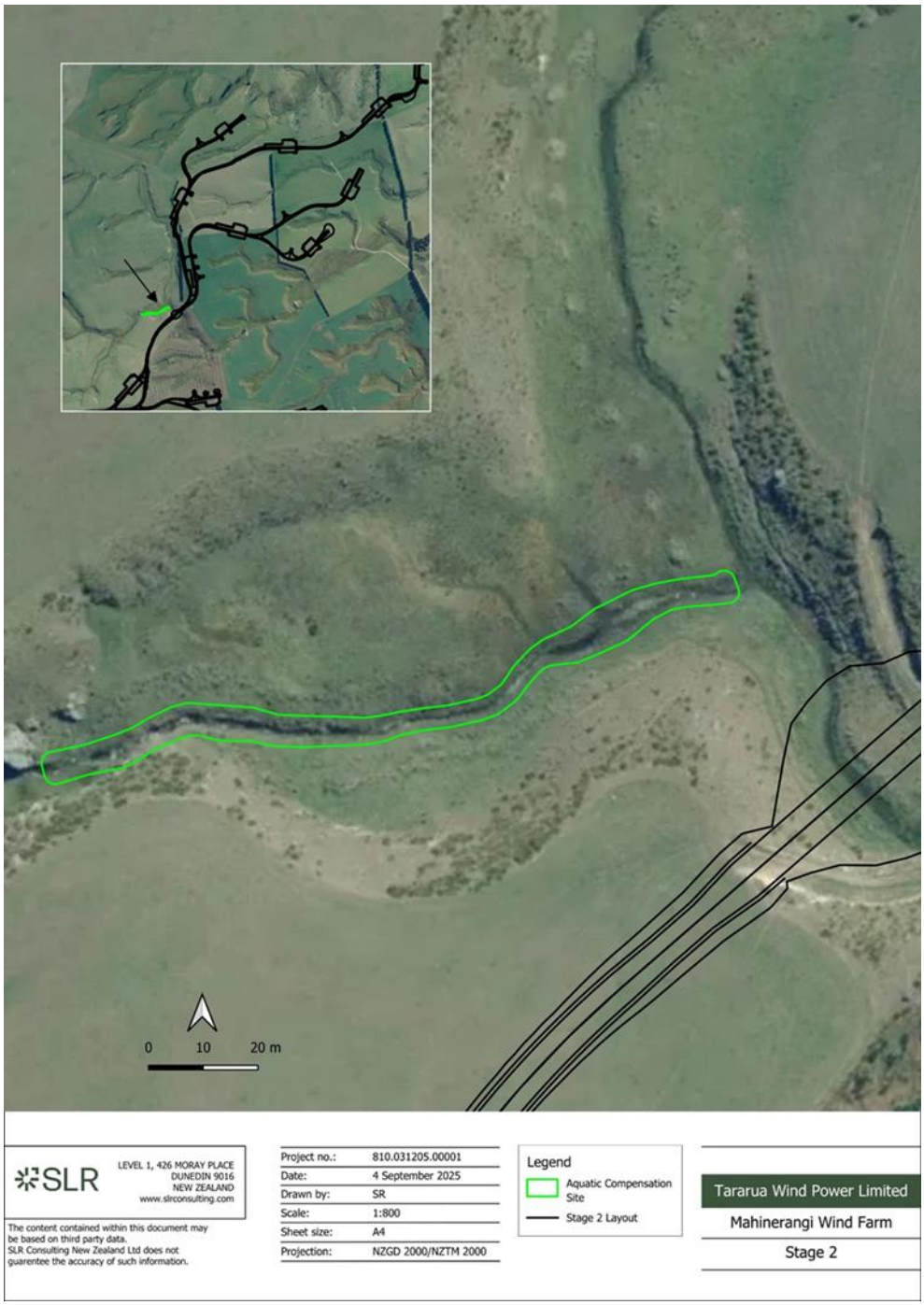


Figure 7.10: Aquatic Compensation Site

The stream in the Aquatic Compensation Site has gravel and cobble substrates and a variety of invertebrate and fish habitats among small pools, riffles, and runs. During dry periods the

stream can be reduced to minimal amounts of water flowing through vegetation. The banks are exposed to stock and in places have little vegetation cover aside from grazed pasture. The stream provides habitat for Eldon's galaxiid.

The Aquatic Compensation Site will be fenced and planted with snow tussock which will provide a strip of undisturbed indigenous vegetation alongside the waterway which will help buffer the wetlands and stream from surrounding land uses, ultimately ensuring a net gain in aquatic (i.e. provide protection of habitats where Eldon's galaxias) values within the wind farm site.

The measures proposed within the Aquatic Compensation Site are set out in Table 7.3 below:

Table 7.3: Measures proposed within the Aquatic Compensation Site

Measure	Details	Benefits
Fencing	The fence will be set back from the edge of the stream channel by at least 2 m. The fences will be permanent and comprise wooden posts and wire strands and be adequate to exclude cattle and sheep, similar to existing fences in the vicinity. Gates or stiles may be installed to aid access for planting and maintenance activities	> Protection of any existing population of *Carex tenuiculmis*. > Removal of a direct source of nutrient inputs from stock. > Recovery of soils from disturbances caused by stock. > Allows formation of vegetative buffer to stream.
Woody weed monitoring and control	Pest plant control will comply with the Woody Weed Management Plan (Part C.16). All pest plants listed in the Otago Regional Pest Management Plan 2019-2029 and any other woody weed species should be controlled prior to snow tussock transfer and maintained at zero density for the term of the consent.	> Preventing displacement of existing and planted snow tussock grassland by exotic shrubland. > Maintenance of and improvements in indigenous biodiversity.
Snow Tussock direct transfer	Snow tussock direct transfer will be undertaken according to the requirements outlined in the RMP (Part C.10).	> Increasing vegetation cover, which will buffer the aquatic habitats from surrounding land uses.

Measure	Details	Benefits
	Snow tussock will be places at stream margins within the ACS.	> Improving fish habitat through shading of the waterway within the Aquatic Compensation Site. > Increasing indigenous cover and biodiversity. > Increasing the extent of protected habitat for indigenous terrestrial invertebrates. > Providing additional habitat for lizards.
Monitoring	The transferred snow tussocks will be monitored according to the RMP (Part C.10). Fences will be monitored for breaches on an annual basis. To illustrate the works undertaken and inform review and reporting purposes, photographs will be taken at the compensation sites prior to works and then, at a minimum, following fence construction, and at 1- and 2-years following snow tussock transfer/planting.	To ensure compensation area is functional.

7.9.3 Other Aquatic Ecology Effects

All other effects of the proposal on aquatic ecology are to be appropriately managed through separation distances, stormwater management and erosion and sediment controls. These management methods are addressed in further detail under Section 7.11 below.

7.10 STORMWATER DISCHARGE AND EROSION AND SEDIMENT EFFECTS

Riley – Civil (2025) within Part B.11 (Civil Engineering Assessment) provides an overview of the stormwater, erosion and sediment control measures that will be undertaken during the construction of Puke Kapo Hau in order to avoid or mitigate potential adverse effects within the project site and surrounds. The findings of this assessment are summarised below.

7.10.1 Surplus Fill Disposal Areas

Riley (2025) estimates that the surplus volume for the project is less than the volume authorised by condition 25(e) of the existing land use consent. However, it is acknowledged that the locations have been redesigned (both in size and location) to suit the project layout of Stage 2 of Puke Kapo Hau. The design and location of the SFDs have considered the following factors in order to minimise adverse effects on waterbodies:

- No disposal shall take place within gullies / wetlands;
- SFDs to maintain a minimum 10 m setback from wetland extents;
- SFDs are to be located on broad ridgeline features with gently to moderately sloping ground <15% gradient, with relatively easy access for construction vehicles;
- SFDs are to be located close to areas of cut with easy construction vehicle access;
- SFDs to be situated in an area of stable ground (generally on the basis of visual assessment);
- No disposal shall take place into any permanent or intermittent rivers or streams;
- SFDs are to be located entirely within the consented Wind Farm Development Area;
- SFDs will be contoured so they do not impound nor divert surface water, generally following the pre-existing ground profile beneath. Therefore, surface runoff will simply sheet flow across the SFD finished surface, thus conserving flows to wetlands downslope; and
- The SFDs will be 'blanket fill' type – i.e. non-engineered fill spread over the grass paddocks – typically 1-2 m thick, and up to 3 m maximum – in accordance with condition 25(i)(e) of the existing land use consent. The fill will be placed to uniform compaction, achieved by the general tracking of construction plant/vehicles.

7.10.2 Construction Stormwater and Erosion and Sediment Controls

Without appropriate erosion and sediment controls, there is potential for sediment to enter waterbodies and create an adverse ecological effect.

The EMP outlines erosion and sediment control measures and the Chemical Treatment Management Plan ("**CMP**") outlines when flocculation or chemical management of discharge would be required. These plans will ensure that potential effects of construction discharge are appropriately managed and mitigated during construction (refer to Part C.02 and Part C.03 respectively).

The measures proposed in the EMP have followed the principles of Auckland Council's GD05 Erosion and Sediment Control Guide for Land Disturbing Activities in the Auckland Region (2016) – which the Otago Regional Council has adopted. The general principles of the erosion and sediment control measures are as follows:

> Diversion of clean water away from the work site, where practicable;

> Minimise disturbance to the areas necessary to complete the construction activities;

> Avoid / control dust emissions through the use of appropriate dust mitigation measures;

> Where practicable, intercept and treat all sediment laden water from the work area prior to discharging into the downstream environment, particularly earthwork areas upslope of sensitive receiving environments such as wetlands;

> Implement measures to prevent construction traffic exiting the construction areas onto public roads / tracks with sediment and other materials attached to the undercarriage and tyres (i.e. wheel wash);

> Inspect the erosion and sediment control measures regularly and undertake any maintenance necessary to maximise the potential to retain sediment on the site;

> Undertake regular inspection and testing of discharges from sediment control devices, to verify minimum standards of discharge are being met in accordance with the consent conditions;

> In the event of forecast for heavy rain, stabilise the site as far as practicable and close the works down; and

> Ongoing assessment of the erosion and sediment control measures and, if required, adjust as the work progresses.

7.10.3 Soil Stabilisation and Site Rehabilitation

As is common for projects that have an extensive earthworks footprint (such as wind farms of this scale), the earthworks will be constructed in a staged manner to reduce the area and length of time the soils remain exposed. The earthworks staging arrangement form part of the EMP (refer to Part C.02).

For each stage of earthworks, sediment and erosion control measures will be implemented to:

> Divert clean water runoff away from earthwork areas; and

- Intercept sediment laden runoff from earthworks areas and direct to sediment devices for treatment (including chemical treatment if/where specified) before controlled release to the downstream receiving environment.

Riley (2025) sets out that these procedures can be undertaken either progressively as each staged earthworks proceeds and / or at the completion of the staged earthworks, as appropriate, but in accordance with the establishment phase planning.

Following earthworks, general disturbance areas and fill batters will be stabilised by respreading locally stockpiled topsoil (stockpiled for a duration < 12 months) to a minimum depth of 300 mm and applying grass seed (or hydro seed) - using non-invasive grass species such as brown top or rye grass. The steeper cut batters will be stabilised with hydro seed (no topsoil), including polymer additives for erosion control where required. Rock cut batters will be left in their natural state – i.e. no stabilisation measures are required.

Once 80% grass strike has been achieved (in accordance with GD05), erosion and sediment control measures can be decommissioned,

A RMP (refer to Part C.10) has been prepared which sets out the details of remediation works (including remedial planting) to be undertaken following the earthworks stabilisation works.

7.10.4 Operational Stormwater Management

Stormwater runoff from new buildings, impervious areas and access roads / tracks has the potential for adverse effects on the environment, including aquatic ecology, if left unmanaged.

A combination of stormwater collection, separation distances from watercourses and maintaining existing overflow paths are used in the management of operational stormwater, as summarised below:

- Stormwater run-off from roofed areas within the O&M Facility and the sealed parking area will be conveyed to a rainwater collection system and discharged to ground;
- Construction of the internal access road network and installation of the culverts in accordance with the ECMP, maintenance of existing flow paths, and use of energy dissipation at culvert outlets will avoid or minimise any adverse effects on the ecological values of the watercourses;
- The hardstand areas for the turbines and ancillary infrastructure are located on ridgelines and distanced from gullies and steep areas which drain towards wetlands and ultimately to flowing watercourses. This separation from gullies and wetlands provides isolation from watercourses. In addition, turbine hardstand areas will maintain existing

flow paths and by doing so, will avoid or minimise any potential adverse effects on wetlands and watercourses;

- Stormwater will be managed at the BESS by using an impervious surface to prevent any discharge of stormwater to ground. The platform will be contoured to direct runoff to a stormwater collection manhole located at the corner of the platform, and then via sumps and pipes to a stormwater detention basin located next to the platform. The manhole will feature a submerged outlet. Outflow from the detention basin will be controlled via a t-bar decant and overflow manhole and will discharge to the adjacent land via a pipe and a rock lined swale/outlet apron (for energy dissipation). The decant will limit discharge from the basin to pre-development levels for the 10yr ARI 24hr rainfall event;
- Continued use of the existing tracks for access along the transmission line corridor will not have any adverse effects on the ecological values of the watercourses; and
- The transmission structures (towers / pylons) and temporary hardstands will be located well away from wetlands and watercourses.

Given the above, any potential adverse effects of operational stormwater runoff to waterbodies will be appropriately managed.

7.11 OTHER CONSTRUCTION AND OPERATIONAL EFFECTS

7.11.1 Dewatering Effects

The project requires a temporary take of groundwater to facilitate dewatering associated with construction activities – primarily associated dewatering from within turbine foundations. All streams, including the Lee Stream tributary, are more than 100 m from the location of any proposed dewatering activities. Some gully wetlands are within 100 m of potential dewatering activities.

Riley – Civil (2025) (refer to Part B.11 – Civil Engineering Assessment) and SLR (2025) (refer to Part B.07 – Ecological Assessment: Aquatic Ecology) provide the relevant context and assessment and confirm that the activity is not to be treated as a surface water take.

Specifically, Riley - Civil (2025) includes a section on hydrogeology and effects of earthworks on wetlands - which confirms that no impact on the groundwater table or overall impact to ground water supply to wetlands is expected. The nearest foundation will be greater than 100 m away from the Lee Stream tributary and, there will be no depletion of water to the waterbody as a result of any foundation dewatering (as any intercepted water will be

pumped out of the excavation, treated and disposed on the downslope side of the excavation).

SLR (2025) assesses the effects of changes to wetland hydrology. This assessment notes the wetlands identified within the project site are predominantly fed by surface flow (i.e. rain, snow melt). Therefore, potential interference of subsurface flows by turbine platform foundations is not considered to be a potential adverse effect.

Given the temporary nature of dewatering, the proposed recording of groundwater levels and the management of discharge, any potential dewatering effects will be appropriately minimised and will have no impact on surface water flows. Further, natural flow paths will be maintained during construction.

7.11.2 Effects of Hazardous Installations and Hazardous Substances

Construction and operational activities and machinery associated with project will require the storage and use of potentially hazardous substances, such as diesel and oil.

7.11.2.1 Contaminant Spills

The ECMP (refer to Part C.01) sets out measures to minimise the risk of hazardous spill events occurring.

For all hazardous substances to be used during the construction of Stage 2 of Puke Kapo Hau, contingency planning is to take place. The purpose of this planning will be to ensure that best practice is incorporated into all aspects of its storage, use and disposal. An example of best practice during the use of such substances includes ensuring that containment facilities are provided should there be an unplanned spill (e.g. bunding or during temporary use, the use of a protective barrier such as polythene sheet or bin), and spill response kits are readily available.

To avoid spillages, an appropriate location for re-fuelling and a suitable storage facility will be decided by the appointed contractor prior to the commencement of construction. The fuel storage location will be located away from waterbodies and will be appropriately bunded and spill kits will be stored at this location at all times.

Significant oil leaks are highly unlikely within the electricity substation, but should oil leak from the transformer tanks, or the radiator body, the full volume will be able to be safely drained and accommodated within the electricity substation facility. In this regard, bunded areas will be able to contain more than 110% of the total volume of oil in the transformers.

Emergency storage of fire water runoff from the BESS will be provided to prevent contaminated fire water from entering the environment. The BESS platform will be an

impervious (paved) surface and contoured such that if a fire were to occur, the contaminated runoff (generated during a firefighting operation) will be directed to a stormwater collection manhole located at the corner of the platform. The stored contaminated water will then be removed from site in a timely manner.

7.11.2.2 Storage

The storage, use and handling of these substances will be undertaken in a manner that complies with all relevant requirements of the Hazardous Substances and New Organisms Act 1996, the Health and Safety at Work (Hazardous Substances) Regulations 2017, and the ECMP.

In addition, appropriate containment will be adopted for the storage of hazardous substances required for the ongoing operation of Stage 2 of Puke Kapo Hau. These will be stored within the O&M Facility in a designated hazardous substances store. The types of substances required will include operational quantities of solvents, oils, grease and similar materials.

Overall, any potentially adverse effects associated with the storage and use of hazardous substances can be appropriately avoided, remedied or mitigated with the ECMP and standard conditions of consent in place.

7.11.3 Fire Risk

The key potential fire risks for the project are associated with the turbines, BESS and construction plant. In this regard, the key risks are associated with lightning strikes to turbines, thermal runaway events at BESS, and the use of machinery in dry environments.

The risk of fire from the turbines can be managed by ensuring appropriate inspection and maintenance, installing fire detection and fire suppression equipment, and considering turbine components as potential causes of fire and fire loads when selecting turbines. Overall, however, the likelihood of a fire igniting from a turbine is considered unlikely to occur during the project life.

It is also noted that condition 25G of the existing land use consent already provides for the requirement to prepare a Fire Management Plan ("**FMP**"). An updated FMP is attached in Part C.07. The objective of the FMP is to establish management procedures to ensure that the fire risk associated with the project is minimised and, should fires occur, that immediate and appropriate action is instigated.

With the FMP in place, the adverse effects of fire risks to people and the environment are considered to be appropriately mitigated.

7.11.4 Dust Effects

Dust can be made airborne by wind or vehicular movement or a mixture of both. Due to the nature of the works, dust will need to be controlled and managed during the construction phase.

7.11.4.1 Dust from Earthworks

Appropriate measures to reduce the dust release during earthworks operations to acceptable levels shall be undertaken as detailed in the EMP (refer to C.02). Methods that will be adopted for the dust control measures are as follows:

- Ensure the track surface remains in a damp condition utilising water trucks as necessary until exposed earthworks are stabilised;
- Limit site traffic speed to a level to reduce the production of dust;
- Stage earthworks as practicable during construction in order to isolate and reduce the area of exposed earthworks and re-vegetate exposed surfaces as soon as practical;
- Stabilised entrance at the entry/exit points of the wind farm site and fill disposal sites and provide a wheel wash at the main entrance; and
- If necessary, earthwork activities may be limited in specific areas during periods of high wind.

7.11.4.2 Dust from Stockpiled Material

Stockpiled material has the potential to create dust. Dust can be generated when material is added to or excavated from a stockpile. The following methods are proposed to control dust from stockpiles:

- Wet suppression via water trucks;
- Covered storage in more sensitive locations;
- Reduced / controlling stockpile height and slopes (reduce wind entrainment); and
- In the extreme event that remedial measures are found to be ineffective for the control of dust, works may be suspended as a precautionary measure until conditions are suitable for resumption.

7.11.4.3 Dust from Concrete Batching

As detailed in the ECMP (refer to C.01), specific dust mitigation measures will be incorporated into the batching plant design shall include but not be limited to:

- Cement shall be stored in sealed silos. Delivery of cement to the silos will be via pneumatic transfer from the delivery vehicles;
- Silos and weigh hoppers shall incorporate fabric filter dust collection systems to control dust emissions during filling operations; and
- Conveyor transfer points and hopper discharge points should be covered or enclosed.

7.11.4.4 Summary

With appropriate dust management measures employed as outlined in the ECMP and EMP, the effects of dust emissions will be managed so as to minimise the potential for adverse effects.

7.12 TRAFFIC EFFECTS

A Traffic Effects Assessment has been prepared by Beca (2025) and is provided in Part B.10 of this application. The following summarises the findings of that assessment.

7.12.1 Traffic Context

The construction of Stage 2 of Puke Kapo Hau will require the transport of the different components, materials, and workers to the wind farm site. The traffic assessment has considered the effects of traffic generation and the viability/safety of access routes relating to these (noting that the transport of components to the project site is already authorised by the existing land use consent).

The trip types associated with the construction and operation of Stage 2 of Puke Kapo Hau will include the transportation of blades and main turbine components, transformers, and transmission / battery infrastructure. In addition, there will be general construction traffic (including the tanking of water), traffic from site staff / contractors, and some potential for visitor traffic.

7.12.2 Transport Routes

Beca (2025) has identified five routes to deliver the different components, materials and workers to the site for construction of Stage 2 of Puke Kapo Hau (refer to Figure 7.11). These different routes originate from either Port Chalmers / Dunedin, Port of Lyttelton or South Port in Bluff, and are grouped based on whether they are suitable for general construction components and materials or the overweight and over-dimension requirements of the turbine and transformer components.

General Construction Route 1 has been used for the assessment of trip types associated with general materials and workers, operational traffic, and visitor traffic. Exact construction

vehicle origins and routes will be determined by contractors and suppliers, but for the purpose of this assessment, it is anticipated that the main route taken would use State Highway 1, State Highway 87, Mahinerangi Road and Eldorado Track to the site. This route was assessed under the existing land use resource consent and was used for the construction of Stage 1.

Any of the three General Construction Routes 1-3 may be used for trip types associated with transmission line towers and components, and BESS modular units. Each of these routes follows the state highway network and high productivity motor vehicle network (which are design to carry heavy vehicles). The last section of all three routes will be on local roads between State Highway 87 and the project site.

The transformer and the turbine components including the tower, nacelle, and blades are over-dimension and over-weight, and require specialist vehicles and appropriate routes to transport to the project site. Both assessed routes start at South Port or the Port of Lyttelton and largely use the strategic highway network to transport the main components and transformer to the project site. It is expected that some local roads would also be required on particular sections of the chosen route. Over-weight and over-dimension load permits are needed with NZTA and relevant local road control authorities once the route has been finalised.

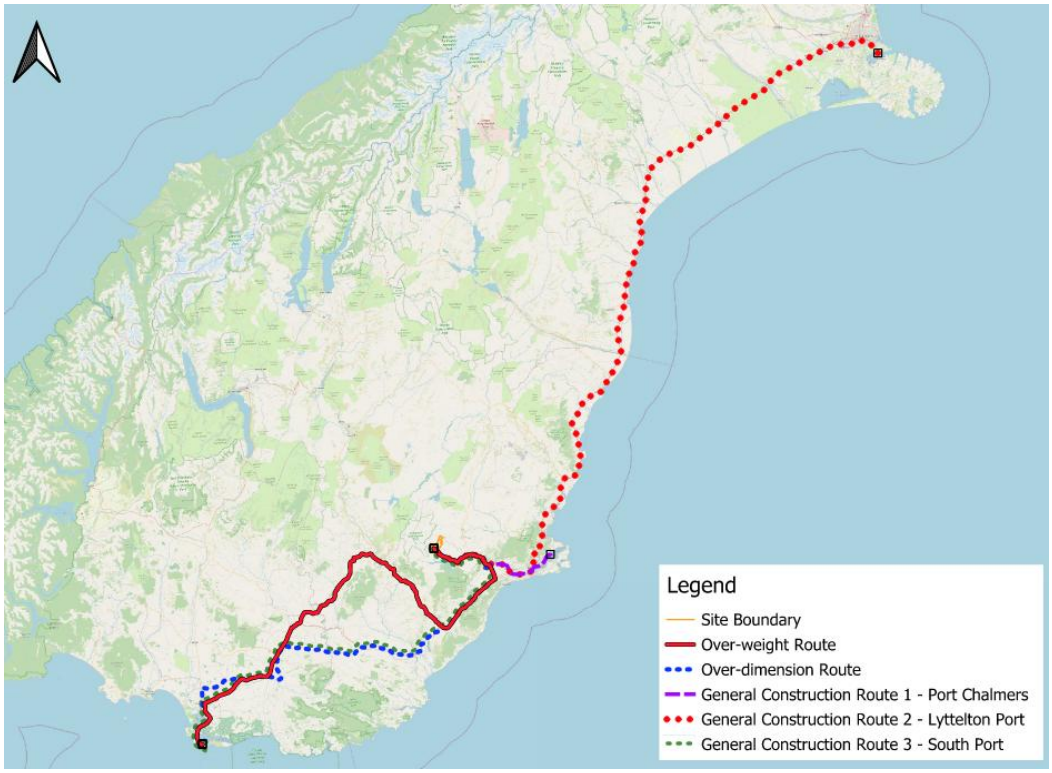


Figure 7.11: Proposed routes for construction traffic

There have been no changes to the relevant road hierarchy classifications since resource consents were granted in 2009.

The proposed routes to site may require slight modifications to the road network such as pavement widening, relocation of signs or poles, and construction of pull over bays to allow the movement of the large vehicles. The modifications are feasible and will be authorised with the road controlling authorities at the time of route selection.

Low hanging powerlines over the road may restrict the transport of some over-height components. Permits and approvals from the electrical and communication authorities will also be obtained to allow the transporters to pass under their lines.

7.12.3 Traffic Effects from Variation to Land Use Consent

Conditions 61 – 68 of the existing land use consent relate to traffic management and require some variations (refer to Part E) in order to reflect changes proposed from what was consented previously and to update relevant references.

7.12.3.1 Wind Turbine Component Traffic

Due to the reduction in the number of turbines being installed, there are 39 fewer turbine component trips associated with the construction of Stage 2 of Puke Kapo Hau. As the number of trips have reduced, the expected adverse effects have also reduced, and therefore the resulting change in the transport effects do not require any further mitigation.

The assessment identifies that the Balclutha Bridge is likely to be used as part of the route for the transport of the turbine blades due to tracking restrictions on alternative routes. The north end of the Balclutha Bridge is constrained, with vehicle tracking for the turbine blade showing minimal clearance. The careful selection of transporter trailer, and specific vehicle tracking movements which will be undertaken during detailed design are expected to provide enough clearance to avoid any damage to the bridge or parapets. A test run has been completed and confirmed the bridge is capable of accommodating the blades with passing the longest / tallest loads expected without any modification to the bridge or adjacent properties.

7.12.3.2 General Construction Traffic

Beca (2025) concludes there are no material transportation issues with general construction traffic accessing Stage 2 of Puke Kapo Hau. In this regard, State Highway 87 is appropriate for the movement of heavy construction vehicles between State Highway 1 and Outram. In addition, the Eldorado Track and Mahinerangi Road have been previously used for the construction of the wind farm and carry heavy vehicles associated with stock / equipment

from adjacent farming and forestry lands. These roads will be upgraded and maintained by TWP as required.

Beca (2025) calculates there is a reduction of 972 heavy vehicle return trips associated with the general construction traffic when comparing the proposed layout of the wind farm to the existing consented layout.

However, there is a change in the distribution of trips on the network due to the change in origin of water for cartage. There will be an increase of 718 heavy vehicle trips on Mahinerangi Road when compared to the existing consented layout. This represents an 8.7% increase in the heavy vehicle trips expected during the construction period, or an average of two additional trips per day. The increased effects on Mahinerangi Road as a result of these trips is expected to be mitigated appropriately through the measures outlined in the Construction Traffic Management Plan ("**CTMP**") and do not require any further mitigation.

7.12.3.3 Operational, maintenance and visitor traffic

The consented wind farm makes provision for up to 10 employees – which will not increase under the layout proposed as part of Stage 2.

Similarly, the proposed changes to the conditions of the existing land use consent do not change the effects of any potential visitor traffic to the wind farm.

7.12.4 Traffic Effects from New Consents

This section assesses the transport effects related to the construction of the transmission line and associated infrastructure which require new land use consents.

7.12.4.1 Construction Traffic

Beca (2025) establishes that traffic generated from the construction of the transmission line and battery will be up to 876 standard heavy vehicles and HPMV vehicles over an 18-month timeframe. This equates to an average of two return trips per day, or four trips on the road network. These trips are expected to be made from Port Chalmers, Port of Lyttelton or South Port.

The increase in traffic volume on the routes to Mosgiel are negligible and fall within expected daily variation of traffic flow on these routes. Between Mosgiel and the project site, the increase in heavy vehicle movements may be noticeable, however any effects will be minor as the road network generally has capacity to absorb these movements. Any effects on the operational efficiency or safety of the road network can be mitigated through the permits and temporary traffic management outlined in the CTMP provided in Part C.04.

The substation transformer is likely to follow the over-weight route from South Port to the project site. The expected traffic generated by the transformer is one over-weight over-dimension return movement and three return movements for pilot vehicles, travelling in convoy. The effects of these movements will be minor, due to the low volume of movements, and can be managed through appropriate permits and temporary traffic management as outlined in the CTMP.

7.12.5 Summary

The change in conditions relating to the variation to the existing resource consent result in fewer overall trips generated for the construction of Stage 2 of Puke Kapo Hau compared to those for the existing land use consent. There is a decrease in heavy traffic movements. In terms of the increase in tip height, possible routes have been considered and are viable. This results in lesser effects, and no additional mitigation is considered to be required for the variation to resource consent. It is noted that a new CTMP has been prepared to replace the existing Traffic Management Plan that was referenced in the existing land use consent (conditions 61 and 62).

The number of daily trips associated with the construction of the transmission line and associated infrastructure is less than 10, and therefore any effects will be minor and able to be mitigated through the use of permits, temporary traffic management, and the implementation of the CTMP.

7.13 HERITAGE EFFECTS

The Archaeological Assessment prepared by Clough and Associates (2025) is provided in Part B.13 of this substantive application, with the key findings summarised below.

7.13.1 Effects Relating to Stage 2 of the Wind Farm

The only archaeological site that would be affected by Stage 2 of Puke Kapo Hau is part of the pole track (Site 91 – H44/1200) that ran from Waipori to Deep Stream during the 19th century and is still used as a farm track within the wind farm. The pole track is considered to have little archaeological value and does not exist as it did in the 19th century and it is the route, rather than the 'infrastructure', that is an archaeological site.

None of the other 25 identified archaeological sites in the wider vicinity would be directly affected by Stage 2.

As such, the project has very limited impact on the identified archaeological sites. However, it is possible that sites that were not located during the survey may be encountered during earthworks. Conditions 69 - 71 of the existing land use consent relate to accidental

discovery protocols and remain valid / appropriate in managing the discovery of unknown archaeological sites and/or artefacts and no changes to those conditions are proposed.

As the proposed development will affect a pole track, a Schedule 8 FTAA approval is sought, together with an approval which covers all works undertaken for this project in the event that unidentified subsurface features be exposed by the proposed works. An Archaeological Management Plan ("**AMP**") is also provided in Part C.06, which outlines the procedures to be followed during archaeological monitoring of earthworks and procedures for recording any archaeological evidence before it is modified or destroyed. It also provides protocols for the exposure of archaeological remains, including koiwi tangata or taonga.

Overall, any potential for adverse effects on archaeology as a result of the project are considered to be minimal and can be appropriately managed.

7.13.2 Effects Relating to the Transmission Line Corridor and Associated Infrastructure

The only recorded archaeological site in proximity to the proposed new transmission line is Site 90 – Sluicing Complex, recorded by Watson (2006). The field survey undertaken by Clough and Associates (2025) confirms that the access road and transmission line corridor is approximately 250 m clear of the extent of this site, and it will not be affected by the proposed establishment of the transmission line.

No other archaeological sites were identified along the transmission line corridor or access tracks.

Conditions 69 - 71 of the existing land use consent remain valid and appropriate in managing the discovery of unknown archaeological sites and / or artefacts.

Similarly, a Schedule 8 FTAA approval is sought, which covers all works undertaken for the transmission line corridor in the event that unidentified subsurface features be exposed by the proposed works (refer to Section A.11 for further detail). In addition, the AMP will address the archaeological monitoring of earthworks.

7.14 CULTURAL EFFECTS

TWP has, and continues to, engage with mana whenua in relation to Stage 2 of Puke Kapo Hau.

As previously noted, the wind farm site is within the area of interest for Ngāi Tahu iwi (as provided in the Ngāi Tahu Claims Settlement Act 1998). Te Rūnanga o Otakou is a Papatipu

Rūnanga[28] of Ngāi Tahu. Te Rūnanga o Ōtākou specifically focuses on the area around Otago Harbour and the surrounding region, including this wind farm site.

No sites of known cultural significance have been identified within the wind farm site, although it is acknowledged that Ngāi Tahu have associations, including spiritual connections, with the broader cultural landscape.

As part of the original consent application for the wind farm (in 2006), discussions with representatives from Te Rūnanga o Ōtākou confirmed that there are no known wāhi tapu sites within the project site. However, it is acknowledged, as a result of these discussions that Old Dunstan Road, located to the north of the site, was formed along the route of a Māori trail, and therefore it is possible that Māori could have travelled through the area associated with the Puke Kapo Hau.

It is possible that unidentified archaeological sites may be located within the site. A Schedule 8 FTAA approval is being sought as part of this application.

An AMP is provided in Part C.06, which also outlines the procedures to be followed during archaeological monitoring of earthworks and procedures for recording any archaeological evidence before it is modified or destroyed. It also provides protocols for the exposure of archaeological remains including koiwi tangata or taonga.

Cultural values associated with waterbodies located within the wind farm site are identified in the Regional Plan: Water for Otago. Lee Stream (where a culvert is proposed within a tributary) is identified as a water body with cultural values for Ngāi Tahu. Effects on the ecological values of these waterbodies have been assessed as part of SLR (2025) in Part B.06 and B.07. Site specific controls during construction (including erosion and sediment control measures) are set out in the draft ECMP (refer to Part C.01) and EMP (refer to Part C.02).

In addition, consent conditions are proposed to ensure construction of the project will minimise any potential adverse effects on waterbodies.

The Kārearea (NZ Falcon) is identified in Schedule 97 of the Ngāi Tahu Claims Settlement Act 1998 as a taonga species, acknowledging Ngāi Tahu's special cultural, spiritual, historic, and traditional association with this taonga. TWP has consulted with Te Rūnanga o Ōtākou on this matter and proposed management measures to minimise adverse effects on the

[28] Papatipu Rūnanga are the traditional, local runanga (tribal councils) that represent the interests of specific geographic areas within the larger Ngāi Tahu tribal territory.

species. These management measures are described in Section 7.6.5 and Boffa Miskell (2025) (Part B.05 – Avifauna Assessment).

TWP continues to engage with mana whenua in relation to the project.

7.15 AVIATION EFFECTS

As part of the original consent application, both Dunedin International Airport and the Otago Aero Club were consulted regarding potential aviation effect, and it was accepted that Puke Kapo Hau would not result in adverse effects on aviation activities. In this regard, the project site is located approximately 50 km from Dunedin International Airport and well outside any controlled airspace or Obstacle Limitation Surfaces.

The Otago Aero Club, based at North Taieri Aerodrome, is also a similar distance.

Although the proposed turbine heights exceed 45 m above ground level, a Part 77 application will be submitted to the Civil Aviation Authority ("**CAA**") as part of the final detailed design process.

7.16 CLIMATE CHANGE

In 2019 New Zealand passed the Climate Change Response (Zero Carbon) Act to set the framework for New Zealand to meet its Nationally Determined Contribution target in line with the 2015 Paris Agreement. It adopted a split gas approach, seeking by 2050 to reduce biogenic methane emissions by 24% to 47% below 2017 levels, whereas other long-lived gases (CO2, N2O and synthetic gases) were required to meet Net Zero Carbon (i.e. gross emissions would be matched by removals by new forest growth).

Stage 2 of Puke Kapo Hau will have a positive and significant contribution toward meeting climate change targets as set in the Climate Change Response (Zero Carbon) Act through the generation of approximately 549 GWh of renewable generation in an average year.

In addition, Stage 2 of Puke Kapo Hau could displace, directly or indirectly, 279,861 tCO2-e of gas-fired generation or 600,000 tCO2-e of coal fired generation. The value of these emission reductions at $59.82 per tCO2-e would be $16.7 million or $33.1 million respectively. These estimates are annual figures and would recur each year, other things held constant.

7.17 NATURAL HAZARDS

Geotechnical investigations undertaken at the site in early 2025[29] support the findings of the original resource consent geotechnical assessment.[30] The following sub-sections provide a summary of the matters considered.

7.17.1.1 Faults

The project site does not include any identified active faults.

There are active faults in the wider surrounding landscape, including the Hyde Fault, which at its closest is within 1 km of the western boundary of the project site. The Akotere Fault is 30 km southeast of the Lake Mahinerangi No. 1 Dam.

7.17.1.2 Landslides

Landslides are not considered a significant hazard for the development of the project site. Any geotechnical risk from landslides have been mitigated through design by ensuring adequate setbacks between structures and any potential landslide scarps.

In addition, the layout design of the wind farm has taken into account land subject to historic landslides.

7.17.1.3 Flooding

The internal access road network and impervious areas will intercept surface water runoff and thus have the potential to effect existing drainage patterns within the project site. Riley (2205) have undertaken a site wide catchment assessment (refer to B.11 – Civil Engineering Assessment) to determine the location and design of proposed stormwater culverts which will minimise the impacts on existing drainage patterns.

Flow rates have been calculated using the Rational Method (NZBC E1/VM1). Culverts have been sized to pass flows from the 10% AEP rainfall event (in accordance with the original regional consents (condition 20) and according to the event duration corresponding to the time of concentration of each unique catchment. In larger rainfall events the water will head up in the drains and culvert inlets and will overtop tracks and hardstands.

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[29] *MWF2 Geotechnical Factual Report* (GFR), ref: 240034-F, Issue 0.1, 6 June 2025, Riley Consultants.

[30] *Mahinerangi Wind Farm, Assessment of Geotechnical and Civil Aspects in Support of Resource Consent Volume 1* Riley Consultants, 31 May 2006, Riley Consultants.

The permanent hardstands comprising the permanent buildings/structures (substation and O&M Facility) will be specifically designed to consider overland flow paths for up to the 1% AEP event.

Minimising the impact on existing drainage patterns, will appropriately manage the potential for flooding within and beyond the site as a result of the project.

7.17.1.4 Ground Stability

The proposed turbine hardstands are designed with foundations excavated into natural ground and founded on bedrock. This design approach results in a typical maximum fill depth of approximately 2 m for the hardstand platform. In accordance with the existing land use consent (condition 25(i)(d)), fill depths of up to 12m are authorised for turbine hardstands. The current design remains well within this allowance, ensuring compliance with consent conditions while maintaining geotechnical stability.

The preliminary design includes a maximum cut/fill batter height for access tracks of 8 m. This is based on topographical constraints and the need to maintain safe and efficient access for construction vehicles. The existing land use consent (condition 25(i)(c)) permits fill depths of up to 10 m for access tracks. The proposed design is compliant with the consented limits and reflects a conservative approach to earthworks.

Where fill is necessary, the stability of the fill material in relation to the overall slope will be considered including the removal of unsuitable material, (i.e. organics, or lower strength soil or rock), appropriately keying the base of fill into the slope, adequate compaction, and moisture conditioning of the fill. Drainage within the fill may also need to be considered to ensure suitable factors of safety are achieved for the fill.

With the design approach in place, ground stability effects are considered to be managed in a manner consistent with Stage 1 of the wind farm.

7.18 CONCLUSION

Overall, it is considered that the proposal to vary land use consents and seek new consents where required for Stage 2 of Puke Kapo Hau will provide significant regional and national benefits and can be constructed and operated in a manner that will appropriately avoid, remedy or mitigate potential adverse effects on the environment.

Importantly, Puke Kapo Hau is already consented for up to 100 turbines - demonstrating it is an appropriate location for a wind farm due to the suitability of the wind resource, surrounding productive farmland and the low density of dwellings in the area and around the project site.

Particular consideration has been given to avoiding potential adverse effects through the design and construction methodology, which has resulted in the avoiding adverse effects as far as practicable. A number of the management measures that have been identified within this section for avoiding, remedying or mitigating adverse effects are summarised in Table 7.4 below. These measures are also reflected in the varied land use conditions and new consent conditions proffered in Part E to this application, and within the management and monitoring plans provided in Part C.

7.19 MANAGEMENT AND MONITORING MEASURES PROPOSED

The collaborative and iterative design process with technical experts has allowed many potential adverse effects on the environment to be avoided in the first instance (as demonstrated in the sub-sections above).

The additional management and monitoring measures proposed by TWP will assist with the avoidance, remediation and mitigation of adverse effects associated with this project as described in and within the technical reports (Part B) and the management and monitoring plans (Part C) provided. These measures are summarised in Table 7.4 below.

Table 7.4: Summary of Key Management and Monitoring Measures for Stage 2 of Puke Kapo Hau

Variation or New Consent	Actual or Potential Effect	New or Varied Mitigation/Management/Monitoring Measures
Landscape and Visual		
Existing Consent Variation	Amenity Value Effects	No additional mitigation required.
Existing Consent Variation	Natural Landscape Effects	Ensure that works (as under the existing consent) will be located on the peneplain surface in areas of pasture and will avoid gullies. Maintain a 10 m minimum buffer, where practicable, from wetlands in accordance with the NES-F. Removal of four wind turbine locations on the south-western spur (the 'Thomas Block') and one in the QEII covenant area to achieve positive effects by avoiding the main area of high-quality snow tussock. The larger area of each permanent hardstand (1,855 m^2 vs 1,400 m^2) will be mitigated by fewer wind turbine numbers and hardstands. The reduction in wind turbine numbers will also reduce the length of access road required for construction.
Existing Consent Variation	Outstanding Natural Landscape Effects	No additional mitigation required.
New Land Use Consent – BESS, Substation and O&M facility	Landscape and Visual	Conditions on location of the BESS, Substation and O&M Facility. Conditions limiting dimension and height of BESS, Substation and O&M Facility. Condition ensuring colours of BESS, Substation and O&M Facility appropriately integrate with their environment.

Variation or New Consent	Actual or Potential Effect	New or Varied Mitigation/Management/Monitoring Measures
New Land Use Consent – Transmission Lines/Poles		Condition on location of transmission line corridor. Condition limiting height and number of steel poles. Condition ensuring the use of steel poles rather than lattice towers.
New Regional Consents	Natural Character Effects of Culvert/Crossing at Lee Stream Tributary	Biophysical aspects of natural character will be addressed through the culvert design and the recommended stream restoration and rehabilitation. The fencing and replanting of the upstream tributary for some 50 m will have positive effects on perceptions of natural character in addition to the benefits for biophysical aspects. Condition to ensure implementation and adherence to the (WACP to provide for fencing, tussock transfer and monitoring of compensation works.
New Regional Consents	Natural Character of Wetland 43	The alignment with the true saddle, and removal of the existing farm track, will return the hydrology to more natural patterns. Fencing and replanting in the upper tributary of the Lee Stream to compensate for adverse effects on wetlands. Condition to ensure implementation and adherence to the WACP to provide for fencing, tussock transfer and monitoring of compensation works.
New Regional Consents	Natural Character Constrained Area D	Construction of a 5.5 m carriageway (as opposed to the12m carriageway provided for under the existing land use consent).
Shadow Flicker and Blade Glint		
Existing Consent Variation	Shadow flicker	No additional mitigation required.

Variation or New Consent	Actual or Potential Effect	New or Varied Mitigation/Management/Monitoring Measures
Existing Consent Variation	Glint	No additional mitigation required. Existing condition of land use consent (Condition 18) requires a neutral off-white or light grey, low reflectivity colour system for turbine blades. TWP is not seeking any variation to that condition.
Noise		
Existing Consent Variation	Operational and Construction Noise	Existing condition of land use consent (being conditions 31-60) remain appropriate to mitigate operational and construction noise, including the changes relating to operating hours and concrete batching. Minor amendments to ensure noise standards are updated current NZ Standards are also proposed. Condition 31 to ensure implementation and adherence to the revised CNMP provided with this application.
New Land Use Consent	Construction Noise	A condition requiring the preparation of, and adherence to the CNMP.
New Land Use Consent	Operational Noise	Composite insulators will be used on the transmission poles, as they are less likely to generate tonal noise. A condition requiring operational noise to be measured in accordance with NZS6801:2008: Acoustics - Measurement of Environmental Sound and assessed in accordance with NZS6802:2008: Acoustics - Environmental Noise. A condition to ensure noise from activities authorised by this consent don't exceed recommended limits within the notional boundary.
Avifauna		
Existing Consent Variation	Effect on Falcon and Pied Oystercatchers	Monitoring of nest sites for Falcon and SIPO during construction.

Variation or New Consent	Actual or Potential Effect	New or Varied Mitigation/Management/Monitoring Measures
		Implementing an expanded pest control programme as outlined in the updated Mammalian Pest Control Management Plan. Condition requiring implementation and adherence to the Avifauna Management Plan which details the above points.
New Land Use Consent	Effect on Falcon and Pied Oystercatchers	A condition requiring that transmission lines and poles are designed to prevent electrocution of Falcons in accordance with conditions. Monitoring of nest sites for Falcon and SIPO during construction. Implementing pest control to protect Falcon nests and juveniles from predation within the project site. Condition requiring implementation and adherence to the Avifauna Management Plan which details the above points.
Construction Traffic		
Existing Consent Variation	Construction traffic vehicle movements on the public road network	No additional mitigation required.
New Land Use Consents	Construction traffic vehicle movements on the public road network	Permits to be sought from relevant roading authorities. Temporary traffic management. A condition to ensure implementation and adherence to a CTMP. Retaining the condition ensuring no heavy construction traffic will access the site except via Mahinerangi Road and El Dorado Track and with a slightly earlier commencement time of 6.00 am, but retaining the 10.00 pm limit. This does not prevent the use of any other roads between the port and State Highway 87 outside these hours.

Variation or New Consent	Actual or Potential Effect	New or Varied Mitigation/Management/Monitoring Measures
Contaminated Land		
New Land Use Consents and Regional Consents	Disturbance of contaminated land.	A condition requiring unexpected contamination discovery protocols to account for any potential unidentified contamination.
Discharges		
New Regional Consents	Risk of contaminants entering a waterbody.	A condition to ensure implementation and adherence to an ECMP and where relevant Chemical Treatment Management Plan. A combination of stormwater collection, separation distances from watercourses and maintaining existing overflow paths are used in the management of operational stormwater. All hazardous substances will be stored in approved and bunded containment in accordance with the relevant New Zealand Standards and Codes of Practice and the Hazardous Substances and New Organisms Act 1996 and the Health and Safety at Work (Hazardous Substances) Regulations 2017.
New Regional Consents	Impact to freshwater from sediment and stormwater runoff	A condition requiring the preparation of, and adherence to the EMP where erosion and sediment control measures and stormwater management is outlined. A condition requiring the preparation of, and adherence to the Construction Environmental Management Plan where best practice construction management methods for culvert installation is outlined. Progressive stabilisation of earthworked areas. Routine monitoring of erosion and sediment control measures to identify maintenance requirements. Routine monitoring of the discharge from sediment retention ponds and decanting earth bunds during high rainfall events to confirm they are operating effectively and meeting performance targets.

Variation or New Consent	Actual or Potential Effect	New or Varied Mitigation/Management/Monitoring Measures
		A condition requiring the implementation and adherence to a RMP to ensure disturbed sites are appropriately stabilised. Condition to ensure implementation and adherence to a Chemical Treatment Management Plan.
New Regional Consents and Land Use Consent	Potential nuisance dust effects in the environment during construction of the wind farm.	A condition requiring implementation and adherence to the EMP and ECMP, which both outline dust mitigation measures associated with construction works. Water to provide dust suppression during construction.
Cultural		
Existing land use consent variation and new consents	Potential for archaeological discovery of cultural importance. Potential effects on ecological values, particularly waterbodies.	Ongoing consultation by TWP with mana whenua. A condition requiring an Archaeological Management Plan to be implemented and adhered to in accordance with an archaeological authority under the HNZPT Act. Recognition of relevant Iwi Management Plans. Implementing best practice erosion and sediment controls and stormwater management measures (through the ECMP and EMP) to ensure water quality is managed appropriately. Condition requiring implementation and adherence to all required ecological management plans and compensation site development as detailed in the WACP. Wildlife authorities sought in relation to lizards and avifauna.
Heritage		
Existing land use consent variation and	Effects on known and unknown archaeology	A condition requiring an AMP to be implemented and adhered to in accordance with an archaeological authority.

Variation or New Consent	Actual or Potential Effect	New or Varied Mitigation/Management/Monitoring Measures
new land use consents.		Archaeological authority sought. Avoiding works within known archaeological sites (with the exclusion of Site 91 - H44/1200).
Aquatic Ecology		
Existing land use consent variation	Positive effects on aquatic ecology	Removal of the Thomas Block, which: > Reduces the number of waterbodies crossed by access roads (reducing the number of new culverts that need to be installed); and > Reducing the land area required for earthworks which reduces risks for sediment runoff and stormwater management requirements.
Existing land use consent variation and new consents	Construction effects on aquatic ecology	A condition requiring the preparation of, and adherence to the EMP where erosion and sediment control measures and stormwater management is outlined.
Existing land use consent variation and new consents	Operational effects on aquatic ecology	Culverts will be installed at key locations along access tracks to prevent disruption of existing drainage networks (i.e. to maintain natural hydrology to the wetlands). Separation of buildings, infrastructure and new impervious areas from waterbodies as far as practicable through design.
Existing land use consent variation and new consents	Lee Stream Culvert Construction Effects	Condition to ensure implementation and adherence to an ECMP where spill contingency measures and where the best practice culvert installation methodology is included. Condition to ensure implementation and adherence to an EMP guiding erosion and sediment control measures. Condition to ensure implementation and adherence to a WQMP which outlines a monitoring programme for the Lee Stream tributary.

Variation or New Consent	Actual or Potential Effect	New or Varied Mitigation/Management/Monitoring Measures
		Condition to ensure implementation and adherence to a Native Fish Recovery Plan which outlines native fish salvage procedures in relation to culvert installation at Lee Stream tributary. Adherence to the New Zealand Fish Passage Guidelines Version 2.0 during construction of the culvert at Lee Stream tributary.
Natural Inland Wetlands		
Existing land use consent variation and new consents	Loss of wetlands	Condition to ensure implementation and adherence to the Wetland and Aquatic Compensation Plan (WACP) to provide for fencing, tussock transfer and monitoring of compensation works.
Existing land use consent variation and new consents	Indirect effects on wetlands	Condition to ensure implementation and adherence to the WMMP.
Terrestrial Ecology		
Existing land use consent variation and new land use consents	Weed Introduction	Condition requiring adherence to and implementation of the Ecological Monitoring and Management Plan which sets out requirements regarding vehicle use, vehicle hygiene, sourcing of weed-free construction materials, prompt revegetation of bare earth following earthworks, and weed monitoring and control. Condition requiring adherence to and implementation of a Woody Weed Management Plan.
Existing land use consent variation	Indigenous Vegetation Clearance	Stage 2 layout results in less potential clearance of snow tussock grassland, indigenous shrublands and wetlands. Thomas Block which contains high-quality snow tussock grassland will be completely avoided in Stage 2.

Variation or New Consent	Actual or Potential Effect	New or Varied Mitigation/Management/Monitoring Measures
New land use consents	Indigenous Vegetation Clearance	Condition to ensure implementation and adherence to the Remediation Management Plan to remediate earthworked areas. Condition to ensure implementation and adherence to the Wetland and Aquatic Compensation Plan (WACP) to provide for fencing, tussock transfer and monitoring of compensation works.
Existing land use consent variation and new consents	Loss of At Risk plant species	A condition requiring implementation and adherence to the Carex tenuiculmis and Epilobium chionanthum Management Plan (C&EMP), which required monitoring and if required, translocation and/or propagation.
Existing land use consent variation and new consents	Loss of terrestrial invertebrates	Condition to ensure implementation and adherence to the WACP to provide additional habitat for invertebrate. Terrestrial invertebrate habitat has already been provided within the QEII covenant area.
Existing land use consent variation and new consents	Fire risk	A condition requiring the preparation of, and adherence to, a FMP.
Lizards		
Existing land use consent variation and new land use consents	Effects on Lizards	A condition requiring the implementation and adherence to the LMP. Wildlife authority sought relating to the trap and transfer of lizards. 59.2 ha of high-quality lizard habitat has already been provided within the Scrappy Pines Block QEII covenant area.

Variation or New Consent	Actual or Potential Effect	New or Varied Mitigation/Management/Monitoring Measures
Natural Hazards		
Existing land use consent variation and new consents	Effects of natural hazards	Earthwork quantities remain compliant with the existing consented limits for earthworks. Slope stability to be mitigated at detailed design to manage risk of failure in cut batters and fill embankments. Avoid construction in proximity to areas with potential for landslide risk. Minimising the impact on existing drainage patterns, to reduce the potential for flood risk within and beyond the site.