BEFORE AN EXPERT PANEL
SOUTHLAND WIND FARM PROJECT

Under the	**FAST-TRACK APPROVALS ACT 2024**
In the matter of	an application for resource consents, a concession, wildlife approvals, an archaeological authority and approvals relating to complex freshwater fisheries activities in relation to the Southland Wind Farm project
By	**CONTACT ENERGY LIMITED**
	Applicant

SOUTHLAND WIND FARM TECHNICAL ASSESSMENT #5: TERRESTRIAL AND WETLAND ECOLOGY

NICK GOLDWATER AND DR KELVIN LLOYD

18 August 2025

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EXECUTIVE SUMMARY

1. Contact Energy Ltd (**Contact**) first engaged Wildland Consultants Ltd (**Wildlands**) in 2022 to carry out the surveys, study, and analysis needed to prepare an assessment of terrestrial and wetland ecological effects report to inform the substantive application for the Southland Wind Farm Project.

2. We note that long-tailed bats are addressed in the separate report by Mr Kessels and Dr Davidson-Watts.

3. A desktop investigation of all relevant information and databases on ecological characteristics and values in the region was completed as part of the assessment undertaken by Wildlands. Numerous field surveys have been undertaken since early 2023 in order to:

    (a) Assess and map the extent and condition of terrestrial and wetland habitat types.

    (b) Delineate wetlands within and adjacent to the Wind Farm footprint.

    (c) Collect vegetation data to inform the Biodiversity Offsetting and Accounting Model.

    (d) Determine the presence or likely presence of nationally 'Threatened', 'At Risk' or otherwise notable fauna and flora species.

    (e) Scope suitable sites for the purpose of offsetting and compensation.

4. This assessment of ecological effects provides:

    (a) A baseline description of ecological characteristics, values and pressures at the proposed Southland Wind Farm Site based on desktop review and field surveys.

    (b) An assessment of effects on those ecological values affected by the proposed wind farm, both before and after measures to avoid, remedy or mitigate for adverse effects.

    (c) Measures, including environmental offsetting and compensation, to address residual adverse effects.

5. The Wind Farm Site encompasses a mix of high-value and modified terrestrial and wetland habitats, with much of the area historically affected by fires used to clear indigenous vegetation. It supports a moderate diversity of

indigenous fauna, including forest birds and threatened wetland and shrubland bird species such as the eastern falcon, South Island fernbird, and NZ pipit. The Jedburgh Plateau (an approximately 530-hectare area within Jedburgh Station) also provides important habitat for invertebrates.

6. Currently, without effective pest control, indigenous biodiversity and ecosystem processes at the site face ongoing pressure from introduced mammalian browsers and predators.

7. The Project has the potential to result in the following adverse effects on ecological features and values within the Wind Farm Site:

   (a) Terrestrial and wetland habitat loss, fragmentation, degradation and general disturbance through earthworks and vegetation clearance.

   (b) Alterations to wetland hydrology as a result of earthworks.

   (c) Direct mortality or injury to species that may be harmed during vegetation clearance or earthworks activities.

   (d) Direct harm to forest or wetland birds through potential blade strike, and noise and lighting disturbance associated with wind farm operations.

   (e) Risk of electrocution and collision for birds interacting with transmission line infrastructure.

   (f) Increased risk of predation of indigenous fauna following construction of wind farm roads.

8. The Project footprint has been reconfigured to the greatest extent practicable to avoid ‘Very high’ and ‘High’ value vegetation and habitat types, including 100% of pāhautea /southern rātā-kāmahi forest, 100% of Indigenous broadleaved forest and scrub, 100% of Mānuka/copper tussock shrubland, and 100% of Mānuka-inaka/copper tussock marsh; more than 99% of southern rātā-kāmahi forest; over 98% of fen and bog wetlands on the Jedburgh Station Plateau; and 96% of mānuka-haumakaroa-mountain holly forest.

9. The proposed conditions of consent and management plans require further pre-construction assessment and minimisation of effects on high value habitats, all within firm areal limits. Although the locations of all fill disposal sites (other than those on the Jedburgh Plateau) have not yet been finalised,

they will avoid High value habitats such as mature indigenous forest, wetlands, and permanent and intermittent watercourses. All fill disposal sites that affect Moderate value indigenous vegetation will be remediated and planted with suitable indigenous species.

10. Wind turbine blades pose a risk to a number of indigenous bird species. However, collision modelling predicts that the risk to all threatened bird species at the Wind Farm Site is very low. The probability of collisions is particularly low for lower-flying species such as South Island fernbird/mātātā and pīhoihoi/NZ pipit, and though present, there has been no documented fatality of kārearea/falcon as a result of blade strike in Aotearoa New Zealand.

11. Management of residual effects remaining after efforts to avoid, remedy or mitigate will be addressed by offsetting and compensation via proposed ecological restoration and/or habitat enhancement measures. Key measures to address significant residual effects include:

    (a) Creation of a fenced 245-hectare area of predominantly Mānuka forest and scrub on Jedburgh Station (**Jedburgh Station Ecological Enhancement Area**) and eradication of feral deer and pigs and planting of enrichment species throughout the area. This is to offset the permanent loss of 63.74 hectares of indigenous-dominant vegetation from a total of 3,024.17 hectares at the Wind Farm Site (or 2.1%), of which 59.04 hectares comprise significant vegetation.

    (b) Aerial pest control across *c.*1,400 hectares within the Jedburgh Station Pest Control Area on a three-yearly cycle, together with a programme of sustained predator trapping along the wind farm roads.

    (c) Intensive rat and mustelid control in a 55-hectare Plateau Fauna Enhancement Area on the Jedburgh Plateau to address residual effects on mātātā/South Island fernbird, pīhoihoi/NZ pipit, and terrestrial invertebrates.

    (d) Fencing and enhancement of *c.*8 hectares of copper tussock grassland and shrubland within the main lizard release area within the Matariki plantation forest (**Copper Tussock Enhancement and Skink Protection Area**).

    (e) Targeted control of feral deer and pigs on the Jedburgh Plateau.

(f) Habitat restoration and enhancement for indigenous lizards and invertebrates, including measures such as transferring piles of woody debris, logs, and rock stacks into proposed relocation sites. In addition, approximately 1.6 hectares of indigenous planting will be undertaken on the Jedburgh Plateau to enhance habitats for invertebrates.

(g) Restoration of 5.11 hectares of exotic-dominant wetland to copper tussock-rautahi marsh on land owned by Contact Energy at Davidson Road (**Davidson Road Wetland Restoration Site**), together with ecological enhancement of 6.67 hectares of isting degraded marsh, and formal legal protection of this site.

12. Contact will also be funding a pest control programme over a 10,000-hectare area of DOC-administered land in the Beresford Range to address residual adverse effects on bats. That will bring benefits for terrestrial vegetation and fauna beyond bats, which are in addition to the benefits we have addressed in terms of the offset and compensation measures we have set out in this report.

13. Detailed guidance on implementing the offset and compensation measures is provided in a draft Habitat Restoration and Enhancement Management Plan (**HREP**).

14. The proposed onsite habitat and restoration package for terrestrial vegetation (i.e. offsetting) will result in positive ecological benefits that outweigh residual adverse effects in alignment with statutory requirements set out in the Southland Regional Policy Statement (**RPS**). Similarly, the proposed package of targeted and sustained pest animal control, ungulate exclusion, and habitat enhancement, will suitably offset residual adverse effects on indigenous fauna.

15. The proposed offsite habitat and restoration package for wetlands (i.e., compensation) will result in positive ecological benefits that outweigh residual adverse effects in alignment with statutory requirements set out in the National Policy Statement for Freshwater Management (**NPS-FM**) and the Southland RPS.

INTRODUCTION

16. This assessment has been prepared by Nicholas Goldwater and Dr Kelvin Lloyd of Wildland Consultants Ltd (**Wildlands**). Technical input has been provided by the following specialists:

    (a) Dr Della Bennet (Avifauna);

    (b) Samantha King (Herpetofauna);

    (c) Vikki Smith (Invertebrates); and

    (d) Dr Justyna Giejsztowt (Offset modelling).

17. Additional input on offsetting and compensation has been provided by Roger MacGibbon, an external advisor and highly experienced ecological practitioner. We note that Mr MacGibbon has prepared his own assessment, which is also being filed with the application.[1]

Qualifications and experience

18. We have the following qualifications and experience relevant to this assessment:

    (a) I, Nick Goldwater, have been employed as a consultant ecologist with Wildland Consultants since 2008. I have a Master of Science (MSc) (First Class Honours) in ecology and environmental science from the University of Auckland, and have 17 years' experience in ecological consultancy. I am a member of the New Zealand Ecological Society, the Auckland Botanical Society, the New Zealand Native Forest Restoration Trust, the New Zealand Wetland Trust, and the New Zealand Plant Conservation Network. I am also a trustee of the Purangi Conservation Trust, based in Coromandel.

    (b) In my role as Senior Principal Ecologist, I undertake field assessments, provide technical advice and services, and manage projects for a range of clients. I have undertaken numerous terrestrial and aquatic assessments in the Auckland, Northland, Waikato and Wellington regions. I have considerable experience in assessing consents relating to vegetation removal and ecological restoration, including wind farms, quarrying activities, subdivisions, and various infrastructure projects, all

[1] Review of Terrestrial and Wetland Ecology and Ecology Offsetting and Compensation (Report 7), Roger MacGibbon, 18 August 2025.

involving the assessment of environmental effects under the Resource Management Act 1991 (RMA). I have assisted councils with numerous projects that include baseline biodiversity surveys, consent reviews, preparation of Ecological Management Plans, and field surveys of vegetation and habitats, threatened plants, indigenous fish, birds, and reptiles.

(c) I have considerable experience assessing and delineating Significant Natural Areas (SNAs), or Significant Ecological Areas (SEAs) as they are known in Auckland. From 2019–2020, I led a project to map and assess approximately 1,600 SNAs in the Northland Region.

(d) In Southland, I have previously undertaken lizard surveys in the Tiwai Spit Conservation Area for the Department of Conservation. This involved deploying pitfall traps and Gee minnow traps as part of a trial mark-recapture study for green skink and cryptic skink.

(e) In 2014, I was engaged by Southland District Council to prepare an ecological assessment for a proposed cycle trail bridge on a section of the Oreti River[2]. I subsequently acted as an expert witness at an Environment Court hearing.

(f) I, Kelvin Lloyd, have been employed as a consultant ecologist with Wildland Consultants since 2004. I am currently a Senior Principal Ecologist.

(g) My qualifications are a BSc (hons) (1996) and PhD (2000) from the University of Otago, where my studies were largely undertaken in the Department of Botany. Following my PhD, I was awarded a three year post-doc hosted by Manaaki Whenua/Landcare Research.

(h) I am an author of 22 scientific papers published in peer-reviewed national and international scientific journals, as well as several popular articles. I have also presented aspects of my research at national and international scientific conferences. I have lectured in plant ecology at 3rd year level at the University of Otago. I remain an honorary research associate of Landcare Research Ltd and continue to publish research papers in collaboration with other scientists as time permits. I am a member of the New Zealand Ecological Society, the New Zealand

[2] Wildland Consultants (2014): Assessment of Ecological Effects of a Proposed Cycle Trail Bridge on a Section of the Oreti River, Southland. *Wildland Consultants Contract Report No. 3467*. Prepared for Southland District Council.

Botanical Society, the Ornithological Society of New Zealand, the New Zealand Native Forest Restoration Trust and the New Zealand Plant Conservation Network.

(i) I have worked on numerous wind farm projects. These include the previous projects on Jedburgh Station[3] and Matariki Forest, and a proposed wind farm on Maungatua, Dunedin. Other wind farm projects that I have worked on for the applicant are the Turitea wind farm and the Castle Hill wind farm in the North Island. I have assisted Hurunui District Council in a peer review role, reviewing ecological applications for the Mt Cass wind farm[4] and the Hurunui wind farm[5].

(j) I am familiar with Southland Region and Otago Region. I have undertaken potential natural ecosystem mapping in both regions. Potential ecosystem mapping requires deep ecological experience of a region. I am also familiar with wetlands in Southland having provided evidence on wetland trends and status for the Southland Land and Water Plan, and co-authored a report on causes for wetland loss in Southland[6]. That incorporated field work to identify causes that modified or cleared the At Risk wetlands identified in desktop project. I am familiar with many outstanding wetlands in Southland, despite the losses and modification of other wetlands.

Code of conduct

19. We confirm that we have read the Code of Conduct for expert witnesses contained in the Environment Court Practice Note 2023. This assessment has been prepared in compliance with that Code, as if it were evidence being given in Environment Court proceedings. In particular, unless we state otherwise, this assessment is within our area of expertise and we have not omitted to consider material facts known to us that might alter or detract from the opinions we express.

[3] Wildland Consultants (2008). Assessment of ecological values at the proposed Slopedown wind farm, eastern Southland. *Wildland Consultants Contract Report No. 1985.* 63 pp.
[4] Wildland Consultants (2008). Audit of ecological assessment, Mt Cass wind farm resource consent application. *Wildland Consultants Contract Report No. 2073.* Prepared for Hurunui District Council. 39 pp.
[5] Wildland Consultants (2011). Review of ecological information for the proposed Hurunui wind farm. *Wildland Consultants Contract Report No. 2501.* Prepared for Hurunui District Council.
[6] Wildland Consultants (2019). Causes of loss of Southland wetlands. Wildland Consultants Report No 5223. Prepared for Environment Southland. 26 pp.

Purpose and scope of assessment

20. The purpose of this assessment is to assess the potential effects of the Southland Wind Farm Project on terrestrial and wetland ecological values to inform the applications under the Fast-track Approvals Act 2024.

21. The scope of the assessment includes:

    (a) Surveying, identifying, mapping and describing all potentially affected terrestrial and wetland habitats;

    (b) Surveys for indigenous birds, lizards, and terrestrial invertebrates;

    (c) A description of the ecological values of terrestrial and wetland habitats, and indigenous fauna recorded at the Project Site;

    (d) Describing potential adverse effects of the proposed wind farm on flora and fauna values identified and described in (a) to (c) above; and

    (e) Identifying and assessing measures to address the construction and operational effects of the Project, including biodiversity offsetting and compensation.

22. Freshwater values and bat values are not addressed in this assessment.[7]

23. All figures and relevant field data have been included in the Appendices.

THE SOUTHLAND WIND FARM PROJECT

24. Contact is seeking various approvals necessary for the construction, operation and maintenance of the Southland Wind Farm. The Project includes up to 55 wind turbines and associated infrastructure.

25. The full project description for the Project is provided in Part A of the substantive application documents. We do not repeat it in our assessment. The figures referenced in this report are also included in Part G to the substantive application documents.

[7] Freshwater values are addressed in the Freshwater Ecology report (Report 8), Dr Greg Ryder and Dr Ruth Goldsmith, 18 August 2025, and bat values are addressed in the Long-tailed Bat report (Report 6), Gerry Kessels and Ian Davidson-Watts, 18 August 2025.

THE PREVIOUS CONSENTING PROCESS FOR THIS PROJECT

26. Along with our colleagues at Wildlands, we were closely involved in the previous COVID-19 (Fast-track Consenting) Act 2020 (**Covid Fast-track**) consenting process for the Project.

27. Wildlands' involvement with the site dates back to 2008, when we were engaged by a different developer to report, on a preliminary basis, on the ecological values of the site in anticipation of a wind farm development. The work carried out in 2008 and 2009 provided useful background to our involvement with the Southland Wind Farm Project, but has not been directly relied on in our assessment of ecological values and effects for the Project.

28. We were engaged by Contact in 2022 to advise on the Project. From December 2022, we have carried out detailed vegetation, wetland and fauna mapping and surveys, amounting to approximately 3,600 person hours in the field. The work we carried out is discussed in the methodology section below.

29. Our work fed into the development of the design for the Project, and in the identification and quantification of key ecological constraints that were reflected in the Covid Fast-track application. That included, for example, design refinements to minimise impacts on the wetlands that we had identified, mapped and delineated through our survey work.

30. We were involved in a significant number of discussions with Contact and its engineering, design team and other consultants in that respect in the lead-up to the lodgement of the Covid Fast-track application. We also assisted Contact in its engagement with councils, the Department of Conservation (**DOC**), and mana whenua in the lead-up to the application being lodged.

31. Following on from that work, we prepared the Assessment of Terrestrial and Wetland Ecological Effects for the Project, which was submitted with the Covid Fast-track application in December 2023.[1] We also prepared a draft Terrestrial Ecology Management Plan (including various specific management plans in respect of vegetation, fauna, and offsetting and compensation requirements), which was also provided with the application in December 2023.

32. Terrestrial and wetland ecology became a key focus of the Covid Fast-track consenting process after the application was lodged, and we played a leading role through that process. In particular:

(a) We prepared an Addendum to the Terrestrial and Wetland Ecology Effects Assessment, which was lodged in May 2024. The addendum reported on further survey work and associated analysis that had been carried out since lodgement of the application (and which had been signalled in our original Assessment).

(b) We assisted with Contact's response to a number of 'Requests for Information' made by the expert consenting panel relating to terrestrial and wetland ecology.

(c) A number of key parties invited to comment on the application – including the relevant councils, DOC, and Te Ao Marama Incorporated (**TAMI**) – addressed terrestrial and wetland ecology matters in their written comments, including in some cases through comments from their expert ecologists. We closely advised Contact in addressing and formally responding to those comments.

(d) In addition, the panel appointed four ecologists to comment on / 'peer review' the application. Three of those peer reviews (in respect of ecology generally, offsetting and compensation, and avifauna) related directly to our work. We prepared detailed responses to each set of comments made by the peer reviewers.

(e) Subsequently, expert conferencing was arranged. Wildlands experts participated in conferencing with the panel's peer reviewers, and experts from DOC and Environment Southland. We participated in four expert conferencing topics: Terrestrial and wetland ecology, avifauna, invertebrates, lizards, and offsetting and compensation.

33. Through this intensive process, from our perspective, there were a number of positive outcomes achieved, including:

(a) Refinements to the indicative Project design, to further minimise effects on wetlands on the 'Jedburgh Plateau'.

(b) Proposed conditions of consent to address concerns raised by peer reviewers and other experts involved in the process. For example, when responding to the formal comments and subsequent to expert conferencing, we closely advised on the new proposed conditions specifically setting 'caps' on clearance of wetland and other valuable habitat and vegetation types, and specifically requiring a continuing

focus on further avoiding / minimising effects through the detailed design process.

(c) Contact was able to reach agreement on updated proposed conditions with DOC and its experts that had been involved in the process (focussed on ecology matters) and Ngāi Tahu and TAMI (focussed on cultural values and effects, but also directly in respect of te taiao and ecology matters).

(d) Through expert conferencing and engagement, we reached agreement with the peer reviewers appointed by the panel to specifically consider offsetting and compensation, and avifauna. In other words, those peer reviewers recorded their agreement that the final proposal and conditions in respect of offsetting and compensation measures, as well as avifauna, were appropriate.

34. One of the outcomes reached was confirmation that further survey work – including in particular verification of vegetation and wetland mapping at the Jedburgh Plateau – would be carried out. That further work was required by Contact's final proposed conditions to be carried out and reported on post-consenting (and before construction) anyway. We have subsequently been able to carry out much of that additional 'ground-truthing' work, and react to and report on it in this new FTAA application. This is described in the methodology section of our report below.

35. We have carefully reviewed the Covid Fast-track expert consenting panel's decision to decline the consents sought for the Project. In terms of wetland and terrestrial ecology, our understanding is that the panel's decision to decline consents focussed on:

(a) The panel's lack of confidence as to the accuracy of the wetland and vegetation mapping of the Jedburgh Plateau, and therefore as to our assessment of the level of effects on ecology values present there.

(b) The panel's concern (based on the advice of one of the peer reviewers it appointed) that vegetation and wetlands on the Plateau, but beyond the Project footprint, would be adversely affected through changes in stormwater flows and drainage patterns.

(c) Its view (again based on the advice of one of the peer reviewers it appointed, but not shared by the ecological offsetting and compensation peer reviewer) that the effects of the Project on the

Jedburgh Plateau are not amenable to ecological offsetting or compensation, and essentially that those effects must be avoided.

(d) Its view (not shared by the specialist avifauna peer reviewer it appointed) that there was insufficient certainty as to operational effects on migratory birds, lizards, and invertebrates to allow consents to be granted.[8]

36. On the other hand, the panel made it clear in their decision that they accepted that terrestrial and wetland ecology effects on Matariki Forest, Glencoe Station, and Jedburgh Station beyond the Jedburgh Plateau can be appropriately addressed.[9]

37. This report is intended to be a 'standalone' and complete report on terrestrial and wetland ecological values, effects and proposed effects management measures across the Project Site. We have, however, put additional emphasis on the matters highlighted in the Covid Fast-track expert consenting panel's decision. Our firm view is that the panel's criticisms and adverse findings were misguided. However, we have – together with Contact and its other consultant experts – carried out additional analyses in respect of those key adverse findings, which we address in this report.

METHODOLOGY

Introduction

38. This section provides a concise summary of the ecological methods we employed to assess the potential environmental effects of the proposed Southland Wind Farm. It outlines the comprehensive suite of field surveys and desktop analyses undertaken to evaluate key ecological values, including wetlands, terrestrial vegetation, avifauna, herpetofauna, and invertebrates, within the wind farm footprint and surrounding areas.

39. Full details on survey methods and the assessment frameworks used to determine ecological significance and level of effects are provided in **Appendix 1**, together with the approach taken to address residual impacts through biodiversity offsetting and compensation. The information presented reflects current best practice in ecological assessment and supports informed decision-making under relevant regional and national policy frameworks.

[8] Southland Wind Farm Covid-19 Recovery (Fast-track Consenting) Act 2020 decision report.
[9] Paragraph 199, Southland Wind Farm Covid-19 Recovery (Fast-track Consenting) Act 2020 decision report.

40. Collectively, Wildlands ecologists have spent approximately 3,600 person hours in the field since December 2022, comprising the following:

    (a) Vegetation mapping and plots, and wetland delineation – 550 hours;

    (b) Avifauna surveys – 1,100 hours;

    (c) Lizard surveys – 1,100 hours; and

    (d) Invertebrate surveys – 875 hours.

41. This time spent onsite has allowed our ecologists to gain a deep understanding of the habitats, ecological processes, species, ecological values, and existing threats to those values.

Vegetation Mapping and Wetland Delineation

42. The majority of the 36 identified vegetation types were mapped in the field following the Atkinson method (Atkinson 1985)[10], whereby the vegetation was classified into structural classes (e.g. forest, scrub, shrubland) based on the height and form of the dominant plants. Vegetation type names were assigned using up to three of the most dominant species in order of dominance.

43. Exotic vegetation types such as exotic conifer plantation forest, gorse scrub, and managed exotic grassland were predominantly mapped as a desktop exercise using high resolution aerial imagery.

44. For wetland mapping, we initially used a desktop analysis to identify wetlands in and around the proposed Wind Farm Site using high-resolution aerial imagery. This focused particularly on wetlands near turbine sites and along proposed construction access tracks. Field-based wetland delineation followed, at 73 locations, using protocols from Clarkson (2013) and the Ministry for the Environment (2022). Three main vegetation tests were applied:

    (a) Rapid test, identifying wetland areas based on dominant species presence.

[10] Atkinson, I.A.E. (1985). *Derivation of vegetation mapping units for an ecological survey of Tongariro National Park, North Island, New Zealand*. Wellington: New Zealand Department of Scientific and Industrial Research, Botany Division. **DSIR Land Resources Report No. 8.**

(b) Dominance test, which classifies a site as wetland if wetland plant species (Obligate, FACW, or FAC) make up over 50% of dominant cover.

(c) Prevalence Index, a weighted index indicating wetland status when the dominance test is inconclusive.

45. Additional hydrological and soil assessments were used when vegetation data were insufficient. Indicators such as low chroma soils and shallow groundwater supported classification.

46. A total of 73 wetland delineated plots were completed across the site.

47. Surveys occurred in March-April 2023, October 2023, March 2024 and April 2025, and together have given us a very good understanding of the nature and extent of the wetlands across at the Wind Farm Site (and in particular in and near the indicative Project footprint).

48. We note that the April 2025 surveys followed on from the previous Covid Fast-track consenting process, and were designed partly in response to the discussions between experts during that process. Analysis of 10-centimetre resolution drone imagery associated with the 2025 surveys provided further refinement.

49. Detailed wetland plot results are provided in **Appendix 8**, and wetland plot photographs are provided in **Appendix 9**.

Vegetation Survey and Biodiversity Monitoring

50. Extensive vegetation plot surveys were conducted in February and March 2024. The surveys have given us a very good understanding of vegetation values at and near the Project Site, and have been used for example, to inform biodiversity offsetting and ecological monitoring.

51. Permanent 10 x 10 metre RECCE plots were used to record species composition, canopy structure, vegetation height, seedling and sapling counts, browsing intensity, and general habitat condition. All plots included environmental data and were distributed across habitat types both inside and outside the wind farm footprint.

52. The RECCE plot surveys covered:

(a) 73 plots at Jedburgh Station;

(b) Seven plots at Matariki Forest;

(c) Five plots in wetlands at Davidson Road East (proposed compensation site, as discussed later in this report);

(d) Four plots in wetlands at Port Blakely Forest; and

(e) Three benchmarking plots[2] in pāhautea forest at Slopedown Conservation Area (outside but near the Project Site).

53. The locations of all wetland delineation plots and 10 x 10 metre RECCE plot surveys are illustrated in Figure Terrestrial Ecology-1 (Part G) below.

LEGEND

Wind Farm

- Wind Turbines
- Transmission Line Route
- Sub Station
- Grid Injection Point (GIP)
- Transpower 220kV Transmission Line
- Civil Works Design
- Jedburgh Plateau
- Wind Farm Site

Wind Farm Properties

- Glencoe Station
- Matariki (Venlaw) Forests
- Jedburgh Station

Transmission Line Properties

- Salvation Army Trust
- Port Blakely

Other Properties

- Contact Energy Property

Plots

- Wetland Delineation Plots (2023)
- Wetland Delineation Plots (2024)
- Wetland Delineation Plots (2025)
- Vegetation Plots - 10m X 10m (2024)

MAP SCALE	PRINT DATE
N Scale: 1:42,500	12/08/2025
	VERSION
	1.0

Kilometers
0 0.5 1 2

CREDITS:

Wildlands
Ecological data provided by Wildlands Consultants

TITLE

FIGURE TERRESTRIAL ECOLOGY - 1
LOCATIONS OF VEGETATION AND WETLAND DELINEATION PLOTS ON THE WIND FARM SITE

Service Layer Credits: Eagle Technology, LINZ

Avifauna Surveys

54. A wide range of avifauna surveys have been carried out since 2023, across all seasons. This multi-method programme, implemented to assess bird populations and evaluate turbine and transmission line collision risks, included:

    (a) Desktop assessment using eBird and DOC records from 2021–2022.

    (b) Five-minute bird counts, conducted over five survey periods (April 2023, February 2024, Oct/Nov 2024, February 2025, and May 2025). 12 transects were established across indigenous forest, wetlands, exotic plantation, and farmland. Each had eight count stations spaced ≥200m apart.

    (c) Observers recorded birds seen or heard within 200m over five minutes, ensuring no double-counting. All counts were done during daylight hours, with incidental sightings also recorded.

    (d) Acoustic monitoring was used to detect cryptic or nocturnal birds. ARF4 digital recorders were deployed for two-week periods and analysed using AI to detect calls from a range of bird species. Bittern-specific surveys were carried out in October 2023 using 15 recorders in wetland areas.

    (e) Flight height and path surveys were completed in Oct/Nov 2024 and February and May 2025 to determine bird flight altitudes and paths at turbine and transmission line sites. These were coordinated with bird counts.

    (f) Kārearea/eastern falcon surveys were done at six fixed points using binocular observation, with additional sightings logged during other bird surveys. Habitat data were recorded to assess potential nesting suitability.

    (g) Playback surveys targeted fernbird, bittern, and marsh crake using recorded calls played at fixed stations.

55. Following expert conferencing, and taking into account Contact's final proposed conditions of consent, by the end of the previous Covid Fast-track consenting process the avifauna peer reviewer confirmed that all her

concerns in respect of avifauna matters had been resolved.[11] We have undertaken more surveys since that previous consenting process, as discussed during expert conferencing. We also note that a Band bird collision risk model has recently been developed to improve understanding of species-specific vulnerability and to assess the potential magnitude of effects over the operational life of the wind farm, and has further informed the proposed conditions of consent and mitigation measures.

56. For context, the Band model for wind farm collision risk modelling has been used widely in New Zealand and overseas. While all models have their limitations, the Band model has been trialled and improved over time and is generally considered to be statistically sound (Chamberlain et al. 2005[12]; Masden & Cook 2016[13]). In the UK, it is most frequently used avian collision risk model for onshore windfarms (Bluewattle Ecology Ltd[14]).

Lizard Surveys

57. Lizard surveys began with a site visit in December 2022, where 65 tracking tunnels were installed across 13 locations, deemed to be the best quality habitat for skinks on the site. These were checked in January 2023 and detected tussock skink presence at six sites.

58. In January 2023, 140 Artificial Cover Objects (**ACO**s) were placed across the site. These included:

    (a) 65 ACOs paired with tracking tunnels; and

    (b) 75 ACOs in other high-quality lizard habitats.

59. In December 2023, 367 ACOs were spaced approximately 10-20 metres apart within lizard habitats at each impact site. All ACOs were checked across four days in February 2024.

60. Twenty-five funnel traps were set and checked over four days in February 2024, and 14 were set and checked over four days in April 2024.

61. Sixty-five tree-mounted ACOs (**TACO**s) were installed in December 2023 and February 2024. The TACOs were constructed using two double layered

[11] Paragraph 5, Avifauna Ecology Peer Review, Additional Comment, 17 January 2025.
[12] Chamberlain, D., Freeman, S., & Rehfisch, M. (2005). Appraisal of Scottish Natural Heritage's wind farm collision risk model and its application (BTO Research Report No. 401; pp. 1–53). British Trust for Ornithology.
[13] Masden, E. A., & Cook, A. S. C. P. (2016). Avian collision risk models for wind energy impact assessments. Environmental Impact Assessment Review, 56, 43–49.
[14] Bluewattle Ecology Ltd 2025: Proposed Southland Wind Farm Bird Strike Modelling. Prepared for Contact Energy Ltd.

Onduline, and were placed at specific sites that were most likely to detect Tautuku gecko, including forest edges and mature forest. These were left for more than six weeks to allow for geckos to occupy them.

62. In October 2024, 126 tree-mounted ACOs were deployed to detect arboreal geckos such as Tautuku gecko (*Mokopirirakau* "southern forest"). These were checked across three survey rounds in February and April 2025. Spotlighting was also used in forest margins.

63. Lizard records from the DOC herpetological database helped confirm species presence and guided mitigation and offset planning.

Invertebrate Surveys

64. Initial invertebrate surveys (April 2023) overlapped with lizard plots and involved hand-searching, sweep-netting, and night spotlighting in forests, wetlands, and scrub. A more intensive survey occurred in February 2024, using heath light traps and structured searches across notable habitats. Habitat corridors and patches with potential for rare species were targeted.

65. Potential habitat on the Jedburgh Plateau was identified for threatened and/or notable invertebrate taxa such as *Powelliphanta* carnivorous snails and Helms' stag beetle (*Geodorcus helmsi*), all of which are protected under the Wildlife Act. As a precaution, a carnivorous land snail survey was completed in March 2024 using hand-searching and leaf litter inspection. Subsequent surveys for Helms' stag beetle (*Geodorcus helmsi*) surveys occurred in Nov 2024 and Jan 2025, and involved:

    (a) 28 pitfall trap grids (five traps per grid) in Jedburgh and Matariki Forests;

    (b) Night spotlighting for two hours per grid; and

    (c) Identification and release of captured individuals.

66. This work characterised invertebrate biodiversity and provided baseline data for assessing habitat significance and potential restoration value.

67. All survey areas for birds, lizards, and invertebrates are illustrated in Figures Terrestrial Ecology-2a and 2b (Part G) below.

Assessment Approach and Residual Effects Management

68. Vegetation and habitats present within the proposed site were assessed for significance against the ecological significance criteria listed in the Southland Regional Policy Statement (**RPS**). The presence of regional Threatened, At Risk, and Rare ecosystems were identified based on vegetation habitat types described in **Appendix 2** of the RPS.

69. The impact assessment followed the Ecological Impact Assessment Guidelines (EcIAG, Roper-Lindsay et al. 2018), structured into three steps:

    (a) Assign ecological value – Based on habitat quality and national/regional threat rankings. Habitat value was assessed using representativeness, rarity, diversity, and context. Conservative assumptions were applied (e.g., treating induced bogs as equivalent to natural bogs).

    (b) Assess magnitude of effects – Considered habitat loss, fragmentation, edge effects, and lag times. Impacts were classified from 'Negligible' to 'Very High'.

    (c) Determine overall level of effects – Combined value and magnitude to categorise residual impacts. Impacts (overall level of effects after avoidance and mitigation measures are accounted for) rated Moderate or higher triggered offset or compensation requirements.

70. We have proposed avoidance and mitigation measures to address effects in the first instance, and a mixture of biodiversity offsets and compensation measures to address residual effects (effects remaining after avoidance and mitigation measures are in place). We discuss our assessments of significance, our EcIAG analysis, and our approach to effects management in detail later in this report.

contact

LEGEND

Wind Farm
- Wind Turbines
- Transmission Line Route
- Civil Works Design
- Jedburgh Plateau
- Wind Farm Site

Avifauna Surveys
- Acoustic Recording Devices
- Cryptic Playback Location
- Falcon Survey Stations
- Transmission Line Flight Height Surveys

Bird Count Transects
- Southern Rātā-Kamahi Forest
- Pasture
- Mānuka Forest and Scrub
- Wetland and Shrubland Mosaic

Lizard Surveys
- ACOs
- Tree ACOs
- Spotlighting Tracks

Invertebrate Surveys
- Pitfall Traps
- Terrestrial Invertebrate Night Search Area
- Terrestrial Invertebrate Day Search Area

MAP SCALE	PRINT DATE
N Scale: 1:25,000	6/08/2025
	VERSION 1.0

Kilometers
0 0.25 0.5 1 1.5

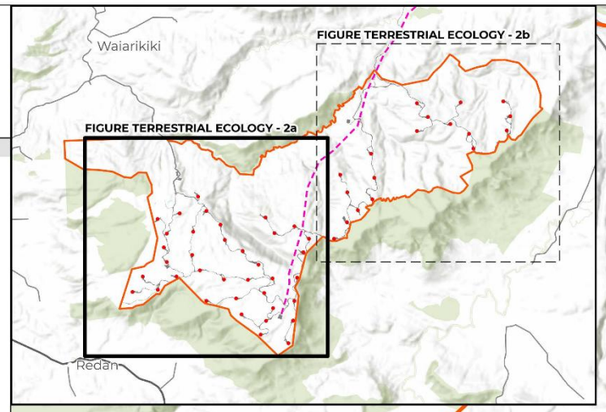
CREDITS:

Wildlands
Ecological data provided by Wildlands Consultants

TITLE

FIGURE TERRESTRIAL ECOLOGY - 2a
LOCATIONS OF FAUNA SURVEY
AREAS AND STATIONS
WIND FARM SITE - WEST

Service Layer Credits: Eagle Technology, LINZ



contact

LEGEND

Wind Farm

- Wind Turbines
- Transmission Line Route
- Civil Works Design
- Wind Farm Site

Avifauna Surveys

- Acoustic Recording Devices
- Falcon Survey Stations
- Fernbird Playback Locations
- Transmission Line Flight Height Surveys

Bird Count Transects

- Exotic Conifer Plantation Forest

Lizard Surveys

- ACOs

Invertebrate Surveys

- Pitfall Traps
- Terrestrial Invertebrate Night Search Area
- Terrestrial Invertebrate Day Search Area

MAP SCALE	PRINT DATE
N Scale: 1:25,000	6/08/2025
	VERSION 1.0

Kilometers
0 0.25 0.5 1 1.5

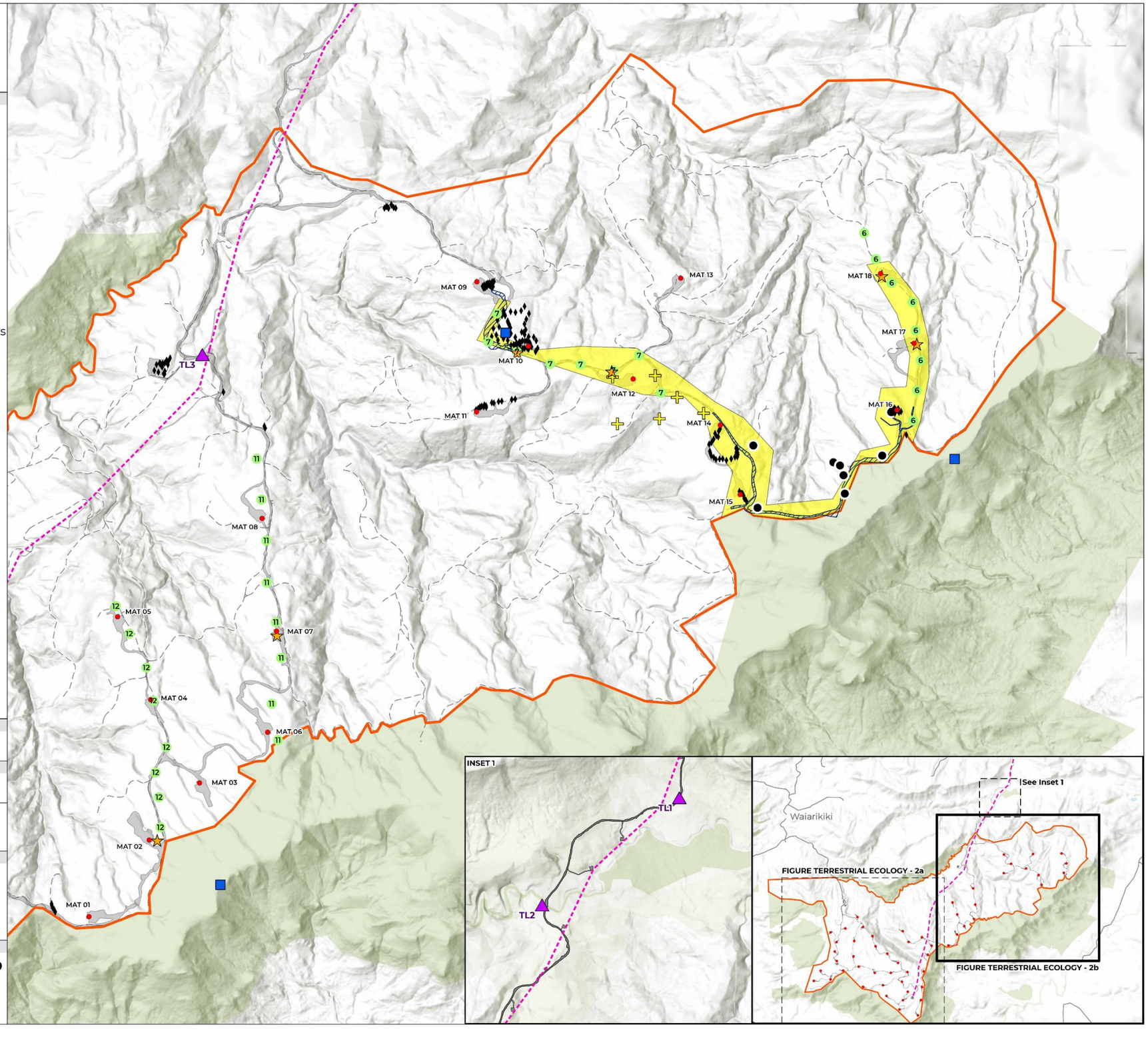
CREDITS:

Wildlands
Ecological data provided by Wildlands Consultants

TITLE

FIGURE TERRESTRIAL ECOLOGY - 2b
LOCATIONS OF FAUNA SURVEY
AREAS AND STATIONS
WIND FARM SITE - EAST

Service Layer Credits: Eagle Technology, LINZ



STATUTORY CONSIDERATIONS

71. This report has been prepared to support Contact's application for approvals for the Project under the Fast-track Approvals Act 2024 (**FTAA**). Under the FTAA, Contact is seeking the following approvals that are relevant to this report:

    (a) Resource consents, that would normally be granted under the Resource Management Act 1991 (**RMA**);

    (b) Wildlife approvals, analogous to authorities that would generally be granted under the Wildlife Act 1953 (**Wildlife Act**); and

    (c) Concessions, that would normally be granted under the Conservation Act 1987.

72. Statutory documents that provide the framework for this assessment of ecological effects are addressed in the Assessment of Environmental Effects for the proposed Wind Farm. In brief these documents include:

    (a) The RMA.

    (b) National Environmental Standards for Freshwater Regulations 2020 (**NES-F**).

    (c) The National Policy Statement for Freshwater Management (**NPS-FM**) 2020.

    (d) National Policy Statement for Renewable Electricity Generation 2011.

    (e) Wildlife Act.

    (f) Conservation Act 1987.

    (g) Southland RPS.

    (h) Proposed Southland Water and Land Plan (Operative in Part).

    (i) Southland District Plan.

73. We note that the National Policy Statement for Indigenous Biodiversity (**NPS-IB**) does not apply to renewable energy projects. Accordingly, we have been guided by the assessment criteria in Appendix 2 of the Southland RPS to determine ecological significance.

74. This assessment largely takes the form of an assessment that would be prepared in support of an RMA application. At the end of our assessment, we include an additional section specifically providing context in support of the Wildlife approvals that are being sought (in respect of lizards and invertebrates).

ECOLOGICAL CONTEXT AND EXISTING ENVIRONMENT

Ecological Districts

75. The Project Site is located in the Slopedown Range, adjoining Catlins Forest Park and about 37 kilometres inland from the southeastern coast of the South Island/Te Waipounamu (Figure Project Description-2 (Part G), **Appendix 3**). The site spans the boundary of the Waipahi and Tahakopa Ecological Districts. The northern part of the Wind Farm Site and wider Project Site is in the Waipahi Ecological District, while the westernmost proposed wind turbine locations are in the Tahakopa Ecological District.

76. Waipahi Ecological District extends from the Mataura River south of Gore township towards the east, while Tahakopa Ecological District includes the hills on the eastern side of the Mataura Valley, and eastward over the Catlins to the Catlins Coast from Nugget Point to Fortrose. The climate of both ecological districts is moist, cool and cloudy with rainfall of 800 - 1,200 millimetres per annum (Waipahi) and 800 – 1,1400 millimetres per annum (Tahakopa) (McEwen 19872). Both ecological districts are characterised by a series of parallel hills and valleys formed by folded Jurassic marine and estuarine sediments (sandstones and mudstones) of the Southland Syncline (McEwen 1987).

Threatened Environment Classification

77. The Southland Wind Farm Site is mainly covered with less reduced and better protected land environments (>30% indigenous vegetation cover remaining, and at least 20% of this is legally protected) but has Acutely Threatened land environments (less than 10% indigenous cover remaining) covering lower altitude parts of western Jedburgh Station and Glencoe Station, most of which comprises Mānuka forest and scrub and grazed exotic grassland (Figure Terrestrial Ecology-5 (Part G), **Appendix 3**).

Protected Areas nearby

78. The Southland Wind Farm Site is adjacent to conservation land on its southwestern and southern boundaries (Figure Terrestrial Ecology-6 (Part G), **Appendix 3**). To the southwest the Slopedown Conservation Area contains an extension to the Jedburgh Plateau, with the broad upland ridges covered by pāhautea forest. At lower elevations there is southern rātā-kāmahi forest.

79. The Catlins Conservation Park borders the Jedburgh Plateau and Matariki Forest. In addition, two small areas of indigenous bush – one to the north of the Wind Farm Site adjacent to the Mimihau Stream South Branch, and an isolated patch of kāmahi forest to the west of Jedburgh Station - are also part of the DOC-administered Catlins Conservation Park.

80. A 150-hectare (approximately) area of forest, which is subject to a QEII covenant, is adjacent to the Catlins Conservation Park area adjacent to the Mimihau Stream South Branch. The forest in this area has common kōwhai (*Sophora microphylla*), which is a key source of winter and spring foliage and flower buds for kererū (*Hemiphaga novaeseelandiae*) and spring nectar for kōparapara/bellbird and tui.

81. All of these protected areas are being significantly impacted by high numbers of feral deer (*Cervus elephus*) and pigs (*Sus scrofa*). Palatable species like kāpuka/broadleaf (*Griselinia littoralis*) and haumakaroa (*Raukaua simplex*) are not present in the browse tier (0.3 m-2 m) but present as mature trees and as seedlings. When the mature trees die, seedlings will become much fewer.

Existing Environment: Southland Wind Farm Site overview and description

82. The Southland Wind Farm Site covers approximately 5,800 hectares spread across three privately owned properties: Glencoe Station, Jedburgh Station, and Matariki Forest. Vegetation types within the Project site include exotic conifer plantation forestry, pasture, and indigenous terrestrial and wetland vegetation.

83. Thirty-six vegetation types were identified at the proposed Wind Farm Site, most of which are successional vegetation types. Of these vegetation types, 23 are indigenous, seven are mixed indigenous-exotic, and seven are dominated by exotic plant species. Detailed descriptions of these vegetation

types are provided in Appendix 2 and maps are provided in Figures Terrestrial Ecology-7a to 7d (Part G) of **Appendix 3**.

84. Approximately 62% of the Wind Farm Site consists of exotic-dominant vegetation, including exotic conifer plantation forest (2,289 hectares), primarily located at Matariki Forest; managed and unmanaged exotic grassland (1,100 hectares), and gorse scrub (291 hectares), which are both primarily located at Jedburgh Station and Glencoe Station (both of which are working farms). At lower altitudes, beyond the areas of exotic conifer plantation forest, the surrounding land is largely defined by rolling pasture, exotic hedgerows, and narrow gullies which support with pasture, gorse, exotic conifers, and mānuka.

85. Indigenous vegetation is mostly confined to Jedburgh Station, where the largest vegetation types comprise manuka forest and scrub (689 hectares), southern rātā-kāmahi forest (339 hectares), and Mānuka/tauhinu-inaka-Vernonica odora scrub and shrubland (249 hectares), the latter of which occurs on the Jedburgh Plateau.

86. Much of the indigenous vegetation is located on the Jedburgh Plateau, which is a c.530 hectares area of Jedburgh Station at the southern part of the Wind Farm Site (altitudinal range of between c.520 and 630 metres above sea level). As discussed above, the Jedburgh Plateau was a central focus of the previous Covid Fast-track consenting process for the Project, though it is worth noting that it makes up only a small proportion of the overall Wind Farm Site (<10%), some of which comprises grazed exotic grassland.

87. The Jedburgh Plateau is located on a landform known as a ‘cuesta’, characterised by a steep slope (scarp) on one side and a gentler slope on the other, formed by erosion of tilted sedimentary layers. It features a network of naturally occurring and induced wetlands, the latter formed following deforestation of former pāhautea (*Libocedrus bidwillii*) cloud forest. The wetlands on the Jedburgh Plateau are ecologically similar to upland wetlands in the Catlins, such as Ajax Bog and those in the McLennan Range, which share gentle topography, broad ridges, and high humidity. While pāhautea cloud forest remains intact in these areas, it has largely disappeared from the Jedburgh Plateau due to historic fires and grazing, except for a small remnant connected to conservation land, and which is outside the Project footprint.

88. These wetlands are interspersed amongst larger areas of mānuka scrub and mānuka and inaka dominated vegetation. The unpalatable indigenous species and mānuka scrub that are present reflect arrested succession caused by browsing from domestic stock and feral red deer. Wetlands on the Jedburgh Plateau are generally in good condition, although locally affected by browsing and animal tracks. They include ridge-top bogs and gully fens, while induced bogs on ridges often dry out in summer. Loss of cloud forest has diminished the ecological context of these wetlands.

89. Exotic grasses are widely present throughout the mosaic of shrubland on the Jedburgh Plateau. Gorse is scattered through shrubland areas on the north side of the Plateau.

FLORA

Indigenous and pest plant species

90. 225 indigenous and 23 exotic plant taxa were recorded at the Wind Farm Site (**Table 1**, **Appendix 4**). Most of the indigenous species are common and typical of the vegetation types and habitats present.

91. One of the vascular plant species observed during the site visit, desert broom, is listed as 'At Risk – Declining' (de Lange *et al.* 2024[15]). Desert broom was observed in the Mimihau Stream North Branch site within copper tussock/rautahi marsh vegetation and is not affected by any proposed roading developments.

92. Three species observed at the sites are listed in the Southland Regional Pest Management Plan (Southland Regional Council 2019[16]): broom (*Cytisus scoparius*), Douglas fir (*Pseudotsuga menziesii*), and gorse (*Ulex europeaus*). One species, crack willow (*Salix fragilis*), is considered an organism of interest. Broom and gorse were both present at the Jedburgh and Mimihau Stream North Branch sites, while Douglas fir and crack willow were observed at Mimihau Stream North Branch. Wilding conifers, including Douglas fir, are common at Matariki.

[15] de Lange P.J., Rolfe J.R., Barkla J.W., Courtney S.P., Champion P.D., Perrie L.R., Beadel S.M., Ford K.A., Breitwiser I., Schönberger I., Hindmarsh-Walls R., Heenan P.B., and Ladley K. 2018: Conservation status of New Zealand indigenous vascular plants, 2017. New Zealand Threat Classification Series 22. Department of Conservation.
[16] Southland Regional Council 2019: Southland Regional Pest Management Plan 2019-2029. Environment Southland Regional Council, Invercargill. 199 pp.

Threatened, At Risk, and Rare ecosystems

93. Appendix 2 of the Southland RPS lists Threatened, At Risk and Rare ecosystems, which are high priorities for protection. Ecosystems listed that may be present at the proposed Wind Farm Site are the Threatened wetland type, and the At Risk types 'broadleaf forest and scrub', 'mixed broadleaf forest and scrub', and 'red tussock grassland'. The Rare forest type, 'cloud forest' - defined as 'stands of mountain cedar forest generally in association with southern rātā (*Metrosideros umbellata*), pink pine (*Halocarpus biformis*), and Hall's totara (*Podocarpus laetus*)' - is present at the edge of the site (outside the Project footprint) (**Table 1**).

Table 1: Vegetation/habitat types within the Wind Farm Site that are listed as Threatened, At Risk, and Rare ecosystems as per Appendix 2 of the Southland RPS.

Sites	Vegetation/Habitat Types
Pāhautea/southern rātā-kāmahi forest	Cloud forests – Rare forest habitat
Southern rātā-kāmahi forest	Rimu-mataī-kahikatea-miro-tōtara/kāmahi-southern rātā forest - Threatened forest habitat type
Mānuka-haumakaroa–mountain holly forest	Broadleaf forest and scrub - At Risk habitat type
Copper tussock/rautahi marsh	Swamps (flaxland) and marshes - Threatened wetland habitat type

FAUNA

Overview

94. A combined total of 85 terrestrial indigenous fauna species have been recorded at the Wind Farm Site, comprising birds, lizards, and invertebrates. Of these, two and eight species are classified as 'Threatened' and 'At Risk' respectively.

95. A combined total of 23 exotic fauna species have been detected at the site. Pest mammal species detected include red deer, feral pigs, European hare (*Lepus europaeus*), ship rats (*Rattus rattus*), hedgehogs (*Erinaceous europaeus*), and feral cat (*Felis catus*). Other pest species such as mustelids (*Mustela* spp.) and mice (*Mus musculus*) are highly likely to be present throughout the Wind Farm Site.

Avifauna

96. Avifauna surveys undertaken between April 2023 and May 2025 have identified 23 indigenous and 15 exotic bird species, all of which are listed in **Table 2** of **Appendix 4**.

97. The surveys included bioacoustic surveys targeting migratory and nocturnal species, including seabirds, in October/November 2024, February 2025, and May 2025. Those bioacoustic surveys were carried out following discussions at expert conferencing during the Covid Fast-track process in respect of the possible impact of the Project on migratory birds (in terms of 'turbine strike').

98. Two indigenous bird species classified as 'Threatened - Nationally Vulnerable' have been recorded at the Wind Farm Site: kārearea/eastern falcon and koekoeā/long-tailed cuckoo. Four indigenous bird species classified as 'At Risk' have also been recorded, including pīhoihoi/NZ pipit, mātātā/South Island fernbird, and tōrea/South Island pied oystercatcher (*Haematopus finschi*) (all At Risk - Declining), and kawau/black shag (*Phalacrocorax carbo novaehollandiae*; At Risk - Relict).

99. Kārearea/eastern and mātātā/South Island fernbird were observed at multiple locations across the Wind Farm Site. Numerous pīhoihoi/NZ pipit observations were made in open country and track margins on the Jedburgh Plateau. They were also frequently observed in pasture.

100. The bioacoustic surveys have only detected three species to date: ruru/morepork (*Ninox novaeseelandiae*; Not Threatened), mātātā/South Island fernbird, and tōrea/South Island pied oystercatcher. Based on the low number of calls, it is likely that tōrea/South Island pied oystercatcher is resident at the site (possibly one or two pairs).

101. Migratory and seabird species such as kuaka/eastern bar-tailed godwits (*Limosa lapponica*; At Risk - Declining), tara/white-fronted tern (*Sterna striata*; At Risk - Declining), taranui/Caspian tern (*Hydroprogne caspia*; Threatened – Nationally Vulnerable), and tarapirohe/black-fronted tern (*Chlidonias albostriatus*; Threatened – Nationally Endangered) have not been detected during the bioacoustics surveys. These results, however, do not necessarily mean that some or all of these species do not occasionally fly across the site.

102. Generally speaking, the bioacoustic surveys reinforced our previous view that the Project poses a low risk to migratory birds.

103. There are multiple eBird records of kuaka/godwit around the Southland and Otago coastline. Kuaka/godwits will fly over the South Island in small numbers; however, the Wind Farm Site is approximately 35 kilometres inland and we consider it highly unlikely that kuaka/godwits will overfly the area.

Birds transiting from one site to another over the South Island generally fly at height, taking advantage of winds (Battley 2011)[17]. Flight heights range between half a kilometre to 3-4 kilometres.

104. Acoustic recording devices were also deployed for matuku-hūrepo/Australasian bittern (*Botaurus poiciloptilus*; Threatened – Nationally Critical) on the Jedburgh Plateau and Port Blakely wetlands in October-November 2023. No bittern were recorded, nor were they recorded during subsequent acoustic surveys undertaken for migratory and nocturnal species in October/November 2024, February 2025, and May 2025.

Lizards

105. Two lizard species were detected at the Wind Farm Site during the 2023-2025 surveys: tussock skink (*Oligosoma chionochloescens*) and Tautuku gecko (*Mokopirirakau* "southern forest"), both classified as At Risk - Declining. Green skink (*Oligosoma chloronoton*; Threatened – Nationally Critical) and herbfield skink (*O. murihiku*; At Risk – Declining) have not been recorded at the Wind Farm Site, although it is possible they are present in low numbers.

106. At Jedburgh Station, tussock skinks have been found in exotic unmanaged grassland along the existing track at JED-21, in [Mānuka]/tauhinu-inaka-*Veronica odora* scrub and shrubland' at JED-26 and JED-28, in exotic unmanaged grassland amongst rock outcrops along the proposed access road between JED-28 and JED-29, and in exotic unmanaged grassland at JED-32.

107. At Matariki Forest, tussock skinks have been found:

    (a) In pine forest in open margins along the existing forestry road north of MAT-08;

    (b) In Copper tussock grassland and Radiata pine/copper tussock grassland along the southern edge of the proposed turbine platform and along the adjacent existing forestry road at MAT-09;

    (c) In Mānuka-gorse/copper tussock grassland at MAT-10;

[17] Battley P. 2011: Science Learning Hub. https://www.sciencelearn.org.nz/videos/141-godwits-in-flight#:~:text=We%20think%20they%20can%20probably,there%20with% 20a%2030%20or

(d) In Wildling conifers/copper tussock shrubland along the existing forestry road close to MAT-11; and

(e) in Mānuka-gorse/copper tussock shrubland along the proposed access road south of MAT-14 and at MAT-15.

108. Tree-mounted ACOs installed at Jedburgh Station were checked in April 2024. No geckos were found. The ACOs were left in situ so that they could be re-checked. In April 2025, Tautuku geckos were located in ACOs in the patch of mānuka within the footprint of JED-21, and on the other side of the main gully filled with southern rātā-kāmahi forest between JED-33 and JED-34. Two geckos were also detected while spotlighting along a track near JED-20 and JED-21 (Figure LMP - 1c (Part G)). In total, six Tautuku geckos were detected during the surveys. It is likely that Tautuku geckos are more widespread across the site, although likely in low densities.

Invertebrates

109. While there are gaps in the invertebrate assemblage that are characterised by the large, slow, easily-predated species, the invertebrate assemblage at the site has relatively high diversity at all trophic levels. A total of 60 indigenous invertebrates have been recorded at the Wind Farm Site (Table 3, **Appendix 4**), of which the following ten taxa are considered notable:

(a) Helms' stag beetles (*Geodorcus helmsi*; At Risk – Declining);

(b) Ground beetle (*Megadromus meritus*; locally endemic);

(c) Ngaokeoke/peripatus (*Peripatoides* sp.);

(d) Short-horned grasshopper (*Sigaus campestris*; At Risk – Declining);

(e) Leaf-veined slug (*Athoracophoridae*);

(f) Giant springtail (*Platanurida* sp.);

(g) Trapdoor spider (*Cantuaria* sp.; likely locally endemic);

(h) Ground beetle (*Holcaspis* sp.; likely to be locally endemic);

(i) Red and black millipede (?*Icosidesmus* sp.; undescribed species, locally endemic); and

(j) Ground beetle (*Megadromus* sp.; likely locally endemic).

110. Live and dead specimens of Helms' stag beetles were detected at the site during surveys undertaken between April 2023 and January 2025. Data from the November 2024 and January 2025 surveys suggest at least two distinct populations of Helms' stag beetle are present at the site: one in the south eastern region of Matariki Forest between MAT-15 and MAT-16, and the other in the southwestern region of Jedburgh Station.

111. Lepidoptera (moths) were at low frequency and diversity. It would also be expected to find brachypterous (not winged) species given the plant species present.

112. Two specimens of trapdoor spider were recorded at Matariki and one on Jedburgh Plateau. Populations of trapdoor spider burrows were seen at Jedburgh Station near JED-34. Several ground beetle (*Megadromus meritus*) and ground wētā (*Hemiandrus maia* and *Anderus fiordensis*) were recorded. They appear to be present in large areas of indigenous vegetation patches on-site.

113. Red and black millipedes were found, including one that had white markings that are red in other specimens. Whether this is a different species or the same species in a different colour morph, moult cycle or life stage is unknown.

114. The fact that Helms' stag beetle at Jedburgh Station were only found on the track running along the boundary between Jedburgh Station and the Catlins Forest Park, rather than within the forest, suggests that Helms' stag beetles in Jedburgh Station are likely crossing the boundary from the adjacent Catlins Forest Park, which is directly south of Jedburgh Station. They are likely to be living and breeding at the edges of the forest directly adjacent to the boundary on Jedburgh Station. The population is now known to extend as far up the track as JED-6. The factors limiting their population are unknown, but predation from feral pig and brushtail possum (*Trichosurus vulpecula*) are likely limiting population growth, as sign of these species is plentiful in the same area as the beetles were found.

115. Additional notable and non-notable species were found during the stag beetle survey, as to be expected when searching new areas (e.g. JED-34) and using new survey techniques (pitfall traps). The presence of taxa such as giant springtail, ground wētā, and more ground beetle species indicates that some important habitat values for indigenous invertebrates are present in the areas where these species are surviving, but they would benefit from habitat

restoration (including mammalian pest control) as they are highly vulnerable to habitat loss and predation by introduced mammals.

ASSESSMENT OF ECOLOGICAL VALUES AND STATUTORY SIGNIFICANCE

Overview

116. Ecological value and significance are related but distinct concepts used in ecological assessments in New Zealand. Ecological significance refers to whether a site or area meets certain thresholds or criteria that identify it as significant indigenous vegetation or significant habitat of indigenous fauna under Section 6(c) of the RMA or criteria within regional or district plans, or RPS. A site is either significant or not significant for the purposes of the RMA. That is to say, a site cannot be 'highly significant' or 'moderately significant'.

117. Ecological value, in contrast, is a broader and more continuous concept. It refers to the overall worth or importance of an ecological feature or area in the context of an ecological impact assessment (EcIA), such as those done under the Ecological Impact Assessment Guidelines (EIANZ 2018). Assessing ecological value uses similar criteria, although rankings can be used for each attribute (e.g. Low, Moderate, High). Ecological value helps determine the magnitude and level of ecological effects of a project.

Ecological values

118. While the Wind Farm Site includes some areas of high value terrestrial and wetland habitats, much of it has been affected by historic fires, which were used as a farming tool to clear the original cover of pāhautea forest and southern rātā-kāmahi forest, and then subsequent clearances of regenerating mānuka-dominant vegetation.

119. The only woody vegetation at the Wind Farm Site that does not appear to have been directly affected by farming practices is the southern rātā-kāmahi forest in the large gully at the north of Jedburgh Station.

120. The grassland and indigenous-dominant upland habitats on Jedburgh Station – including the Jedburgh Plateau - are subject to cattle grazing in winter (between May and August) and grazing by sheep in summer. Unformed vehicle tracks are present on several of the lower elevation ridges within the site, and stock tracks pass through many of the shrubland areas and across some wetland gullies. The site includes pest plants and exotic-dominant habitat types that are found throughout the region. Moreover, indigenous

biodiversity values are subject to browsing and predation pressure by the full suite of introduced mammalian pests as the area is not currently subject to pest management.

121. Matariki Forest forms approximately 36% of the Wind Farm Site, and mostly comprises exotic conifer plantation forest (2,268 hectares). Although not ecologically significant, areas of plantation forest have been assigned a conservative ecological value of 'Moderate', given that long-tailed bats are known to forage on its margins and kārearea/eastern falcon may include it in its hunting territory. Narrow riparian corridors comprising Indigenous broadleaved forest and scrub (assessed as High value) are present within the plantation forest, while relatively small and often isolated patches of Low to High value copper tussock-dominant vegetation occur across Matariki Forest together with larger areas of Low value gorse scrub. Forestry roads are common throughout Matariki Forest.

122. Overall, the Wind Farm Site provides a large and diverse area of indigenous habitat for indigenous fauna, acknowledging that the majority of higher value ecological features are present at Jedburgh Station. A moderate diversity of forest bird species is present at the site, while wetland and shrubland habitats on the Jedburgh Plateau and Matariki Forest provide local habitat for threatened species such as kārearea/eastern falcon, mātātā/South Island fernbird, and pīhoihoi/NZ pipit.

123. The Wind Farm Site supports large areas of suitable habitat for invertebrates, including moths, spiders, wētā, and beetles. However, an intact invertebrate assemblage is unlikely to be present due to past habitat modifications and uncontrolled mammalian herbivores and predators. Plateau habitats on the Jedburgh Plateau and Matariki Forest appear to be important for invertebrate biodiversity despite the presence of pest animals, with several notable species being found as discussed above.

124. There appears to be a depauperate lizard fauna at the Wind Farm Site, with only tussock skink and Tautuku gecko having been detected. Numbers for both species, particularly Tautuku gecko, are likely to be sparse due to the effects of past land clearance and predation by pest mammals.

125. In broad terms the site includes 36 habitat types and numerous associated species of indigenous plants and fauna. Key ecological features include:

    (a) Extensive indigenous habitat for avifauna, lizards, and invertebrates.

(b) Diverse avifauna and invertebrate assemblages.

(c) Threatened and At Risk bird, lizard, and terrestrial invertebrate taxa.

(d) A large example of southern rātā-kāmahi forest (Vegetation Type 4).

(e) Indigenous wetland habitats (Vegetation Types 1, 6, and 7).

(f) A small area of rare pāhautea forest (Vegetation Type 11).

126. **Table 2** below presents a summary of the 'notable' habitats and species that are known or assumed present across the Wind Farm Site. Notable habitats and species include those that are classified as 'Threatened 'or 'At Risk' as per Appendix 2 of the Southland Regional Policy Statement or otherwise assessed as having 'Moderate' or higher ecological value under (EcIAG)[18]. An assessment of ecological values of all vegetation and habitats within the Wind Farm Site is provided in **Appendix 5**.

127. Note that we have conservatively assessed exotic conifer plantation forest as having 'Moderate' ecological value due to its mosaic of foraging, commuting and potential roosting habitats for long-tailed bats. It is not appropriate, however, to assess this vegetation type as ecologically significant.

Table 2: Notable habitats and species present at the Wind Farm Site.

Notable Vegetation and Habitat Types and Species	Threat Status as per Southland RPS and Assigned Ecological Value Category ('Moderate' or higher)
Terrestrial Habitats	
Southern rātā-kāmahi forest	Threatened/Very high
Pāhautea/southern rātā-kāmahi forest	Threatened/Very high
Mānuka-haumakaroa-mountain holly forest	At Risk/High
Mānuka-inaka-mountain holly-(gorse) scrub and shrubland	Not Threatened/Moderate
Mānuka/tauhinu-inaka-*Veronica odora*-scrub and shrubland	Not threatened/Moderate
Mānuka forest and scrub	Not threatened/Moderate
Mānuka scrub	Not threatened/Moderate
Mānuka scrub and shrubland	Not threatened/Moderate
[Mānuka]/gorse-tauhinu scrub	Not Threatened/Moderate
Mānuka/copper tussock grassland	Not Threatened/Moderate
[Mānuka-gorse]/copper tussock grassland	Not Threatened/Moderate
[Gorse]/copper tussock grassland	Not Threatened/Moderate
[Radiata pine]/copper tussock shrubland	Not Threatened/Moderate
[Radiata pine]/copper tussock grassland	Not Threatened/Moderate
Inaka scrub	Not Threatened/Moderate
Inaka/copper tussock scrub	Not Threatened/ Moderate

[18] Regional threat status has been applied to ecosystem/habitat types as per Threatened, At Risk, and Rare Ecosystems from Appendix 2 of the Southland RPS, whereas National Threat Status has been applied to species in accordance with the New Zealand Threat Classification System.

Notable Vegetation and Habitat Types and Species	Threat Status as per Southland RPS and Assigned Ecological Value Category ('Moderate' or higher)
Copper tussock grassland	Not Threatened/High
Kōhūhū/gorse/rarauhe scrub	Not Threatened/Moderate
Exotic conifer plantation forest	Not Threatened/Moderate
Wetland Habitats	
Bog wetland	Not Threatened/Very high
Fen wetland	Not Threatened/Very high
Copper tussock/rautahi marsh	Threatened/Very high
Notable Avifauna	
Pīhoihoi/NZ pipit	At Risk - Naturally Uncommon/Moderate
Koekoeā/long-tailed cuckoo	Threatened – Nationally Vulnerable/Very high
Kārearea/eastern falcon	Threatened – Nationally Vulnerable/Very high
Kererū	Not Threatened/Moderate
Tūi	Not Threatened/Moderate
Korimako/bellbird	Not Threatened/Moderate
Mātātā/South Island fernbird	At Risk - Declining/High
Matuku-hūrepo/ Australasian bittern	Threatened – Nationally Critical/Very high
Notable Herpetofauna	
Tussock skink	At Risk - Declining/High
Green skink (potentially present)	Threatened/Very high
Tautuku gecko	At Risk - Declining/High
Notable Terrestrial Invertebrates	
Helms' stag beetle	At Risk - Declining (requires WAA permit)/High
Megadromus meritus and *Megadromus* sp.	Not threatened but locally endemic/Moderate
Short-horned grasshopper	At Risk - Declining/High
Ngaokeoke/peripatus	Potentially threatened and/ or locally endemic/ Potentially Very high/High
Leaf-veined slug (Athoracophoridae)	Not threatened but locally endemic/Moderate
Giant springtail (*Platanurida* sp.)	Potentially threatened and/or locally endemic/High
Trapdoor spider (*Cantuaria* sp.)	Potentially threatened and/or locally endemic/High
Ground beetle (*Holcaspis* sp.)	Potentially threatened and/or locally endemic High
Millipede (*?Icosidesmus* sp.)	Possibly a new species/Moderate

Key pressures on current ecological values and ecosystem processes

Ungulates and other herbivores

128. The actions of feral deer and feral pigs are having detrimental effects on habitats and ecosystem processes at the Wind Farm Site, particularly in indigenous forest, shrubland, and wetland habitats.

129. In the Southern rātā-kāmahi forest (Vegetation Type 4) and Mānuka forest and scrub (Vegetation Type 8), intensive deer browse has selectively

removed palatable indigenous plant species, therefore affecting processes such as regeneration and forest succession (Plate 1). Feral pigs have created significant damage by rooting up the ground, which in turn can facilitate the invasion of exotic plant species, result in soil compaction and altered infiltration rates, and mobilise sediments near streams (Plate 2). These actions have resulted in a depauperate bare ground tier and understorey throughout all forest and scrub ecosystems at the Wind Farm Site, with only unpalatable species persisting, e.g. crown fern (*Lomaria discolor*) (Plate 3).

130. Browsing by stock and feral deer within indigenous shrubland habitats on the Jedburgh plateau have also suppressed regeneration, resulting in a state of arrested succession. Only unpalatable species persist such as mānuka, *Veronica odora*, tauhinu, and small-leaved coprosma species. The browsing and trampling actions by these animals has also fragmented the shrubland habitats.

131. In wetlands, browsing of soft-stemmed species like sedges and ferns has led to reduced plant cover, diminished habitat complexity, and reduced species diversity. Pugging – the trampling of soils by hooved animals – exacerbates these impacts by compacting soil, damaging root structures, and creating anaerobic or waterlogged conditions that further inhibit seed germination and seedling establishment (Plate 4).

132. These pressures collectively reduce the ecological integrity of indigenous ecosystems at the Wind Farm Site. Loss of plant diversity and structural complexity weakens ecosystem resilience and functioning. Key interactions, such as propagule dispersal by birds that rely on fruiting plants suppressed by browse, are disrupted. In forests, reduced understory vegetation limits habitat availability for invertebrates, lizards, and ground-dwelling birds, while in wetlands, pugging can destroy peat-forming vegetation and damage hydrological regimes. The cumulative effects of ungulate impacts thus undermine both the compositional and functional aspects of ecosystems, compromising natural regeneration processes and the long-term viability of indigenous biodiversity.

133. European hares have been observed on the Jedburgh Plateau and they are likely to be inhibiting the regeneration of some palatable indigenous species.

Plate 1 – Browsed understorey of Mānuka forest and scrub. 25 October 2024

Plate 2 – Browsed understorey of Southern rātā-kāmahi forest with only crown fern remaining. 25 October 2024

Plate 3 – Pig rooting in ground tier of Southern rātā-kāmahi forest. 25 October 2024

Plate 4 – Stock and deer pugging in a wetland on the Jedburgh plateau. 13 April 2024

Mammalian predators

134. It is assumed that, in the absence of control, a full suite of predators are present at the site, noting that species such as ship rats, hedgehogs, possums, and feral cats were detected during field surveys.

135. It is expected the predators will be adversely affecting bird, lizard, and invertebrate numbers across the site. In particular, the low numbers of lizards

and flightless invertebrates detected at the site during multiple surveys – together with the detection of predated beetle carcasses - indicate that predators are having a considerable effect. There is also anecdotal evidence[19] that mātātā/South Island fernbird is declining on the Jedburgh Plateau due to predation from rodents and mustelids.

Ecological significance

136. The following areas qualify as significant indigenous vegetation and / or habitat, according to the Southland RPS criteria:

    (a) The Jedburgh Plateau (including all wetlands, shrubland, and scrub), and lower mānuka stands and adjoining southern rātā-kāmahi forest.

    (b) The majority of copper tussock-dominant habitats and indigenous woody habitats within Matariki Forest.

    (c) Habitats of desert broom at the Mimihau crossing and copper tussock marshes at Kaiwera Downs.

137. The assessment of ecological significance was made on individual types of vegetation and habitat for representativeness and fauna habitat, and across vegetation and habitat types for diversity and pattern and some of the ecological context. All significant areas were important for Rarity, and indigenous forest and wetlands on the Jedburgh Plateau and Davidson Road East were significant for the Southland RPS criteria of Representativeness.

138. The indigenous vegetation on Jedburgh Station is large and compact. Jedburgh and Matariki contain significant habitats for fauna including birds, lizards, and invertebrates, but they are mostly depleted populations due to habitat modification and the depredations of herbivores and predators.

139. The criteria of the Southland RPS are detailed in italics below and evaluations made in turn. A summary is provided in **Table 3** below.

    (a) Representativeness

    (i) Indigenous vegetation or habitat of indigenous fauna that is representative, typical or characteristic of the natural diversity of the relevant ecological district or coastal biogeographic region. This can include degraded examples where they are some of the best remaining

[19] Based on observations made at the site in 2009 by Wildland Consultants.

examples of their type, or represent all that remains of indigenous biodiversity in some areas.

140. The small amount (6.25 hectares) of pāhautea forest on the Jedburgh Plateau meets this criterion, as would the southern rātā-kāmahi forest (although it has lost its emergent podocarps), and natural bogs and fens. The copper tussock marshes at the Contact property at Davidson Road meet this criterion as well, as despite their modified condition, they represent a much-reduced wetland type in the Waipahi Ecological District.

(ii) Indigenous vegetation or habitat of indigenous fauna that is a relatively large example of its type within the ecological district or coastal biogeographic region.

141. The large area of southern rātā-kāmahi forest meets this criterion within the Waipahi Ecological District. The large extent (*c.*689 hectares) of mānuka forest and scrub also qualifies within the Waipahi Ecological District.

(b) Rarity/Distinctiveness

(i) Indigenous vegetation or habitat of indigenous fauna that has been reduced to less than 20% of its former extent, in the Region, or relevant land environment, ecological district, freshwater environment, or coastal biogeographic region.

142. Some of the mānuka scrub at lower elevation is on land environments with less than 10% remaining indigenous vegetation. These areas meet this criterion. The wetlands on the Jedburgh Plateau do not meet this criterion even though there is an estimated 10% remaining nationally (we are aware that historic extent of wetlands in Southland has been significantly over-estimated on the Southland Plains[20], probably from use of a topographical correction, but we do not know whether this is true of other regions). We note that national scale is not part of the criterion. The marsh wetlands at the Mimihau crossing point and the marsh wetlands at the land Contact owns at Davidson Road qualify at the ecological district scale.

(ii) Indigenous vegetation or habitat of indigenous fauna that supports an indigenous species that is threatened, at risk, or uncommon,

[20] Anne-Gaelle E. Aussiel, Phillipe Gerbeaux, W. Lindsay Chatterton, Theo Stephens, Derek Brown, and John Leathwick. (2008). Wetland ecosystems of national importance for biodiversity: criteria, methods and candidate list of nationally important inland wetlands. Landcare Research Contract Report: LC0708/158.

nationally or within the relevant ecological district or coastal biogeographic region.

143. Cloud forest is a rare ecosystem in Southland. At the site, it is represented by pāhautea forest, and therefore meets this criterion. The southern rātā-kāmahi forest is a threatened forest type in Southland, and meets this criterion. One plant, desert broom, is classified as 'At Risk – Declining' and its habitat at the Mimihau crossing therefore meets this criterion. Mānuka forest and scrub on the Jedburgh Plateau and the adjacent southern rātā- kāmahi forest provides habitat for tussock skinks and Tautuku gecko, which are both classified as 'At Risk – Declining', and two 'Threatened - Nationally Vulnerable' (koekoeā/long-tailed cuckoo and kārearea/eastern falcon) and two 'At Risk – Declining' bird species (mātātā/South Island fernbird and Pīhoihoi/NZ pipit). Matariki Forest supports one 'At Risk - Relict bird' species (kawau/black shag). Several notable invertebrate species are present in forest and shrubland habitats across the site, including At Risk species. The entire Jedburgh Plateau and adjoining southern rātā-kāmahi forest meets this criterion.

(iii) The site contains indigenous vegetation or an indigenous species at its distribution limit within Southland or nationally.

144. Tautuku gecko at Jedburgh Station is at the northern distribution of the species.

(iv) Indigenous vegetation or an association of indigenous species that is distinctive of restricted occurrence, occurs within an originally rare ecosystem, or has developed as a result of an unusual environmental factor or combinations of factors.

145. No associations of species meet this criterion at the site. They are determined by typical factors, including topography, elevation, climate and anthropogenic disturbance.

(c) Diversity and Pattern

(i)Indigenous vegetation or habitat of indigenous fauna that contains a high diversity of indigenous ecosystem types, indigenous taxa, or has changes in species composition reflecting the existence of diverse natural features or gradients.

146. There is a high diversity of successional vegetation types on the Jedburgh Plateau and in Matariki Forest, which are present to anthropogenic causes. The invertebrate assemblage on the Jedburgh Plateau is an example of a high diversity of indigenous taxa, and meets this criterion. Avifauna diversity is moderate but does not meet this criterion. No other fauna assemblage is particularly diverse.

(d) Ecological Context

(i) Vegetation or habitat of indigenous fauna that provides or contributes to: an ecological linkage, ecological corridor or network; buffering function; or ecosystem service.

147. When evaluating this criterion, it is important to consider a linkage or corridor or network for what species. When considering buffering, it is important to know the relevant threats and whether or not the vegetation or habitat provides buffering from those threats or pressures.

148. Shrubland and wetland vegetation on the Jedburgh Plateau does link to non-forest vegetation on the Puke Mimihau Ridge, although ground-dwelling fauna such as skinks and large invertebrates currently have fragmented populations due to predation, the destructive effects of stock and feral deer, and the presence of farm roads, tracks and fire breaks. These fauna species therefore cannot take full advantage these linkages.

149. Indigenous and exotic forest at the Wind Farm Site form part of a local habitat for forest avifauna and kārearea/eastern falcon, while the wetlands and shrublands do play part of a network (or mosaic of habitats) for fernbird. However, the terrestrial vegetation provides little buffering to the threats of browsing ungulates or mammalian predators, which are the key threats to indigenous biodiversity on the Plateau.

150. The indigenous cover provides an ecosystem service in delivering clean water in headwater streams, but generally that service is diluted in lowland pastoral habitats.

(ii) A wetland which plays an important hydrological, biological, or ecological role in the natural function of a water body, including a river or coastal system, or springs, lakes and streams.

151. The wetlands on Jedburgh Plateau deliver relatively clean water to some of the headwater streams of Redan Stream and meet the criterion.

(iii) Indigenous vegetation or habitat of indigenous fauna that provides important habitat (including, but not limited to, refuges from predation, or key habitat for feeding breeding or resting) for an indigenous species either seasonally or permanently.

152. The Jedburgh Plateau provides important habitat for pīhoihoi/NZ pipit, mātātā/South Island fernbird, and numerous invertebrates. Indigenous grasslands, mainly in Matariki Forest, provide important habitat for tussock skink.

Table 3: Summary of ecological significance per vegetation and habitat type (assessed against the Southland RPS criteria).

Vegetation Type ID	Vegetation Type	Ecologically Significant?	Criteria Met
1	Bog wetland	Yes	Representativeness sub-criterion (i)
2	Exotic grassland (unmanaged)	No	N/A
3	Mānuka-inaka-mountain holly-(gorse) scrub and shrubland	Yes	Rarity/Distinctiveness sub-criterion (ii)
4	Southern rātā-kāmahi forest	Yes	Representativeness sub-criterion (i); Ecological Context sub-criterion (i); Ecological Context sub-criterion (iii) Rarity/Distinctiveness sub-criterion (ii)
5	Mānuka/tauhinu-inaka-*Veronica odora*-scrub and shrubland	Yes	Diversity and Pattern sub-criterion (i); Ecological Context sub-criterion (i); Rarity/Distinctiveness sub-criterion (ii)
6	Copper tussock/rautahi marsh	Yes	Representativeness sub-criterion (i); Rarity/Distinctiveness sub-criterion (ii)
7	Fen wetland	Yes	Representativeness sub-criterion (i); Rarity/Distinctiveness sub-criterion (ii)
8	Mānuka forest and scrub	Yes	Ecological Context sub-criterion (i); Rarity/Distinctiveness sub-criterion (ii)
9	Copper tussock/rautahi swamp	Yes	Representativeness sub-criterion (i); Rarity/Distinctiveness sub-criterion (ii)
10	Mānuka-haumakaroa-mountain holly forest	Yes	Representativeness sub-criterion (i); Diversity and Pattern sub-criterion (i)
11	Pāhautea/southern rātā-kāmahi forest	Yes	Representativeness sub-criterion (i); Rarity/Distinctiveness sub-criterion (i); Rarity/Distinctiveness sub-criterion (ii)
12	Exotic broom shrubland	No	N/A
13	Mānuka/gorse-tauhinu scrub	No	N/A

Vegetation Type ID	Vegetation Type	Ecologically Significant?	Criteria Met
14	Gorse/copper tussock grassland	Yes	Representativeness sub-criterion (i); Rarity/Distinctiveness sub-criterion (ii)
15	Mānuka/copper tussock grassland	Yes	Representativeness sub-criterion (i); Rarity/Distinctiveness sub-criterion (ii)
16	Mānuka-gorse/copper tussock grassland	Yes	Rarity/Distinctiveness sub-criterion (ii)
17	Wilding conifer/copper tussock shrubland	Yes	Rarity/Distinctiveness sub-criterion (ii)
18	Wilding conifer/copper tussock grassland	Yes	Rarity/Distinctiveness sub-criterion (ii)
19	Wilding conifer/gorse-copper tussock scrub[3]	No	N/A
20	Copper tussock grassland	Yes	Representativeness sub-criterion (i); Rarity/Distinctiveness sub-criterion (ii)
21	Gorse scrub	No	N/A
22	Gorse/copper tussock grassland	No	N/A
23	Gorse/copper tussock shrubland	No	N/A
24	Inaka scrub	Yes	Rarity/Distinctiveness sub-criterion (ii)
25	Mānuka scrub and shrubland	Yes	Rarity/Distinctiveness sub-criterion (ii)
26	Mānuka-gorse/copper tussock shrubland	No	N/A
27	Wilding conifer/mānuka-copper tussock shrubland	No	N/A
28	Mānuka scrub	Yes	Rarity/Distinctiveness sub-criterion (ii)
29	Kōhūhū/gorse/rarauhe scrub	Yes	Rarity/Distinctiveness sub-criterion (ii)
30	Exotic conifer plantation forest	No	N/A
31	Exotic grassland (managed)	No	N/A
32	Indigenous broadleaved forest and scrub	Yes	Representativeness sub-criterion (i); Rarity/Distinctiveness sub-criterion (ii)
33	Mixed indigenous-conifer forest and scrub	Yes	Rarity/Distinctiveness sub-criterion (ii)
34	Indigenous scrub and shrubland	Yes	Representativeness sub-criterion(i); Rarity/Distinctiveness sub-criterion (ii)
35	Mānuka-inaka/copper tussock marsh	Yes	Representativeness sub-criterion (i); Rarity/Distinctiveness sub-criterion (ii)
36	Mānuka/copper tussock shrubland	Yes	Rarity/Distinctiveness sub-criterion (ii)

POTENTIAL EFFECTS OF THE PROPOSED WIND FARM

Overview

153. The Project has the potential to result in adverse effects on ecological values at the Wind Farm Site[21]. In general terms, these effects may include:

    (a) Effects arising during construction:

        (i) Permanent loss of terrestrial and wetland habitats, fragmentation, degradation, and general disturbance due to vegetation clearance and earthworks.

        (ii) Temporary loss of terrestrial habitats due to construction of fill disposal sites.

        (iii) Alterations to wetland hydrology through earthworks.

        (iv) Direct mortality or injury to indigenous fauna that may be harmed during vegetation clearance or earthworks activities.

    (b) Effects arising once the Southland Wind Farm is operational:

        (i) Direct harm to forest or wetland birds through potential blade strike, and noise and lighting disturbance associated with wind farm operations.

        (ii) Risk of electrocution for birds interacting with transmission line infrastructure.

        (iii) Increased risk of predation of indigenous fauna following construction of wind farm roads.

        (iv) Risk of large birds colliding with transmission lines.

154. We have addressed the potential effects in two parts: construction effects and operational effects. Summary tables that show the magnitude and level of effect for each ecological feature before avoidance, remediation, and mitigation measures have been implemented are provided in **Table 6a (Construction effects)** and **Table 6b (Operational effects)** at the end of the effects assessment section of this evidence.

[21] Potential effects on freshwater habitats are addressed in the Freshwater Ecology statement of evidence of Mr Greg Ryder.

Construction effects on terrestrial vegetation

Permanent loss of terrestrial vegetation within the wind farm footprint

155. The total indicative footprint of the wind farm (excluding disposal fill sites and existing roads) is *c.*134.05 hectares, of which *c.*63.74 hectares comprise vegetation dominated by indigenous vegetation (or 2.1% of all significant vegetation at the Wind Farm Site), of which 59.04 hectares comprise significant vegetation. This largely comprises moderate value vegetation characterised by mānuka and inaka-dominant vegetation and Mixed indigenous shrubland scrub. A breakdown of affected areas per vegetation type is provided in **Table 4a.**

156. The indicative footprint includes the transmission line route, requiring approximately 4,200 m² of vegetation clearance for pylon construction, of which about 78% is exotic vegetation (e.g. conifer plantation, pasture, and gorse scrub). The 1.5-hectare Grid Injection Point will be built entirely within exotic grassland, around three kilometres north of Port Blakely Forest.

157. It is acknowledged that the quantum of vegetation loss may change following the completion of the final wind farm design. There are limitations in the application and proposed conditions in that respect, including:

    (a) the limited extent to which each turbine can be moved from its current indicative location;

    (b) the caps on the extent of clearance of key habitat types (including but not limited to wetlands). For the higher value habitat types, there is very little additional 'headroom' compared to the indicative clearance areas; and

    (c) the requirement that Contact continue to seek to minimise effects on key vegetation / habitat types through the detailed design process (this requirement applies over and above the 'caps' for each vegetation type).

158. Overall, any change or increases in clearance between the indicative and final detailed design would be prioritised in areas that support lower value vegetation.

159. The recommended mitigation, offset and compensation measures allow some room for additional impacts. That is broadly reflected in the caps

proposed for clearance. **Table 4a** includes commentary on the additional level of impact on each vegetation type that can be accommodated without the need for specific additional measures, or when additional measures are likely to be required.

160. In summary:

(a) There are a small number of habitat types that have very limited 'headroom' (high value indigenous forest types, wetlands, and high value copper tussock grassland);

(b) Moderate value habitat types have a higher level of 'headroom' (for example, mānuka forest and scrub and [mānuka]/tauhinu-inaka-Veronica odora-scrub and shrubland); and

(c) The final level of clearance of the relatively low value and/or abundant exotic habitat types (e.g. unmanaged grassland and pine forest) is not material in terms of the measures to be employed to address effects.

Table 4a: Area of indicative permanent loss and percentage loss per vegetation type within the Wind Farm Site construction footprint.

Vegetation Type	Ecological Value	Current extent (ha)	Impact Area (ha)	Proportion of Habitat Impacted (%)
Indigenous forest and scrub				
Southern rātā-kāmahi forest[1]	Very high	338.61	0.74	0.20
Pāhautea/southern rātā-kāmahi forest	Very high	6.75	0.00	0.00
Mānuka-haumakaroa-mountain holly forest[1]	High	26.75	1.07	4.00
Indigenous broadleaved forest and scrub	High	108.95	0.00	0.00
Indigenous scrub and shrubland[2]	Moderate	4.67	0.45	9.60
Mixed indigenous-conifer forest and scrub[2]	Moderate	7.08	0.44	6.20
Total		**492.81**	**2.70**	
Mānuka and inaka-dominant vegetation				
Mānuka forest and scrub[2]	Moderate	689.07	16.88	2.40
Mānuka scrub and shrubland[2]	Moderate	22.46	1.61	7.20
Mānuka scrub[2]	Moderate	82.67	0.71	0.90
Inaka scrub	Moderate	2.14	0.96	44.90
Total		**796.34**	**20.16**	
Mixed indigenous shrubland and scrub				
[Mānuka]/tauhinu-inaka-*Veronica odora* scrub and shrubland[2]	Moderate	249.03	25.25	10.10
Mānuka-inaka-mountain holly-(gorse) scrub and shrubland[2]	Moderate	53.69	3.67	6.80
Mānuka-gorse/copper tussock shrubland[3]	Moderate	128.66	3.44	2.70
Wilding conifers/mānuka-copper tussock shrubland[3]	Moderate	19.81	0.63	3.20

Vegetation Type	Ecological Value	Current extent (ha)	Impact Area (ha)	Proportion of Habitat Impacted (%)
[Mānuka]/gorse-tauhinu scrub[2]	Moderate	16.71	0.63	3.80
Mānuka/copper tussock shrubland	High	0.83	0.00	0.00
Total		**468.73**	**33.62**	
Exotic grassland				
Exotic unmanaged grassland[3]	Low	484.85	12.88	2.70
Exotic grazed grassland[3]	Negligible	615.97	24.20	3.90
Total		**1,100.82**	**37.08**	
Wetland				
Fen wetland[1]	Very high	102.26	1.08	1.10
Bog wetland[1]	Very high	28.70	0.94	3.30
Copper tussock/rautahi marsh[1,#]	Very high	0.73	0.01	1.90
Mānuka-inaka/copper tussock marsh	High	1.67	0.00	0.00
Copper tussock/rautahi swamp	Moderate	0.19	0.00	0.00
Total		**133.55**	**2.03**	
Copper tussock-dominant vegetation				
Mānuka/copper tussock grassland[1]	High	13.07	2.86	21.9
Copper tussock grassland[1]	High	0.34	0.23	67.6
Mānuka/copper tussock shrubland	High	0.83	0.00	0.00
[Gorse]/copper tussock grassland[2]	Moderate	0.41	0.21	51.2
[Mānuka-gorse]/copper tussock grassland[2]	Moderate	11.03	0.56	5.10
[Wilding conifer]/copper tussock shrubland[2]	Moderate	6.00	1.36	22.7
[Wilding conifer]/copper tussock grassland[2]	Moderate	0.24	0.02	8.3
Total		**31.92**	**5.24**	
Exotic-dominant forest, scrub, shrubland and grassland				
Exotic conifer plantation forest[3]	Moderate	2,289.38	21.2	0.90
Gorse scrub[3]	Negligible	291.23	6.8	2.30
Gorse/copper tussock grassland[3]	Low	22.65	2.44	10.80
Gorse/copper tussock shrubland[3]	Low	19.42	2.75	14.20
Wilding conifer/mānuka-copper tussock shrubland	Low	0.63	0.63	100
[Wilding conifer]/gorse-copper tussock scrub[3]	Negligible	1.28	0.01	0.80
Exotic broom shrubland[*]	Negligible	0.12	0.03	25.00
Total		**2,624.71**	**33.86**	
Total loss of combined vegetation types			**134.69**	
Total loss of indigenous-dominant vegetation types			**63.74**	

1. Very little scope to increase the loss of these vegetation types without increasing the proposed offsetting and compensation package.
2. Some scope to increase the loss of these vegetation types (e.g. 5-20% increase).
3. Ample scope to increase the loss of these vegetation types.

[#] There is an additional 138ha of copper tussock outside of the Wind Farm Site, but within the Project Site.

*Outside of the Wind Farm Site, but within the Project Site.

Temporary loss of terrestrial vegetation within the footprint of fill disposal sites

161. 101 potential fill disposal sites, comprising 53 blanket fill sites, 39 shoulder fills and 9 gully fill sites, have been identified to facilitate the construction of the Project (Figures Terrestrial Ecology-8a and 8b in **Appendix 3**). The number and location of the fill disposal sites remains indicative, except for the Jedburgh Plateau where eight final sites have been confirmed. We note that the parameters for the final sites will ensure no high or very high value vegetation will be lost during the construction of the fill disposal sites.

162. The majority of the fill disposal sites are located in pasture (at Jedburgh Station and Glencoe Station) and in low value and/or exotic-dominant habitats at Matariki Forest. Efforts have been made to keep the extent of fill sites on the Jedburgh Plateau to a minimum and this has resulted in the confirmation of eight fill disposal sites that will be located on the Plateau; however, some areas of 'Moderate' value indigenous habitats cannot practicably be avoided.

163. As discussed later in this report, the loss of 'Moderate' value indigenous vegetation will be remediated by replanting the same plant species in the planting season immediately following the rehabilitation of each fill site. A remediation approach means that offsetting or compensation is not required, as there will not be any residual or permanent effects.

164. An indicative breakdown of affected vegetation types is provided in **Table 4b** below.

Table 4b: Indicative areas of temporary loss and percentage loss per vegetation type associated with construction of fill disposal sites.

Vegetation Type	Ecological Value	Current extent (ha)	Impact Area (ha)	Proportion of Habitat Impacted (%)
Indigenous forest and scrub				
Southern rātā-kāmahi forest	Very high	338.61	0	0
Mānuka-haumakaroa-mountain holly forest	High	26.75	0	0
Indigenous scrub and shrubland[2]	Moderate	4.67	0	0
Mixed indigenous-conifer forest and scrub	Moderate	7.08	0.30	4.2
Total		**377.11**	**0.30**	
Mānuka and inaka-dominant vegetation				
Mānuka forest and scrub	Moderate	689.07	7.15	1.03
Mānuka scrub and shrubland	Moderate	22.46	0.88	3.90
Mānuka scrub	Moderate	82.67	0	0
Inaka scrub	Moderate	2.14	0.08	3.70
Total		**796.34**	**8.11**	

Vegetation Type	Ecological Value	Current extent (ha)	Impact Area (ha)	Proportion of Habitat Impacted (%)
Mixed indigenous shrubland and scrub				
[Mānuka]/tauhinu-inaka-*Veronica odora* scrub and shrubland	Moderate	249.03	8.40	3.37
Mānuka-inaka-mountain holly-(gorse) scrub and shrubland	Moderate	53.69	2.57	4.79
Mānuka-gorse/copper tussock shrubland[3]	Moderate	128.66	1.10	0.85
[Wilding conifers]/mānuka-copper tussock shrubland	Moderate	19.81	1.01	5.10
[Mānuka]/gorse-tauhinu scrub	Moderate	16.71	0.57	3.41
Total		**467.90**	**13.65**	
Exotic grassland				
Exotic unmanaged grassland	Low	484.85	7.80	1.60
Exotic grazed grassland	Negligible	615.97	17.26	2.80
Total		**1,100.82**	**25.06**	
Wetland				
Fen wetland	Very high	102.26	0.00	0.00
Bog wetland	Very high	28.7	0.00	0.00
Copper tussock/rautahi marsh	Very high	0.73	0.00	0.00
Mānuka-inaka/copper tussock marsh	High	1.67	0.00	0.00
Copper tussock/rautahi swamp	Moderate	0.19	0.00	0.00
Total		**133.55**	**0.00**	
Copper tussock-dominant vegetation				
Mānuka/copper tussock grassland	High	13.07	0.00	0.00
Copper tussock grassland	High	0.34	0.00	0.00
Mānuka/copper tussock shrubland	High	0.83	0.00	0.00
[Gorse]/copper tussock grassland	Moderate	0.41	0.00	0.00
[Mānuka-gorse]/copper tussock grassland	Moderate	11.03	0.08	0.73
[Wilding conifer]/copper tussock shrubland	Moderate	6.00	1.32	22
[Wilding conifer]/copper tussock grassland	Moderate	0.24	0.22	91.67
Total		**31.92**	**1.62**	
Exotic-dominant forest, scrub, shrubland and grassland				
Exotic conifer plantation forest	Moderate	2,289.38	18.99	0.83
Gorse scrub	Negligible	291.23	9.72	3.34
Gorse/copper tussock grassland	Low	22.65	2.59	11.43
Gorse/copper tussock shrubland	Low	19.42	0.93	4.79
[Wilding conifer]/gorse-copper tussock scrub	Negligible	1.28	0.00	0
Exotic broom shrubland*	Negligible	0.12	0.00	0
Total		**2,624.08**	**32.23**	
Total loss of combined vegetation types			**80.97**	
Total loss of indigenous-dominant vegetation types			**23.68**	

Effects on wetlands

Loss of wetland extent

165. Based on the currently-proposed wind farm layout, vegetation clearance and earthworks will include some unavoidable removal of fen wetland (1.08 hectares), bog wetland (0.94 hectares) and copper tussock/rautahi marsh (0.01 hectares), which represent proportional losses of 1.1%, 3.3%, and 1.9% respectively within the Wind Farm Site, noting that c.138 hectares of copper tussock/rautahi marsh is present in the wider Project Site. Even though these extents would normally trigger a Low magnitude of effect (i.e. <5% loss of total extent), more weighting has been applied to these wetlands because of their Very high ecological value and the fact their loss cannot be offset (but can be compensated). As such, we have assessed the magnitude of effect on fen, bog, and copper tussock/rautahi marsh as Moderate.

Effects on wetland hydrology

166. Earthworks also have the potential to indirectly affect wetlands through changes to hydrology. However, wetlands on the broad ridges on the Jedburgh Plateau show some resistance to hydrological change, which is likely due to them being largely charged by rainwater rather than groundwater or surface water. For example, the existing farm track has been excavated through wetlands on part of the site, and sits lower than the adjacent wetlands, but there is little evidence of hydrological change to the wetlands away from the immediate track margins.

167. These wetland types are also resilient to climate variability, persisting despite droughts and storms. As such, we do not anticipate that the proposed wind farm will significantly change the hydrology of wetlands, except in areas where wetlands are directly impacted. For completeness, however, Contact has commissioned a specialist report that has modelled the hydrological response of wetlands to infrastructure such as roads and turbine platforms. This is discussed later in this report.

Effects of fragmentation on habitats

168. The key potential effects of habitat fragmentation resulting from the construction of new roads and infrastructure include:

    (a) Loss of core habitat, including changes to interior conditions such as moisture, humidity, and shade.

(b) Loss of connectivity between habitats.

(c) Edge effects such as altered microclimate as a result of increase light and wind.

(d) Increased vulnerability to invasion by pest plant species.

(e) Higher disturbance rates, i.e. edges are more exposed to grazing, trampling and other disturbances.

169. At the Wind Farm Site, fragmentation will largely occur within the same vegetation types (e.g. mānuka-dominant vegetation, mixed indigenous shrubland and scrub) rather than between distinct ecosystems. Core ecological linkages between forests, wetlands, shrublands, and grasslands will be retained. Fragmentation effects are expected to be minor in the context of a landscape already dominated by extensive indigenous vegetation, where connectivity for fauna remains intact.

170. It is important to note that most affected habitats are regenerating systems already fragmented by historic grazing and browsing. These areas are moderately to highly disturbed and susceptible to weed invasion but are generally resilient to light and wind. As a result, new fragmentation is unlikely to significantly worsen existing conditions. Further, ecological processes such as wind and bird dispersal of plant propagules will not be impeded by the new fragmentation.

Potential construction effects on indigenous fauna species

Overview

171. Potential construction effects on indigenous birds, lizards, and invertebrates as a result of earthworks, construction and operation of the proposed wind farm could include:

(a) Disturbance, injury or death to indigenous birds, lizards, and invertebrates.

(b) Fragmentation of fauna habitats and populations.

(c) Disturbance during construction including dust/vibration and noise and increased traffic on existing and new roads.

172. Comprehensive effects management measures are proposed in respect of these actual and potential effects, and are discussed later in this report.

Disturbance (including death and injury) and displacement of indigenous fauna during construction and vegetation removal and potential fragmentation of fauna habitats and populations

Effects on indigenous birds

173. Vegetation removal during the breeding season could also result in adverse effects on birds. Breeding birds could lose nests, eggs or chicks that are present in areas where vegetation is cleared. While many birds will produce extra clutches to compensate for failed breeding attempts, such effects should be avoided where possible.

174. We consider that the pre-mitigation magnitude of effect of the removal of habitats at the Wind Farm Site will be Moderate for ground-nesting bird species such as mātātā/South Island fernbird and pīhoihoi/NZ pipit and Moderate for forest birds such as korimako /bellbird, tūi, and kererū. We consider the pre-mitigation magnitude of effect of fragmentation for all bird species to be Low to Negligible, given they are highly mobile and no habitats will be left isolated as a result of vegetation clearance.

Effects on indigenous lizards

175. Aotearoa New Zealand's lizards are slow-breeding reptiles and are not very mobile, and are therefore less capable of avoiding the effects of vegetation clearance. They are also highly vulnerable to predation, meaning that populations are slow to recover from losses. This means that the effects of loss may be long-term. In addition, live-bearing species, such as those likely to be present at the Wind Farm Site, have long pregnancies and thus the death of an individual female could also result in the death of any unborn young.

176. Tautuku gecko present in scrub and shrubland will be vulnerable to these effects, noting that most Tautuku gecko habitat will be avoided within the Wind Farm Site. Construction activities in rough grassland, such as vehicle use or materials storage, may adversely affect tussock skink, which is confirmed as present at the site. Although the total area of vegetation clearance is low compared to the size of indigenous habitat outside of the wind farm footprint, loss of habitat or death/injury to lizards may still occur in the absence of mitigation.

177. In terms of fragmentation, evidence from the site surveys shows that tussock skinks favour disturbed areas such as road edges, while Tautuku gecko have

been found in a small ‘island’ of mānuka scrub surrounded by farm tracks. This indicates that even less mobile species such as Tautuku gecko can cross open areas to access suitable habitat. As such, we consider the pre-mitigation magnitude of effect of fragmentation on tussock skink and Tautuku gecko to be Low.

178. We consider that the pre-mitigation magnitude of effect of vegetation clearance on tussock skink and Tautuku gecko to be Moderate, and potentially Moderate and High respectively for herbfield skink and green skink if they are discovered.

Effects on indigenous invertebrates

179. Most impacts at the Wind Farm Site will arise from the clearance of important invertebrate habitat such as shrubland and copper tussock-dominant vegetation. Slow-moving, less mobile species are also vulnerable to being killed or displaced during vegetation clearance.

180. The removal of indigenous vegetation directly affects invertebrate habitat, reducing the availability of microhabitats such as leaf litter, rotting wood, understorey vegetation, and soil layers. This can lead to local population declines or loss of species with small ranges, limited dispersal ability, or narrow habitat preferences.

181. Habitat fragmentation may further isolate populations, limiting gene flow and increasing vulnerability to stochastic events. Less mobile species such as Helms’ stag beetle, ngaokeoke/peripatus, and potentially species such as *Powelliphanta* sp. snails (which have not been found on the Wind Farm Site to date) are more vulnerable to fragmentation.

182. Removing indigenous vegetation also exposes the ground to increased solar radiation, wind, and temperature fluctuations, altering microclimatic conditions critical for many invertebrate species. This can reduce humidity-dependent taxa and shift community composition toward more disturbance-tolerant generalists.

183. Overall, we consider the pre-mitigation magnitude of effect for less mobile invertebrate species to be Low to Moderate, while for more mobile species the magnitude of effect is likely to be Low.

Effects of noise disturbance, vibration and road traffic on fauna

184. Noise and vibration can disturb bird nesting and foraging behaviour, potentially causing nest abandonment, reduced breeding success, and displacement from key habitat areas. For lizards, vibration and noise may cause stress, disrupt thermoregulation behaviour, and deter basking, feeding, or movement through disturbed areas. Noise has less direct effect on invertebrates, although vibration may disrupt burrowing species and soil-dwelling taxa, leading to displacement or mortality.

185. Given that the construction footprint occupies a relatively small, defined area and the activities are temporary, we consider the magnitude of effect of noise and vibration on fauna will be Low.

186. Vehicles using the new wind farm roads pose a risk to fauna crossing the roads or basking on the roads. This risk is considered very low, however, given that vehicles will only intermittently use the roads once the wind farm is operational (e.g. maintenance crews). Speed will also be restricted.

Potential operational effects of the wind farm on indigenous fauna

Overview

187. Potential operational effects of the proposed wind farm on indigenous birds and other indigenous fauna include:

    (a) Blade strike during wind farm operation.

    (b) Electrocution from substation equipment.

    (c) Collision with transmission lines.

    (d) Increased predation risk due to increased movements by introduced predatory mammals along newly-formed roads and tracks.

Avifauna collisions with turbines

188. Direct mortality at wind farms results from birds striking revolving blades, towers, and nacelles. There is the potential for highly mobile bird species such as kererū, kārearea/eastern falcon, and tūī to collide with blades and other structures at the Southland wind farm, although it is noted there is yet to be a documented falcon fatality caused by wind farms in Aotearoa New Zealand. This is likely due to their exceptional manoeuvrability, speed, and eyesight.

189. Bittern have not been recorded on the Jedburgh Plateau and Port Blakely Douglas Fir Forest wetlands, and it is considered highly unlikely that bittern would breed on the Plateau because of the lack of suitable habitat. However, there are bittern known in the wider area (e.g. Dunvegan Fen Complex) and the risk to this species from blades and transmission lines cannot be completely eliminated.

190. There is evidence from other wind farms in Aotearoa New Zealand (e.g. Waipipi) that kāhu/harrier (*Circus approximans*; Not Threatened) are particularly vulnerable to collision with turbine blades. As such, it is estimated the operational magnitude of effect of the wind farm on kāhu/harrier will be Moderate to High (see **Table 5** below).

191. A comprehensive meta-analysis of international literature relating directly to the impacts of wind farms on birds and bats concluded that a smaller number of large turbines resulted in lower predicted mortality rates compared with a greater number of small turbines (Thaxter et al. 2017[22]). It is also likely that bird species which fly closer to the ground, such as mātātā/South Island fernbird, would be less vulnerable where rotors are positioned high off the ground, which is what is proposed for the Southland Wind Farm. The large turbines proposed for the Southland Wind Farm will be well-spaced across the landscape as opposed to clustered or arranged in rows or a grid.

192. Expert conferencing during the Covid Fast-track consenting process (October 2024) recorded the following key outstanding matters of concern in relation to operational effects:

    (a) Migratory birds and potential flight paths across the Southland Wind Farm Site;

    (b) Movement across the Southland Wind Farm Site by nocturnal species; and

    (c) Unknown collision risks of species' interactions with proposed infrastructure, including turbines, transmission lines, and construction and operational lighting.

[22] Thaxter C.B., Buchanan G.M., Jamie C., Butchart S.H.M., Newbold T., Green R.E., Tobias J.A., Foden W.B., O'Brien S., Pearce-Higgins J.W. 2017: Bird and bat species' global vulnerability to collision mortality at wind farms revealed through a trait-based assessment. Proc. R. Soc. B Biol. Sci. 284: 20170829.

193. The avifauna peer reviewer appointed by the panel also considered that use of a Band collision risk model would provide the necessary data to deliver more certainty on effects of the proposed wind farm on avifauna present.

194. Contact subsequently amended the consent conditions to require additional avifauna monitoring prior to construction and once the wind farm is operational, together with the addition of the compensation triggers listed in Condition EC37B, which require the implementation of additional compensation in the event these triggers are equalled or exceeded.

195. We note that the avifauna peer reviewer advising the panel, and DOC and its expert advisors, were satisfied that the updated conditions addressed outstanding concerns relating to the operational effects of the wind farm on notable bird species.

196. Following the expert conferencing, Wildlands continued with its seasonal avifauna survey programme, and has now completed an additional three rounds (Oct/Nov 2024, February 2025, and May 2025). Bioacoustic monitoring was undertaken during each of these survey rounds in order to detect migratory and nocturnal bird species.

197. The information collected during the avifauna surveys was used to inform a Band bird collision model developed by Bluewattle Ecology[23] in May 2025. The model assists with understanding the potential magnitude of effect of the proposed wind farm on indigenous birds.

198. The report that has been produced by Bluewattle Ecology in respect of that modelling is attached to this report as **Appendix 6**. The model focused on 11 key bird species, the results for which are summarised in **Table 5** below. The key findings of the report include the following:

    (a) Of the eleven species modelled, harrier, bellbird and black-backed gull are predicted to have reasonably common (more than one per year) strike events. Fewer than one mortality per year is predicted for all the other modelled species.

    (b) In terms of perceived and actual collision risk (based on overseas and available New Zealand literature on wind farms in similarly high value

[23] Bluewattle Ecology Ltd 2025: Proposed Southland Wind Farm Bird Strike Modelling. Prepared for Contact Energy Ltd.

bird habitats areas), the proposed Southland Wind Farm is considered to be a low-risk site.

Table 5: Modelled risk of collision and magnitude of effect for 11 indigenous bird species.

Species	Predicted mortality rates	Threat status and ecological value	Magnitude of effect	Level of effect before mitigation
Korimako/ bellbird	2 - 4 birds per year	Not Threatened/ Moderate	Moderate	Moderate
Karoro/black-backed gull	4 – 8 birds per year	Not Threatened/ Low	Moderate	Low
Kārearea /eastern falcon	1 bird every 15 – 40 years	Threatened/Very high	Negligible	Low
Kererū	1 bird every 3 – 6 years	Not Threatened/ Moderate	Low	Low
Kahu/harrier	20-40 birds per year	Not Threatened/Low	Moderate to High	Low to Moderate
Pīhoihoi/NZ pipit	1 bird every 20 – 40 years	At Risk/High	Negligible	Very low
Torea/South Island pied oystercatcher	1 bird every 50 to 100 years	At Risk/High	Negligible	Very low
Tui	1 bird every 5 - 9 years	Not Threatened/ Moderate	Low	Low
Paradise duck	1 bird every 4 - 8 years	Not Threatened/ Low	Low	Very low
Mātātā/South Island fernbird	Virtually zero	At Risk/High	Negligible	Very low
Matuku-hūrepo/bittern	1 bird every 18 to 35 years (virtually zero)	Threatened/Very high	Negligible	Very low

199. No bitterns have been seen on site, but it is possible that the occasional one may fly over some part of the Wind Farm Site exploring or moving from one suitable habitat to another. One approach to this is to estimate the number of flights over the Wind Farm Site which will produce one fatality. A Monte Carlo analysis undertaken by Bluewattle Ecology found that it would take between 7,000 and 13,000 flights to produce one bittern death. Even if a bittern flew over the wind farm every day for a year, then based on the Monte Carlo

analysis the mortality would be one death every 18 to 35 years, so we can conclude that bittern mortality will be essentially zero.

200. With regard to torea/South Island pied oystercatcher, data collected by the Ornithological Society of New Zealand (**OSNZ**) show that approximately 2,300 birds travel NE/SW from the Southland coast to the east coast of the South Island each year and back again. Assuming a flight corridor width of 100 kilometres, it is possible that some of these birds could travel through the Southland Wind Farm Site. Based on a trail density[24] of 46 flights/km/year, the Band model prepared by Bluewattle Ecology predicted a low risk to torea/South Island pied oystercatchers travelling through the Southland Wind Farm Site.

201. The results of the Band collision risk model indicate that the risk of collision for Threatened and At Risk bird species is likely to be lower than the proposed compensation triggers listed in proposed Condition EC37B. In other words, the model suggests a low probability that any of the triggers will be hit. We note, however, that some bird species listed in Condition EC37B have not been detected at the site to date (e.g. kūaka/godwit and tarāpuka/black-billed gull) and they have not been included in the model. Notwithstanding this, the proposed conditions EC37B-EC37E provide additional certainty that the potential effects of the Project associated with bird collision will be addressed.

Avifauna collisions with transmission lines

202. Little is known about the risks to Aotearoa New Zealand birds of colliding with transmission lines. It is therefore necessary to evaluate international research to determine the effects of powerlines on avian mortality. In a nationwide study in Sweden that included the recovery of 10,714 birds where information about the cause of death was known, 8.6% of all bird deaths were attributed to collision with power lines (Fransson et al. 2019). This included physically colliding with the powerlines as well as electrocution. For indigenous birds found within the Project Site, the species most likely to be at risk of collision with pylon structures and wires are the strong fliers that fly well above the canopy such as kārearea, kāhu, kererū, and tūī.

[24] Trail density in the Band model is a measure of how many bird flights pass through the space swept by turbine blades. It's a key factor that, combined with turbine design and bird behaviour (e.g., avoidance), determines the estimated number of bird collisions with wind turbines. Trail density is expressed as the total km of trails per km^2 per year.

203. For migratory species, the chance of indigenous birds striking lines in Aotearoa New Zealand is low as, with the exception of torea/South Island pied oystercatcher in Southland[25], few birds migrate seasonally across land, and those that do are coastal species that predominantly migrate along coastlines (Craig 2016[26]). The presence of transmission lines next to the wetlands at Port Blakely Douglas Fir Forest creates a very minor risk of bittern collisions[27], although this can be minimised through the use of visual flight diverters.

204. We note that one of the potential transmission line routes was subsequently dropped during the Covid Fast-track consenting process given its close proximity to confirmed bittern habitat at the Dunvegan Wetland Complex (to the northeast of the Project Site).

Electrocution of birds

205. In relation to the risk of electrocution for indigenous birds, high voltage transmission cables pose little risk to Aotearoa New Zealand birds compared to low voltage lines. The cables will be widely spaced and the largest indigenous birds known to occur within the Project Site could not feasibly create a short circuit between wires. Also, the previously typical design of power lines whereby the wires are connected to insulators positioned above cross bars on power poles provided a chance for larger birds to be electrocuted if they spread their wings while perched. Hanging wires below cross bars, which is now the common design in Aotearoa New Zealand, eliminates this problem (Craig 2016[28]). As such, the potential level of effect of electrocution is considered to be Very low.

Increased risk of predation via road construction

206. The construction of new roads through or near natural habitats at the wind farm could facilitate the spread and activity of introduced mammalian predators, such as stoats, ferrets, feral cats, rats, and hedgehogs. Roads create linear corridors that predators can use to move more easily and efficiently across the landscape. Open and compacted surfaces reduce physical barriers, allowing faster travel and access into previously less-accessible or remote areas of indigenous habitat.

[25] Based on data collected by OSNZ.
[26] Craig J.L. 2016: Statement of Evidence, Blueskin Bay wind farm proposal Environment Court Hearing. 17 pp.
[27] Bittern were not recorded at the Port Blakely wetlands.
[28] Craig J.L. 2016: Statement of Evidence, Blueskin Bay wind farm proposal Environment Court Hearing. 17 pp.

207. Road construction and subsequent human activity (e.g. vehicles, construction equipment, rubbish disposal) can also inadvertently introduce or encourage the spread of predators. For example, feral cats and rodents may be drawn to work sites by food waste or shelter opportunities.

208. We note that farm roads and tracks are already present across much of the site (e.g. eastern part of Jedburgh Station and throughout Matariki Forest). As such, we anticipate that the construction of additional roads will have a Low magnitude of effect (prior to mitigation) for ground-dwelling bird species such as mātātā/South Island fernbird and pīhoihoi/NZ pipit, and a Low to Moderate magnitude of effect on terrestrial invertebrate species (prior to mitigation).

MEASURES TO AVOID, REMEDY OR MITIGATE ACTUAL OR POTENTIAL ADVERSE EFFECTS

Overview

209. The Project has been designed to avoid, remedy, or mitigate (minimise) adverse effects on ecological values to the greatest extent practicable. The design of the wind farm layout has been an iterative process informed by successive vegetation surveys, whereby amendments have been made to avoid as much high value habitat as possible, including bogs, fens, and southern rātā-kāmahi forest. Firm clearance limits have also been set within proposed conditions, within which measures prioritising further avoidance and minimisation of impacts on high value habitats is the ongoing priority through detailed design and construction of the Project.

210. Key avoidance measures include:

    (a) The Wind Farm Site footprint has been reconfigured, and existing roads used to the greatest extent practicable to avoid ‘Very high’ and ‘High’ value habitats, including 100% of Pāhautea/southern rātā-kāmahi forest, 100% of Indigenous broadleaved forest and scrub, 100% of Mānuka/copper tussock shrubland, and 100% of Mānuka-inaka/copper tussock marsh; over 99% of southern rātā-kāmahi forest; over 98% of copper tussock/rautahi marsh; over 97% of fen and bog wetlands on the Jedburgh Plateau; and 94% of mānuka-haumakaroa-mountain holly forest.

(b) Vegetation/habitat clearance protocols to reduce the potential for adverse effects on indigenous fauna (with detail set out in the Vegetation Management Plan).

(c) Constraints on fill disposal sites to minimise impact on the ecology of the Wind Farm Site, including avoiding placement on high value ecological areas, wetlands, and permanent and intermittent waterways. The process followed to identify indicative fill disposal sites is discussed below.

(d) Appropriate site selection for transmission pylons and other ancillary infrastructure to avoid high value habitats such as wetlands, streams, and mature indigenous forest, noting that the final transmission line route avoids known bittern habitat near the proposed Wind Farm Site, thus reducing the likelihood of collision.

(e) Use of culverts and sub-soil drainage under new roads to avoid adverse effects on wetland hydrology.

211. Measures proposed to remedy potential adverse effects include:

(a) Rehabilitation, including indigenous revegetation, of sites cleared or disturbed by earthworks for temporary construction activities, and of permanent fill disposal sites.

212. Measures proposed to mitigate (minimise) potential adverse effects on fauna include:

(a) Implementation of indigenous bird nest surveys in advance of vegetation/habitat clearance during the bird breeding season, and cessation of vegetation clearance activities within 50 metres (for 'Threatened' or 'At Risk' species) or 25 metres (non-threatened indigenous species) until chicks have fledged (noting that the 50-metre setback can be reduced to 25 metres on a case-by-case basis, if deemed appropriate).

(b) Implementation of salvage and relocation programmes for coarse wood, invertebrates, and lizards, in accordance with standards and guidelines.

(c) Installing and maintaining a network of traps along the new wind farm roads at Jedburgh Station to minimise the potential adverse effects of increased predators using the roads as corridors.

(d) Lighting design within the constraints of Civil Aviation Authority (CAA requirements) to minimise any disturbance to fauna and to minimise attractiveness to avifauna.

(e) Pre- and post-construction monitoring for avifauna, lizards and invertebrates to inform any additional management measures that may be required, such as targeted pest control and habitat enhancement.

213. Measures to avoid, remedy or mitigate effects as set out and described in more detail below will be required as conditions of consent and implemented through ecological management and monitoring plans. In particular, an overall Terrestrial and Wetland Ecology Management Plan (**TEMP**) has been prepared and is being submitted with the FTAA application, and includes the following specific management plans[29]:

(a) Avifauna Management Plan (AMP);

(b) Lizard Management Plan (LMP);

(c) Terrestrial Invertebrate Management Plan (specifically including a Stag Beetle Management Plan) (TIMP);

(d) Habitat Restoration and Enhancement Management Plan (HREP);

(e) Vegetation Management Plan (VMP); and

(f) Biosecurity Management Plan.

214. The TEMP, and the more specific ecology management plans included in the TEMP, will be finalised after this consenting process (but ahead of construction commencing). Finalising the TEMP will be subject to certification processes as set out in the proposed conditions of consent. The exceptions to that process are the LMP and TIMP, which are proposed to be finalised by the decision-making panel considering the FTAA application, noting that those management plans apply directly to the Wildlife approvals being sought.

[29] Draft management plans are appended to this statement of evidence (except for the LMP and TIMP, which are provided as final versions).

Avoidance of high value vegetation

215. The greatest opportunity to avoid ecological features on the site (to the extent practicable) includes the decision on siting project infrastructure, the exclusion of activities from within or near areas of high ecological value, and construction staging.

216. The wind farm footprint entirely avoids Pāhautea forest (Very high ecological value), broadleaved forest and scrub, Mānuka/copper tussock shrubland, and Mānuka-inaka/copper tussock marsh (all High value), while the indicative fill disposal sites avoid all High value and Very high value vegetation types.

217. It is also noted that the proposed wind farm will utilise the existing road footprint in Port Blakely Douglas Fir Forest to avoid earthworks within the adjacent wetlands and also maintain existing hydrological conditions.

Measures to remedy potential adverse effects

218. Where Moderate value indigenous vegetation is cleared or disturbed by earthworks for temporary construction activities or for the deposition of fill, the replanting of appropriate species will take place in the following planting season. The type of planting will be dictated by the affected species at each fill site.

219. Vegetation cleared for construction or spoil will be rehabilitated in the following September to March, noting that spring is preferable for planting. Disturbed areas will be recontoured, topsoiled to at least 300 millimetres, and revegetated with pasture or indigenous species, depending on what was removed. At fill sites, topsoil will be stored in low mounds (<2 m) for under 12 months to retain viability in accordance with the Vegetation Management Plan.

220. Plants will be eco-sourced from nearby districts, ideally from onsite-collected seed, and selected to match the original vegetation and support fauna. Plant guards will be used to protect vulnerable species from rabbit and hare browse, except for unpalatable species such as mānuka and tauhinu. Maintenance, including weed control and infill planting, will continue for at least five years.

221. It is anticipated that the effects of each fill site will be fully remediated within five to 15 years, which equates to a ‘medium term’ timescale as per Table 9

of the EIANZ guidelines. More information on remediation methodology and plant schedules are provided in the Vegetation Management Plan.

222. Fill disposal sites in grazed pasture will be reseeded with exotic grass once they are completed.

Minimisation of effects on indigenous terrestrial vegetation and wetlands

223. To date, regular, iterative reconfiguration and refinement of the original proposed wind farm footprint that we have advised on dating back to 2023[30] have been undertaken to minimise impacts on high value habitats and associated species – including the use of pre-existing roads to the greatest extent possible – with the emphasis on avoiding bog wetlands where practicable. Key examples of minimisation are provided below:

    (a) Southern rātā-kāmahi forest (Very high ecological value): impact area reduced from 3.78 to 0.74 hectares (out of a total of 338.61 hectares).

    (b) Mānuka-haumakaroa-mountain holly forest (High ecological value): impact area reduced from 2.22 to 1.07 hectares (out of a total of 26.75 hectares).

    (c) Bog wetland (Very high ecological value): impact area reduced from 2.75 to 0.94 hectares (out of a total of 28.70 hectares).

224. These figures remain indicative until the Project footprint is confirmed through detailed design. As noted above, the proposed conditions of consent require Contact to seek to further minimise clearance of high value vegetation and habitats during detailed design, and impose immutable caps on final clearance of high value vegetation and habitats.

225. We note in particular that Contact has, on our advice, taking into account the value of the wetlands on site and the practical constraints associated with constructing the Project, set a hard limit of 2.5 hectares of wetland loss for the Project. Successive iterations to the wind farm layout, informed by field surveys undertaken between October 2023 and April 2025, have been made to meet this limit.

226. In addition, targeted weed control will be undertaken in indigenous-dominated habitats located within 50 metres of all roads and structures for a

[30] Following the initial July 2023 design, revisions to the Wind Farm layout were made in October 2023, April 2024, and May 2025.

minimum of three years following the commencement of the operation of the Southland Wind Farm.

227. Monitoring and control of wilding conifers will also be undertaken in wetlands and indigenous-dominated terrestrial habitats on the Project Site for the duration of the operation of the Southland Wind Farm.

Mitigating effects on wetland hydrology

228. The potential effects of Project construction on the remaining (not directly affected) wetlands on the Jedburgh Plateau was a focus of discussion during the Covid Fast-track consenting process. Our view during that process, informed by the wetland hydrology memo prepared by Williamson Water & Land Advisory dated 17 October 2023[31], was that wetland hydrology would be maintained through the proposed scheme of culverts and sub-soil drains.

229. In light of the commentary in the Covid Fast-track panel's decision, a subsequent, more detailed hydrological analysis was provided by Williamson Water & Land Advisory Ltd in June 2025, based on the revised indicative wind farm layout[32] (**Williamson Memo**). The purpose of this report was to develop a robust hydrological model that maintains water balance neutrality and prevents dewatering or isolation of bog and fen wetlands during and after construction. The key indicative design elements proposed to maintain flow paths and hydrological connectivity between wetlands (and between wetlands and waterways) include installing 109 culverts and 1.2 kilometres of clay bunds.

230. Culvert sizing has been based on:

    (a) 10-year ARI (a storm that, on average, occurs once every 10 years).

    (b) Site-specific gradients and catchments.

    (c) Embedment depth for fish passage.

231. The Williamson Memo concludes that:

> *With the proposed water management devices in place, the area of impaired wetland [wetland that may be indirectly affected in hydrological terms] is estimated to be 0.09 ha of fen, while no bog area*

[31] Southland Wind Farm – Wetland Soils & Hydrology Site Visit. Memo prepared by WWLA Ltd for Contact Energy Ltd, 17 October 2023.
[32] Southland Wind Farm at Jedburgh Station Plateau – Conceptual Hydrological Design. Memo prepared by WWLA Ltd for Contact Energy Ltd, 10 June 2025.

is estimated to be impaired. The estimation of impaired wetland area may be reduced during detailed design if ecological provisions for fish passage are demonstrated to be unnecessary.

232. Proposed conditions provide for any adjustments to be made to the water management system to reflect the final Project footprint.[33]

233. Taking into account the natural hydrological regime of the wetlands on the Jedburgh Plateau, together with the proposed construction design to maintain hydrology, we have assessed the magnitude of effect on wetland hydrology as Low to Negligible.

234. Sediment controls will be implemented to ensure that mobilised sediment does not enter wetlands in close proximity to the works footprint[34]. Finally, and to provide an additional layer of certainty, the post-construction wetland monitoring requirements proposed during the Covid Fast-track consenting process have been carried through to the proposed conditions for this FTAA application.

Minimisation of effects on indigenous birds during breeding season

235. We have recommended (and Contact has adopted) appropriate condition requirements to minimise effects on indigenous birds during breeding season, as follows.

236. Vegetation clearance should avoid the peak bird breeding season where practicable (1 September to 31 March inclusive) to reduce disturbance to breeding birds.

237. If vegetation clearance cannot be avoided during peak bird breeding season, a pre-construction survey will be undertaken to assess if indigenous birds are breeding within the proposed work site. No earlier than eight days prior to works commencing in an area, a suitably-qualified and experienced ecologist must undertake a survey to confirm that no bird species are nesting within the construction footprint and surrounding area.

238. If nesting indigenous birds are detected, construction activities within 50 metres (of Threatened or At Risk species) or 25 metres (of non-Threatened species) of the active nest should cease until all chicks have fledged and the

[33] Proposed Condition CM12.
[34] Refer to the draft Construction and Environmental Management Plan included in Part J of the substantive application documents.

nests have been abandoned (noting that the setbacks can be reduced on a case-by-case basis, if deemed appropriate).

Minimise the potential for collisions with power lines

239. During the Covid Fast-track consenting process, it was decided to remove the transmission line route that intersected with the Dunvegan Wetland Complex (to the northeast of the Project Site), where bittern are known to reside. Although the final transmission line route does traverse marsh wetlands in Port Blakely Forest, a bioacoustic survey undertaken by Wildlands in October 2023 did not detect bittern in this area.

240. Mitigation strategies include the placement of spikes on cross-arms to deter birds, the use of bird diverter devices such as dynamic flappers, orange spirals, and yellow spirals, which have shown varying degrees of effectiveness in reducing avian mortality. Flappers, in particular, have demonstrated a high reduction in mortality. In a Spanish study conducted by Ferrer et al (2020)[35], the use of dynamic flappers was responsible for a 70.2% lower mean avian mortality rate (95% Confidence Interval: 50–90%) compared to control spans. The results also indicated that flappers are effective across a broad range of avian species. The study used flappers with the shape of a cross with orange and red sides, inserted with reflective stickers.

241. Flappers that move are ‘dynamic’ and have a clamping mechanism which affixes to the power line and a lower section which dangles beneath providing the visual warning aspect to deter birds. Being a dynamic device, the engineering and durability of the design are all important as these devices can be more vulnerable to wear and tear over the longer term. The benefit of including an element of movement in the device is that it will compete for the bird’s attention even when not in the direct line of sight of the bird[36].

242. Due to the presence of bittern in the Dunvegan Wetland Complex to the northeast of the Project Site, together with threatened species such as koekoeā/long-tailed cuckoo and kārearea/falcon, Contact intends to install dynamic flappers along sections of wire that traverse large wetland complexes in Port Blakely Forest and high-quality southern rātā-kāmahi

[35] Ferrer M., Morandini V., Baumbusch R., Muriel R., De Lucas M. and Calabuig C. 2020: Efficacy of different types of “bird flight diverter” in reducing bird mortality due to collision with transmission power lines. Global Ecology and Conservation 23, p.e01130.
[36] Information sourced from https://balmoralengineering.com/bird-flappers-for-overhead-power-line-collision-mitigation.

forest (two sections in total, see Figure AMP-2 in the Avifauna Management Plan).

Aeronautical hazard lighting

243. The use of flashing/intermittent lights to help pilots identify obstacles like wind turbines is less attractive to avifauna such as seabirds, compared to a fixed beam light (Australian Government 2020[37]). The timing of when lights flash must follow a predictable, well-spaced pattern. Small flashing red lights are less attractive than using white light, which has a high blue spectrum.

244. Red lights (intermittently flashing) will be used on only the 16 wind turbines that are required to be lit, as determined by the Civil Aviation Authority. This both lowers the magnitude and level of effect on indigenous birds meaning the overall effect on birds will be Very low.

Post-construction avifauna monitoring

245. Two forms of post-construction avifauna monitoring will be undertaken.

246. Seasonal (i.e. quarterly) monitoring involving five-minute bird counts, flight path surveys, fixed point surveys for kārearea/eastern falcon and kererū, playback call monitoring for mātāta/South Island fernbird, and bioacoustic surveys, will be undertaken for three years following the commencement of the commissioning of wind turbines in accordance with Condition EC36. After the first three years, monitoring will be carried out every five years for the life of the Project. This monitoring will provide data on the effects of the construction and operation of the wind farm on avifauna.

247. Collision mortality monitoring will also commence once the wind farm is operational, in accordance with proposed Condition EC37. This will involve regularly searching a sub-set of wind turbines for injured or dead birds, and is required to validate (and update) the original bird collision model prepared for the proposed wind farm. Collision monitoring will be carried out quarterly for the first three years of operation, then five-yearly for the duration of the operation of the wind farm.

248. Bird collision monitoring will be measured against the compensation trigger for the individual bird species set out above (and specified in proposed Condition EC37B). If the collision monitoring confirms that the compensation

[37] Australian Government 2020: National light pollution guidelines for wildlife including marine turtles, seabirds and migratory shorebirds, Commonwealth of Australia 2020: Australian Government, Department of the Environment and Energy. 107 pp.

trigger for any individual bird species listed in Condition EC37B has been equalled or exceeded, then Contact will be required to implement compensation likely in the form of additional predator control, habitat enhancement, or funding of an existing conservation programme (in accordance with Condition EC37E).

Mitigating effects on lizards

249. Measures to mitigate potential effects on lizards are outlined below. A detailed methodology is provided in the Lizard Management Plan (LMP). The LMP is subject to approval by the Panel and forms part of the Wildlife approvals sought by Contact for the Project. Specifically, Contact is seeking approval to salvage and relocate lizards from the Wind Farm Site during construction. This is discussed further in Part D of the substantive application documents.

Tussock skink

250. Salvage and relocation operations will be required for tussock skinks at turbine sites where skinks have been previously detected. Pre-clearance checks will be required at a number of other sites where skinks have been previously detected (but in very low numbers), as per the LMP.

251. Two release sites have been identified for tussock skinks, one each at Matariki Forest and Jedburgh Station. These release sites have been chosen based on habitat quality, existing lizard values, and ability to improve the sites to increase capacity for transferred lizards within the site. Refer to the management of residual effects section later in this evidence for more detail.

Tautuku gecko

252. Additional tree artificial cover objects (TACOs) will be installed at sites where gecko presence has been confirmed, being JED-20, JED-21, and between JED-33 and JED-34, a minimum of three months prior to pre-clearance checks beginning, in order to allow any geckos time to habituate to the covers. TACOs will be installed on trees which have sufficient sunlight and/or proximity to contiguous canopy cover.

253. Where geckos have been, or are detected during pre-clearance checks, manual searching of vegetation where Tautuku gecko habitat is present will occur (as per the LMP).

254. A secure soft release pen will be constructed within mānuka forest and scrub south of JED-21 (in the Jedburgh Station Ecological Enhancement Area discussed below), prior to the beginning of any works. All Tautuku geckos that are captured during pre-clearance TACO checks will be safely transferred to the soft release pen. Refer to the residual effects management section for more detail.

Green skink

255. If green skink are discovered during vegetation clearance work, any works must cease immediately and the incidental discovery protocol will be followed, including determining whether complete avoidance of identified green skink habitat is possible. Salvage and transfer should not be considered for this species unless completely necessary and following consultation with DOC. In the event salvage and transfer is considered necessary, green skink will be transferred to the leaky fence that will be established in the Copper Tussock Enhancement and Skink Protection Area (described further below).

Herbfield skink

256. If herbfield skink are discovered during pre-clearance checks, salvage, or vegetation clearance, salvage and transfer will follow tussock skink guidance.

Mitigating effects on invertebrates

Notable invertebrates other than Helms' stag beetle

257. Measures to address potential effects on nationally Threatened, At Risk, and other notable invertebrate species within vegetation and habitats that may be affected by the Project are outlined below. The detailed methodology is provided in the Terrestrial Invertebrate Management Plan (**TIMP**). The TIMP is subject to approval by the Panel and forms part of the wildlife approvals being sought by Contact for the Project. These approvals include the salvage and relocation of Helms' stag beetles from the Wind Farm Site during construction. This is described in further detail in Part D of the substantive application documents.

258. Where proposed turbine locations or wind farm roads have not been identified as requiring targeted notable species invertebrate surveys (i.e., considered to be low potential invertebrate habitat), the incidental discovery

protocol will be implemented, in accordance with the methods set out in the TIMP.

259. The proposed conditions also provide for the relocation of surface invertebrate habitats / features (such as log or rock piles). Details are set out in the TIMP.

Helms' stag beetle

260. A Stag Beetle Management Plan (**SBMP**) has been prepared as a specific chapter in the TIMP. The SBMP has been prepared to be included in the TIMP as this supports the wildlife approvals being sought in this application for the salvage and transfer of this species, as noted above.

261. Salvage of Helms' stag beetle is required as specimens were recorded during surveys in both Jedburgh Station and Matariki Forest. The aim of salvage is to maximise the number of live stag beetles caught and removed to a safe location in order to minimise effects of vegetation clearance on the Helms' stag beetle population. Grids of pit fall traps will be placed throughout areas of the Project footprint where Helms' stag beetle have been found in contiguous habitat during previous surveys. Further details on the salvage and transfer of stag beetles, including trapping methodology and timeframes, are set out in the SBMP.

262. Salvage will concentrate on the following three areas:

    (a) Mānuka forest and scrub between JED-06 and JED-05, which contains the largest known population onsite.

    (b) Mānuka forest and scrub between JED-21 and JED-22, where a dead Helms' stag beetle was found during a previous survey.

    (c) Mānuka-gorse/copper tussock shrubland between MAT-15 and MAT-16, identified as optimal habitat from the most recent surveys.

263. Concurrent night-time spotlight searches will also be conducted using similar methodology to the November 2024 and January 2025 stag beetle surveys, but limiting searches to areas where Helms' stag beetle have been found, with search effort determined by the number and size of the areas to search.

264. Helms' stag beetles will be released soon after salvage into the designated release area, which will have been enhanced to increase their carrying capacity. The Jedburgh Station Ecological Enhancement Area appears to

provide excellent potential Helms' stag beetle habitat, though currently it has high pest mammal activity. It is likely to hold a small Helms' stag beetle population, which will benefit from pest mammal control. Predator control and ungulate exclusion should ensure that the area is safe for Helms' stag beetles to inhabit. This will occur as part of the residual effects management scheme and is further discussed below.

Measures to minimise effects of predators using roads as corridors

265. In order to reduce predation pressure on indigenous fauna on the Jedburgh Plateau, DOC200 traps, DOC250 traps, and cat traps (if required) will be spaced evenly along the wind farm road network, targeting mustelids, rats, and feral cats. Refer also to the residual effects management section below.

Table 6a: Expected residual magnitude and level of effect for wind farm construction after avoidance, remediation and mitigation measures have been implemented.

Ecological Feature	Ecological Value	Potential Effects Associated with the Proposed Wind Farm	Expected Magnitude of Effect before Mitigation	Timescale	Measures to Avoid, Remedy or Mitigate Effects	Expected Magnitude of Residual Effect	Expected Level of Residual Effect
Vegetation							
Pāhautea/southern rātā-kāmahi forest	Very high	This habitat type is avoided by the proposed footprint. Disturbance effects during construction are considered to be Very low.	N/A	N/A	This habitat has been avoided.	N/A	N/A
Mānuka/copper tussock shrubland	High value	This habitat type is avoided by the proposed footprint. Disturbance effects during construction are considered to be Very low.	N/A	N/A	This habitat has been avoided.	N/A	N/A
Southern rātā-kāmahi forest	Very high	**Permanent loss** of 0.74 hectares of habitat, which equates to a negligible proportion of available habitat in the surrounding landscape.	Negligible	Permanent	Avoidance of >99% of this habitat has been achieved through the latest wind farm design.	Negligible	Low
		Edge effects and noise and disturbance associated with construction are expected to be Low.	Negligible	Temporary	Avoidance of >99% of this habitat has been achieved through the latest wind farm design.	Negligible	Low
Mānuka-haumakaroa-mountain holly forest	High	**Permanent loss** of 1.07 hectares of habitat, which equates to a low proportion of available habitat in the surrounding landscape.	Low	Permanent	Vegetation clearance protocol to minimise potential for incidental habitat loss/effects outside the project footprint.	Low	Low
		Edge effects and noise and disturbance associated with construction are expected to be low.	Negligible	Temporary	N/A	Very Low	Very Low
Indigenous broadleaved forest and scrub	High	This habitat type is avoided by the proposed footprint. Disturbance effects during construction are considered to be Very low.	N/A	N/A	This habitat has been avoided.	N/A	N/A
Mānuka forest and scrub	Moderate	**Permanent loss** of 16.9 hectares of habitat, which equates to a low proportion of available habitat in the surrounding landscape.	Low	Permanent	Vegetation clearance protocol to minimise potential for incidental habitat loss/effects outside the project footprint.	Low	Low
		Temporary loss of 7.15 hectares of habitat within fill disposal sites.	Low	Temporary	Remediation of temporary construction areas and fill disposal sites through indigenous revegetation.	Negligible	Very Low
		Edge effects and noise and disturbance associated with construction are expected to be moderate.	Moderate	Temporary	Planting c.8.7 ha of tracks and fire breaks to mitigate the effects of fragmentation.	Low	Low
Mixed indigenous shrubland (comprises Moderate value low stature vegetation types)	Moderate	**Permanent loss** of 33.62 hectares of habitat from a combined total of 489 hectares, which equates to a low proportion of available habitat in the surrounding landscape.	Moderate	Permanent	Vegetation clearance protocol to minimise potential for incidental habitat loss outside the project footprint	Moderate	Moderate
		Temporary loss of 13.96 hectares of habitat within fill disposal sites.	Low	Temporary	Remediation of temporary construction areas and fill disposal sites through indigenous revegetation.	Negligible	Very Low

Ecological Feature	Ecological Value	Potential Effects Associated with the Proposed Wind Farm	Expected Magnitude of Effect before Mitigation	Timescale	Measures to Avoid, Remedy or Mitigate Effects	Expected Magnitude of Residual Effect	Expected Level of Residual Effect
		Edge effects and noise and disturbance associated with construction are expected to be low given the already fragmented nature of these habitats.	Negligible	Temporary	N/A	Negligible	Very Low
Copper tussock grassland, Mānuka/copper tussock grassland	High	Loss of 3.09 hectares from a combined total of 13.41 equates to a moderate proportion of available habitat in the surrounding landscape.	Moderate	Permanent	Vegetation clearance protocol to minimise potential for incidental habitat loss outside the project footprint	Moderate	High
Mānuka/copper tussock shrubland	High	The indicative fill disposal site design was revised to avoid this habitat.	N/A	N/A	This habitat has been avoided.	N/A	N/A
Copper tussock-dominant vegetation (combined Moderate value habitats)	Moderate	**Permanent loss** of 2.15 hectares from a combined total of 166.7 hectares of habitat equates to a moderate proportion of available habitat in the surrounding landscape.	Moderate	Permanent	Vegetation clearance protocol to minimise potential for incidental habitat loss outside the project footprint	Moderate	Moderate
		Temporary loss of 4.22 hectares of habitat within fill disposal sites.	Moderate	Temporary	Remediation of temporary construction areas and fill disposal sites through indigenous revegetation.	Negligible	Very Low
		Edge effects are negligible given that this vegetation supports little woody vegetation and provides minimal buffering functions.	Negligible	Temporary	N/A	Negligible	Very Low
Copper tussock-dominant vegetation (combined Low value habitats)	Low	**Permanent loss** of 5.19 hectares from a combined total of 42.1 hectares of habitat equates to a moderate proportion of available habitat in the surrounding landscape.	Moderate	Permanent	Vegetation clearance protocol to minimise potential for incidental habitat loss outside the project footprint	Moderate	Low
		Temporary loss of 3.52 hectares of habitat within fill disposal sites	Moderate	Temporary	Remediation of temporary construction areas and fill disposal sites through indigenous revegetation.	Negligible	Very Low
		Edge effects are negligible given that this vegetation supports little woody vegetation and provides minimal buffering functions	Negligible	Temporary	N/A	Negligible	Very Low
Mixed indigenous-conifer forest and scrub	Moderate	**Permanent loss** of 0.44 hectares of habitat equates to a moderate proportion of available habitat onsite.	Moderate	Permanent	Vegetation clearance protocol to minimise potential for incidental habitat loss outside the project footprint	Moderate	Moderate
		Temporary loss of 0.30 hectares of habitat within fill disposal sites	Moderate	Permanent	Remediation of temporary construction areas and fill disposal sites through indigenous revegetation	Negligible	Very Low
Indigenous scrub and shrubland	Moderate	**Permanent loss** of 0.45 hectares of habitat equates to a moderate proportion of available habitat onsite.	Moderate	Permanent	Vegetation clearance protocol to minimise potential for incidental habitat loss outside the project footprint	Moderate	Moderate
Exotic conifer plantation forest	Moderate	**Permanent loss** of 21.22 hectares of habitat within wind farm layout, which equates to a negligible proportion available in the surrounding landscape.	Low	Permanent	No action required	Low	Low
		Temporary loss of 18.99 hectares of habitat within fill disposal sites	Low	Permanent	Likely to be replanted in exotic conifers	Low	Low

Ecological Feature	Ecological Value	Potential Effects Associated with the Proposed Wind Farm	Expected Magnitude of Effect before Mitigation	Timescale	Measures to Avoid, Remedy or Mitigate Effects	Expected Magnitude of Residual Effect	Expected Level of Residual Effect
Copper tussock/rautahi marsh	Very high	**Permanent loss** of 0.01 hectares of habitat, which equates to a low proportion of available habitat in the surrounding landscape.	Moderate	Permanent	Wind farm layout has been revised to avoid >98% of this habitat type	Moderate	High
Copper tussock/rautahi swamp	Moderate	The wind farm road layout was revised to avoid this habitat.	N/A	N/A	This habitat has been avoided.	N/A	N/A
Mānuka-inaka/copper tussock marsh	High	This habitat type is avoided by the proposed footprint. Disturbance effects during construction are considered to be Very low.	N/A	N/A	This habitat has been avoided.	N/A	N/A
Bog wetland	Very high	**Permanent loss** of 0.94 hectares of habitat, which equates to a low proportion of available habitat in the surrounding landscape.	Moderate	Permanent	Wind farm layout has been revised to avoid >97% of wetlands.	Moderate	High
Fen wetland	Very high	**Permanent loss** of 1.08 hectares of habitat, which equates to a low proportion of available habitat in the surrounding landscape.					
All wetlands	Very high	Potential modification of wetland hydrology	Low	Permanent	Installation of culverts and run-off diversion systems to maintain water flows within and between wetlands.	Negligible	Very low
Indigenous fauna							
Pīhoihoi/NZ pipit	High	**Permanent loss** of potential nesting and foraging habitat c.40-50 hectares of habitat, including grassland, fen, and copper tussock-dominant habitats, which comprise a moderate proportion of available habitat in the surrounding landscape.	Moderate	Permanent	Vegetation clearance protocol to minimise potential for incidental habitat loss outside the project footprint	Low	Low
		Temporary loss of potential nesting and foraging habitat (Exotic unmanaged grassland)	Low	Temporary	Remediation of temporary construction areas and fill disposal sites through indigenous revegetation.	Negligible	Very Low
		Injury to and/or mortality during vegetation clearance.	Moderate	Permanent	Where practicable, the clearance of vegetation during peak bird breeding season (September to March inclusive) should be avoided. Undertake nest surveys if vegetation clearance occurs during bird breeding season.	Low	Low
		Fragmentation of habitat.	Low	Permanent	Wind farm roads will be built along existing roads and tracks where practicable. Predator trapping along the wind farm roads for the life of the wind farm.	Negligible	Very low
Korimako /bellbird, tūi, kererū	Moderate	**Permanent loss** of potential nesting and foraging habitat in *c*.50 ha of habitat, which is a low proportion of available habitat in the surrounding landscape.	Low	Permanent	Vegetation clearance protocol to minimise potential for incidental habitat loss outside the project footprint.	Low	Low

Ecological Feature	Ecological Value	Potential Effects Associated with the Proposed Wind Farm	Expected Magnitude of Effect before Mitigation	Timescale	Measures to Avoid, Remedy or Mitigate Effects	Expected Magnitude of Residual Effect	Expected Level of Residual Effect
		Temporary loss of potential nesting and foraging habitat (Mānuka forest and scrub, Mixed indigenous-conifer forest and scrub)	Low	Temporary	Remediation of temporary construction areas and fill disposal sites through indigenous revegetation.	Negligible	Very Low
		Injury to and/or mortality during vegetation clearance.	Moderate	Permanent	Where practicable, the clearance of vegetation during peak bird breeding season (September to March inclusive) should be avoided. Undertake nest surveys if vegetation clearance occurs during bird breeding season.	Low	Low
		Fragmentation of habitat.	Low	Permanent	Wind farm roads will be built along existing roads and tracks where practicable. Predator trapping along the wind farm roads for the life of the wind farm.	Negligible	Very low
Koekoeā/long-tailed cuckoo	Very high	**Permanent loss** of potential nesting and foraging habitat in *c.*50 ha of habitat, which is a low proportion of available habitat in the surrounding landscape. Injury to and/or mortality during vegetation clearance.	Low	Permanent	Where practicable, the clearance of vegetation during peak bird breeding season (September to March inclusive) should be avoided. Undertake nest surveys if vegetation clearance occurs during bird breeding season. Vegetation clearance protocol to minimise potential for incidental habitat loss outside the project footprint.	Negligible	Low
		Temporary loss of *c.*10 hectares of potential nesting and foraging habitat (Mānuka forest and scrub, Mixed indigenous-conifer forest and scrub)	Low	Temporary	Remediation of temporary construction areas and fill disposal sites through indigenous revegetation.	Negligible	Very Low
Koekoeā/long-tailed cuckoo		Fragmentation of habitat.	Low	Permanent	Wind farm roads will be built along existing roads and tracks where practicable. Predator trapping along the wind farm roads for the life of the wind farm.	Negligible	Low
Kāhu/harrier	Low	Injury to and/or mortality during vegetation clearance.	Low	Permanent	Where practicable, the clearance of vegetation during peak bird breeding season (September to March inclusive) should be avoided. Undertake nest surveys if vegetation clearance occurs during bird breeding season.	Low	Very low

Ecological Feature	Ecological Value	Potential Effects Associated with the Proposed Wind Farm	Expected Magnitude of Effect before Mitigation	Timescale	Measures to Avoid, Remedy or Mitigate Effects	Expected Magnitude of Residual Effect	Expected Level of Residual Effect
Kārearea/Eastern falcon	Very high	**Permanent loss** of potential nesting and foraging habitat in pine and indigenous forest and scrub, which comprises a low proportion of available habitat in the surrounding landscape. Injury to and/or mortality during vegetation clearance.	Low	Permanent	Where practicable, the clearance of vegetation during peak bird breeding season (September to March inclusive) should be avoided. Undertake nest surveys if vegetation clearance occurs during bird breeding season. Vegetation clearance protocol to minimise potential for incidental habitat loss outside the project footprint.	Negligible	Low
Torea/South Island pied oyster catcher	High	Loss of potential roosting/nesting habitat at Glencoe Station. Injury to and/or mortality of chicks and eggs during vegetation clearance.	Negligible	Permanent	Where practicable, the clearance of vegetation during peak bird breeding season (September to March inclusive) should be avoided. Undertake nest surveys if vegetation clearance occurs during bird breeding season.	Negligible	Very low
Mātātā/South Island fernbird	High	**Permanent Loss** of potential nesting and foraging habitat on the Jedburgh plateau and Matariki. Injury to and/or mortality during vegetation clearance.	Moderate	Permanent	Where practicable, the clearance of vegetation during peak bird breeding season (September to March inclusive) should be avoided. Undertake nest surveys if vegetation clearance occurs during bird breeding season. Vegetation clearance protocol to minimise potential for incidental habitat loss outside the project footprint.	Low to Moderate	Low to Moderate
		Temporary loss of potential nesting and foraging habitat.	Low	Temporary	Remediation of temporary construction areas and fill disposal sites through indigenous revegetation.	Negligible	Low
		Fragmentation of habitat.	Low	Permanent	Wind farm roads will be built along existing roads and tracks where practicable. Predator trapping along the wind farm roads for the life of the wind farm.	Negligible	Very low
Matuku-hūrepo/Australasian bittern	Very high	Potential loss of 2 hectares of foraging habitat (wetlands) on Jedburgh plateau.	Negligible	Permanent	Undertake nest surveys if vegetation clearance occurs during bird breeding season.	Negligible	Low
Tussock skink, herbfield skink	High	**Permanent loss** of c.20 ha of suitable tussock and grassland habitat. This equates to a moderate proportion of available habitat within the surrounding landscape.	Moderate	Permanent	Vegetation clearance protocol to minimise potential for incidental habitat loss outside the project footprint.	Moderate	Moderate
		Temporary loss of suitable habitat.	Moderate	Temporary	Remediation of temporary construction areas and fill disposal sites through indigenous revegetation.	Negligible	Very Low

Ecological Feature	Ecological Value	Potential Effects Associated with the Proposed Wind Farm	Expected Magnitude of Effect before Mitigation	Timescale	Measures to Avoid, Remedy or Mitigate Effects	Expected Magnitude of Residual Effect	Expected Level of Residual Effect
		Direct harm to any skinks.	Moderate	Permanent	Implement Lizard Management Plan to undertake salvage and relocation prior to vegetation clearance. Avoidance of terrestrial vegetation removal in confirmed lizard habitat (as identified in the Lizard Management Plan and Vegetation Management Plan) during months when lizards are inactive and therefore difficult to capture (May to October inclusive).	Low	Low
Tautuku gecko	High	**Permanent loss** of c.25 hectares of suitable forest, scrub and shrubland habitat. This equates to a moderate proportion of available habitat within the surrounding landscape.	Moderate	Permanent	Vegetation clearance protocol to minimise potential for incidental habitat loss outside the project footprint	Low	Low
		Temporary loss of c.11 hectares of suitable forest, scrub and shrubland habitat.	Moderate	Temporary	Remediation of temporary construction areas and fill disposal sites through indigenous revegetation.	Negligible	Very Low
		Direct harm to any geckos.	Moderate	Permanent	Implement Lizard Management Plan to undertake salvage and relocation prior to vegetation clearance. Lizard and lizard habitat (coarse wood) salvage and relocation prior to vegetation clearance.	Low	Low
Green skink (if detected during pre-clearance checks)	Very high	**Permanent loss** of approx. 60 ha of suitable tussock, grassland and shrubland habitat. This equates to a moderate to high proportion of available habitat within the surrounding landscape.	Moderate/ High	Permanent	Vegetation clearance protocol to minimise potential for incidental habitat loss outside the project footprint	Moderate	High
		Temporary loss of suitable tussock, grassland and shrubland habitat (a low proportion of available habitat within the surrounding habitat).	Low	Temporary	Remediation of temporary construction areas and fill disposal sites through indigenous revegetation.	Negligible	Very Low
		Direct harm to individual skinks.	Moderate	Permanent	Avoidance of terrestrial vegetation removal in confirmed lizard habitat (as identified in the Lizard Management Plan and Vegetation Management Plan) during months when lizards are inactive and therefore difficult to capture (May to October inclusive). Implement Lizard Management Plan to undertake salvage and relocation prior to vegetation clearance.	Low	Moderate

Ecological Feature	Ecological Value	Potential Effects Associated with the Proposed Wind Farm	Expected Magnitude of Effect before Mitigation	Timescale	Measures to Avoid, Remedy or Mitigate Effects	Expected Magnitude of Residual Effect	Expected Level of Residual Effect
Helms' stag beetle	High	**Permanent loss** of suitable habitat; direct mortality of invertebrates; fragmentation of populations.	Moderate	Permanent	Implement measures outlined in the Stag Beetle Management Plan to undertake salvage and relocation prior to vegetation clearance. Vegetation clearance protocol to minimise potential for incidental habitat loss outside the project footprint.	Moderate	High
Megadromus meritus and *Megadromus* sp.	Moderate	**Permanent loss** of suitable habitat; direct mortality of invertebrates; fragmentation of populations.	Low to Moderate	Permanent	Implement Terrestrial Invertebrate Management Plan to detail salvage and relocation prior to vegetation clearance. Vegetation clearance protocol to minimise potential for incidental habitat loss outside the project footprint.	Low to Moderate	Low to Moderate
Ngaokeoke/peripatus	Very high or high					Low to Moderate	Moderate to High
Short-horned grasshopper	High					Low	Low
Leaf-veined slug (Athoracophoridae)	Moderate		Low to Moderate	Permanent		Low to Moderate	Low to Moderate
Giant springtail (*Platanurida* sp.)	High						Moderate to High
Trapdoor spider (*Cantuaria* sp.)							
Ground beetle (*Holcaspis* sp.)							
Millipede (*?Icosidesmus* sp.)	Moderate						Low to Moderate
All invertebrates	Moderate to Very high	Temporary loss of habitat due to construction of fill disposal sites	Low to Moderate	Temporary	Remediation of temporary construction areas and fill disposal sites through indigenous revegetation.	Negligible	Very Low

Table 6b: Expected residual magnitude and level of effect for wind farm operation after avoidance, remediation and mitigation measures have been implemented.

Ecological Feature	Ecological Value	Potential Effects Associated with the Proposed Wind Farm	Expected Magnitude of Effect before Mitigation	Timescale	Measures to Avoid, Remedy or Mitigate Effects	Expected Magnitude of Residual Effect	Expected Level of Residual Effect
Indigenous fauna							
Pīhoihoi/NZ pipit	High	Risk of blade strike.	Negligible (based on collision model outputs)	Permanent	None required.	Negligible	Very low
Tūi, kererū	Moderate	Risk of electrocution. Risk of blade strike.	Low (based on collision model outputs)	Permanent	Measures to insulate wires/transformers to minimise risk of electrocution. Use of visual deterrents to minimise bird collisions with transmissions lines.	Low	Very low
Korimako/bellbird	Moderate	Risk of electrocution. Risk of blade strike.	Moderate (based on collision model outputs)	Permanent	Measures to insulate wires/transformers to minimise risk of electrocution. Use of visual deterrents to minimise bird collisions with transmissions lines.	Moderate	Moderate
Koekoeā/long-tailed cuckoo	Very high	Risk of electrocution. Risk of blade strike.	Negligible	Permanent	Use of visual deterrents to minimise bird collisions with transmissions lines.	Negligible	Low
Kāhu/harrier	Low	Risk of blade strike Risk of electrocution.	Moderate to High (based on collision model outputs)	Permanent	Measures to insulate wires/transformers to minimise risk of electrocution. Use of visual deterrents to minimise bird collisions with transmissions lines.	Moderate to High	Low to Moderate
Karoro/black-backed gull	Low	Risk of blade strike	Low (based on collision model outputs)	Permanent	Use of visual deterrents to minimise bird collisions with transmissions lines.	Low	Very low
Paradise duck	Low	Risk of blade strike	Low (based on collision model outputs)	Permanent	Use of visual deterrents to minimise bird collisions with transmissions lines.	Low	Very low
Kārearea/Eastern falcon	Very high	Risk of blade strike – need to be based on model and other studies Risk of electrocution.	Negligible (based on collision model outputs)	Permanent	Use of visual deterrents to minimise bird collisions with transmissions lines.	Negligible	Low
Torea/South Island pied oyster catcher	High	Risk of blade strike – need to be based on model and other studies. Risk of collision with transmission lines.	Negligible (based on collision model outputs)	Permanent	Use of visual deterrents to minimise bird collisions with transmissions lines.	Negligible	Very low
Mātātā/South Island fernbird, pīhoihoi/NZ pipit	High	Increased predation due to new roads providing corridors for pests.	Negligible (based on collision model outputs)	Permanent	No measures required.	Negligible	Very low
Matuku-hūrepo/Australasian bittern	Very high	Risk of blade strike. Risk of collision with transmission lines.	Negligible (based on collision model outputs)	Permanent	Use of visual deterrents to minimise bird collisions with transmissions lines.	Negligible	Low
Tussock skink, herbfield skink	High		Low	Permanent			Low

Ecological Feature	Ecological Value	Potential Effects Associated with the Proposed Wind Farm	Expected Magnitude of Effect before Mitigation	Timescale	Measures to Avoid, Remedy or Mitigate Effects	Expected Magnitude of Residual Effect	Expected Level of Residual Effect
Tautuku gecko		Increased predation due to new roads providing corridors for pests.			Predator control along wind farm roads for the life of the consent.	Low	
Green skink (if detected during pre-clearance checks)	Very high						Moderate
Helms' stag beetle	High		Moderate			Low	Low
Megadromus meritus and *Megadromus* sp.	Moderate						
Ngaokeoke/peripatus	Very high or high		Low			Low	Very low
Short-horned grasshopper	High		Moderate			Low	Low to Very low
Leaf-veined slug (Athoracophoridae)	Moderate		Low				
Giant springtail (*Platanurida* sp.)	High						
Trapdoor spider (*Cantuaria* sp.)	High						
Ground beetle (*Holcaspis* sp.)	High		Moderate				
Millipede (*?Icosidesmus* sp.)	Moderate		Low				

LEVEL OF RESIDUAL EFFECTS AFTER EFFORTS TO AVOID, REMEDY AND MITIGATE EFFECTS

266. Following implementation of efforts to avoid, remedy or mitigate adverse effects, the Project is expected to result in the permanent loss of approximately 134.05 hectares of vegetation. Specifically, this includes:

267. Approximately 63.74 hectares of indigenous vegetation/habitat (which equates to 2.1% of all significant indigenous vegetation/habitat at the Wind Farm Site) comprising:

    (a) 2.70 hectares of indigenous forest and scrub.

    (b) 20.16 hectares of mānuka and inaka-dominant forest and scrub.

    (c) 33.62 hectares of mixed indigenous shrubland.

    (d) 5.24 hectares of copper tussock-dominant grassland and shrubland.

    (e) 1.08 hectares of fen wetland.

    (f) 0.94 hectares of bog wetland.

    (g) 0.01 hectares of copper tussock/rautahi marsh.

268. Approximately 70.31 hectares of exotic or exotic-dominant vegetation/habitat comprising:

    (a) 21.20 hectares of exotic conifer plantation forest.

    (b) 12.03 hectares of exotic or exotic-dominant scrub/shrubland.

    (c) 37.08 hectares of exotic or exotic-dominant grassland.

269. These figures are based on the latest indicative footprint. As discussed above the proposed conditions provide for further efforts to minimise permanent loss of higher value vegetation through the detailed design process, as well as caps on clearance of key habitat / vegetation types.

270. During the operational phase of the wind farm, there is also the potential for ongoing effects on various bird species through blade strike, and for lighting and noise-associated disturbance of wildlife. As such, the magnitude of residual effect on fauna species accounts for both the loss of habitat at the construction stage and the potential effects during the operation of the wind farm.

271. A summary of the residual adverse effects following implementation of measures to avoid, minimise, and mitigate potential adverse ecological effects is provided in **Table 7**. Note that this table combines the residual effects of the wind farm construction and operation. The highest level of effect for each ecological feature is included in the table. For most bird species the level of operational effects of the wind farm will be higher than construction effects, while for some other ecological features the level of residual effect for wind farm construction and operation are the same.

Table 7: Summary of residual adverse effects on all habitat types and species based on the revised magnitude of potential effects.

Ecological Feature	Ecological Value	Magnitude of Residual Effect	Level of Residual Effect	Type of effect
Southern rātā-kāmahi forest	Very high	Negligible	Low	Construction
Mānuka-haumakaroa-mountain holly forest	High	Low	Low	
Mānuka forest and scrub	Moderate	Low	Low	
Indigenous shrubland (comprises Moderate value and significant low stature vegetation types)	Moderate	Moderate	Moderate	
Copper tussock grassland, Mānuka/copper tussock grassland	High	Moderate	High	
Copper tussock-dominant vegetation (combined Moderate value habitats)	Moderate	Moderate	Moderate	
Copper tussock-dominant vegetation (combined Low value habitats)	Low	Moderate	Low	
Mixed indigenous-conifer forest and scrub	Moderate	Moderate	Moderate	
Indigenous scrub and shrubland	Moderate	Moderate	Moderate	
Exotic conifer plantation forest	Moderate	Low	Low	
Bog wetland	Very high	Moderate	High	
Fen wetland	Very high	Moderate	High	
Copper tussock/rautahi marsh	Very high	Moderate	High	
Pīhoihoi/NZ pipit	High	Low	Low	
Kererū, tui, bellbird	Moderate	Low	Low	
Koekoeā/long-tailed cuckoo	Very high	Negligible	Low	
Kāhu/harrier	Low	Moderate to High	Moderate to High	Operational
Kārearea/Eastern falcon	Very high	Negligible	Low	Construction, Operational
South Island pied oystercatcher	High	Low Negligible	Very low	Operational

Ecological Feature	Ecological Value	Magnitude of Residual Effect	Level of Residual Effect	Type of effect
Mātātā/ SI fernbird	High	Low to Moderate	Low to Moderate	Construction
Matuku-hūrepo/Australasian bittern*	Very high	Negligible	Low	Construction, Operational
Tussock skink, herbfield skink*	High	Low	Low	
Green skink*	Very high	Low (assuming present)	Moderate (if present and close to wind farm footprint)	Construction
Tautuku gecko	High	Low	Low	Construction, Operational
Helms' stag beetle	High	Low to Moderate	Low to Moderate	Construction
Megadromus meritus and *Megadromus* sp.	Moderate	Low to Moderate	Low to Moderate	Construction
Short-horned grasshopper	High	Low	Low	Construction, Operational
Ngaokeoke/peripatus	Very high or high	Potentially Low to Moderate	Potentially Moderate to High	Construction
Leaf-veined slug (Athoracophoridae)	Moderate	Moderate	Low to Moderate	
Giant springtail (*Platanurida* sp.)	High	Moderate	Moderate to High	
Trapdoor spider (*Cantuaria* sp.)	High	Moderate	Moderate to High	
Ground beetle (*Holcaspis* sp.)	High	Moderate	Moderate to High	
Millipede (?*Icosidesmus* sp.)	Moderate	Moderate	Low to Moderate	

*Species not detected at the Southland Wind Farm Site.

MANAGEMENT OF RESIDUAL EFFECTS

Overview

272. This section describes the biodiversity offsetting and compensation measures proposed to address the residual effects of the Project on terrestrial and wetland ecology values (excluding bats, which are dealt with by Mr Kessels and Dr Davidson-Watts) after all reasonable steps have been taken to avoid, remedy and mitigate them.[38] The following residual adverse effects will be specifically addressed:

[38] Residual effects on freshwater ecology values are addressed by Dr Ryder and Dr Goldsmith.

273. Vegetation / habitats:

(a) Residual adverse effects on terrestrial and wetland vegetation assessed as ‘Moderate’, ‘High’ or ‘Very High’, because those effects equate to ‘Significant residual adverse effects’ under the Southland RPS, as set out in **Table 7** above.

(b) All residual effects on indigenous habitats assessed as significant under the RPS, regardless of level of residual effect.

274. Avifauna: Residual effects on the following indigenous bird species (regardless of the level of effect):

(a) Korimako/bellbird (Resident, Not Threatened);

(b) Tūi (Resident, Not Threatened);

(c) Kererū (Resident, Not Threatened);

(d) Karoro/southern black-backed gull (Resident, Not Threatened);

(e) Kāhu/harrier (Resident, Not Threatened);

(f) Kārearea/eastern falcon (Resident, Threatened – Nationally Vulnerable);

(g) Koekoeā/long-tailed cuckoo (Migratory, Threatened);

(h) Matuku-hūrepo/Australasian bittern (Not resident, Threatened – Nationally Critical);

(i) Torea/South Island Pied Oystercatcher (Resident and Migratory, At Risk – Declining);

(j) Mātātā/South Island fernbird (Resident, At Risk – Declining); and

(k) Pīhoihoi/New Zealand pipit (Resident, At Risk – Declining).

275. Lizards: Residual effects on all indigenous lizard species, regardless of the level of effect. That includes those that have been detected at the Wind Farm Site (tussock skink and Tautuku gecko, both classified as At Risk – Declining) and two species that may potentially be present at the site (herbfield skink, classified as At Risk – Declining, and green skink, classified as Threatened – Nationally Critical).

276. Invertebrates: Residual effects on all notable species (ten in total, including Helms' stag beetle, short horned grasshopper, giant springtail, and peripatus).

277. We have developed a fulsome package of biodiversity offsetting and compensation measures to address these residual effects, as discussed below.

Biodiversity offsetting and compensation

Overview

278. Management of residual effects remaining after efforts to avoid, remedy or mitigate takes the form of offsetting or compensation via proposed ecological restoration and/or habitat enhancement measures.

279. Under the Southland RPS a biodiversity offset is defined as a 'measurable conservation outcome resulting from actions which are designed to compensate for significant residual adverse effects on biodiversity arising from project development after appropriate avoidance, minimisation, remediation and mitigation measures have been taken'.

280. Conversely, environmental compensation is defined in the Southland RPS as:

> *Means any action (works, services or restrictive covenants) as compensation for unavoided and unmitigated adverse effects of the activity for which consent is being sought including actions that provide measurable biodiversity outcomes that address significant adverse biodiversity effects arising from project development which do not meet the thresholds of a biodiversity offset.*

281. As defined in the RPS, biodiversity offsets will address the following principles:

    (a) No net loss – the offsetting proposal achieves no net loss and preferably a net gain of biodiversity;

    (b) Additional conservation outcomes – biodiversity outcomes are above and beyond results that would have occurred if the offset was not proposed;

(c) Limits to offsetting – biodiversity offsetting should not be applied to justify impacts on vulnerable and irreplaceable biodiversity;

(d) Proximity – the offsetting proposal should be located close to the application site, where this will achieve the best ecological outcomes;

(e) Like for like – offsetting measures re-establish or protect the same as or similar type ecosystem to that which is adversely affected;

(f) Long-term outcomes – the offset's positive ecological outcomes last at least as long as the effects of the application activity, and preferably in perpetuity;

(g) Timing – the delay between the loss of biodiversity through development and the gain or maturation of ecological outcomes is minimised; and

(h) Any offsetting proposal will include biodiversity management plans prepared in accordance with good practice.

282. Under the RPS, these principles do not directly apply to environmental compensation.[39] That said, the biodiversity offset principles are fundamental to the overall design of the biodiversity offset/compensation package for the proposed Southland Wind Farm.

Limits to offsetting and the Jedburgh Plateau

283. There is merit in providing additional context with regard to the vulnerability and irreplaceability of the wetland and terrestrial habitat present at the Jedburgh Plateau. This was a focus during the previous Covid Fast-track consenting process: one of the peer reviewers was of the view that these habitats could not appropriately be offset or compensated for because their supposed vulnerability and irreplaceability. That view was subsequently relied on by the expert consenting panel in its decision.

284. In our view, these habitats can all appropriately be offset or compensated for. For completeness, we have provided the definitions of irreplaceability and vulnerability in the NPS-IB:

> *Irreplaceability is a measure of the uniqueness, replaceability and conservation value of biodiversity and the degree to which the*

[39] Given that the Southland RPS does not include environmental compensation principles, the principles listed in Appendix 4 of the NPS-IB have been followed (noting that the NPS-IB does not apply to the project).

biodiversity value of a given area adds to the value of an overall network of areas. It interacts with vulnerability, complexity and rarity to indicate the biodiversity value and level of risk for a given area.

Vulnerability is an estimate of the degree of threat of destruction or degradation that indigenous biodiversity faces from change, use or development. It is the degree to which an ecosystem, habitat or species is likely to be affected by, is susceptible to or able to adapt to harmful impacts or changes. It interacts with the irreplaceability, complexity and rarity to indicate the biodiversity value and level of risk for a given area.

285. It is useful to draw comparisons to other locations when undertaking an analysis of irreplaceability and vulnerability. The Southland Region contains a great array of bog and fen wetlands, and many of those are of far greater significance than those on the Jedburgh Plateau. For example, the Te Anau Basin has numerous larger and more important wetlands and wetland complexes than those present at the Wind Farm Site. Sites closer to Slopedown such as Ajax Hill and the MacLennan Range also support large, intact, and protected wetlands that have high irreplaceability value.

286. The wetlands on the Jedburgh Plateau do not have high irreplaceability due to the effects of past land practices including the clearance of the original indigenous vegetation cover (and so have lost their terrestrial context), and the presence of stock and feral deer in suppressing natural regeneration processes and ecological succession. This is particularly the case for some areas of 'induced' bog, which would have historically supported pāhautea cloud forest.

287. For similar reasons, we do not consider the wetlands on the Jedburgh Plateau have high vulnerability. This is because they are relatively intact (but by no means 'pristine') despite the ungulate browse and local trampling effects, and the effects of historic land practices, including burning and wholesale vegetation clearance.

288. The Jedburgh Plateau has been used for farming for over 100 years. It is still being intermittently grazed by approximately 300 head of cattle, and it is browsed by high numbers of feral deer. The fact that these wetlands still persist after clearance of vegetation by fire and historic grazing, and currently withstand the effects of cattle and deer, suggests that they have low vulnerability despite their high ecological value.

289. Ecosystems with high vulnerability are at immediate risk and may require urgent intervention to prevent irreversible damage. We do not consider that the wetlands on the Jedburgh Plateau are at immediate risk or under significant threat. Moreover, any effects that browsing animals are having on the wetlands are reversible.

290. The proportion of wetland habitat affected on the Jedburgh Plateau is minimal relative to what remains in the wider Catlins upland area, or indeed, relative to what remains on Jedburgh Plateau. In addition, it is anticipated that the ecological condition of the wetlands unaffected by the proposed wind farm (i.e. approximately 98% of all wetlands on the Jedburgh Plateau) will improve as a result of the actions proposed to address residual adverse terrestrial and wetland ecology effects. In particular, and as discussed below, key actions that will have significant benefits for the wetlands at the Jedburgh Plateau and to biodiversity in general across a large area of the Wind Farm Site include:

    (a) large-scale aerial and ground-based control of introduced mammalian pests (deer, possums, rats, stoats, and potentially pigs and hares) across indigenous vegetation and habitats over the1,400-hectare Jedburgh Station Pest Control Area (including all the wetlands within the Jedburgh Plateau);

    (b) additional efforts within the 245-hectare Ecological Enhancement Area (within the Jedburgh Station Pest Control area), which will be fenced to exclude stock and feral deer and pigs;

    (c) targeted deer and pig control will be undertaken on a six-monthly basis (spring and late summer) across the Jedburgh Plateau; and

    (d) intensive ground-based pest animal control within a 55-hectare (approximately) Plateau Fauna Enhancement Area at the southeastern end of the Jedburgh Plateau, targeting rodents and mustelids.

Offsetting and compensation approach and rationale

291. Biodiversity offsetting is proposed to address the residual effects on significant terrestrial vegetation at the Project Site. This will occur through various actions at the Wind Farm Site, focussed in particular (but not exclusively) on the Jedburgh Plateau.

292. Biodiversity compensation is proposed as the primary mechanism to address the loss of wetland extent at the Wind Farm Site. This will occur through increasing indigenous wetland extent and enhancing existing wetland on land purchased by Contact at Davidson Road, as discussed below. In addition, as discussed above, the fen and bog habitats at Jedburgh Station will still benefit from offset measures such as ungulate exclusion and targeted pest control.

293. The overarching goal of the residual effects management package for the Project is to achieve Net Gain (offsetting) or Net Positive (compensation) outcomes for indigenous biodiversity.

294. There are three main potential approaches to / options for achieving biodiversity gains at an offset or compensation site:

    (a) Enhancement of an existing habitat to improve its condition (biodiversity gain);

    (b) Creation of habitat through new plantings (biodiversity gain); and

    (c) Preventing loss of the otherwise inevitable destruction of habitat (averting biodiversity loss).

295. We propose to use enhancement of existing habitat to address residual effects on indigenous vegetation and indigenous fauna (birds, lizards and invertebrates). This will be achieved through a combination of pest control (aerial poisoning and ground-based trapping and hunting of feral ungulates), enrichment planting, and fencing of specific areas to keep stock and feral ungulates out (discussed below).

296. Enhancing existing habitat is an appealing proposition because of the general ecological principle that restoration actions are more likely to be successful in existing habitats. This is particularly relevant to terrestrial and wetland habitats at Jedburgh Station, many of which are damaged and prevented from developing into more complex plant communities by browsing animals.

297. These measures are focussed on Jedburgh Station, where the majority of the effects occur, but there are also measures proposed at Matariki Forest and at the Contact Energy property at Davidson Road. There is enormous potential to improve ecological condition and enhance indigenous biodiversity through the comprehensive programme of sustained pest animal control,

enhancement and enrichment planting and fencing of specific areas to exclude stock and feral ungulates.

298. Appropriate management will allow successional processes to occur in indigenous forest, shrubland and wetland habitat at Jedburgh Station. It is expected that indigenous scrub and shrubland, and some non-woody habitats, will begin to revert to two broad habitat types: southern rātā-rimu forest and pāhautea forest.

299. Also, as previously mentioned, we expect areas of induced bog to revert to pāhautea forest, although this was not accounted for in the Biodiversity and Accounting Offsetting Models (BOAMs – discussed below).

The package of measures to address residual effects

300. Measures for terrestrial and wetland habitat restoration and enhancement are summarised below. The location of these measures is shown below in Figures Terrestrial Ecology-3a to 3d (Part G) of this report.

Jedburgh Station Pest Control Area

301. Large-scale aerial control of introduced mammalian pests will be carried out across indigenous vegetation and habitats over a *c.*1,400-hectare area on Jedburgh Station, for the life of the Southland Wind Farm Project (the **Jedburgh Station Pest Control Area**). The Jedburgh Station Pest Control Area covers all of the Jedburgh Plateau, and a substantial portion of the remainder of Jedburgh Station, including the large gully of southern rātā-kāmahi forest and the small, but important, remnant of pāhautea forest at the southern end of the Jedburgh Plateau.

302. Aerial pest control will be undertaken on a three-yearly cycle (for the life of the Project).

303. The *c.*530-hectare Jedburgh Plateau will, in addition to the Jedburgh Station Pest Control Area actions described above, be subject to targeted deer and pig control that will be undertaken on a six-monthly basis (May-June and February-March, where practicable) for two years following the commissioning of the wind farm, and no less than every three years thereafter for the life of the wind farm.

Jedburgh Station Ecological Enhancement Area

304. An ungulate exclusion fence[40] will be constructed and maintained for the life of the Southland Wind Farm around a 245-hectare block of indigenous vegetation characterised by mānuka forest and scrub, and smaller areas of shrubland and fen and bog wetlands on Jedburgh Station, mostly outside the Jedburgh Plateau (the **Jedburgh Station Ecological Enhancement Area**). Within this area:

    (a) feral deer and pigs will be eradicated and stock excluded; and

    (b) enrichment planting will be undertaken (within terrestrial habitats) at a rate of 20 plants per hectare (*c*.5,000 plants in total).

305. These actions will protect the Jedburgh Station Ecological Enhancement Area from browsing mammals (stock, deer, and pigs) and restore successional processes to increase floristic diversity and enhance forest structure. Combined with the benefits of controlling feral deer and pigs across the Jedburgh Plateau and pest animals within the large gully of southern rata-kamahi forest, this approach will be used to offset the loss of indigenous-dominant woody vegetation by trading loss of extent for improved ecological condition across approximately 1,400 hectares.

306. The fence will also permanently protect 18 hectares of fen and 1.5 hectares of bog from ungulate browsing and pugging.

307. In addition, assisted regeneration and enrichment planting will also be undertaken on the existing tracks that are no longer required within the Jedburgh Station Ecological Enhancement Area. This will provide an additional 8.7 hectares of restoration to help offset the effects of fragmentation.

Copper Tussock Enhancement and Skink Protection Area

308. An ungulate exclusion fence will be constructed and maintained for the life of the Southland Wind Farm at an approximately 8-hectare degraded copper tussock vegetation site at Matariki Forest (the **Copper Tussock Enhancement and Skink Protection Area**).

309. Feral deer and pigs will be eradicated, ground-based control of rats and mice will be carried out, and weed control and enhancement planting will be

[40] Effectively a deer fence, but it will also keep out other ungulates including pigs and stock.

undertaken at the Copper Tussock Enhancement and Skink Protection Area. Management targets for rats and mice are <5% and <10% tracking tunnel indices respectively (as per Condition EC57).

310. This will offset the direct and unavoidable loss of 5.2 hectares of significant copper tussock-dominant grassland and shrubland by enhancing approximately 8 hectares of similar habitat, primarily through ungulate exclusion and pest plant control, i.e. trading loss of extent for improvement in condition.

Plateau Fauna Enhancement Area

311. Targeted intensive ground-based predator control (minimum of 2 devices per hectare), for the life of the Southland Wind Farm, across 55 hectares on the Jedburgh Plateau (the **Plateau Fauna Enhancement Area**).

312. Pest species targeted include rats, stoats, and hedgehogs.[41]

313. This will benefit the local populations of mātātā/South Island fernbird, pīhoihoi/NZ pipit, lizards, and invertebrates.

314. Overall, the pest control programme at the Wind Farm Site will offset the actual and potential residual construction effects on significant indigenous forest and shrubland types. It will also offset residual construction effects on indigenous bird species such as koekoeā/long-tailed cuckoo, mātātā/South Island fernbird and pīhoihoi/NZ pipit, and any residual operational effects on indigenous bird species such as tūi, kererū, and korimako/bellbird.

Davidson Road Wetland Restoration Site

315. Indigenous wetland revegetation and enrichment planting will be carried out in wetlands that are currently dominated by exotic grasses on land owned by Contact at Davidson Road, approximately six kilometres north of the Wind Farm Site (**Davidson Road Wetland Restoration Site**). These are marsh and swamp wetlands that differ from the affected upland bogs and fens.

316. Actions at the Davidson Road Wetland Restoration Site will include:

    (a) Removal and ongoing exclusion of stock by fencing.

[41] This area will also be subject to targeted deer and pig control will be undertaken on a six-monthly basis (May-June and February-March), because it is within the Jedburgh Plateau.

(b) Grazed areas of exotic grassland with wetland soils will be partially revegetated with copper tussock, rautahi and harakeke (total area of 5.11 hectares). This will restore 'natural wetland' status to these areas that are currently dominated by improved pasture species (on hydric soils). The outcome will be an overall increase in the extent of natural wetlands in Southland.

(c) Enrichment planting will also be undertaken throughout existing areas of indigenous-dominant wetland covering an area of 6.67 hectares.

(d) Approximately one hectare of terrestrial revegetation to provide connectivity and buffering between areas of wetland.

(e) Targeted pest plant control and control of rabbits and hares.

317. The actions at the Davidson Road Wetland Restoration Site will be undertaken to address the loss of natural wetland extent through construction of the wind farm (and in particular the loss of bog and fen wetlands on Jedburgh Plateau), and provide habitat for mātātā/South Island fernbird and other wetland birds.

318. A number of measures are proposed as compensation for actual and potential residual effects on lizards, as set out below.

319. Two release sites have been identified for the relocation of any salvaged skink prior to and during construction.

320. One site is at Jedburgh Station – and more specifically on the Jedburgh Plateau – at an approximately 0.48-hectare site adjacent to the Wind Farm Site road access between JED-28 and JED-29, where tussock skinks have been previously captured (**Jedburgh Plateau Skink Release Area**).

321. The other site is within the approximately 8-hectare Copper Tussock Enhancement and Skink Protection Area discussed above, which is on Matariki Station between MAT-09 and MAT-10.

322. These two sites will be utilised as appropriate, depending on where skink are salvaged. As additional compensation:

(a) An ungulate exclusion fence (deer fence) will be established around the Copper Tussock Enhancement and Skink Protection Area to protect lizards from browsing ungulates. A temporary leaky fence will be

constructed to receive incidental green and/or herbfield skinks that may be discovered during salvage.

(b) Targeted control of mice will be carried out at both sites every three months for the first five years following the commencement of the operation of the Southland Wind Farm. That will complement the broader pest control programme to provide an opportunity for relocated lizards to establish.

(c) Pest plant control will be carried out for a 10-year period in the Copper Tussock Enhancement and Skink Protection Area.

(d) Habitat enhancement will be carried out through transfer of woody debris and logs, and enhancement planting.

323. Habitat enhancement and pest animal control at the skink release sites will also benefit indigenous invertebrates, noting that some salvaged invertebrates may be relocated to these sites.

324. There is also provision for additional compensation measures for green skink and Tautuku gecko as follows:

(a) If green skink are found within the Project footprint, in order to compensate for the residual effects from the project, Contact will fund the construction of a minimum two-hectare Green Skink Protection Area (predator exclusion fence) at an existing population for green skink, in agreement with DOC. This will include the establishment and maintenance of a predator exclusion fence for the life of the Project, combined with predator control (to eradicate mice and other predators) within the protection area.

(b) For Tautuku gecko (which have been detected at the Wind Farm Site), a temporary Gecko Soft Release Pen will be established within the Jedburgh Station Ecological Enhancement Area. Any salvaged Tautuku gecko will be transferred into that soft release pen, which will be subject to pest control. The soft release pen will be decommissioned once the ungulate exclusion fence around the wider Jedburgh Station Ecological Enhancement Area is in place.

(c) The commitment to provide a research institution or environmental organisation $30,000.00 for research or management of Tautuku gecko.

325. To compensate for any residual adverse effects on notable indigenous invertebrates, a one-off payment of $30,000.00 to a research institution to support a grant for research into developing best practices for translocating notable indigenous invertebrates.

326. For ground-based invertebrates, planting will be carried out using a mixture of copper tussock and divaricating shrub species adjacent to roads and turbines on the Jedburgh Plateau. These relatively small, discrete planting areas (total area of approximately 16,000m^2) will provide habitat and connectivity for invertebrates between existing areas of indigenous shrubland.

Post-construction avifauna monitoring

327. As discussed earlier in this report, post-construction avifauna monitoring (in terms of 'turbine strike' effects) is proposed. If that monitoring confirms that any of the species-specific 'Compensation Triggers' listed in Condition EC37B (in terms of mortality) are exceeded, compensation will be provided, with details to be determined through the process set out in the proposed conditions (EC37E).

328. The purpose of the compensation will be to enhance a known habitat or breeding site of the affected bird species away from the wind farm. This may be in the form of additional predator control or habitat enhancement or the provision of funding to an existing or proposed predator control or habitat enhancement programme for the affected bird species.

329. In addition, an Expert Avifauna Panel will be established in accordance with proposed Condition EC38 to provide advice and input into the monitoring and management of potential adverse effects on indigenous avifauna. In particular, the Panel will provide advice in respect to the review of the AMP following the completion of the pre-construction avifauna monitoring, as well as advise and assist in the event one or more of the compensation triggers listed in Condition EC37B is equalled or exceeded.

330. Detailed methodologies for the offset and compensation measures are set out in the Habitat Restoration and Enhancement Plan (and in the Lizard Management Plan in respect of lizard relocation sites, and in the Stag Beetle and Terrestrial Invertebrate Management Plans in respect of relocation sites for notable invertebrates).

331. In summary, the offsetting and compensation programme targets (i) high-value habitats at the Wind Farm Site – including but not limited to wetlands on the Jedburgh Plateau and the gully dominated by southern rātā-kāmahi forest and (ii) moderate-value indigenous habitats with strong potential for ecological improvement, such as Mānuka forest and scrub at Jedburgh Station. The programme is expected to deliver meaningful biodiversity gains across the Jedburgh Plateau and the wider Jedburgh Station.

332. We note that Contact will also be funding a pest control programme over a 10,000-hectare area of DOC-administered land in the Beresford Range, Catlins. That is proposed to address residual adverse effects on bats, and is discussed in Kessels and Davidson-Watts (2025). It will bring benefits for terrestrial vegetation and fauna beyond bats, which are in addition to the benefits we have addressed in terms of the offset and compensation measures we have set out above.

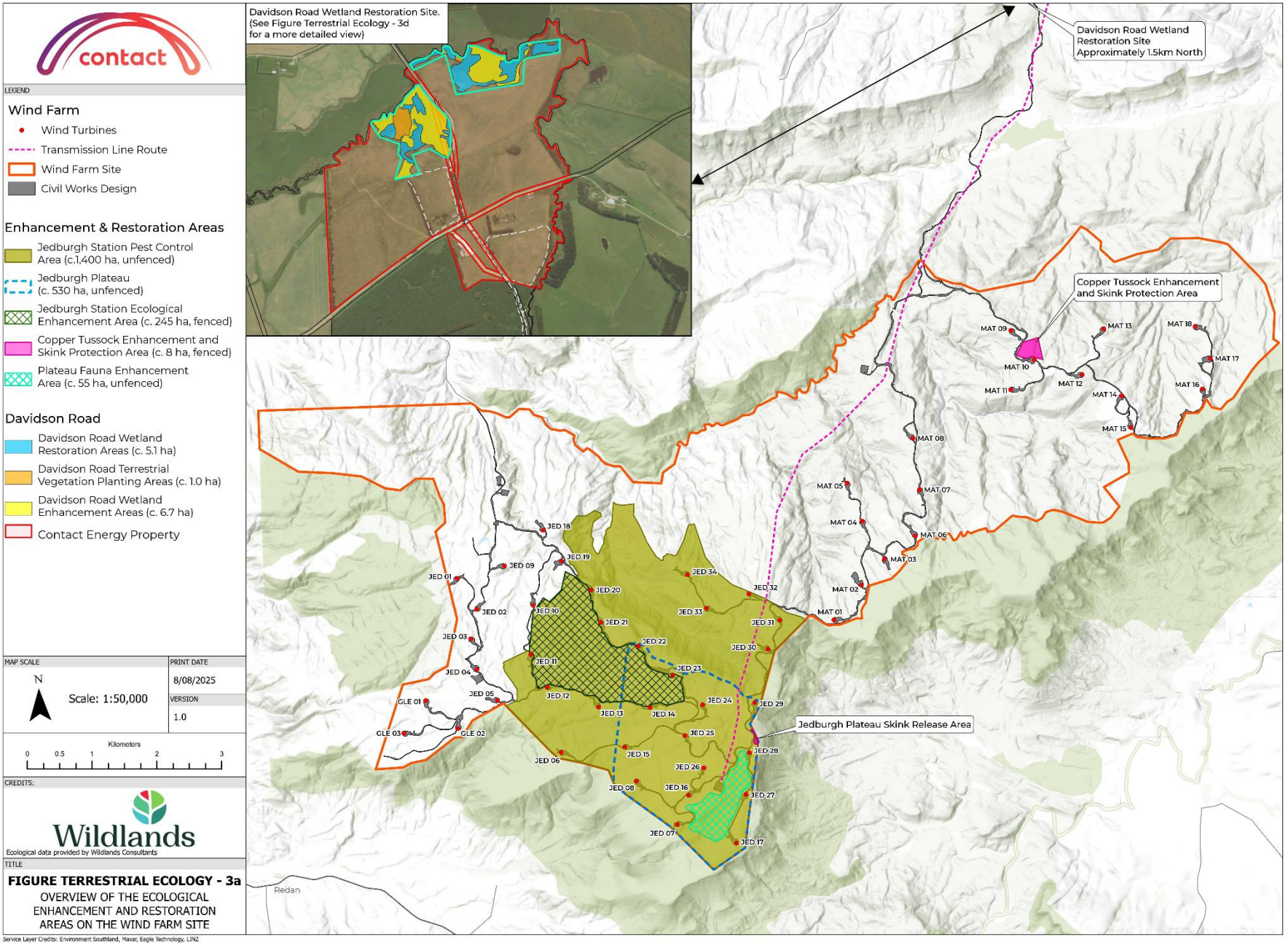
333. We have provided a summary in **Table 8** below that shows the expected level of residual effect for ecological features that have a post-mitigation level of residual effect of at least Moderate.

Table 8: Summary of expected level residual effects on habitat types and species with a post-mitigation level of effect of at least Moderate

Ecological Feature	Ecological Value	Magnitude of Residual Effect	Level of Residual Effect	Offset/compensation measure	Expected Level of Residual Effect following Offsetting and Compensation
Copper tussock grassland, Mānuka/copper tussock grassland	High	Moderate	High	Enhancement of c.8 hectares of degraded copper tussock within the Copper Tussock Enhancement and Skink Protection Area, including exclusion of deer and pigs.	Net gain in habitat condition
Indigenous shrubland (comprises Moderate value and significant low stature vegetation types)	Moderate	Moderate	Moderate	Enhancement of indigenous vegetation at Jedburgh Station, including planting 5,000 enrichment species, exclusion of and targeted control of deer and pigs. Aerial pest control across 1,400 hectares.	Net gain in habitat condition
Copper tussock-dominant vegetation (combined Moderate value habitats)	Moderate	Moderate	Moderate		
Mixed indigenous-conifer forest and scrub	Moderate	Moderate	Moderate		
Indigenous scrub and shrubland	Moderate	Moderate	Moderate		
Bog wetland	Very high	Moderate	High	Restoration of 5.11 hectares of exotic wetland into indigenous copper tussock/rautahi marsh and enhancement of 6.67 hectares of degraded marsh. Stock exclusion and permanent legal protection. Targeted control of deer and pigs on the Jedburgh Plateau.	Net gain in extent of indigenous wetland vegetation
Fen wetland	Very high	Moderate	High		
Copper tussock/rautahi marsh	Very high	Low	Moderate		
Koekoeā/long-tailed cuckoo	Very high	Low	Moderate	Aerial pest control across 1,400 hectares.	Very low to Net Gain
Kāhu/harrier	Low	Moderate to High	Moderate to High	Enhancement of indigenous vegetation at Jedburgh Station, including planting 5,000 enrichment species, exclusion of and targeted control of deer and pigs.	Low to Moderate
Mātātā/ SI fernbird	High	Low to Moderate	Low to Moderate	Enhancement of c.8 hectares of degraded copper tussock within the Copper Tussock Enhancement and Skink Protection Area.	Net gain in bird numbers and habitat condition

Ecological Feature	Ecological Value	Magnitude of Residual Effect	Level of Residual Effect	Offset/compensation measure	Expected Level of Residual Effect following Offsetting and Compensation
				Aerial pest control across 1,400 hectares. Targeted control of deer and pigs on the Jedburgh Plateau. Intensive pest control within the 55-hectare Plateau Fauna Habitat Enhancement Area.	
Green skink*	Very high	Moderate (assuming present)	High (if present and close to wind farm footprint)	Construction of a minimum two-hectare predator-proof Green Skink Protection Area at an existing habitat for green skink.	Potentially Very low
Helms' stag beetle	High	Low to Moderate	Low to Moderate	Aerial pest control across 1,400 hectares. Enhancement of indigenous vegetation at Jedburgh Station, including planting 5,000 enrichment species and exclusion of stock and feral ungulates. Targeted control of deer and pigs on the Jedburgh Plateau. Intensive pest control within the 55-hectare Plateau Fauna Habitat Enhancement Area. Measures to enhance habitat (e.g. relocation of course woody debris). Planting discrete areas (1.6 hectares in total) across Jedburgh Plateau to provide habitat and maintain connectivity for less mobile invertebrates.	Net gain in abundance of invertebrate taxa and condition of invertebrate habitat
Megadromus meritus and *Megadromus* sp.	Moderate	Low to Moderate	Low to Moderate		
Ngaokeoke/peripatus	Very high or high	Potentially Low to Moderate	Potentially Moderate to High		
Leaf-veined slug (Athoracophoridae)	Moderate	Moderate	Low to Moderate		
Giant springtail (*Platanurida* sp.)	High	Moderate	Moderate to High		
Trapdoor spider (*Cantuaria* sp.)	High	Moderate	Moderate to High		
Ground beetle (*Holcaspis* sp.)	High	Moderate	Moderate to High		
Millipede (?*Icosidesmus* sp.)	Moderate	Moderate	Low to Moderate		

*Species not detected at the Southland Wind Farm Site.


contact
LEGEND
Wind Farm
Wind Turbines
Transmission Line Route
Wind Farm Site
Civil Works Design
Enhancement & Restoration Areas
Jedburgh Station Pest Control Area (c.1,400 ha, unfenced)
Jedburgh Plateau (c. 530 ha, unfenced)
Jedburgh Station Ecological Enhancement Area (c. 245 ha, fenced)
Copper Tussock Enhancement and Skink Protection Area (c. 8 ha, fenced)
Plateau Fauna Enhancement Area (c. 55 ha, unfenced)
Davidson Road
Davidson Road Wetland Restoration Areas (c. 5.1 ha)
Davidson Road Terrestrial Vegetation Planting Areas (c. 1.0 ha)
Davidson Road Wetland Enhancement Areas (c. 6.7 ha)
Contact Energy Property
MAP SCALE
N
Scale: 1:50,000
PRINT DATE
8/08/2025
VERSION
1.0
Kilometers
0 0.5 1 2 3
CREDITS:
Wildlands
Ecological data provided by Wildlands Consultants
TITLE
FIGURE TERRESTRIAL ECOLOGY - 3a
OVERVIEW OF THE ECOLOGICAL ENHANCEMENT AND RESTORATION AREAS ON THE WIND FARM SITE
Service Layer Credits: Environment Southland, Maxar, Eagle Technology, LINZ
Davidson Road Wetland Restoration Site. (See Figure Terrestrial Ecology - 3d for a more detailed view)
Davidson Road Wetland Restoration Site Approximately 1.5km North
Copper Tussock Enhancement and Skink Protection Area
Jedburgh Plateau Skink Release Area
MAT 01
MAT 02
MAT 03
MAT 04
MAT 05
MAT 06
MAT 07
MAT 08
MAT 09
MAT 10
MAT 11
MAT 12
MAT 13
MAT 14
MAT 15
MAT 16
MAT 17
MAT 18
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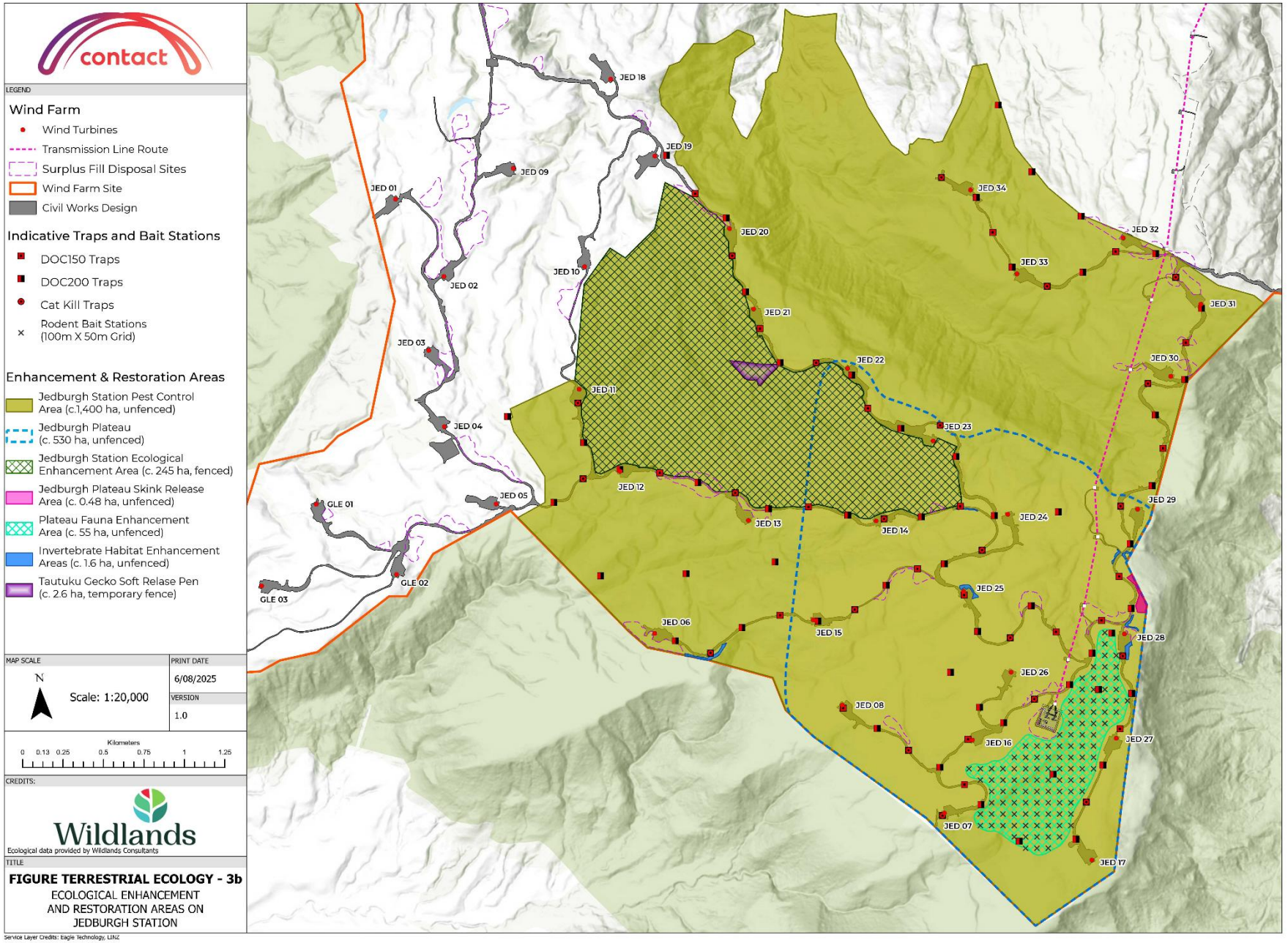
GLE 02
GLE 03
Redan


contact
LEGEND
Wind Farm
Wind Turbines
Transmission Line Route
Surplus Fill Disposal Sites
Wind Farm Site
Civil Works Design
Indicative Traps and Bait Stations
DOC150 Traps
DOC200 Traps
Cat Kill Traps
Rodent Bait Stations (100m X 50m Grid)
Enhancement & Restoration Areas
Jedburgh Station Pest Control Area (c.1,400 ha, unfenced)
Jedburgh Plateau (c. 530 ha, unfenced)
Jedburgh Station Ecological Enhancement Area (c. 245 ha, fenced)
Jedburgh Plateau Skink Release Area (c. 0.48 ha, unfenced)
Plateau Fauna Enhancement Area (c. 55 ha, unfenced)
Invertebrate Habitat Enhancement Areas (c. 1.6 ha, unfenced)
Tautuku Gecko Soft Relase Pen (c. 2.6 ha, temporary fence)
MAP SCALE
N
Scale: 1:20,000
PRINT DATE
6/08/2025
VERSION
1.0
Kilometers
0 0.13 0.25 0.5 0.75 1 1.25
CREDITS:
Wildlands
Ecological data provided by Wildlands Consultants
TITLE
FIGURE TERRESTRIAL ECOLOGY - 3b
ECOLOGICAL ENHANCEMENT AND RESTORATION AREAS ON JEDBURGH STATION
Service Layer Credits: Eagle Technology, LINZ
JED 18
JED 19
JED 09
JED 01
JED 20
JED 10
JED 02
JED 21
JED 03
JED 22
JED 11
JED 04
JED 23
JED 12
JED 05
GLE 01
JED 13
JED 14
JED 24
GLE 02
GLE 03
JED 25
JED 06
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JED 28
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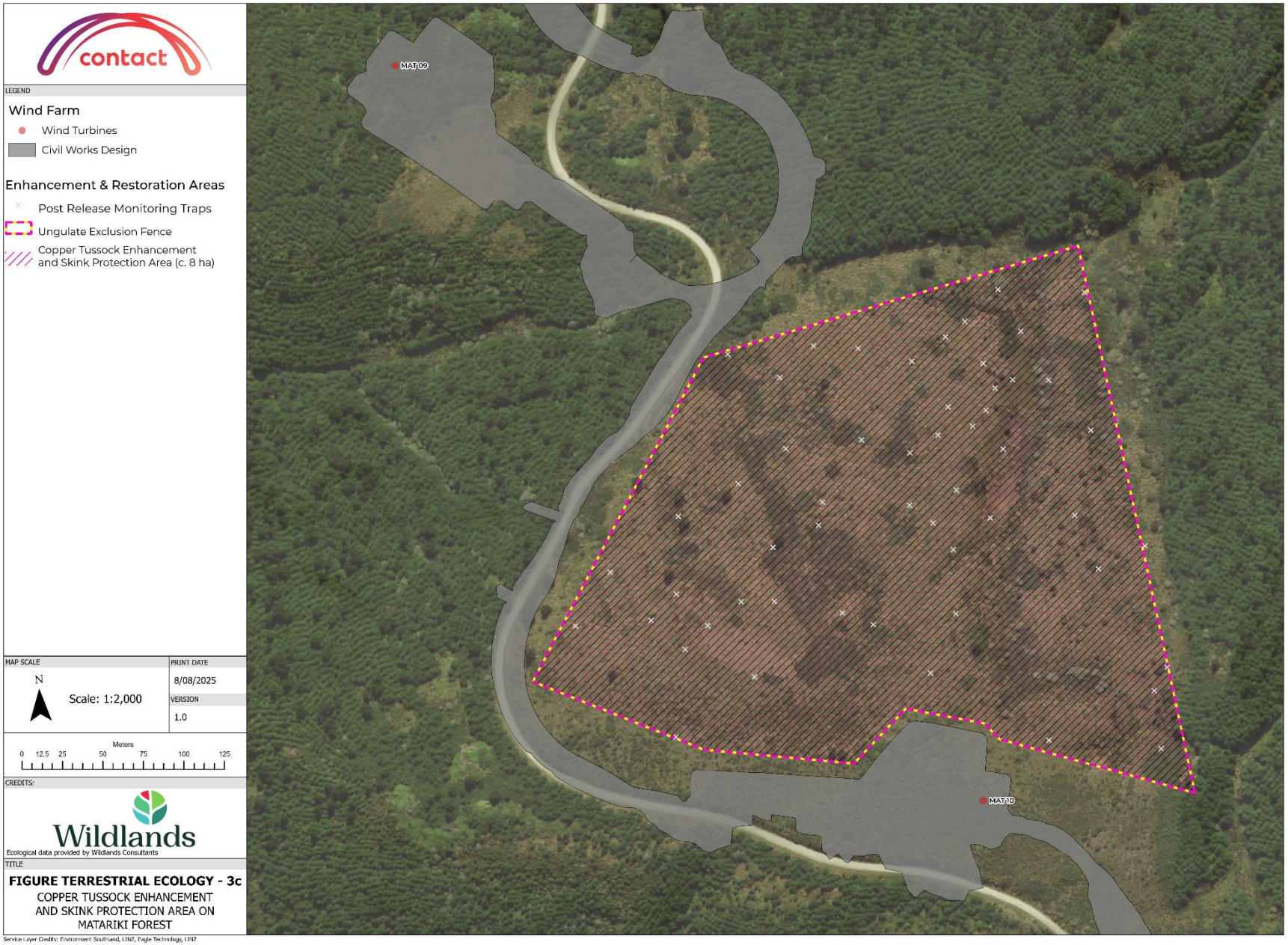
JED 30
JED 29


contact
LEGEND
Wind Farm
Wind Turbines
Civil Works Design
Enhancement & Restoration Areas
Post Release Monitoring Traps
Ungulate Exclusion Fence
Copper Tussock Enhancement and Skink Protection Area (c. 8 ha)
MAT 09
MAT 10
MAP SCALE
N
Scale: 1:2,000
PRINT DATE
8/08/2025
VERSION
1.0
Meters
0 12.5 25 50 75 100 125
CREDITS:
Wildlands
Ecological data provided by Wildlands Consultants
TITLE
FIGURE TERRESTRIAL ECOLOGY - 3c
COPPER TUSSOCK ENHANCEMENT AND SKINK PROTECTION AREA ON MATARIKI FOREST
Service Layer Credits: Environment Southland, LINZ, Eagle Technology, LINZ


contact
LEGEND
Wind Farm
Temporary Laydown Areas
Contact Energy Property
Enhancement & Restoration Areas
Davidson Road Wetland Restoration and Covenant Area (c. 15 ha, fenced)
Davidson Road Wetland Restoration Areas (c. 5.1 ha)
Davidson Road Terrestrial Vegetation Planting Areas (c. 1.0 ha)
Davidson Road Wetland Enhancement Areas (c. 6.7 ha)
Note
All areas shown above are subject to further discussion with Gore District Council about the paper road through the Contact Energy property and the adjoining property owner.
MAP SCALE
N
Scale: 1:3,500
PRINT DATE
8/08/2025
VERSION
1.0
Meters
0 25 50 100 150 200
CREDITS:
Wildlands
Ecological data provided by Wildlands Consultants
TITLE
FIGURE TERRESTRIAL ECOLOGY - 3d
DAVIDSON ROAD WETLAND RESTORATION SITE AND PROPOSED COVENANT
Service Layer Credits: Environment Southland, Maxar

Use of and Results of Biodiversity Offset and Accounting Models

334. A Biodiversity Offset Accounting Model (BOAM; Maseyk et al. 201827) has been developed to demonstrate offsetting, i.e. No Net Loss or Net Gain outcomes for addressing residual adverse effects on terrestrial habitats within the Wind Farm Site.

335. The BOAMs focus on the residual loss of significant vegetation. The models do not account for exotic-dominant nor for indigenous fauna. We are confident that the data we have collected for indigenous avifauna will inform a robust statistical before-and-after analysis with respect to the operational effects of the wind farm on avifauna. Including cryptic taxa such as lizards and invertebrates is also not practical, but post-construction monitoring of fauna will help confirm the success of the proposed offsetting and compensation actions.

336. In developing the BOAMs, we used woody and non-woody vegetation types to group all significant terrestrial vegetation types affected by the proposed wind farm, based on their expected successional trajectories. Even though we have separated woody and non-woody (copper tussock-dominant) vegetation types in the ecological assessment, for the purposes of offsetting it is appropriate to assume that non-woody terrestrial habitats subject to appropriate management are expected to revert to indigenous forest over sufficiently long-time scales. The proposed restoration measures are anticipated to facilitate this successional development.

337. The BOAMs for terrestrial vegetation demonstrate that the proposed actions at the Wind Farm Site will deliver the following outcomes onsite for vegetation:[42]

338. Net gain in habitat values within the 245-hectare Ecological Enhancement Area (focussed on the Jedburgh Plateau) within 5 to 10 years following the removal of stock and control of feral deer and pigs.

339. Improvements in the condition and structure of indigenous shrubland on the Jedburgh Plateau will be realised within 10 to 25 years following the control of feral deer and pigs.

[42] Noting that outcomes for fauna have not been modelled.

340. Significant improvements in the condition and structure of southern rātā-kāmahi forest on Jedburgh Station will be realised within 5 to 10 years following the control of feral deer, possums, and rats.

341. For wetlands, we have provided a basic offset model to demonstrate that onsite and offsite management interventions together are highly likely to result in a net positive outcome for wetlands within 5 to 8 years (acknowledging that a compensation approach is being used to address wetland loss).

342. We have undertaken this work to provide an additional layer of confidence in respect of the proposed measures to address effects on wetlands.

343. More detailed discussion of the methodology employed in developing and applying the BOAMs is provided in **Appendix 1**, and full results of the BOAMs are provided in **Appendix 7**.

Securing and verifying the offset and compensation programme

344. It is important to have certainty that these measures will be delivered, and that the anticipated biodiversity gains will eventuate. To that end, the proposed conditions of consent require:

345. Contact to demonstrate it has the necessary legal authorisations to carry out all of these measures, including confirming specific enduring legal arrangements that have been agreed to be entered into that provide for the Jedburgh Station Ecological Enhancement Area, Copper Tussock Enhancement and Skink Protection Area and Davidson Road Wetland Restoration Site to be retained in perpetuity.

346. That the detailed specified planting and pest control outcomes / performance targets in Condition EC52 have been met.

347. That regular reporting on the offset and compensation measures against the required outcomes / performance targets is carried out, for a total of 25 years post-completion of the planting measures. A biodiversity outcome monitoring programme, using existing vegetation plots, will be undertaken to verify that the performance targets set out in proposed Condition EC52 are being achieved and maintained for the long term - and therefore net gain or net positive outcomes are achieved. In order to verify net gains in biodiversity, a randomised sample of terrestrial and wetland plots will be remeasured and

repeat bird surveys will be undertaken once feral ungulates have been controlled.

348. Vegetation plots will be remeasured at five years following the first round of aerial and ground-based pest animal control, whereas bird monitoring will commence in spring-summer immediately following the first round of aerial pest control.

349. Future monitoring will be undertaken once the wind farm becomes operational and the first round of pest animal control has been undertaken (i.e. aerial pest control, targeted deer control, and roadside trapping). Monitoring for birds will be undertaken for a minimum of three consecutive years, while vegetation monitoring will be undertaken on a five-yearly cycle to ensure that biodiversity targets are being met.

350. If monitoring results indicate a decline in any of the ecological features of concern (e.g. a decline in bird abundance and/or diversity or a lack of regeneration of terrestrial habitats), and these declines can be corroborated with the results of carcass surveys or the presence of pest animals, then further measures will need to be implemented by Contact, potentially including an increase in targeted ground-based pest animal control and undertaking further enrichment planting.

WILDLIFE APPROVALS

351. As discussed above, the effects management regime for the Project includes searching for and then catching, holding and releasing, lizards and invertebrates. Where the relevant species are protected under the Wildlife Act, approvals are needed to authorise those activities.

352. Contact is therefore applying for Wildlife approvals under the FTAA (akin to authorities usually granted under the Wildlife Act) to catch, hold and release as part of species management:

    (a) Tussock skink and Tautuku gecko, which are both known to be present;

    (b) Green skink and herbfield skink, which have not been found at the Project Site but may be present (and will be caught, held and released if found); and

    (c) Helms' stag beetle.

353. We have advised Contact on its application for Wildlife approvals (including proposed conditions). The LMP and Stag Beetle Management Plan (part of the TIMP) are ready to be approved through this consenting process, and to apply directly to the Wildlife approvals.

Nick Goldwater

Dr Kelvin Lloyd