Carex tenuiculmis and Epilobium chionanthum Management Plan

Mahinerangi Wind Farm Stage 2

Tararua Wind Power Limited

Prepared by:

SLR Consulting New Zealand

SLR Project No.: 810.031205.00001

6 October 2025

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Revision Record

Revision	Date	Prepared By	Checked By	Authorised By
1.0	6 October 2025	Steve Rate	Hamish Dean	Steve Rate

Basis of Report

This report has been prepared by SLR on the instructions of our Client, in accordance with the agreed scope of work. It is intended to support the Client's application under the Fast Track Approvals Act 2024 and may be relied upon by the Expert Panel and relevant administering agencies for the purposes of assessing the application. While SLR has exercised due care in preparing this report, it does not accept liability for any use of the report beyond its intended purpose. Where information has been supplied by the Client or obtained from external sources, it has been assumed to be accurate unless otherwise stated.

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Acronyms and Abbreviations

CDC	Clutha District Council
MWF	Mahinerangi Wind Farm
OBL	Obligate wetland species, i.e., almost always a hydrophyte, rarely found in non-wetlands
TWP	Tararua Wind Power Limited

1.0 Introduction

Tararua Wind Power Limited ("TWP"), a fully owned subsidiary of Mercury NZ Limited, is progressing Stage 2 of the Mahinerangi Wind Farm which is to be known as "Puke Kapo Hau" ("the Project", "Puke Kapo Hau" or "MWF Stage 2").

The MWF Site is located on the eastern foothills of Lammermoor Range, situated approximately 5 km north of Lake Mahinerangi and approximately 50 km west of Dunedin.

Variation to Land Use Consent RM1409 Condition 30 and proposed Condition 30A require the following:

Management of *Carex tenuiculmis* and *Epilobium chionanthum*

30. *The Consent holder shall ensure that the construction of the Puke Kapo Hau Mahinerangi Wind Farm Stage 2 is undertaken in accordance with the requirements of the certified Carex tenuiculmis and Epilobium chionanthum Management Plan (C&EMP) prepared by SLR Consulting New Zealand that forms Part C of the Puke Kapo Hau Mahinerangi Wind Farm Stage 2 – Fast-Track Approvals Act Application … in accordance with the following conditions:*

    i) Prior to construction, the Consent Holder shall undertake a survey to determine whether Carex tenuiculmis *and* Epilobium chionanthum *are present within specific wetland locations identified in the C&EMP that could potentially be affected by construction activities.*

    ii) If the survey undertaken in accordance with Condition 30A i) above determines that Carex tenuiculmis *and* Epilobium chionanthum *are present within affected wetlands, then the Consent Holder shall develop a pre and post construction works monitoring programme that includes;*

    - *Assessing the habitat within which the species is present;*
    - *Protecting existing habitat of At Risk species in the Wetland Compensation Site;*
    - *Collecting seed and propagating seedlings;*
    - *Translocating the At Risk individuals to selected locations either within the 'Scrappy Pines Block' or the 'Wetland Compensation Site';*
    - *Planting additional seed raised individuals at locations either within the 'Scrappy Pines Block' or the 'Wetland Compensation Site'; and*
    - *Bi-annual monitoring of new populations to ensure that the plants have successfully established.*

30A *All management actions shall be recorded and reports submitted to the Clutha District Council following the Pre-Construction Survey. Reports should include (as relevant):*

    i) Dates of all site visits.

    ii) Location, number, and condition of plants in wetlands directly affected by works (prior to works).

    iii) Number of plants removed from each directly affected wetland and transplanted.

    iv) Location of translocation sites.

    v) Location of planting sites for propagated plants.

vi) Number of plants planted and planting locations.

2.0 Objectives

The purpose of this *Carex tenuiculmis* and *Epilobium chionanthum* Management Plan (the 'Plan') is to minimise actual or potential adverse effects on *Carex tenuiculmis* and *Epilobium chionanthum* (classified as At-Risk plant species) in specific locations where these species could potentially be affected by construction activities.

This Plan is an update of the plan prepared for Stage 1 of the consented wind farm (Golder Associates 2010) and will apply to the development of Stage 2 of the wind farm and the transmission line.

3.0 *Carex tenuiculmis*

3.1 Ecology

Carex tenuiculmis is a sedge of lowland to montane slow-flowing stream sides, lake margins, tarns, ponds and associated wetland vegetation. This species usually grows in association with other carices and does not like tall vegetation. It flowers November–December and fruits January–May (de Lange 2025a). It is an obligate wetland species (OBL) i.e., almost always a hydrophyte, rarely found in non-wetlands.

Carex tenuiculmis is a naturally sparse species which has declined in numbers due to drainage of wetlands, vegetation clearance, agricultural development, competition from introduced species and damage from animal browse and trampling (Heenan *et al*. 1997). *Carex tenuiculmis* has a national threat classification of At Risk - Declining (de Lange *et al*. 2023) and a regional threat classification of Regionally Endangered (Jarvie *et al*. 2024).

3.2 Location of Populations in and Near the Wind Farm Site

Carex tenuiculmis is present in wetlands between P5 and PCorner along the Transmission Line Corridor (SLR 2025 - see Figure 1, Photo 1). Populations in this area will not be affected by the proposed works.

Carex tenuiculmis was also tentatively recorded within the Wind Farm Site, although the number of records and their location(s) are not provided (Kingett Mitchell 2011). This species was not recorded within the Wind Farm Site during the 2004-2005 surveys.

Carex tenuiculmis has also been recorded in the nearby Lammermoor Range (Heenan *et al*. 1997) and in wetlands near Lake Mahinerangi (SR, pers. obs).

4.0 Marsh Willowherb (*Epilobium chionanthum*)

4.1 Ecology

Marsh willowherb is a perennial herb (Photo 2). Compared to other *Epilobium* species, it has large flowers and hairless, dull green leaves with tiny teeth. It is found in swamps and wet swards of grasses or sedges, beside lakes or rivers, and in bogs, mostly below 900m a.s.l. It flowers October – March and fruits November – April (de Lange 2025b). It is an obligate wetland species (OBL) i.e. almost always a hydrophyte, rarely found in non-wetlands.

Marsh willowherb is threatened by wetland drainage and the spread of invasive weeds (de Lange 2025b). This species has a national threat classification of At Risk - Declining (de Lange *et al*. 2023) and a regional threat classification of Regionally Vulnerable (Jarvie *et al*. 2024).

4.2 Location of Populations in the Wind Farm Site

Marsh willowherb was recorded southwest of turbines 11 and 17 in wetlands 31 and 44 (wetland delineation plots 13 and 25) within the Wind Farm Site (SLR 2025; see Figure 2). This species may be present elsewhere in the Wind Farm Site, as *Epilobium* species with similar vegetative features were observed outside the flowering period in several other wetlands.

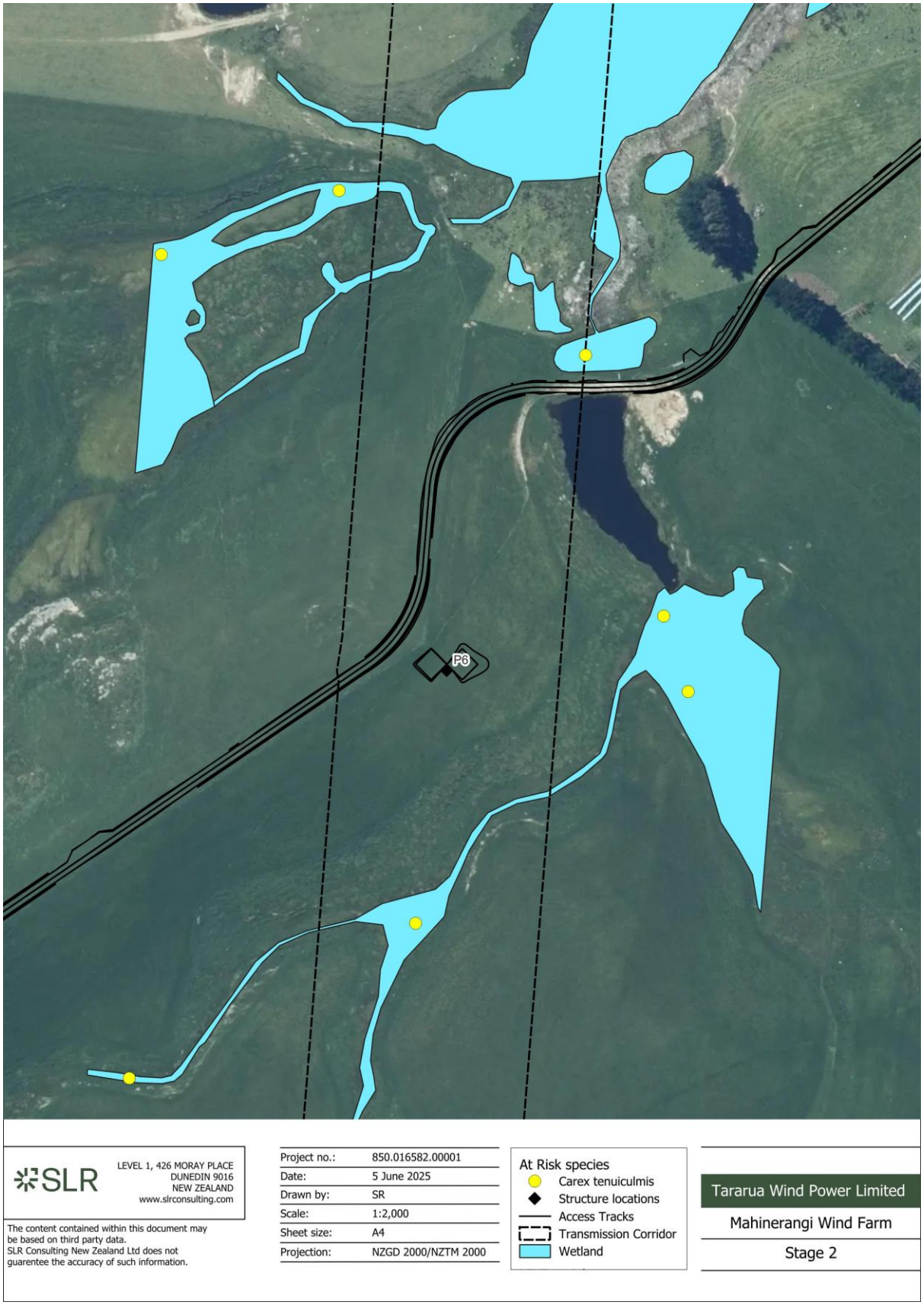

Figure 1: Location of *Carex tenuiculmis* along the Transmission Line Corridor.

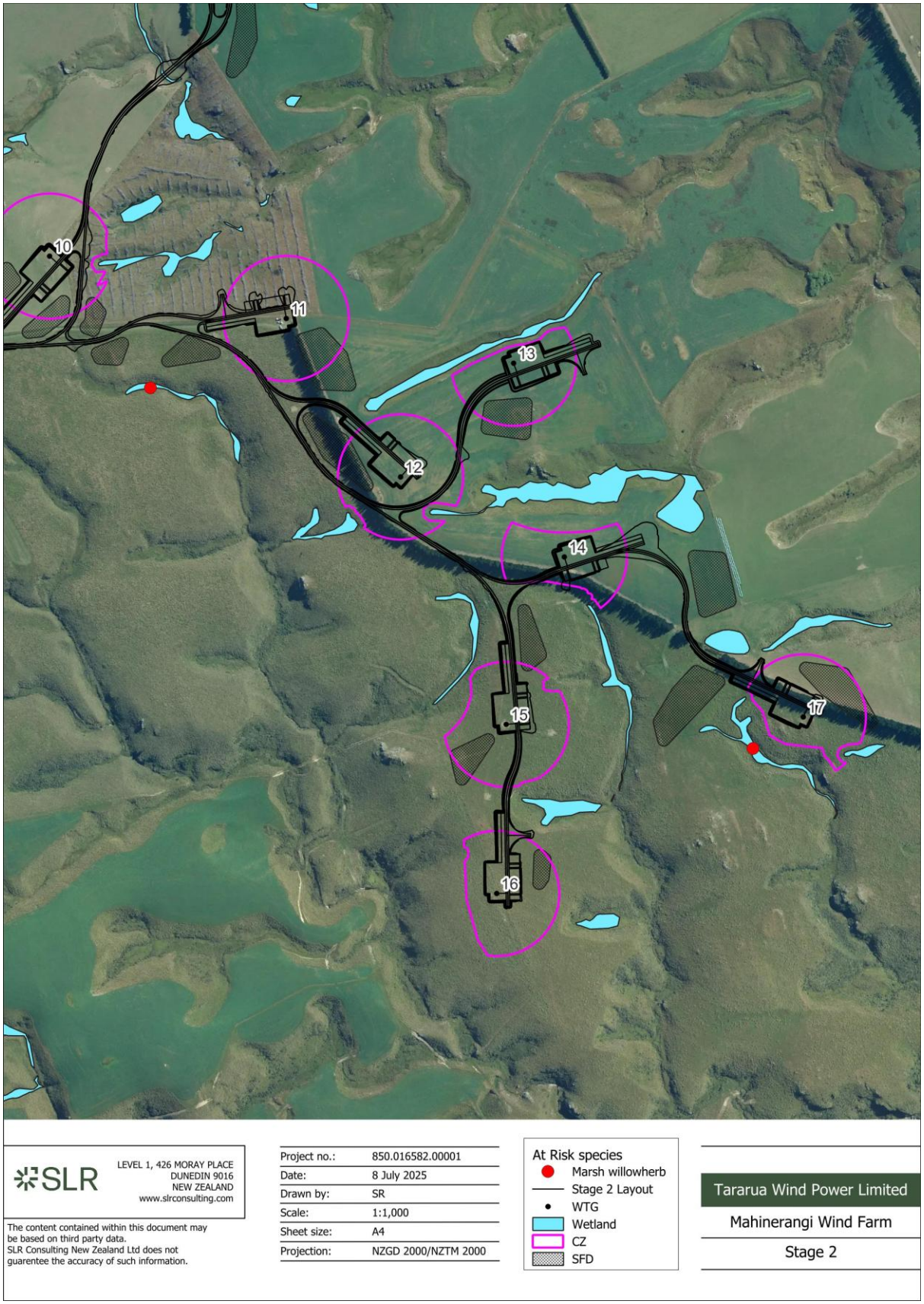

Figure 2: Sites where marsh willowherb has been recorded in the Wind Farm Site.

Photo 1: ***Carex tenuiculmis*** **(reddish foliage) in a wetland south of P6 in the Transmission Line Corridor. Inset shows inflorescence.**

Photo 2: Marsh willowherb from wetland delineation plot 13 (29 January 2025).

5.0 Potential Effects on At Risk Plant Species

5.1 Direct Effects

There are no known populations of *Carex tenuiculmis* in wetlands within the Wind Farm Site or Transmission Line Corridor that will be directly affected by construction works or operation of the wind farm. However, *Carex tenuiculmis* has been previously tentatively identified within the Wind Farm Site and therefore could be present in the two directly affected wetlands. The population located adjacent to the Transmission Line Corridor access track which passes over a pond bund (Photo 2) will not be directly affected, as there is an existing track and no changes are proposed to this crossing.

Marsh willowherb has not been recorded in the two wetlands that will be directly affected by works within the Wind Farm Site but may be present because similar but non-flowering willowherbs which could not be identified to species were observed throughout the Wind Farm Site.

In the two wetlands that will be directly affected by works within the Wind Farm Site, a pre-construction survey followed by any necessary management actions (Translocation, Propagation, Monitoring), as detailed below, will address any adverse effects on At Risk species.

5.2 Indirect Effects

With the exception of two locations discussed in 5.1, the Stage 2 wind farm layout - including turbine hardstands, Contingency Zones, access tracks, site infrastructure, and spoil deposition areas - has been designed to avoid physical disturbance on wetlands and provide a minimum buffer distance of 10 m from wetlands. There are no physical disturbance impacts on wetlands within the Transmission Line Corridor.

Carex tenuiculmis and marsh willowherb populations could be indirectly affected by changes to wetland hydrology which could dry out the wetland and therefore reduce available habitat for this obligate wetland species.

Management actions identified within the Wetland Monitoring and Management Plan (SLR 2025b) that avoid indirect effects of works on wetlands within the Wind Farm Site will also protect At Risk plant species by protecting their habitat. These include:

- Not blocking waterways and runoff.
- Minimising the length of new flow paths.
- Directing all flows that would have originally flowed into a gully into the same gully.
- Locating and contouring fill disposal sites to conserve catchment areas; and
- Including appropriate armouring of drains and areas downstream of culvert outlets to help reduce the effects of any increased flow velocity.

6.0 Monitoring and Management of *Carex tenuiculmis* in the Wind Farm Site

See the flow chart in Appendix A for a summary of monitoring and management actions for *Carex tenuiculmis*.

6.1 Pre- and Post-Works Monitoring

Pre-works

Prior to any construction, the two locations within the wind farm development area where physical disturbance of a wetland cannot be avoided will be surveyed for the presence of *Carex tenuiculmis* (and any other Threatened or At Risk plant species). Surveys will extend 100 m upstream or downstream of proposed earthworks at these sites.

A survey will also be undertaken of the one site adjacent to access tracks on the Transmission Corridor where *Carex tenuiculmis* is present.

Surveys will be taken during the summer months when fruits, which allow easier identification, are present.

At the two wetlands that cannot be avoided by works, the GPS locations and condition of all *Carex tenuiculmis* plants and their habitat will be recorded. Pre- and post-construction photographs of the plants and their wetland habitat will also be taken from the same position.

If plants are found within the earthworks footprint, then they will be translocated to an appropriate site and monitored, as outlined below.

If no plants are found at either site, no further management of *Carex tenuiculmis* is required at that site.

At the Transmission Corridor site, two 2 × 2 m plots will be established alongside the access track in wetland habitat containing *Carex tenuiculmis* and marked with pegs. The plots will be photographed, *Carex tenuiculmis* plants will be counted, and an assessment of the condition of in the plants undertaken.

Post-works

At the two wetlands that cannot be avoided by works, if plants are found upstream or downstream of wetlands directly affected by works, a post-works[1] survey will be undertaken a minimum of 6 months post-works to determine the condition of plants and the presence of new plants. At the Transmission Corridor site, a post-works survey will also be undertaken a minimum of 6 months following completion of works. The post-works surveys are to follow the same methods used in the pre-works survey.

If plants are no longer present or dead, then double the number of plants will be propagated and planted out at suitable sites and monitored (see below). If plants appear stressed or are in poor condition, a second post-construction survey will be undertaken after one year.

If plants have died, but there are new seedlings that have been recruited into the population during the construction period, then the population at this site will be considered healthy and intact.

[1] All construction activity, including stabilisation of earthworks with vegetation, has ceased at the site.

6.2 Translocation and Propagation

Translocation and Planting Sites

Two areas are available as long-term translocation and planting sites for *Carex tenuiculmis* due to the absence of grazing farm stock and other land use effects: the QEII Covenant and the Wetland Compensation Site established as mitigation for adverse effects on wetlands (see Wetland and Aquatic Compensation Plan, SLR 2025a). Gully wetlands within these areas will be assessed to determine the presence of suitable habitat for *Carex tenuiculmis* translocation and planting e.g. the presence of other obligate wetland species and unshaded habitat. Details on habitat suitability will be recorded. Suitable translocation sites will be recorded on a GPS.

Translocation Guidelines

Prior to construction, any *Carex tenuiculmis* plants directly affected by construction will be removed with sufficient soil to retain the root ball and immediately translocated to a site or sites that have been identified as suitable habitat for *Carex tenuiculmis*.

Propagation

Carex tenuiculmis is easily grown from fresh seed and by dividing established plants (de Lange 2025). Seed should be collected from populations within the Transmission Line Corridor in summer and sown in seed raising mix. If not grown on site, plants will need to be hardened off on site to allow plants to adjust to local conditions.

Monitoring

Planted and translocated *Carex tenuiculmis* will be monitored biannually following planting and translocation until the closure criteria are met. Monitoring will comprise an assessment of plant condition/survival (0-dead, 2-poor, 3-moderate, 4-good, 5-excellent) with a descriptor of the reason for the score.

An assessment of any other management to ensure plant survival will also be undertaken, such as weed management. Dead plants will be replaced.

7.0 Management of Marsh Willowherb

The same pre- and post-works surveys undertaken for *Carex tenuiculmis* will be undertaken for marsh willowherb. However, this species cannot be transplanted as it is unlikely to survive. Instead, if any plants are found in wetlands directly affected by works, then double the number of plants will be propagated and planted out at suitably protected sites. This builds some redundancy into the planting in case this species is difficult to establish. Monitoring of planted plants will follow that for *Carex tenuiculmis*. Marsh willowherb is easily propagated from fresh seed and cuttings (de Lange 2025b).

8.0 Closure Criteria

If At Risk plant species are found in the directly affected wetland area, then the closure criterion is:

- Transplanted or propagated plants are alive and in good condition two years following planting.

If At Risk plant species are found outside the directly affected wetland area but within 100 m of this area, then the closure criterion is:

- Monitored plants are alive and in good condition a minimum of 6 months following completion of works at the site.

If the Transmission Line Corridor population of *Carex tenuiculmis* shows evidence of change attributed to works, then the closure criterion is:

- Propagated plants are alive and in good condition two years following planting.

If these criteria are met, then the management for At Risk plant species will be considered complete.

9.0 Reporting

All management actions should be recorded and reports submitted to CDC following the Pre-Construction Survey, following the Post-Construction Survey or a change in translocation or planting sites.

Reports should include, where relevant:

- Dates of all site visits.
- Location, number, and condition of plants in wetlands directly affected by works (prior to works).
- Number of plants removed from each directly affected wetland and transplanted.
- Location of translocation sites.
- Location of planting sites for propagated plants.
- Number of plants planted and planting locations.
- Monitoring of success of translocations and planting (location, number, and condition of plants).
- Management recommendations.

10.0 Management Plan Review

This Plan should be reviewed on an annual basis until the closure criteria are met. The review should consider survivorship of translocated and propagated plants or any other issues identified through monitoring and reporting. For example, if propagated plants do not establish after two years, then this might suggest that conditions no longer suit them and that future recruitment would be unlikely. In that case, a better location may be found for planting. Proposed changes to this Plan should be submitted to CDC for approval/certification.

11.0 References

de Lange, P.J. 2025a. *Carex tenuiculmis* Fact Sheet (content continuously updated). New Zealand Plant Conservation Network. https://www.nzpcn.org.nz/flora/species/carex-tenuiculmis/ (12 May 2025).

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12.0 Closure

Sincerely,

SLR Consulting New Zealand

[redacted]

Steve Rate
Senior Ecologist

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Hamish Dean
Principal Ecologist

Appendix A Management Flow Chart for *Carex tenuiculmis*

Carex tenuiculmis and *Epilobium chionanthum* Management Plan

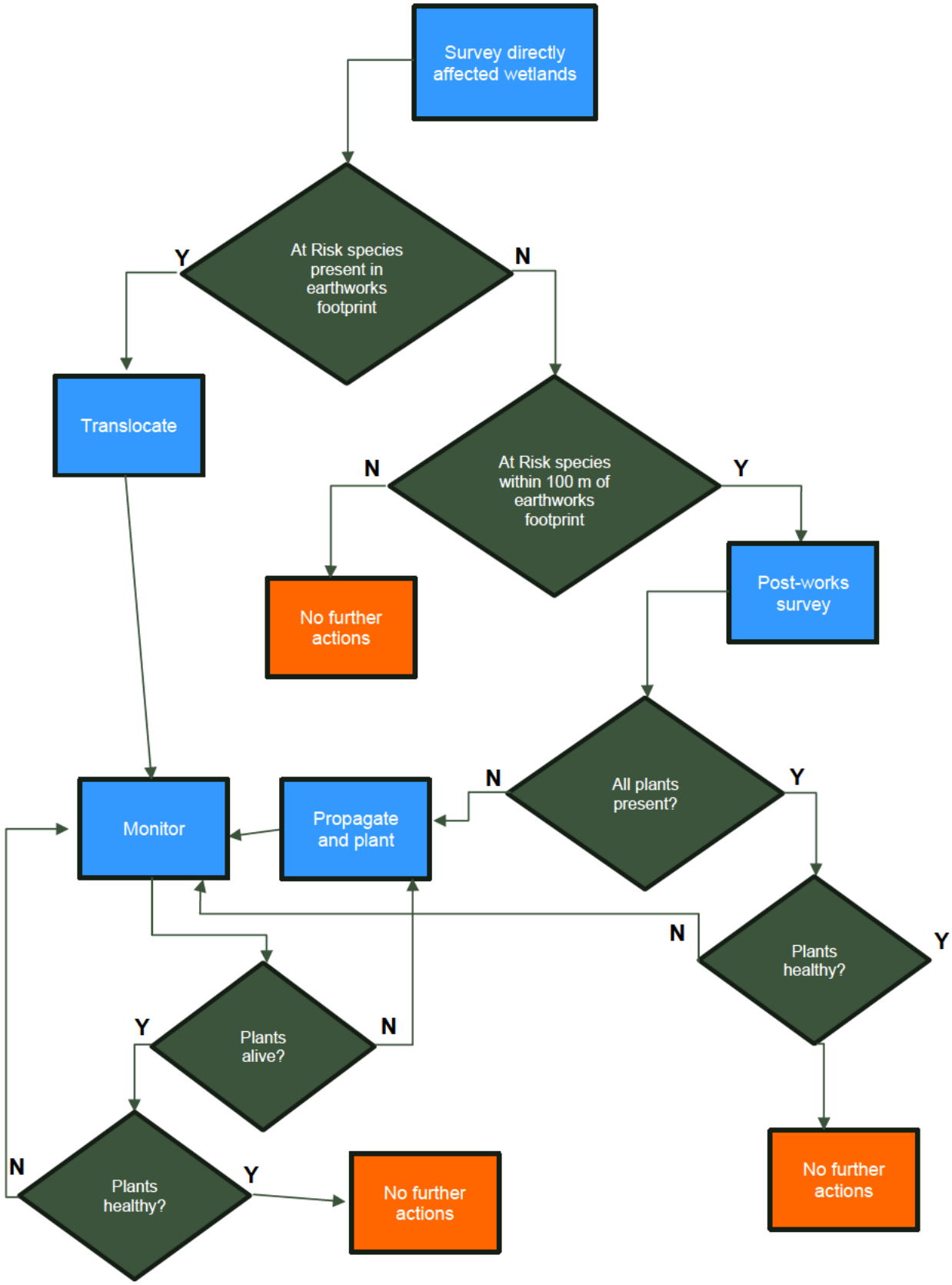
Mahinerangi Wind Farm Stage 2

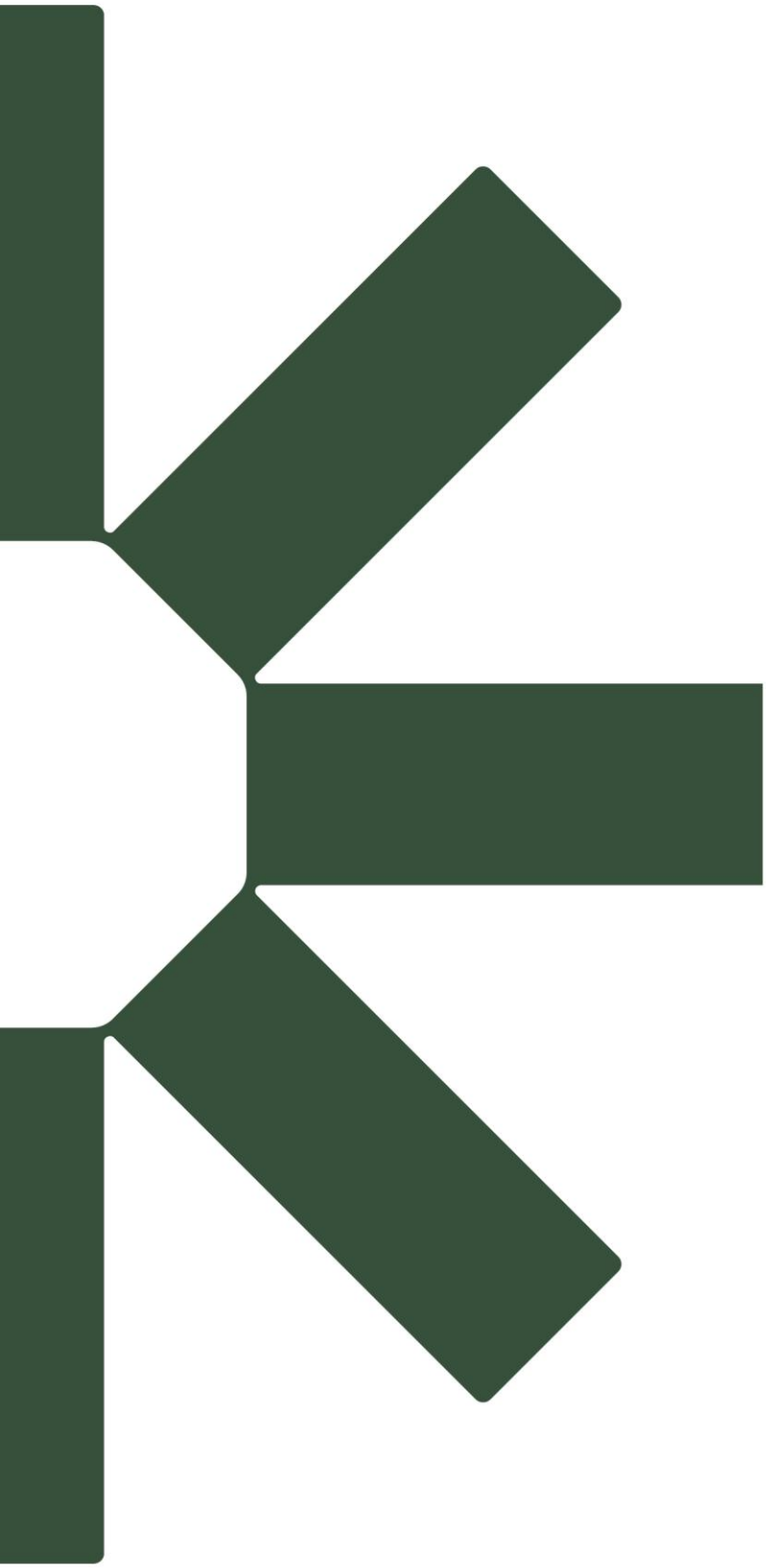
Tararua Wind Power Limited

SLR Project No.: 810.031205.00001

6 October 2025

Wind Farm Site





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