Appendix H Ecological Impact Assessment

Fast-Track Approvals Act 2024 Substantive Application

Hinuera Solar Farm

Harmony Energy NZ #6 Limited

SLR Project No.: 880.016894.00001

19 August 2026

Ecological Impact Assessment

Harmony Hinuera Solar Farm

Harmony Energy NZ #6 Limited

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Auckland

Prepared by:

SLR Consulting New Zealand

SLR Project No.: 880.016894.00001

Client Reference No.: 4S.003116

23 June 2026

Revision: 1.1.

Revision Record

Revision	Date	Prepared By	Checked By	Authorised By
1.0	22 May 2026	Andrew Briggs	Kelly Hayhurst	Keren Bennett
1.1	12 June 2026	Andrew Briggs	Hamish Dean / Keren Bennett	Hamish Dean

Basis of Report

This report has been prepared by SLR Consulting New Zealand (SLR) with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with Harmony Energy NZ #6 Limited (the Client). Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid.

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Statement of Qualifications and Experience

Andrew Briggs – Associate Ecologist, SLR Consulting

I am an Associate Ecologist at SLR Consulting Limited (SLR). SLR is a global environmental and advisory consultancy specialising in sustainability and climate change strategy, planning, environmental management and impact assessment and waste management and remediation. I have been employed at SLR since October 2022.

I hold the qualification of Master of Science: Conservation Ecology from the University of Stellenbosch (2016). I have been a member of the Certified Environmental Practitioner Scheme since September 2023.

I have over ten years of ecological assessment experience, across South Africa and New Zealand. My experience includes completing wetland, aquatic, terrestrial and faunal ecological assessments and management plans for a variety of proposed infrastructural and environmental monitoring projects.

Recent projects I have worked on include the Ōpunake, Marton and Carterton solar farms which were approved under the Covid-19 Recovery (Fast-track Consenting) Act 2020.

I confirm that, in my capacity as author of this report, I have read and abide by the Environment Court of New Zealand Practice Note 2023, and in particular section 9 the Code of Conduct for Expert Witnesses.

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Acronyms and Abbreviations

ACOs	Artificial Cover Objects
ABM	Automatic Bat Monitors
BRP	Bat Roost Protocols
dB	Decibel
DOC	Department of Conservation
ED	Ecological District
EcIA	Ecological Impact Assessment
EIANZ	Environment Institute of Australia and New Zealand
eDNA	Environmental DNA
FAC	Facultative plants
FACU	Facultative upland plants
FACW	Facultative wetland plants
LENZ	Land Environments New Zealand
MfE	Ministry for the Environment
NPS-FM	National Policy Statement for Freshwater Management (Amended 2025)
NZFFD	New Zealand Freshwater Fish Database
NZPCN	New Zealand Plant Conservation Network
OBL	Obligate wetland plants
SPL	Sound Pressure Level
L_{Aeq}	The 'A' weighted equivalent noise level. It is defined as the steady sound level that contains the same amount of acoustical energy as the corresponding time-varying sound.
TEC	Threatened Environment Classification
VRP	Vegetation Removal Protocols
WRC	Waikato Regional Council
WRPMP	Waikato Regional Pest Management Plan

1.0 Introduction

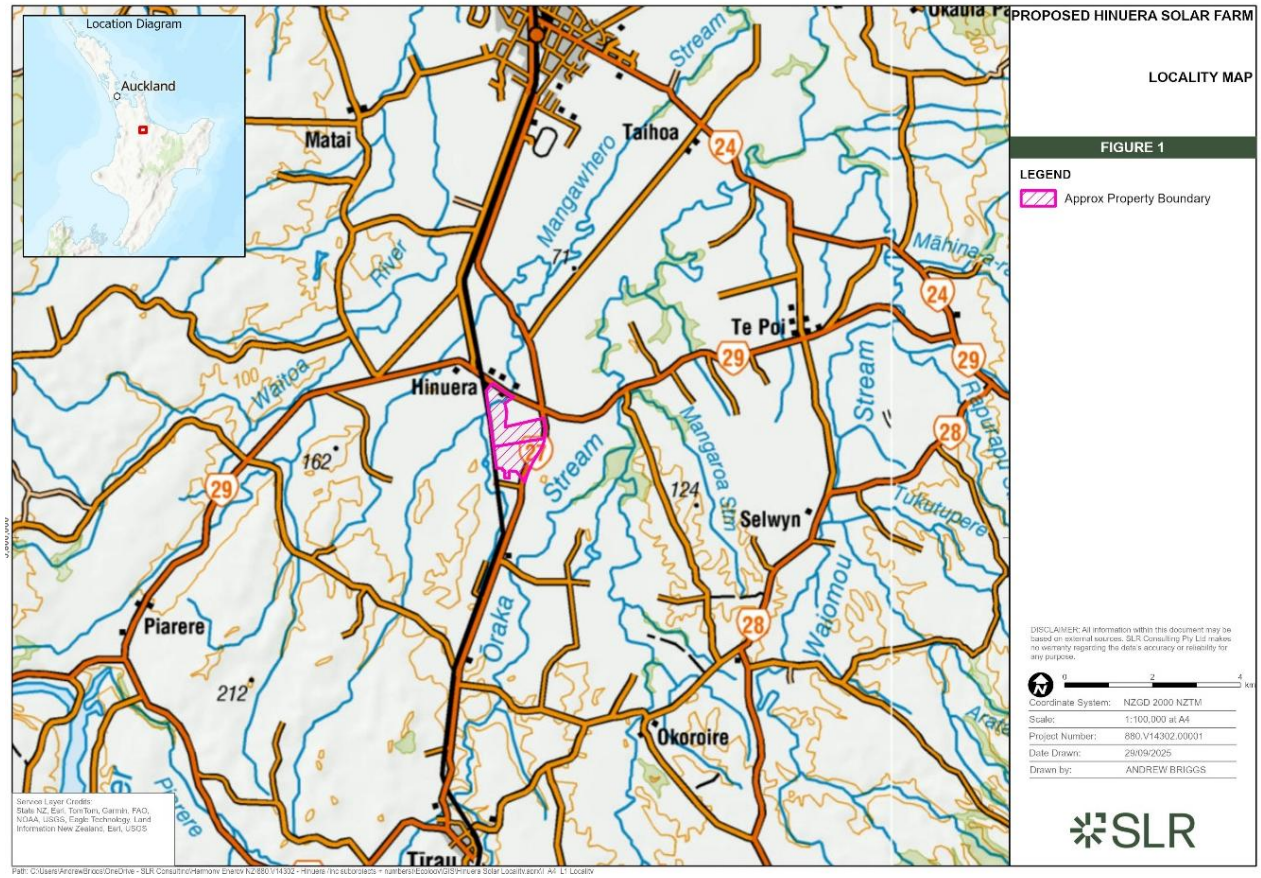
1.1 Background

Harmony Energy NZ #6 Limited is proposing the development of a ~70MW AC/100MW DC solar farm ('the site') at the corner of State Highway 29 and State Highway 27 near Hinuera, within the Matamata – Piako District. A map showing the locality of the site is provided in Figure 1, below.

The solar farm infrastructure is to be located within an existing agricultural operation where the majority of landcover is pasture for livestock grazing. The proposed solar farm will comprise solar panel arrays, underground cabling, internal roading, inverter stations, battery stations, a switch station, operational buildings and perimeter fencing.

Existing farm races are proposed to be used for access roads as far as possible, however, earthworks are required for the installation of necessary infrastructure including required stations and substations, additional internal roading, posts / poles to support the solar panels as well as trenching for underground cabling.

Figure 1: Locality map for the proposed solar farm.



1.2 Report purpose

The purpose of this report is to provide an assessment of ecological effects to support the resource consent application to establish a solar farm at the site. The ecological assessment relates to the construction, operation and decommissioning of a solar farm.

Key features and habitat values of vegetation and fauna were identified, and an assessment of ecological effects was undertaken to assess the potential effects pertaining to the construction,

operation and decommissioning of the proposed solar farm. The proposed design for the solar farm is located in Appendix A.

1.3 Site description and ecological context

The properties earmarked for the solar farm are Lot 1 DPS 83767, Section 1 Block X Tapapa SD, Lot 2 DPS 83767, Part Lot 1 DP 11891, Part Lot 2 DP 11891, Part Lot 3 DP 11891 and Lot 2 DP 473263, wherein a total area of approximately 134 ha will be used for the placement of required infrastructure. The site is primarily set in exotic pasture along with maize fields, intermittent hedgerows and standalone exotic trees. The site drains in a general northerly direction, at a gradient of less than 1%, via a series of streams and drains.

The site is situated within the Hinuera Ecological District (ED), the Matamata-Piako District, and the Waikato Region. Vegetation cover within the ED is currently dominated by pasture used for dairy farming. Historically the area would have comprised a mosaic of fernland and swampland with intermittent patches of native forest. The ED experiences warm humid summers and cool winters with an annual rainfall of between 1000-1400 mm, which falls primarily in winter (McEwan, 1987).

Soils on the river flats within the ED comprise poorly drained gleyed soils, often with layers of peat and strongly affected by waterlogging. Soils on rolling and hilly landscapes comprise well drained, friable rhyolitic ash soils. Additional soil types within the ED include peat (on the periphery of peat bogs) and brown granular clays (on andesitic cones near Morrinsville) (McEwan, 1987).

2.0 Methodology

2.1 Desktop assessment

Prior to the site visit a desktop assessment of the site was undertaken. The review of relevant background literature and databases conducted to understand the ecological values within the site and surrounding areas included:

- Relevant planning maps for the Matamata-Piako District and Waikato Region;
- Threatened Environment Classification (TEC) version 2012 (Cieraad et al. 2015);
- S-Map online administered by Landcare Research (S-Map, 2023);
- NZ Herpetofauna Atlas database published by Department of Conservation (DOC);
- iNaturalist;
- NZ Bird Atlas;
- DOC bat Database (DOC, 2023); and
- NZ Plant Conservation Network (NZPCN) plant distribution database.

Any potentially threatened species found would be recorded and their threat status checked against the relevant national threatened species classification lists[1]

2.2 GIS mapping

The proposed project area was mapped using ArcGIS Pro. Within the proposed development area, existing vegetation, wetlands, streams and drains were mapped onto aerial imagery to

[1] O'Donnell et al. 2023 (bats); de Lange et al. 2023 (vascular plants); Robertson et al. 2021 (birds); Dunn *et al*. 2025 (freshwater fish) and Hitchmough et al. 2026, (lizards).

allow for quantification of the areas to be impacted by the solar panel installation and construction of associated infrastructure.

2.3 Site survey

Following a preliminary desktop assessment, the terrestrial and aquatic habitat characteristics of the site and proximal surrounding area were assessed during a site visit on the 13th,15th and 21st June 2023.

2.3.1 Limitations to this report

We presume no fundamental changes to land-use have taken place on the properties since the initial site assessment and therefore features identified in 2023 should still be present. A follow-up bat presence / absence survey was undertaken at the site over October and November 2025.

2.3.2 Terrestrial habitats

During the site visit, both native and exotic plant communities were recorded, and a qualitative assessment of on-site vegetation habitats was conducted. The assessment focused on the botanical and ecological value of identified plant communities. Areas with potential for restoration (i.e., modified or low-value vegetation areas that could be enhanced through indigenous planting or natural regeneration) were also identified.

2.3.3 Wetlands

Potential wetland features of the site were initially assessed by a review of aerial imagery. These features were then assessed on the ground using the wetland delineation protocols developed by the Ministry for the Environment (MfE, 2022a) to support the National Policy Statement for Freshwater Management (NPS-FM, 2020). The wetland assessments were completed under 'normal circumstances', with generally fair-weather conditions during the assessment period (MfE, 2022a).

During the site assessment, wetlands were primarily identified and delineated using the 'Rapid Test[2]'. Five vegetation plots were also established in pasture areas where the dominant species were not clearly facultative wetland species (FACW) or obligate wetland species (OBL) to determine whether these areas met the definition of a natural wetland under the NPS-FM. Vegetation and cover were recorded per stratum within the plots, whilst soil sampling (with reference to Fraser et al. 2018) was undertaken as an additional measure where marginal results were recorded for the wetland indicator status tests (Dominance Test and Prevalence Test; Clarkson, 2014).

In many cases, the Pasture Exclusion Assessment Methodology was applied to areas potentially meeting the definition for a natural inland wetland (MfE 2022b). These potential wetland areas, within actively grazed pasture, often comprised mud, cattle pugging and a mix of pasture and wetland grasses (e.g. *Glyceria* species). These areas were, however, excluded as wetland habitat in terms of the wetland delineation protocols developed by the MfE as they meet the pasture exclusion criteria (i.e. greater than 50% pasture grass cover).

In some cases, nationally listed pasture species comprised more than 50% cover within vegetation plots located in potential wetlands outside of actively grazed pasture (e.g. within fenced forestry blocks). As these areas were not actively managed as pasture, the pasture exclusion criteria were not considered applicable. In these instances, greater weight was placed

[2] The vegetation Rapid Test is a quick visual check that classifies vegetation as hydrophytic (wetland) where all dominant plant species are obligate wetland (OBL) or facultative wetland (FACW) species. (MfE,2022a)

on plant wetland indicator status and the presence of hydric soils to determine the areas definition. Representative photographs and basic plot data is included in Appendix B.

2.3.4 Aquatic habitats

Qualitative instream and riparian assessments were undertaken where characteristics of freshwater habitats, such as descriptions of watercourses and vegetation, were recorded during the site visit.

Assessment of watercourse habitat values was conducted along a representative 50 m survey reach within the downstream extent of the stream on site. A Rapid Habitat Assessment as per the National Rapid Habitat Assessment Protocols was carried out for the survey reach (Clapcott, 2015). Nine habitat parameters were scored from 0 (poor) to 10 (optimal). This was then used to characterise the overall quality of each survey reach.

The depth and level of flow within the Mangawhero Stream prevented a macroinvertebrate sample from being obtained safely on the days of assessment. Given the nature of the proposed development, no direct impacts are expected on instream fauna. An Environmental DNA (eDNA) sample was, however, obtained from the stream at the northern extent of the site (see Figure 2, below).

eDNA assessments survey cellular material of species that are dispersed into the environment and include genetic information from cells such as larvae, urine, scales and exoskeletons (David *et al*. 2021). For this survey, six replicate water samples were collected from the stream on the 21st June 2023. Replicate sampling involved a 50 mL syringe with a 1.2 µm cellulose acetate encapsulated syringe filter. Water samples were repeatedly pushed through the filter until the filter was saturated with material, and no additional water could be pushed through. The sample was then preserved by transferring the filter to a 3ml syringe containing a DNA/RNA preservative. All equipment used was sterile, and samples were taken using sterile nitrile gloves.

The approximate location of the stream assessment is shown in Figure 2, below.

2.3.5 Terrestrial fauna

2.3.5.1 Birds

Alongside a desktop review of online databases such as iNaturalist (2023) and eBird (2023), all birds seen and heard during the site visit were recorded.

2.3.5.2 Lizards

The site was assessed for lizard habitat suitability as part of the field survey. Manual non-destructive habitat surveys for individuals were conducted by searching any suitable lizard habitats, including refugia such as deadwood, rocks, wood stockpiles and leaf litter in conjunction with the installation and retrieval of artificial cover objects (ACOs). ACOs were installed on site on 13th June 2023 and surveyed in spring. A total of four double-layered ACOs were installed in various habitat types considered suitable for native lizards, including exotic tree stands and hedgerows. The ACOs were deployed for 104 days to settle in before being surveyed.

2.3.5.3 Bats

The site was assessed for bat habitat suitability as part of the field survey. A bioacoustics survey to detect the presence of New Zealand long-tailed bats (*Chalinolobus tuberculatus* – Threatened: Nationally Critical; O'Donnell et al., 2023) was undertaken between 21 June and 1 August 2023. Although bat activity is generally lower during winter, long-tailed bats may remain active throughout the year, and acoustic monitoring during this period can still detect their presence if bats are present within the survey area. For the winter survey, four Automatic Bat Monitors (ABM; AR4 model, manufactured by DOC) were deployed in tree habitat on site (see orange symbols in

Figure 2, below). To supplement the winter presence survey, an updated and more detailed survey was undertaken between 24th October to 11th November 2025 using 12 ABMs (see teal symbols in Figure 2, below).

All ABM recordings were analysed visually using AviaNZ Bioacoustic Analysis Software in accordance with protocols described by Lloyd (2017). All recorders were pre-programmed to start monitoring one hour before sunset until one hour after sunrise using the seasonal times (e.g. 18:00 pm – 07:00 am in winter and 19:00 pm – 09:00 am during summer surveys), to capture the period of expected bat activity. The minimum recording nights for long-tail bats is varied and can be as little as two consecutive nights with suitable weather, although a period of two weeks is preferred. The ABMs deployed at the site lasted up to 40 nights prior to the end of battery life.

Across the site, groups of trees (exotic or native) with a diameter at breast height (DBH) greater than 15 cm were assessed to confirm they are either high, moderate or low risk potential bat roost trees based on the presence of roost features such as flaky bark, cracks, crevices and holes[3].

2.4 Assessment of ecological effects

The assessment of ecological effects was informed by the Ecological Impact Assessment (EcIA) guidelines of the Environment Institute of Australia and New Zealand (Roper-Lindsay et al. 2018).

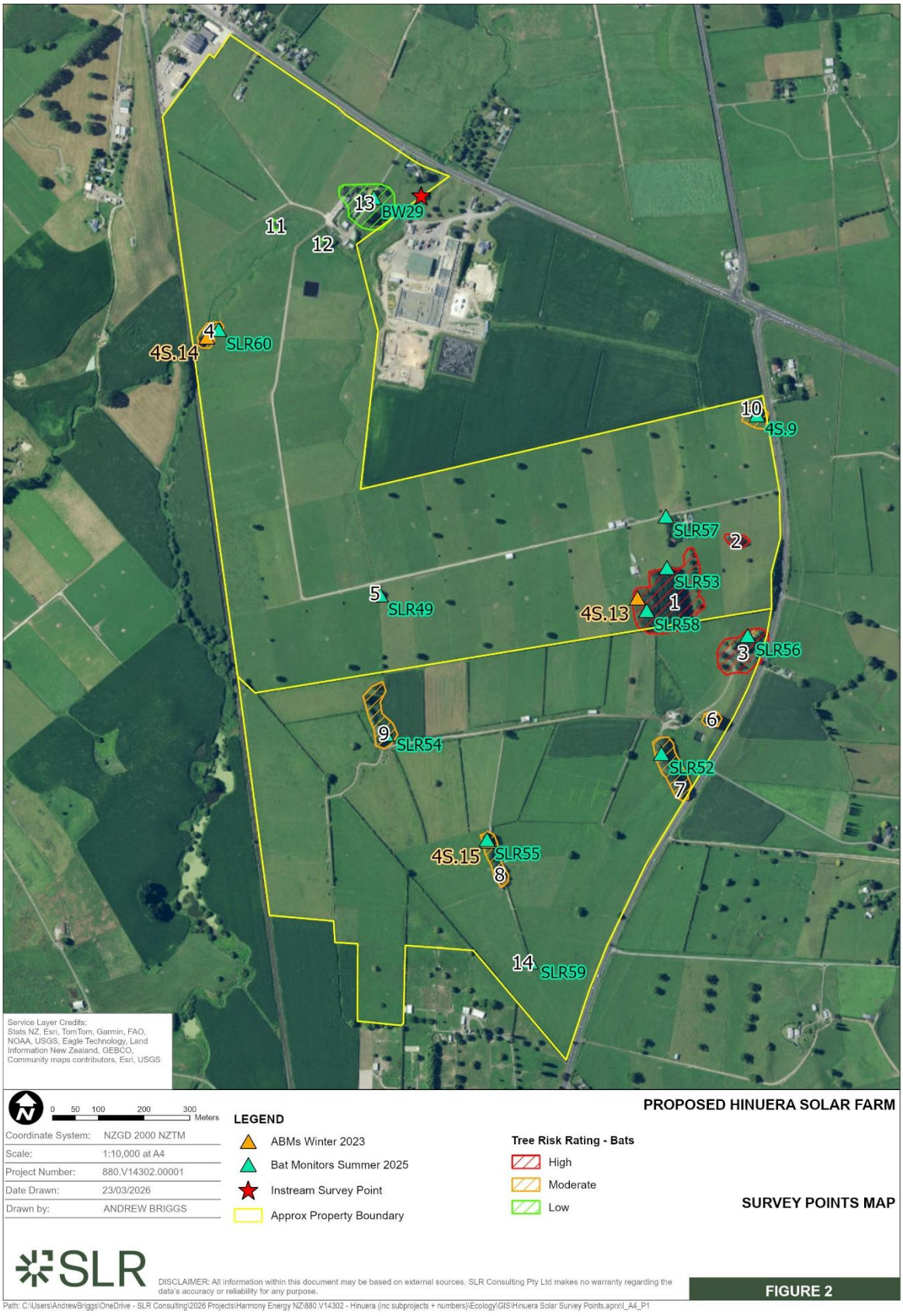
The following steps were used for this assessment:

- Ecological values are assigned a level on a scale of Low, Moderate, High or Very High based on assessing the values of species, communities and habitats identified against criteria set out in the EcIA guidelines.
- The magnitude of effect of the proposed works on ecological values is evaluated as either No Effect, Negligible, Low, Moderate, High, or Very High. The 'Magnitude of Effect' is based on:
    - The scale of the unmitigated effect per se (i.e. the proposed works, impacts on hydrology, impacts on wetland vegetation).
    - The proportion of habitat loss versus local availability.
    - The expected duration of effect (e.g. permanent versus temporary); and
    - The intensity of the effect (i.e. the extent to which habitat loss within the site is complete or partial).
- The overall level of effect in the absence of mitigating measures is determined using a matrix that is based on the ecological values and the magnitude of effects on these values in the absence of any efforts to avoid, remedy or mitigate for potential effects.

The overall level of effect is used to determine if mitigation is required. Effects assessed as 'Moderate' or greater warrant efforts to avoid, remedy and/or mitigate them.

[3] As per protocols for minimising the risk of felling occupied bat roosts (Bat Roost Protocols) (2024). Bat Recovery Group, step 2(b). https://www.doc.govt.nz/globalassets/documents/conservation/native-animals/bats/bat-recovery/protocols-minimising-risk-felling-occupied-bat-roosts.pdf

Figure 2: Bat monitor and instream survey sampling locations within the proposed solar farm.

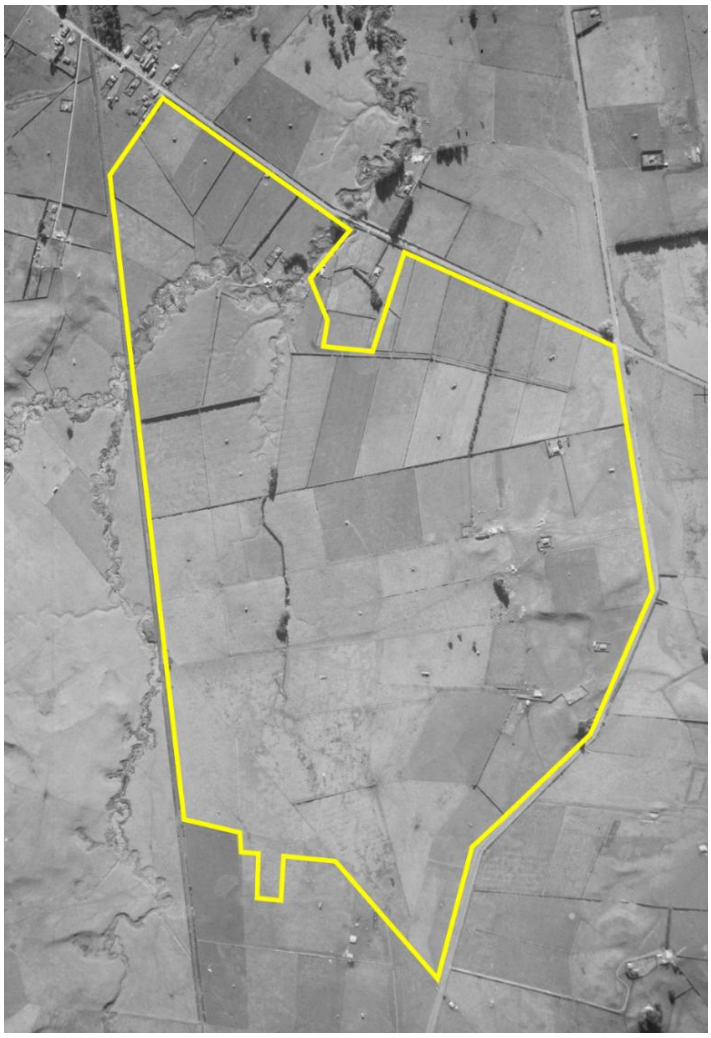


3.0 Results

3.1 Desktop Assessment

Based on aerial imagery, it appears that the site has been primarily under pasture since at least 1943 (see Figure 3, below). The site is within a general low gradient relief, sloping in a northerly direction, and is drained by the Mangawhero Stream.

Figure 3: Historical Imagery of the proposed solar farm site 13/06/1943 (Retrolens, 2023). Approximate site boundary is shown in yellow.

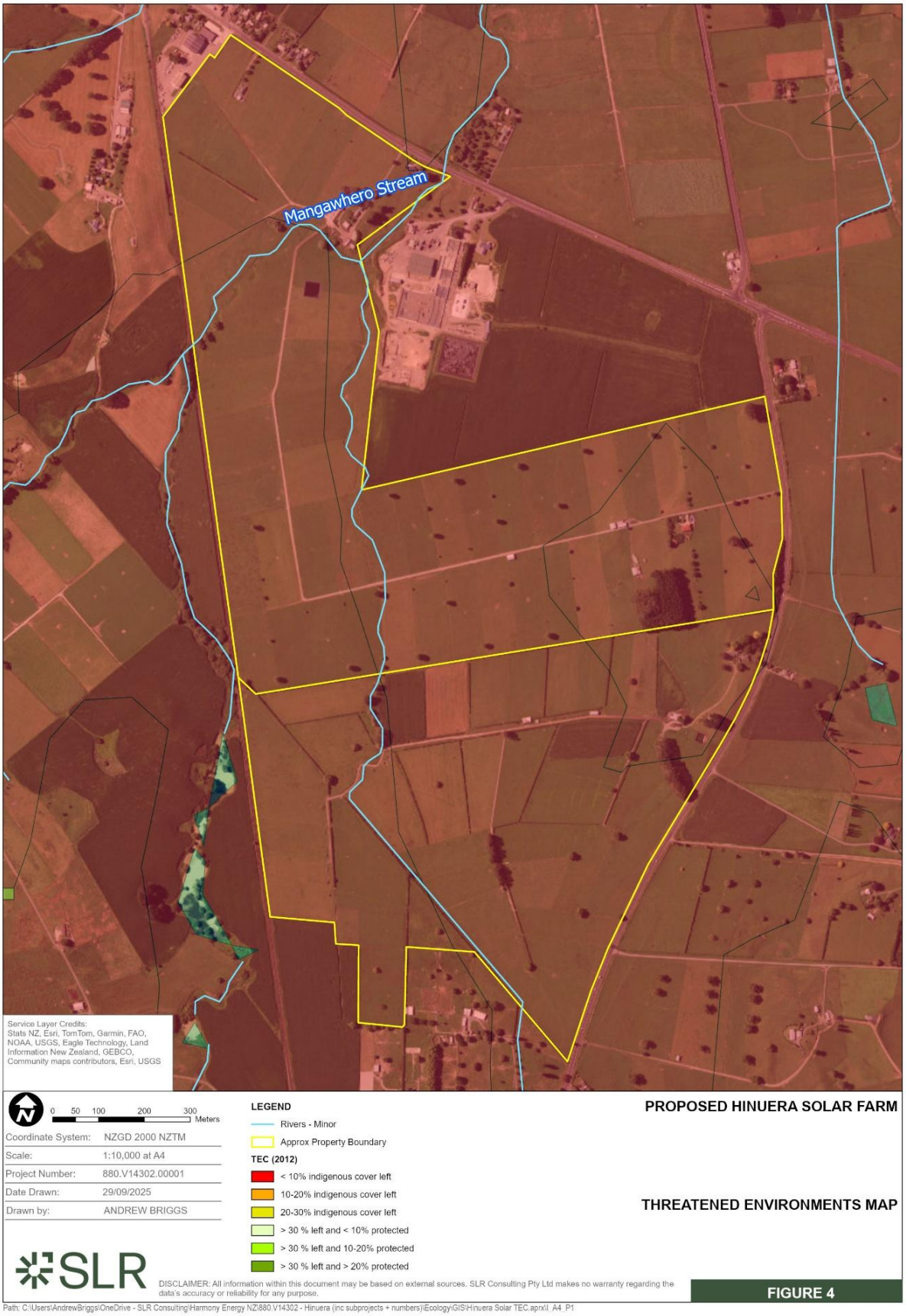


Land Environments New Zealand (LENZ) classifies the entirety of the site as the highest Threatened Environments Classification (TEC) category (<10% indigenous cover left; Figure 4). The TEC is a source of broad (i.e. national) scale background information: specifically, how much indigenous vegetation remains within land environments; its legal protection status; and how past vegetation loss and legal natural heritage protection are distributed across New Zealand's landscape.

TEC recognises that indigenous environments in this area have been severely reduced and have no formal protection. This aligns with observations onsite where the majority of native vegetation has been cleared for pastoral land use.

The potential vegetation of New Zealand dataset indicates that conditions on site would suit kahikatea-pukatea-tawa forest with comparatively smaller areas of rimu/tawa-kāmahi forest (Leathwick et al. 2004).

Figure 4: TEC map for the proposed solar farm.



3.2 Terrestrial habitat

3.2.1 General

Three primary vegetation types were identified on site, namely, exotic pasture grass cover, exotic tree shelterbelts / plantations, and exotic hedgerows.

Pasture grass was the dominant landcover on site which is expected given that the predominant land use within the properties is cattle grazing. Common pasture grasses observed within this vegetation type included rye grass (*Lolium* spp.), paspalum (*Paspalum dilatatum*) and cocksfoot (*Dactylis glomerata*). Common legumes included white clover (*Trifolium repens*) and plantain (*Plantago major*) whilst exotic herbaceous species within pasture included celery-leaved buttercup (*Ranunculus sceleratus*), creeping buttercup (*Ranunculus repens*), clustered dock (*Rumex conglomeratus*) and broad-leaved dock (*Rumex obtusifolius*).

Exotic tree shelterbelts were located intermittently within the greater study site, whilst smaller stands and sporadic individual trees were also present. A small stand of exotic trees (c. 1.12 ha) was identified in the site's eastern side. Dominant exotic tree cover on site included macrocarpa (*Hesperocyparis macrocarpa*), radiata pine (*Pinus radiata*), London plane (*Platanus acerifolia*) various gums (*Eucalyptus* spp.), various willows (*Salix* spp.), poplar (*Populus* spp.) and cedar (*Cedrus* spp.). A low abundance of the native cabbage tree (*Cordyline australis*) was located around Wetland W01 (see Appendix C for location).

Hedgerows located on the edges of certain paddocks within the study area were dominated by barberry (*Berberis glaucocarpa*), with an overall lower abundance of Japanese honeysuckle (*Lonicera japonica*), Chinese privet (*Ligustrum sinense*), English ivy (*Hedera helix*), blackberry (*Rubus fruticosus*), *Muehlenbeckia* spp. and smilax (*Asparagus asparagoides*).

Photos of the general terrestrial habitat on site are provided in Photo set 1, below, and the map showing the variable terrestrial habitat is shown in Figure 5. Note that an additional map showing the labels of each wetland is included in Appendix C.

Photo 1: (A-D) Representative photos of terrestrial vegetation on site.

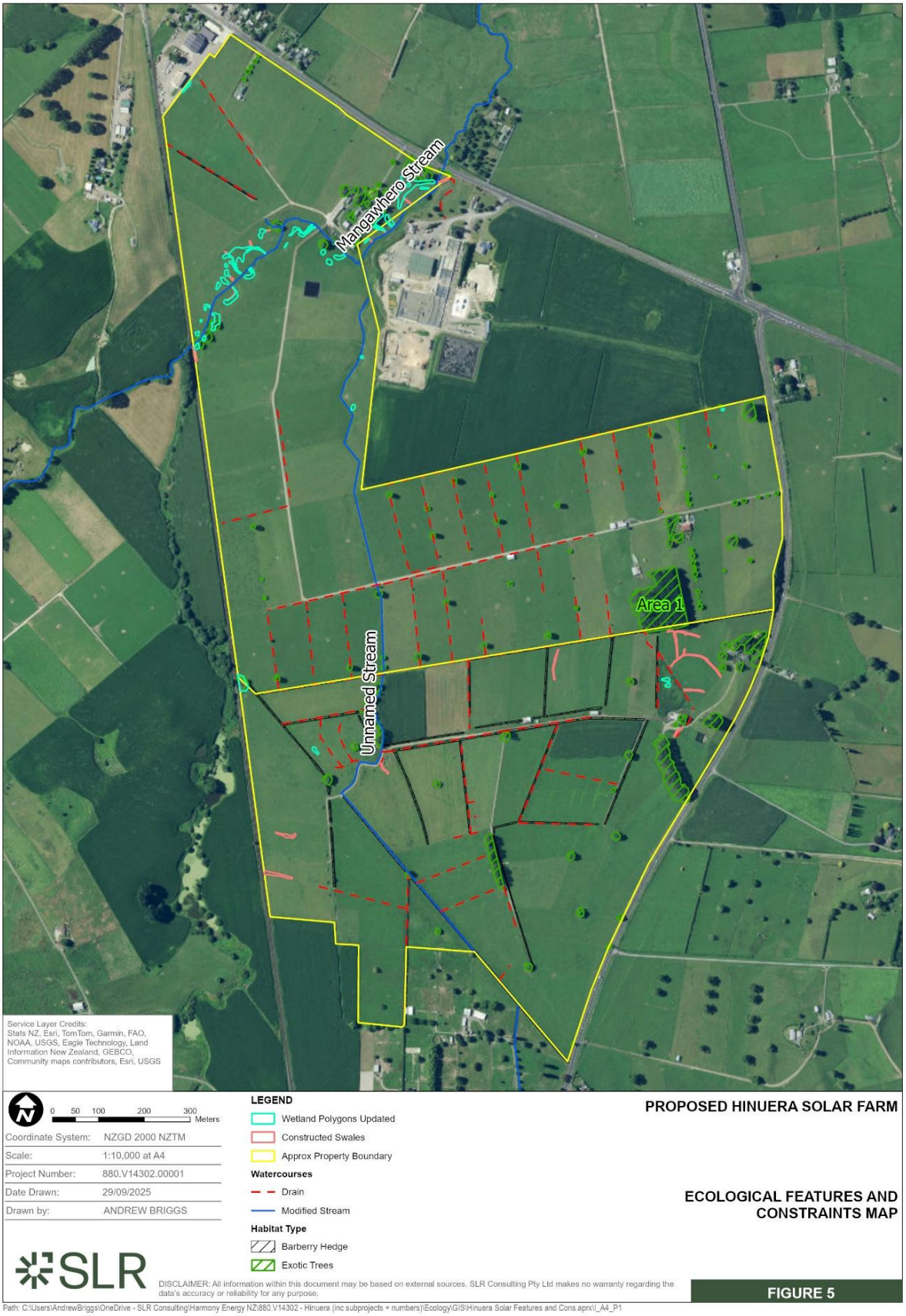
Photo A: General view of pasture vegetation which was prevalent throughout the study site.

Photo B: An example of a stand of exotic trees (radiata pine) within the study site.

Photo C: View of exotic tree row alongside an entrance way to the study site.

Photo D: An example of a barberry dominated hedge, adjacent to a shallow drain.

Figure 5: Terrestrial vegetation cover within the project site. Note all non-shaded habitat within the property boundary constitutes exotic pasture.



3.2.2 Pest plants

Generally low numbers of pest plants were observed within the site, given the prevalence of managed pasture. As mentioned above, intermittent and small stands of exotic trees were observed whilst exotic shrubland vegetation was confined to the hedgerows on site. Pest plants observed within the site, and their WRPMP management status, are listed in Table 1, below.

Table 1: Exotic and pest plants encountered on site. Control programme options derived from the Waikato Regional Pest Management Plan 2022-2032 (WRPMP, 2022).

Common Name	Scientific Name	Management Status
Smilax	*Asparagus asparagoides*	N/A
Barberry	*Berberis glaucocarpa*	Progressive Containment
Cedar	*Cedrus* spp	N/A
Gum tree	*Eucalyptus* spp	N/A
Reed sweetgrass	*Glyceria maxima*	Site-led
English ivy	*Hedera helix*	N/A
Macrocarpa	*Hesperocyparis macrocarpa*	N/A
Chinese privet	*Ligustrum sinense*	Site-led
Japanese honeysuckle	*Lonicera japonica*	Site-led
Radiata pine	*Pinus radiata*	Progressive Containment
London plane	*Platanus acerifolia*	N/A
Poplar	*Populus* spp	N/A
Blackberry	*Rubus fruticosus* agg.	Site-led
Willow	*Salix* spp.	Site-led

3.3 Aquatic habitats

3.3.1 Wetlands (Natural inland wetlands)

Wetland habitat comprising obligate wetland (OBL) and facultative wetland (FACW) herbaceous species were found sporadically within the low points in the landscape and adjacent to streams draining the site. The primary OBL and FACW herbaceous species prevalent in wetland areas included reed sweetgrass (*Glyceria maxima*), blue sweet grass (*Glyceria declinata*), creeping bent (*Agrostis stolonifera*) and mercer grass (*Paspalum distichum*). The majority of wetland habitat identified was confined to low lying areas adjacent to the Mangawhero Stream and comprised exotic hygrophilous (i.e. marshy) grassland vegetation. A total of 31 discreet wetlands were identified during the site survey, accounting for a total area of 0.71 Ha. Note that three wetlands, W21 – W23, are located either outside of the legal boundary (i.e. W21 – 30 m^2) or partially outside of the legal boundary (i.e. W22 – 28 m^2 and W23 – 111 m^2), representing a total area of 169 m^2 of the 0.71 Ha.

Recent rainfall was noted in the area at the time of survey which resulted in multiple low-lying areas comprising standing water and mud, perched above clayey substrates and fringed by, primarily, pasture species. These areas were, however, excluded as wetland habitat in terms of the wetland delineation protocols developed by the Ministry for the Environment (MfE 2022b) as they meet the pasture exclusion criteria (i.e. greater than 50% pasture cover).

Photos of the general wetland habitat on site are provided in Photo set 2, below, and a map of wetland habitat on site is provided in Figure 5, above. Note that an additional map showing the

location of wetland plots is included in Appendix C and a table detailing the characteristics of each wetland is included in Appendix D.

Photo 2: (E-F) Representative photos of wetland habitat on site

Photo E: View of wetland habitat dominated by OBL grass species (*G. maxima*), adjacent the Mangawhero Stream.

Photo F: Low point dominated by a FACW grass species (*P. distichum*) within a paddock comprising, primarily, managed pasture.

3.3.2 Watercourses

Two streams were identified on site, namely, the Mangawhero Stream and an unnamed tributary of the Mangawhero Stream (Figure 5). The streams drain in a generally northern to north easterly direction towards the Waihou River. The unnamed stream has been extensively modified through channel straightening, likely to assist with land drainage.

The formerly meandering course of the Mangawhero Stream has also been shortened, and has incised, reducing the frequency of flows overtopping the banks of the stream which once supported an extensive valley-bottom wetland network within the macro channel of the stream (i.e. the bank-full width; see Photo 3). The construction of drains and swales within the macro channel has further reduced the extent of wetland habitat that would have been adjacent to the stream, although patches of wetland habitat remain.

Photo 3: (G-H) Changes to the course of the Mangawhero Stream within the northern extent of the site.

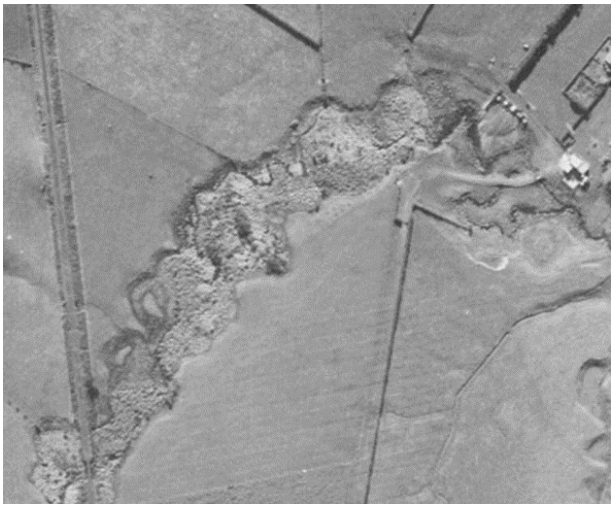


Photo G: View of short reach of the Mangawhero Stream in 1944 (Retrolens, 2023)

Photo H: View of the same reach in 2022 (Google Earth, 2023)

In addition to physical channel modification, minor road crossings, small pipe culverts and a larger box culvert are also present within the streams throughout the site to facilitate access.

The streams were primarily soft bottomed with well vegetated banks. Key biotopes included runs and riffles with comparatively shorter areas of shallow pools. The flow was turbid and varied in depth from 0.5 – 1.2 m. The Mangawhero Stream was approximately 1.5 – 2.5 m wide with approximately 1.5 m high banks in the vicinity of the representative instream survey point. Primary marginal vegetation was dominated by reed sweet grass and *Persicaria* spp. with vegetation in the narrow riparian areas comprising pasture grasses, reed sweet grass and creeping buttercup. Instream aquatic vegetation was limited throughout the assessed reaches. Representative photographs of the streams are included in Photo 4, below.

Under the RHA scoring system, the assessed reach of the Mangawhero Stream obtained generally low habitat scores, given the low riparian and instream habitat integrity / diversity. The scores and relevant comment for each assessed parameter within the stream is provided in Table 2, below. Values are reflective of highly degraded watercourses that can be typical within farmland.

Photo 4: (I-J) Representative photos of the streams within the site.

Photo I: View looking downstream from the true right bank of the Mangawhero Stream. Note the prevalence of reed sweet grass on the stream banks.

Photo J: View looking upstream from the true left bank of the heavily modified unnamed tributary which traverses the length of the site.

Table 2: Rapid Habitat Assessment results for the Mangawhero Stream.

Parameter	Stream Result[4]	Comment
1. Deposited sediment	3	The stream comprised a high abundance of fine sediments on the substrate, linked with the general geology of the area and upstream land-use.
2. Invertebrate habitat diversity	3	Limited substrate diversity for invertebrates although the high grass density and a relatively deep channel provide some cover for invertebrates.
3. Invertebrate habitat abundance	2	A low abundance of favourable substrate for EPT taxa.
4. Fish cover diversity	4	Low diversity of fish cover within the stream, limited to marginal vegetation.
5. Fish cover abundance	5	Similarly low abundance of potential fish cover, although the channel is fairly deep.
6. Hydraulic heterogeneity	4	Runs and pools dominate the reach, low biotope diversity.
7. Bank erosion	7	Generally minor erosion observed within the stream.
8. Bank vegetation	2	Primarily pasture grass and reed sweet grass, a very low abundance of interspersed exotic trees within reach.
9. Riparian width	2	Riparian zone primarily pasture grasses, very narrow, generally fenced at the top of the stream bank.
10. Riparian shade	1	Very low abundance of riparian trees providing shade within the reach.
Total	**34**	

3.3.3 Artificial Drains and Constructed Swales

An extensive network of shallow, well vegetated drains and swales were observed within the site extent. These drains and swales were likely excavated to reduce the level of saturation within paddocks that were historically wet, to allow for improved agricultural prospects. The northern property is also drained through networks of sub-surface drainage (*Pers. Comm*. C. Schweizer).

The drains were typically up to 1.5 m wide and 1 m deep, V-shaped, and have well vegetated banks comprising a variety of herbaceous species ranging from OBL to facultative upland (FACU) species. The constructed swales were more subtly shaped and up to 1.5 m wide and 0.5 m deep whilst also containing OBL to FACU vegetation. Note that constructed swales dominated by FACU vegetation were not included in the overall vegetative cover map in Figure 5, above.

Representative images of drains and constructed swales on site are included in photo 5, below.

[4] Habitat Assessment Protocols (Clapcott, 2015). Nine habitat parameters are scored from 0 (poor) to 10 (optimal).

Photo 5: (K-N) Representative photographs of drains and swales on site.

Photos K and L: Examples of farm drains located on the perimeters of paddocks within the study site.

Photos M and N: Examples of constructed swales showing a swale dominated by FACW species (left) and a swale dominated by FACU species (right). Note that the constructed swales were typically located throughout paddocks and not confined to the perimeters.

3.4 Fauna

3.4.1 Bats

The nearest known record of New Zealand long-tailed bats (*Chalinolobus tuberculatus*) was approximately 3 km west of the site within an isolated tree stand during a survey in 2016, and a number of New Zealand long-tailed bat passes were recorded approximately 4 km north-east of the site during a sustained survey in 2018 (DOC, 2023).

The first onsite bat survey conducted by SLR Consulting Ltd in winter 2023 indicated the presence of New Zealand long-tailed bats within the study area. Bat roosting habitat within the site is limited to narrow shelterbelts and relatively small exotic tree stands. Given the frequency of detections within proximity to ABM 4S.13 (refer to Figure 2), it is possible that bats are roosting within nearby mature *Eucalyptus* trees ('Area 1'; Figure 5). The canopy of shelterbelts, surrounding pasture, and adjacent waterways all provide habitat that may support foraging activity across the site.

An additional survey completed over October and November 2025 confirmed regular detections of bats, particularly around ABMs SLR52 (an exotic shelterbelt), SLR53, and SLR 58 (shown as "Area 1") (see Table 4 and Figure 2). An example of a *C. tuberculatus* call sequence recorded on

site is provided Figure 6, below. Results of the bat monitoring using ABMs are presented in Table 3 and Table 4, below.

Figure 6: Bat call detection from 4S.13 on 23rd June 2023.

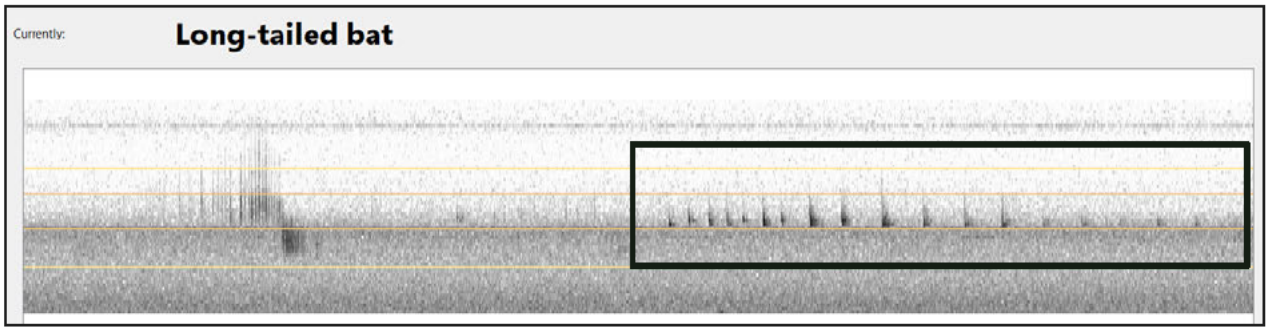


Table 3: Bat records from the proposed solar farm during the field survey in winter 2023.

ABM No.	Nights of Detections/ Total Nights Recorded	No. of Detections	Mean Detections / Night	Notes
4S.13	20 / 41	770	18.78	Regular bat detections at this point. Potential roosting area within the large *Eucalyptus* trees.
4S.14	1/41	1	0.02	Many potential detections[5], one definite detection.
4S.15	4/8	5	0.63	Bat monitor malfunctioned after eight days, landowner indicated that the ABM became dislodged and was found in the mud.

Table 4: Bat records from the proposed solar farm during the field survey in spring 2025.

ABM No.	Nights of Detections/ Total Nights Recorded	No. of Detections	Mean Detections / Night	Notes
4S.9	0 / 8	0	0	No bat detections. Bat monitor ran out of battery after eight nights in the field.
BW29	0 / 7	0	0	No bat detections. Bat monitor ran out of battery after seven nights in the field.
SLR49	4 / 18	4	0.22	Four definite detections.
SLR52	13 / 18	213	11.83	Regular bat detections at this point.
SLR53	13 / 18	333	18.5	Regular bat detections at this point.
SLR54	4 /18	7	0.22	Two faint calls, other calls are definite detections.
SLR55	3 / 15	3	0.20	One faint call, other calls are definite detections.

[5] Very faint 'potential detections' picked up by the spectrogram refer to faint markers and patterns in the expected frequency band, likely from bats that are relatively far away from the ABM (i.e. in excess of 50m).

ABM No.	Nights of Detections/ Total Nights Recorded	No. of Detections	Mean Detections / Night	Notes
SLR56	14 / 18	50	2.78	Moderate bat detections at this point.
SLR57	1 / 18	1	0.06	Single bat detection.
SLR58	15 / 18	172	9.56	Regular bat detections at this point.
SLR59	4 / 18	4	0.22	One faint call, other calls are definite detections.
SLR60	4 / 18	6	0.33	Few bat detections.

After undertaking the risk rating of potential bat roost trees across the site, there were a total of 14 trees/tree groups assessed, and of these three were classified as high risk (i.e. exhibiting features described above), seven were moderate and the remaining were low. Note not all trees across the site were assessed. A summary of this assessment is indicated in Table 5, below.

Table 5: Potential bat roost tree inventory as of November 2025.

ID	Tree Species	DBH (cm)	Description	Potential Bat Roost suitability
1	*Pinus radiata*, *Eucalyptus globulus* and *Sequoia sempervirens*	various	Pine, eucalypt and redwood patch in the centre of the site, large specimens with flaking bark and suitable sized cavities for roosting.	High
2	*Platanus* × *acerifolia*	>15cm	London plane tree located near the large patch of potential roosting habitat. Features flaking bark which may be suitable for roosting.	High
3	*Populus deltoides*, *E. globulus* and *Platanus* × *acerifolia*	various	A collection of ornamental and common exotic trees located nearest the farm dwelling. Large specimens with flaking bark and suitable sized roosting cavities.	High
4	*P. deltoides*	various	Three poplar trees located within the floodplain of the existing watercourse. Some suitable roosting characteristics including cavities. Limited recordings identified during survey.	Medium
5	*P. radiata*	>50cm	Isolated pine located along the stream bank. Suitable roosting characteristics including cavities. Limited recordings identified during survey.	Medium
6	*P. radiata*	various	Collection of pines along ridge, suitable roosting characteristics including cavities. Located near high-risk roosting area.	Medium
7	*P. deltoides*	various	Row of poplar trees containing some suitable roosting characteristics including flaking bark. Limited recordings identified during survey. Located near high-risk roosting area.	Medium
8	*P. deltoides*	various	Row of trees containing some suitable roosting characteristics including flaking bark. Limited recordings identified during survey. Located near high-risk roosting area.	Medium

ID	Tree Species	DBH (cm)	Description	Potential Bat Roost suitability
9	*P. radiata, E. globulus* and *P. deltoides*	various	Row of trees containing some suitable roosting characteristics including flaking bark and cavities. Limited recordings identified during survey.	Medium
10	*E. globulus*	various	Large eucalypts along roadside. Many suitable roosting features including flaking bark and cavities. No recordings during survey however located close to high-risk trees.	Medium
11	*P. deltoides*	>15cm	Isolated tree, some minimal roosting characteristics. No recordings of bats in monitors nearby.	Low
12	*P. deltoides*	>15cm	Isolated tree, some minimal roosting characteristics. No recordings of bats in monitors nearby.	Low
13	*P. deltoides, E. globulus* and *Platanus × acerifolia*	various	A collection of ornamental and common exotic trees located nearest the farm dwelling. Limited roosting characteristics and no bat recordings in recent survey.	Low
14	*P. deltoides*	>15cm	Isolated tree, some minimal roosting characteristics. No recordings of bats in monitors nearby.	Low
	Various	various	All remaining trees not otherwise specified across the site. Largely small diameters, or poorly suited for bat roosting.	Low

3.4.2 Birds

A total of 22 bird species were observed during the site visit, comprising 12 'Introduced: Naturalised' species, nine 'Not Threatened' native species and a single domestic species with no threat status (see Table 6, below). One additional species (grey teal) was picked up from eDNA sampling. The majority of recorded birds were common open country, pasture species.

Suitable bird nesting habitat within the site is fairly limited, however, exotic trees and hedgerows within and adjacent to the study site are available for nesting.

Note that a full bird species list, including potential species known to occur in the vicinity of the site, is provided in Appendix E.

Table 6: Bird records from the proposed solar farm during the field survey.

No.	Common Name	Scientific Name	Threat Status (Robertson *et al.* 2021)	eDNA Sample (21 June 2023)
1	Australian magpie | Makipai	*Gymnorhina tibicen*	Introduced: Naturalised	
2	Common myna | Maina	*Acridotheres tristis*	Introduced: Naturalised	
3	Common starling | Tāringi	*Sturnus vulgaris*	Introduced: Naturalised	
4	Domestic mallard	*Anas platyrhynchos domesticus*	N/A	
5	Eastern rosella | Kākā uhi whero	*Platycercus eximius*	Introduced: Naturalised	

No.	Common Name	Scientific Name	Threat Status (Robertson *et al.* 2021)	eDNA Sample (21 June 2023)
6	Eurasian blackbird | Manu pango	*Turdus merula*	Introduced: Naturalised	
7	Eurasian skylark | Kairaka	*Alauda arvensis*	Introduced: Naturalised	
8	European goldfinch | Kōurarini	*Carduelis carduelis*	Introduced: Naturalised	
9	European greenfinch	*Chloris chloris*	Introduced: Naturalised	
10	Grey teal | Tētē-moroiti	*Anas gracilis*	Not Threatened	X
11	Grey warbler | Riroriro	*Gerygone igata*	Not Threatened	
12	House sparrow | Tiu	*Passer domesticus*	Introduced: Naturalised	
13	Mallard | Rakiraki	*Anas platyrhynchos*	Introduced: Naturalised	X
14	New Zealand fantail | Pīwakawaka	*Rhipidura fuliginosa*	Not Threatened	
15	Pūkeko	*Porphyrio melanotus*	Not Threatened	X
16	Rock pigeon | Kererū aropari	*Columba livia*	Introduced: Naturalised	
17	Sacred kingfisher | Kōtare	*Todiramphus sanctus*	Not Threatened	
18	Silvereye	*Zosterops lateralis*	Not Threatened	
19	Spur-winged plover	*Vanellus miles*	Not Threatened	
20	Swamp harrier | Kāhu	*Circus approximans*	Not Threatened	
21	Welcome swallow | Warou	*Hirundo neoxena*	Not Threatened	X
22	White-faced heron | Matuku moana	*Egretta novaehollandiae*	Not Threatened	
23	Yellowhammer | Hurukōwhai	*Emberiza citrinella*	Introduced: Naturalised	

3.4.3 Lizards

The DOC Herpetofauna 2025 database indicates that the closest skink record was c.13km west from the site, of a copper skink (*Oligosoma aeneum*, At Risk – Declining, Hitchmough et al., 2025). The closest gecko record was c.13km to the east, on the edges of the Kaimai ranges, and is of a forest gecko (*Mokopirirakau granulatus*, At Risk – Declining).

During the surveys onsite, both manual habitat searches and a small number of ACO surveys, no indigenous lizards were detected. The majority of the site comprises grazed pasture offering very limited habitat and resources for indigenous lizards. Copper skink in particular can persist in grazed environments along fencelines and in scattered shrublands that contain woody debris or thick rooted grass material providing appropriate microhabitats (Woolley et al., 2025), however the presence of these microhabitats at site was limited and non-contiguous. Given the disturbed nature of the site, and limited microhabitat availability it is considered unlikely indigenous lizards are present at the site in numbers.

3.4.4 Fish

Species of fish known to occur within freshwater habitats in the vicinity of the site, within the Mangawhero Stream and proximal tributaries, according to the New Zealand Freshwater Fish Database (NZFFD) and eDNA sample results have been listed in Table 7. Longfin and shortfin

eels (*Anguilla dieffenbachii* and *A. australis*, respectively), Crans bully (*Gobiomorphus basalis*) and the exotic *Gambusia* were recorded from the site streams from eDNA sampling.

Table 7: Fish species present in the NZFFD for the area, including eDNA results.

Common Name	Scientific Name	Threat Status (Dunn et al. 2025)	NZFFD	eDNA Sample (21 June 2023)
Shortfin eel	*Anguilla australis*	Not Threatened	X	X
Longfin eel	*Anguilla dieffenbachii*	At Risk: Declining	X	X
Unidentified eel	*Anguilla spp.*	N/A	X	X
Goldfish	*Carassius auratus*	Introduced: Naturalised	X	
Torrentfish	*Cheimarrichthys fosteri*	At Risk: Naturally Uncommon	X	
Īnanga	*Galaxias maculatus*	Threatened: Nationally Vulnerable	X	
Gambusia	*Gambusia affinis*	Introduced: Naturalised	X	X
Crans bully	*Gobiomorphus basalis*	At Risk: Naturally Uncommon	X	X
Unidentified bully	*Gobiomorphus spp.*	N/A		X
Rainbow trout	*Oncorhynchus mykiss*	Introduced: Naturalised	X	
Common smelt	*Retropinna retropinna*	At Risk: Declining	X	

3.4.5 Macroinvertebrates

No active macroinvertebrate sampling was undertaken although an eDNA sample confirmed the presence of multiple families and genera within the reach (see Table 8, below). Taxa detected through eDNA were macroinvertebrates common to modified waterways.

Table 8: Macroinvertebrate data summary for the site based on the eDNA sample.

Taxon	Individual MCI Scores	eDNA Sample (21 June 2023)
Diptera (True flies)		
Austrosimulium	3.9	X
Chironomidae	3.8	X
Corynoneura	1.7	X
Psychodidae	6.1	X
Mollusca (Snails)		
Hyridella	6.7	X
Physella	0.1	X
Potamopyrgus	2.1	X
Oligochaeta (Worms)	3.8	X
Trichoptera (Caddisflies)	-	X

Taxon	Individual MCI Scores	eDNA Sample (21 June 2023)
Crustacea		
Copepoda	2.4	**X**
Ephemeroptera (Mayflies)		
Austroclima	6.5	**X**
Zephlebia	8.8	**X**
Total Taxa identified		**12**

3.4.6 Pest animals

Multiple brown hare (*Lepus europaeus*) and European rabbits (*Oryctolagus cuniculus*) were observed throughout the site, with a single feral cat observed near the farm buildings at the northern end of the site. Brushtail possum (*Trichosurus vulpecula*), Norway rat (*Rattus norvegicus*) and black rat (*Rattus rattus*) were recorded through the eDNA sample whilst rodent vocalisations were occasionally detected at from ABM 4S.14 in the vicinity of the Mangawhero Stream. It is likely that additional pest animals such as mustelids and hedgehogs are present within the general area.

4.0 Assessment of ecological effects

4.1 Ecological values

4.1.1 Vegetation – Botanical values

The majority of ecological values present within the proposed solar farm have been assessed as 'Negligible' to 'Low' based on the highly modified nature of the site and predominance of grazed exotic pasture.

An exotic tree stand ('Area 1'; Figure 5) was determined to be of moderate ecological value, however this is attributable to its values as faunal habitat and is discussed in the relevant fauna sections below.

4.1.2 Vegetation – Regional Significance

When determining significance of vegetation in the Waikato, it needs to meet at least one of the 'criteria for determining the significance of indigenous biodiversity' within the Waikato Regional Policy Statement (Appendix F; WRC, 2022). Specifically, 'Area 1' meets criterion three, defined as vegetation or habitat that supports indigenous species, or associations of indigenous species, that are classified as threatened or at risk. The trees within Area 1 provide potential suitable habitat, as they meet the requirements for bat roosting, including a diameter at breast height (DBH) greater than 15 cm and the presence of key roost features such as flaky bark, cracks, crevices, and hollows. This habitat suitability is further supported by the confirmed presence of bats across the site.[6]

Although this area would be classed as 'locally significant' according to the guidance report, the habitat types are not representative of native forest habitat historically expected within the Waikato Region due to the level of habitat modification (Wildlands, 2023). Ecological values of the site for bats are further assessed in Section 4.1.3 below.

A breakdown of each habitat type and associated values is included in Table 9, below. Note that habitat across the site for each fauna type in general and the ecological significance of this is assessed under the specific fauna sections below (Sections 4.1.3 – 4.1.5).

[6] Note that, as bats frequently change roosts, individual exotic trees identified within this stand that aren't occupied by roosting bats will not necessarily meet the criteria for significance. It is therefore likely that each tree with potential bat roost habitat will require investigation per the DOC Bat Roost Protocols prior to removal (discussed further in Section 4.2.8., below).

Table 9: Ecological values assessment for on-site habitat

Habitat grouping	Area (ha)	Representativeness		Rarity/distinctiveness		Diversity & Pattern		Ecological Context		Overall Ecological Value
Pasture	~140	Very Low	Site would likely have been dominated by native fernland and swamps with intermittent pockets of forest.	Very Low	Pasture is common in the general area and lowlands of the ED. Threatened birds have been identified within 10km of the site although this habitat is largely unsuitable.	Very Low	Comprises primarily three or four common grasses and herbaceous pasture species.	Very Low	General site and nearby areas dominated by pasture associated with cattle grazing.	**Negligible**
Exotic grass dominated wetlands	0.71	Low	Degraded modified FACW grassland vegetation. Wetlands in the area would have likely comprised native ferns, sedges and forest.	Moderate	Wetlands are under-represented nationally and are a national priority for protection (e.g. Ausseil *et al.* 2008), however, small pockets of degraded wetland habitat within the agricultural mosaic are common in the region.	Low	Comprises primarily monotypic short grassland, although certain wetlands comprised a mix of exotic grasses and pioneer herbaceous vegetation.	Low	These wetlands were grazed, pugged and surrounded by pasture areas, providing limited habitat for fauna and flora. Most wetlands located within the former extent of the Mangawhero Stream floodplain offering a degree of habitat connectivity and potential for restoration. A few small, scattered wetlands across the wider site.	**Low**
General exotic tree cover (Incl. small stands, amenity and	2.84	Very Low	Site would likely have been dominated by native fernland and swamps with	Low	Shelterbelts planted on the edge of some paddocks, a few stands of large exotic trees, multiple individual exotic trees are scattered throughout the	Very Low	Comprises variable exotic tree species including *Pinus* spp., *Eucalyptus* spp., willows,	Low	Tree individuals and shelterbelts are isolated across the site with low refuge value. Bats possibly roosting although preliminary	**Low**

Habitat grouping	Area (ha)	Representativeness		Rarity/distinctiveness		Diversity & Pattern		Ecological Context		Overall Ecological Value
individual trees)			intermittent pockets of forest.		site. Possible bird resting and nesting locations.		poplar and macrocarpa.		data indicates they are concentrated around the mixed exotic tree stand.	
Mixed exotic tree stand (Area 1)	1.20	Very Low	Site would likely have been dominated by native fernland and swamps with intermittent pockets of forest.	Moderate	Stand of large exotic trees. Other exotic and native forest in the area is highly fragmented, nearby Waihou River comprises some semi-intact contiguous forest. Possible bird resting and nesting locations. Likely New Zealand long-tailed bat roosting and foraging areas (note that the value this presents is assessed under fauna specific sections below).	Very Low	Comprises variable exotic tree species including *Pinus* spp., and *Eucalyptus* spp.	Moderate	Compact plantation block / stand with generally low refuge value and connectivity to other areas, however, bats have been regularly detected within proximity to the stand. Accordingly, these trees have been assigned as 'high risk' indicating a high likelihood of bat roosting activities.	**Moderate**
Barberry hedgerows	1.82	Very Low	Site would likely have been dominated by native fernland and swamps with intermittent pockets of forest.	Low	Hedgerows are intermittent between pastures, could provide some refuge to lizards and birds.	Very Low	Comprises primarily of barberry with occasional other exotic shrubs and creepers.	Very Low	Isolated, narrow and elongated, offering little faunal refuge opportunity.	**Negligible**
Riparian vegetation associated with streams	~0.94	Very Low	Narrow riparian zones associated with the Mangawhero Stream, and the Unnamed Stream,	Low	Channels have been modified through straightening. Vegetation dominated by exotic grass with no native riparian trees. Negligible refuge	Low	Narrow riparian zone dominated by low diversity pasture grasses.	Moderate	Perennial streams on site are important for connectivity and refuge for dependant species. Riparian width is low.	**Low**

Habitat grouping	Area (ha)	Representativeness		Rarity/distinctiveness		Diversity & Pattern		Ecological Context		Overall Ecological Value
			comprises exotic grassland with occasional exotic trees. No native forest species noted.		value for terrestrial fauna although instream areas may provide limited habitat for aquatic / semi-aquatic species.					

4.1.3 Bats

The bat survey conducted over a period of approximately six weeks during winter of 2023 and 18 nights during spring of 2025 confirmed the presence of New Zealand long-tailed bats within the proposed development site. The frequency of bat detection by the ABMs indicate that bats regularly utilise the area at night, particularly 'Area 1' which also contains high risk bat roost trees as assessed by SLR ecologists. According to the EIANZ guidelines for New Zealand, threatened terrestrial species are assigned a value of 'Very High' in the case they are located in the ZOI (Zone of Influence) which for this project scale is the entire site and surrounds. As longtail bats (a Threatened: Nationally Critical species) were frequently recorded within the site the ecological value for bats and their habitat is **very high**.

4.1.4 Birds

The site observations and eDNA sampling confirmed that all bird species currently utilising the site were common and / or introduced. Although 'At Risk' and 'Threatened' species have been recorded within 10 km of the study site, these birds likely traverse the area during flight and are not likely to utilise the habitat on site for an extended period of time. The ecological value of avifauna on site is **low**.

4.1.5 Lizards

The site has been significantly modified, comprising very limited and fragmented lizard habitat as well as a likely high abundance of pest animals. No species were recorded during active and passive searches (i.e. with ACOs), and it is unlikely that native lizard species are present in significant numbers given the agricultural land use. The ecological value of the site for lizards is **low**.

4.1.6 Fish

The Mangawhero Stream offers some refuge opportunities for fish however habitats are degraded, and instream barriers may exist between the site and the downstream Waihou River given the presence of numerous crossing points. Migratory species including longfin eel ('At Risk: Declining') and shortfin eel ('Not Threatened') were recorded within the eDNA sample. Given the potential presence of At-Risk species, the ecological value of fish within the site extent is considered to be **high**.

4.2 Ecological effects and mitigation

The works associated with the proposal include the construction and installation of solar panel arrays, roading, and various types of ancillary infrastructure. Construction and operational impacts associated with the proposed solar farm may result in the following direct and indirect ecological effects:

- Small-scale soil disturbance, associated with piling for insertion of the steel poles holding the solar array structures will result in localised habitat disturbance. Piles will be vibro- or hammer driven with limited associated soil disturbance. This will occur throughout the site (see Appendix A for indicative layout).
- Potential hydrological alteration within exotic grass dominated wetland habitat from the creation of roads and hard infrastructure, potentially changing overland flow paths.
- Earthworks associated with construction of access roads and cable trenches within the proposed solar farm area resulting in localised habitat disturbance.

- Earthworks to facilitate construction and implement ancillary infrastructure associated with the proposed solar farm (e.g. inverters, lay down areas, etc.) resulting in localised habitat disturbance.
- Stormwater runoff during construction potentially resulting in watercourse sedimentation and habitat disturbance.
- Minor habitat disturbance and alteration of aquatic habitat resulting from new culvert placement in the unnamed stream.
- Potential for collision of birds and bats with solar panels.
- Removal of exotic trees across the site, resulting in negative indirect effects (and possible direct effects) on bats (see Section 4.2.1 on avoidance).
- Lighting and noise associated with on-site infrastructure causing disturbance of terrestrial fauna.
- Minor vegetative and hydrological effects relating to decommissioning.

There is potential for positive ecological effects associated with the proposal. Based on the initial design plans, positive effects would include improved aquatic habitat and water quality resulting from the change to a less intensive land use type (sheep grazing), improved biodiversity values through restoration plantings, weed / exotic tree removal, pest animal control and enhanced connectivity of natural areas in a landscape context through buffer and corridor plantings, particularly around the Mangawhero Stream (see the draft Restoration and Planting Plan; SLR, 2025). Potential effects are discussed below and summarised in Table 11: Assessment of ecological features considering preliminary mitigation measures..

4.2.1 Avoidance

After initial results from the acoustic surveys, the project extent has been modified to exclude “Area 1” as outlined above as a mature pine and eucalyptus stand that had high bat activity. Areas “2” and “3” also identified as high risk (as they contain high risk bat roost trees) are also now excluded from the footprint, as of March 2026, after consideration of the potential ecological effects. In addition, areas identified as moderate risk for bat roost trees as of November 2025 – Area “6” and “10” (see Figure 2 in Section 2.3.) are also out of the current project extent. The change in project extent by the client has reduced the removal of currently assessed high risk roost trees, and subsequently reduced the risk to a threatened species.

In addition, 29 of the 31 identified natural inland wetlands are being avoided by the proposed construction of solar infrastructure, with 26 of these wetlands being earmarked for enhancement.

4.2.2 Effects on terrestrial vegetation

The vegetation that may be affected by the proposed works comprises, almost entirely, of pasture used for cattle grazing.

Vegetation disturbance is expected to be limited to the localised clearance of pasture and exotic trees to allow for the construction of panels, disturbance of vegetation from piling rigs installing the piles as well as earthworks disturbance associated with roads, structures and trenching for cabling.

The magnitude of effect to general exotic tree cover and pasture areas to be directly affected by proposed construction works is expected to be low while the overall level of effect to these areas is expected to be **very low.**

Effects to terrestrial vegetation relating to potential decommissioning of the solar farm are also anticipated to be **very low** given that little vegetation disturbance would be expected during removal.

4.2.3 Effects on stream habitat

There is potential for sediment to discharge into the nearby receiving streams during the construction period for general site preparation works, the upgrade of one culvert within the Mangawhero Stream and installation two new culverts up to 10 m long within the unnamed stream. New internal access tracks are proposed that will be unsealed, while other existing unsealed farm tracks will be retained and used for accessing the solar farm as far as practicable.

Provided culvert length is kept to the minimum required, designed and installed to avoid the creation of barriers to fish passage, and appropriate sediment and erosion control measures are implemented and adhered to during the construction phase, including provisions relating to the timing of the earthworks (i.e. only taking place during earthworks season), the Guidelines for Soil Disturbing Activities (WRC, 2009), the low gradient nature of the site as well as the scale of the site works will mean the spatial and temporal effects of these risks to the receiving environment are expected to be low in magnitude, resulting in a **very low** level of effect. Effects on instream fauna are discussed in Section 4.2.5 below.

During the operational phase the impervious solar panels may increase the level of imperviousness within the site, and discharge stormwater runoff. However, the solar panels will have gaps between modules where rainwater can be expected to infiltrate the groundcover, or follow current land contours to the receiving watercourses.

There will be a small permanent reduction in open stream extent resulting from the two new culverts within the unnamed stream. The project proposes a riparian buffer planting along both the Mangawhero Stream and unnamed stream, which is expected to result in increased shading of the stream, increase bank stability, and provide filtration of overland flows to the benefit of any aquatic fauna utilising the stream, thereby improving the overall health of the streams on site. The area and composition of proposed planting of the riparian and marginal zones is expected to be approximately 2.38 ha, over approximately 2750 m of stream, inclusive of an approximate 5 m buffer either side of the streams, which should adequately address any ecological effects relating to a reduction in open stream extent from the implementation of the two new culverts (SLR, 2025). An additional 5 m buffer from the edge of the planting areas will be retained as open pasture, bringing the total stream buffer to 10 m from construction works areas.

Likewise, as discussed in Section 4.2.10. below, a reduction in nutrient losses associated with the potential conversion of the site from dairying to sheep grazing and solar generation is expected to result in a small positive effect on downstream water quality. As such, the long-term effects of the proposal on the aquatic environments are considered to be a positive **net-gain**.

Sediment discharges associated with potential decommissioning are also anticipated to be of **very low** level of effect provided the above-mentioned control measures are followed.

4.2.4 Effects on wetland habitat

The solar farm layout was designed with general consideration to wetland features and accordingly the majority of the identified wetland areas have been avoided, and in most cases will be planted and enhanced as part of planned restorative measures.

4.2.4.1 Effects of activities within wetlands

Direct impacts to wetlands are anticipated at two small areas (wetlands identified as W02 (99 m^2) and W03 (174 m^2), see Appendix D) from proposed works associated with the solar farm

construction and operation. These impacts relate primarily to potential hydrological and habitat modifications associated with the placement of piles and panels in the wetlands.

Localised changes to stormwater runoff resulting from panels over top may affect the hydrology of wetlands W02 and W03 but this is expected to be low magnitude because stormwater runoff from the solar panels will occur to a pervious surface (i.e. the grassy vegetation below) during rainfall events. The site plans indicate a gap of just over 2 m between panel rows (Maven, 2026) which is expected to allow for infiltration. Pile driving poles into these wetlands to hold the solar panels and the associated trenching for cables should not present a barrier to the movement of water within the wetlands, nor cause drainage of water from wetlands. All trenches will be backfilled as soon as practicable. As a result, noticeable hydrological changes or drainage effects to wetlands W02 and W03 are not anticipated. Any small-scale changes to hydrology are unlikely to adversely impact wetland values, function or extent.

Vegetation removal associated with this construction is not expected to be a significant ecological effect, as the current landcover is grazed exotic grasses, therefore the effects of the proposal to the integrity of wetlands W02 and W03 should not result in a degradation in value.

4.2.4.2 Effects of activities adjacent to wetlands

Possible effects on the hydrology of wetlands W02 and W03 from works occurring adjacent to these wetlands may occur due to minor changes in topography resulting from earthworks.

As these effects will not be known until detailed design is complete, the consent application is being conservatively made as if these wetlands are to be fully drained / lost. Therefore, we have assessed the effects to these two wetlands as if they are to be fully drained / lost, representing at least a high magnitude of effect.

In this worst-case scenario, effects on these wetlands cannot be avoided, minimised or remedied so although the level of effect is assessed as low it is proposed that they are offset through restoration planting of potential wetland habitat along the Mangawhero Stream. Planned restoration planting using wetland plant species within wetlands W04 – W10, W12 – W28, as well as their small buffer zones along the low-lying areas adjacent to the Mangawhero Stream represents a total area of 2.43 ha, of which 0.61 ha has been delineated as natural inland wetland (SLR, 2025). The remaining area to be restored as wetland has wetland hydrology but meets the pasture exclusion and is not natural inland wetland. Proposed planting and stock exclusion should allow planted wetland species to proliferate, likely resulting in a small expansion of natural inland wetland extent within the site. This increase in extent of natural inland wetland habitat within the site over time is expected to be, at least, greater in area than the potential loss associated with wetlands W02 and W03 (273m²). An overall loss in wetland extent and value is therefore not anticipated, and additional compensation or offsetting is not required.

Indirect effects to other wetlands within the site can potentially arise because of landform and hydrological changes to the contributing catchment. Given the very flat nature of the site, minimal changes to landform are anticipated near the wetlands.

Provided appropriate erosion and sediment control measures are implemented during construction works and any areas of bare earth are revegetated in a timely manner, the risk to the wetlands within the development area from sedimentation will be low.

4.2.4.3 Summary of wetland effects

The effects of activities within wetlands are expected to be largely avoided, except for in wetlands W02 and W03 where panel and pole placement may have a low magnitude of effect on wetland hydrology which will be unlikely to adversely impact wetland values, function or extent.

Earthworks adjacent to but outside wetlands W02 and W03 could have an impact on wetland hydrology, and therefore value and extent. We have assumed a worse-case scenario of a very high magnitude of effect caused by drainage and complete loss of value and extent. This potential loss will be offset by the planned restoration planting which is expected to lead to an increase in biodiversity and a small increase in extent, as well as a functional **net gain** for the site wetlands.

Any other indirect effects to wetland habitats or hydrology from the proposed solar farm development are expected to be negligible, resulting in a very low level of effect.

4.2.5 Effects on aquatic fauna

As noted above, the sediment discharges associated with the development will be managed through appropriate sediment and erosion control measures, minimising potential adverse effects of sediment discharges on aquatic fauna. The installation of new culverts to allow for the planned access roads will require works within the unnamed stream. Instream works have the potential to directly impact aquatic fauna if not managed appropriately. Following best practice construction methods, isolation and localised dewatering of the works area to enable installation of the culverts 'in the dry' is recommended, to avoid sediment discharges during works to downstream receiving environments. However, dewatering has the potential to strand fish, resulting in death. Fish salvage and relocation prior to and/or during dewatering of the isolated works reaches is recommended to minimise potential adverse effects on native fish and any large invertebrates that may also be present.

To ensure new culverts do not create new barriers to upstream migration of fish, where native fish are likely to be present and where upstream fish habitat is present, the culverts should be sized and installed in line with the rules of the Waikato Regional Plan and design considerations listed in the NES-F and the New Zealand Fish Passage Guidelines (Franklin et al. 2024).

Accordingly, providing the above mitigation measures are implemented as recommended, the magnitude of adverse effects of the works on aquatic fauna are expected to be Low, and accordingly the level of effects will be **Low**.

In the longer term, the proposed riparian planting will result in increased shading and habitat for the watercourse to the benefit of aquatic fauna. Likewise, as discussed in Section 4.2.10. below, the decreased levels of nutrient inputs as a result of conversion from cattle to sheep farming, can be expected to improve water quality. As such, the long-term effects of the proposal on the aquatic environment are considered to be a positive 'net gain' for the site.

4.2.6 Effects from lighting associated with on-site structures

No visible lights are generally present on a solar farm, though some security lighting may be required around infrastructure at the site. To minimise any adverse effects on threatened bats utilising the site for foraging, it is recommended that the following considerations are followed as part of the lighting design:

- Lighting is limited to specific purposes (security lighting for infrastructure buildings);
- Use of shielding to avoid upward light spill;
- Use of low intensity lighting on the outside of any buildings / stations on site; and
- Use of adaptive controls such as motion sensors to allow for part-night lighting, where feasible.

Note that New Zealand does not have any official bat-friendly lighting guidelines at present, and these controls are informed by the UK guidelines (Reason and Way, 2025), research in Australia (e.g. DCCEEW, 2023) and discussions between NZ bat experts.

It is expected that with these considerations implemented to minimise light spill, the potential adverse effects on bats and other nocturnal fauna will be low.

4.2.7 Effects of noise on fauna

Construction disturbance linked to the installation of the solar panels using a small piling rig may create some localised noise disturbance, which has been recorded at a Sound Pressure Level (SPL) OF 85 dB L_{Aeq} at a 10 m distance (SLR, 2026a). At a distance of 75 m, this SPL would comply with the 70 dB L_{Aeq} limit prescribed by NZS 6803:1999 (i.e. the latest national standard of construction noise; SLR, 2026a), which is similar level of sound to agricultural implements such as tractor (*Pers. Comm. – P. Runcie: SLR Acoustics and Vibration Expert*). The actual piling produces an intermittent higher pitched noise, which is temporary and will progress across the site as construction progresses. Mobile fauna may temporarily move out of the immediate area of works during construction, although the temporary noise disturbance will not be too dissimilar to ongoing agricultural activities at the site.

Operational noise from the solar farm and associated battery storage is generally expected to be low. Any potential effects would likely be localised and limited to areas in close proximity to the main noise generating equipment (as described in the acoustic assessment for the site; SLR 2026a). The low levels of noise emitted by the main noise generating equipment (e.g. the inverters or BESS) is highly localised and not expected to adversely affect fauna utilising the wider site. The effect of potential noise associated with the solar farm on local fauna is considered to be **negligible**.

4.2.8 Effects on birds

Overseas studies show that bird strike on solar panels can cause injury or death, possibly as a result of reflections of the sky, misinterpreting the reflective surface as water, or due to polarisation of light. Similar impact effects are seen with other reflective surfaces like windows in buildings.

The ‘lake effect’ theory is that large fields of solar panels may appear to be water and birds (particularly water birds) may try to land on it or drink from it, resulting in injury (Kagan *et. al*. 2014). There is contrasting data on the level of impact of solar panels on birds and none in the New Zealand context, however bird fatality detections from three solar farms in California showed rates of between 0.02 birds/ha/year to 0.6 birds/ha/year (Western Ecosystems Technology 2017). None of these studies showed high rates of water birds being adversely affected by solar panels and raptors made up only 0% to 4% of all birds impacted (Western Ecosystems Technology 2017). Only three ‘Not Threatened’ native waterbird species, namely, the pūkeko, white-faced heron and grey teal were recorded during the field survey.

Photovoltaic panels causing polarisation of light has also been thought to be an issue for wildlife, however a study in South Africa found no evidence that birds were responding to polarised light (Visser 2018). The placement of the panels proposed for this site means that there are 2 m gaps between the rows, and it is likely that this will provide enough of a visual cue for birds to be able to perceive the panels themselves and not mistake them for water or be disoriented by reflections.

Solar panels are designed to absorb light and not to reflect it, with panel arrays having a similar reflectance to still water, and less reflectance than concrete (Riley & Olsen 2011). Whether the effects of solar panel arrays are any greater than that posed by buildings has not been well studied and the overall effect of solar arrays on birds is not well understood. As the site comprises, primarily, common open country bird species, and is not located in proximity to habitats that support large water or wading bird populations, the overall risk to water birds from the panels is assessed as low. An incidental bird carcass discovery strategy has been

recommended to record whether the solar panels result in potential direct adverse effects on birds (see Table 11).

Individual exotic trees across the site will be cleared as a component of the site works. Clearance of these trees has the potential to have direct adverse effects on resident native birds if active nesting sites are disturbed or destroyed. Native birds and their active nests are protected under the Wildlife Act 1953. Although few native bird species were observed to utilise the site, if trees are to be cleared during the key bird nesting season (September to January), a pre-felling survey should also be completed to assess whether any active native bird nests are present. Active nests are those that contain eggs or chicks. If active native bird nests are identified, felling of the nest tree should be deferred until chicks have fledged or the nest fails.

The magnitude of the potential effects to birds is considered to be low and as all of the bird species at this site are common native or exotic species and the level of effect of the panel arrays on them is expected to be **very low**.

4.2.9 Effects on bats

4.2.9.1 Construction effects

As mentioned above, a number of exotic trees on site will be cleared which has the potential to have a direct adverse effect on resident bats, if bat roosting sites are disturbed. Acoustic surveys confirmed bat presence and identified several tree stands with high levels of activity. As a result, the footprint of the project has now been reduced to exclude and avoid clearing areas of 'high-risk' potential bat roost trees and two 'moderate risk' potential roost trees, which reduces the number of potential roost trees being removed.

While some trees and tree stands have been avoided, a number of 'moderate risk' bat trees will be removed under the proposal (see Table 10 for a summary of bat habitat expected to be lost across the site). As such, it is recommended that bat roost protocols (BRPs) are implemented prior to clearing/felling of appropriately sized[7] native or exotic trees (DOC, 2024)[8]. This involves pre-clearance monitoring to check whether bats are using the impacted trees and subsequent actions to ensure no harm to bats. This monitoring should follow best practise requirements outlined in the protocols for minimising the risk of felling occupied bat roosts and be outlined in a site-specific bat management plan (BMP). To further address the effects of habitat loss, the Bat Management Plan will include offset calculations to quantify habitat loss and develop an offset package aimed at achieving no net loss. This will incorporate pest animal control, targeted infill planting, and riparian and wetland restoration

[7] Trees considered high risk for potential bat roosting are those with a DBH greater than 15 cm that exhibit features such as cracks, crevices, cavities or fractured limbs, loose flaking bark, hollow trunks or branches, canopy or stem deadwood suitable for hollows, or evidence of bat use (e.g. guano, grease marks, or urine staining).

[8] Protocols for minimising the risk of felling occupied bat roosts (Bat Roost Protocols) (2024). Bat Recovery Group. https://www.doc.govt.nz/globalassets/documents/conservation/native-animals/bats/bat-recovery/protocols-minimising-risk-felling-occupied-bat-roosts.pdf

Table 10: Summary of bat habitat loss across the project site.

Habitat/Site Impact(s)	Scattered Trees (not individually assessed so conservatively classified as potential for roost habitat)	Moderate Value Exotic Dominated Areas 4,5,7,8, 9	Pasture (low value foraging habitat)
Areal extent of impact (ha):	0.44	0.93	111

4.2.9.2 Operational effects

The effects of solar panels on long-tailed bats are not currently known. Data from overseas suggests bats avoid solar farms to some extent, possibly due to the presence of solar arrays impairing bats' orientation. There is also evidence that there is the potential for collision from bats mistaking smooth, horizontal panel surfaces for water (Szabadi et al. 2023). Other studies found that while there are species-specific differences as to how bats interact with solar farms, they overall appear to negatively affect bat activity in the area (Tinsley et al. 2023).

Panels may also attract insects that bats forage on. Further investigations are needed to reveal which insect groups are attracted to solar panels at solar farms, though solar cells may be sources of polarised light which attracts flying aquatic insects (Szabadi et al. 2023). Long-tailed bats may preferentially feed on aquatic insects, especially Dipterans and Coleopterans (Ling et al. 2023). However, it is currently unknown whether insect attraction around solar panels would be a beneficial outcome for long-tailed bats with respect to insect diversity and species, or if there may be the potential for an increased predation risk around lights (Schamhart et al. 2023) or collision risk with panels.

4.2.9.3 Overall effects on bats

The effects of the solar panel construction has the potential to result in habitat loss (loss of moderate - low functional foraging, roosting and commuting habitat) and fragmentation, and direct effects from collision during operation activities. Due to the uncertainty as to the actual adverse effects on bats, the magnitude of the effect of the proposal on bats is considered moderate, resulting in an overall high level of effect, with the requirement for mitigation.

After the redesign of the footprint to avoid the high-risk roost trees and high activity areas, a draft BMP (SLR, 2026b) has been compiled to manage potential adverse effects on bats. The BMP outlines measures to avoid or minimise direct effects, including injury or mortality during construction.

The management plan also addresses the loss of low-moderate foraging areas by requiring the establishment of 6.4 ha of riparian and wetland planting to provide improved foraging habitat in the medium to long term. Planting native vegetation increases vegetation productivity, which supports higher insect abundance and biodiversity. This, in turn, improves food availability for bats, enhancing the landscape's value as a foraging habitat.

To account for the loss of moderate-value potential roost habitat, a one-hectare area will be enhanced. The enhancement will be of an area identified as having potential for roost trees close to the solar site, and includes infill planting of faster growing exotic trees, as well as suitable native species for longer term gains (Department of Conservation, 2025). Species selection will consider ecological compatibility and suitability for bat roosting. In addition to planting, roost features will be installed in the enhancement area, by using bat roost boxes and/or feature creation in existing trees.

Overall, the management approach includes avoidance of high-risk trees to retain existing high potential roosting habitat, establishment of planting that will provide future roosting and food resource opportunities, targeted predator control to improve bat survivability, installation of artificial roosts to address temporal gaps in habitat availability, and construction management measures to avoid injury or mortality. With these measures in place, a negligible magnitude of effect on bats is anticipated, resulting in an overall low level of effect with no residual effects.

4.2.10 Effects on lizards

The likelihood of native lizard presence is low within the site given the lack of suitable habitat, the regular land-use changes (grazing and maize production) as well as ongoing agricultural practices within the site. The relatively small disturbance area associated with the proposed piling, infrastructure and access road construction will result in an overall low magnitude of effect to ground-dwelling lizards, and accordingly a **very low** level of effect.

The Wildlife Act 1953 protects native skinks and geckos, meaning they cannot be collected, handled, or kept in captivity without a permit from the Department of Conservation (DOC). This protection extends to all native geckos and skinks. A permit to handle, move, or disturb any native geckos and skinks will be required if the construction works were to disturb any habitat where native skinks and geckos are present. However, given the above very low likelihood of lizard presence across the works area, a Wildlife Permit is not anticipated to be required. An incidental discovery protocol should be completed and implemented during construction.

Localised habitat improvements for lizards can be expected following establishment of the native riparian and screening planting proposed.

4.2.11 Positive effects

Enhancement and restoration measures are proposed that would result in positive outcomes from the proposed solar farm. These measures include restoring native plant communities through wetland and riparian planting, thereby increasing the overall biodiversity of these areas and likely resulting in a small increase in natural inland wetland extent over time. The riparian and wetland planting, along with planting around certain boundaries of the site with an appropriate mix of species (which includes toetoe – *Austroderia fulvida*, korokio - *Corokia cotoneaster*, kānuka – *Kunzea robusta* and harakeke – *Phormium tenax*) will enhance connectivity through the site and with the surrounding landscape. The areas earmarked for proposed restorative planting are provided in the draft Restoration and Planting Plan and include 2.38 Ha of stream edge (i.e. riparian) planting and 2.43 Ha of wetland (and wetland buffer) planting (SLR, 2025).

Finally, changing the farming system from dairy cattle to lower-intensity sheep grazing is expected to reduce the pressure on the land and impacts on downstream aquatic ecosystems and water quality through reduced losses of contaminants such as nutrients (Brown et al. 2011; PCE, 2013). Nutrient yields tend to be lower for sheep farming compared to dairy farming, especially for nitrogen (47 kg/ha/yr for dairy versus 12 kg/ha/yr for sheep), but also phosphorus (1.1 kg/ha/yr for dairy versus 0.8 kg/ha/year for sheep) (McDowell et al. 2021). Sediment losses can be higher on a national average for sheep farming; however, this is often associated with farming marginal, steep land with higher erosion potential. The project site is of flat topography, and the sediment losses compared to current farming practices, especially after planting of riparian and wetland margins, are not expected to increase in this case.

The lowered levels of nutrient losses achieved through the conversion to sheep farming in combination with riparian and wetland plantings is expected to enhance aquatic habitat values over time.

Table 11: Assessment of ecological features considering preliminary mitigation measures.

Ecological feature	Ecological Value	Effects	No Mitigation		Proposed Mitigation	With Mitigation	
			Magnitude of effect	Level of Effect		Magnitude of effect	Level of Effect
Pasture	Negligible	Vegetation and earth disturbance of areas currently under pasture to construction of access roads, solar arrays and other solar farm infrastructure.	Low	Very Low	Not required	Low	Very Low
Exotic grass dominated wetlands	Low	Local effect on vegetation and hydrology resulting from earthworks and placement of solar infrastructure within or near two small wetlands (Wetlands W02 – W03; see Appendix C).	High	Low	Not required, however: • Revegetate and restore riparian and wetland zones in line with the draft Restoration and Planting Plan (SLR, 2025).	Positive	Net Gain
		Minor indirect effects from run-off and nearby vegetation clearing are possible, no planned direct adverse effects on the wetlands within proposed planting areas (Wetlands W01, W04 – W31; see Appendix C).	Negligible	Very Low	Not required, however: • Fence off the macro channel of the Mangawhero Stream, which will include delineated wetland areas, proposed areas earmarked for riparian planting in line with requirement for bat management and within the draft Restoration and Planting Plan. • Erosion and sediment control measures will be implemented as necessary to avoid sediment discharge to the wetlands.		

Ecological feature	Ecological Value	Effects	No Mitigation		Proposed Mitigation	With Mitigation	
			Magnitude of effect	Level of Effect		Magnitude of effect	Level of Effect
					• Delineate wetland extents where close to works footprint to restrict unnecessary vehicular and pedestrian movement within these wetlands. • Remove weeds from wetland areas. • Revegetate and restore riparian zones in line with requirement for bat management and the draft Restoration and Planting Plan (SLR, 2025).		
General exotic tree cover (Incl. small stands, amenity and individual trees)	Low	Potential disturbance/loss of exotic individual trees and stands (i.e. potential bird and bat habitat).	Low	Very Low	Not required, however: • A pre-construction native bird nest survey should be completed for each tree to be removed. • The trees need to be assessed at the time of removal for risk for bat roosting. High and moderate risk roost trees should then: o Be subject to tree felling protocols for bats. o Be recorded in a project roost tree database for planting and compensation requirements. See "Bats" section for this table.	Low	Very Low
Mixed exotic tree stand (Area 1)	Moderate	Has now been removed from the footprint.	Negligible	Very Low	Not required	Negligible	Very Low

Ecological feature	Ecological Value	Effects	No Mitigation		Proposed Mitigation	With Mitigation	
			Magnitude of effect	Level of Effect		Magnitude of effect	Level of Effect
Barberry hedgerows	Negligible	Potential vegetation disturbance/loss of areas currently planted as hedgerows	Low	Very Low	Not required	Low	Very Low
Riparian vegetation associated with streams	Low	Local impact on vegetation and stream bank stability during culvert implementation or if arrays are placed near channel. Erosion of banks and sedimentation of watercourses if construction activities are nearby.	Low	Very Low	Not required, however: • Implement erosion and sediment control and stormwater management, as mentioned in Section 4.2.2., above. • Fence off stream areas. • Remove any weeds from riparian zones. • Revegetate and restore riparian zones in line with requirement for bat management and the draft Restoration and Planting Plan (SLR, 2025).	Positive	Net Gain
Bats	Very High	Mortality / injury to bats relating to potential tree clearing and additional construction works. Loss of low-moderate foraging habitat, and potential roost trees. Artificial light at night associated with infrastructure, potentially	Moderate	High	• Implement all construction and effects management within the site-specific Bat Management Plan (SLR, 2026b). • Vegetation removal protocols (VRPs) must be implemented for each tree to be removed. This task involves rating the tree for risk of roost potential and then running through the appropriate bat management protocols as required.	Negligible	Low

Ecological feature	Ecological Value	Effects	No Mitigation		Proposed Mitigation	With Mitigation	
			Magnitude of effect	Level of Effect		Magnitude of effect	Level of Effect
		altering usual bat behaviour.			• Where additional trees are rated through the construction timeline, these will be added to the Potential Bat Roost Trees Inventory. See Appendix C of the SLR BMP for the inventory. • Restoration of wetland areas and 10m riparian setback, including predator control, which will be extended across the site. • Enhancement of a 1 ha area/s that have potential roosts trees and can be infill planted with appropriate fast growing exotics, and native species. • A minimum replacement ratio of 1:5 for any lost actual (i.e. bats are found within the roost at the time of protocol implementation) roost habitat shall be achieved within the same construction phase. This replacement shall explicitly account for time lags associated with tree establishment and development and therefore is not intended to be a tree-for-tree replacement.		
Birds	Low	Bird mortality / injury relating to earthworks, vegetation clearing, general plant movement and	Low	Very Low	Not required, however, • A pre-felling active native bird nest survey should be completed for each tree to be removed.	Low	Very Low

Ecological feature	Ecological Value	Effects	No Mitigation		Proposed Mitigation	With Mitigation	
			Magnitude of effect	Level of Effect		Magnitude of effect	Level of Effect

		potential collision with solar panels.
		Noise and vibration disturbance from construction and inverters, reducing habitat suitability for birds.
					• An incidental bird carcass discovery strategy is recommended to ascertain the effects on birds, which should include information on:
					  • The species and number of dead / injured birds, along with date, time, location and information on injuries.
					  • Dead / injured Threatened or At-Risk species that are discovered. These should reported to DOC who may wish to inspect carcasses and can give advice on where injured birds can be taken.
					  • A summary of bird strikes, which should be kept by the solar farm operator should they be required to be inspected by the consenting authority or DOC.		

Lizards	Low	Mortality / injury to lizards relating to earthworks, vegetation clearing and general plant movement. Noise and vibration disturbance, reducing habitat suitability for lizards.	Low	Very Low	• An incidental discovery protocol for lizards, in line with Wildlife Act provisions, should be compiled and implemented during construction.	Low	Very Low

Ecological feature	Ecological Value	Effects	No Mitigation		Proposed Mitigation	With Mitigation	
			Magnitude of effect	Level of Effect		Magnitude of effect	Level of Effect
Fish	High	Fish habitat degradation due to increased turbidity of watercourses related to potential sediment run-off from construction. Construction effects during instream works, including sediment discharge to downstream receiving environments and fish kills from direct effects and/or dewatering. Potential for the formation of fish passage barriers from culvert installation resulting in a reduction in habitat availability	Moderate	High	• Avoid unnecessary machine tracking and vehicular movement in watercourses by making use of existing bridges and crossings. • Implement erosion and sediment control measures, as mentioned in section 4.2.2., above. • Implement restorative riparian planting alongside both the Mangawhero Stream and the unnamed tributary. Fence off these areas to exclude stock. • Ensure works methodologies specify instream works undertaken in isolated reaches to avoid sediment discharge to receiving environments. • Undertake salvage and relocation of native fish species from isolated works reaches, prior to and/or during dewatering. • Ensure new culvert design and installation is undertaken in line with WRC and NES-F requirements to maintain or provide fish passage, in locations where habitats for fish are present upstream.	Low	Low

5.0 Summary

Harmony Energy NZ #6 Limited is proposing the development of a ~70 MW AC/100 MW DC solar farm at the corner of State Highway 29 and State Highway 27 near Hinuera, within the Matamata – Piako District. This assessment of ecological effects was prepared to inform a resource consent application for the solar farm establishment, and relates to the construction, operation and decommissioning of the proposed solar farm at the site.

The site has been predominately under pasture since at least 1943 and generally has a very gently sloping topography that drains in a northerly direction. Additional terrestrial vegetation within the site comprised individual exotic trees, exotic tree stands, hedgerows and secondary wetland vegetation. Only common open country bird species were seen or heard on site, and it was considered unlikely that native lizards, such as copper skink, are present in high densities due to the rarity of suitable habitat on site. Notably, New Zealand long-tailed bats were recorded within the site, most commonly at an exotic tree stand during the six-week acoustic sampling period during winter of 2023 and during the 18-night sampling period in spring 2025.

No active fish or macroinvertebrate sampling was undertaken on site, however, eDNA sampling indicated the presence of the ‘At Risk’ longfin eel together with a small number of other common native and introduced fish species.

The ecological values of most habitat features on this site were assessed as ‘Negligible’ to ‘Low’ based on the predominate rural land cover, which was pasture used for cattle grazing. Exotic trees and hedgerows provided minor areas of refuge for terrestrial fauna and comprised no native species. Wetlands were present scattered through the site and, although a nationally under-represented ecosystem, comprised degraded features with primarily secondary exotic grassland vegetation. An exotic tree stand on the site identified as ‘Area 1’ was identified as having ‘Moderate’ ecological value and meets the criteria for a locally significant habitat under the Waikato Regional Policy Statement on the basis that it may provide roost trees for the Threatened: Nationally Critical longtail bat.

The ecological value of native species ranged from ‘low’ to ‘very high’, which is primarily based on the detection and threat status of respective faunal species.

When demonstrating avoidance, potential high value roost habitats for bats (identified through visible roost features and from bat activity recorded through acoustic monitoring) have now been removed from the project footprint. In addition, two areas of moderate value potential roost tree habitat as well as 29 of the 31 natural inland wetlands, have also been removed from the impact zone.

Potential adverse ecological effects associated with the proposed solar farm are construction works that have the potential to injure or kill native fauna, the potential loss of two small low value wetland habitats, the potential loss of up to 20 m of open stream extent to two new culverts, the removal of moderate – low potential bat roost habitat, the loss of moderate – low functional foraging and commuting bat habitat, stormwater run-off from newly created structures, and fish passage effects associated with on-site infrastructure.

Overall, after mitigation measures proposed within this EcIA and the subsequent fauna management and restoration plans, the level of effects was assessed as ‘Low / Very Low’ for the ecological features affected.

A number of positive effects are expected to occur as a result of proposed enhancement and restoration measures, as outlined in the draft Restoration and Planting Plan. While small areas of natural inland wetland and stream extents may be lost, the extent of enhancement proposed would result in an ecological ‘Net Gain’ for the site.

6.0 Closure

We trust you will find the above in order, should there be any queries regarding the findings kindly contact the author on [redacted]

Sincerely,

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Appendix A General Arrangement of Proposed Solar Farm

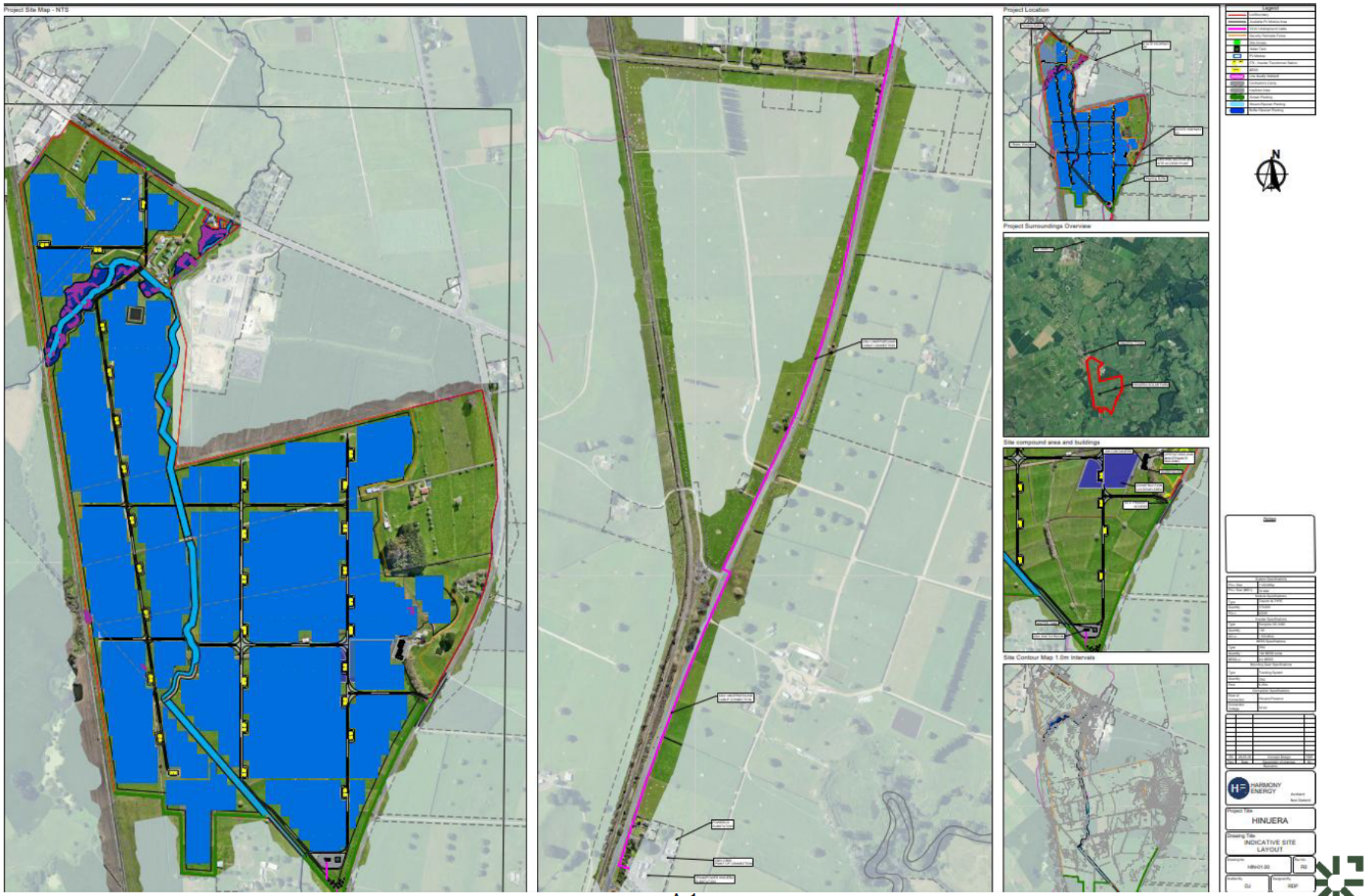
Ecological Impact Assessment

Harmony Hinuera Solar Farm

Harmony Energy NZ #6 Limited

SLR Project No.: 880.016894.00001

23 June 2026


Project Site Map - NTS
Project Location
Project Surroundings Overview
Site compound area and buildings
Site Contour Map 1.0m Intervals
HARMONY ENERGY
HINUERA
INDICATIVE SITE LAYOUT

Appendix B Basic Wetland Delineation Plot Data

Ecological Impact Assessment

Harmony Hinuera Solar Farm

Harmony Energy NZ #6 Limited

SLR Project No.: 880.016894.00001

23 June 2026

Plot No.	Coordinates		Plot Results
	NZTM	DMS	
P01	1843536E, 5801565N	37°54'3.17"S, 175°46'11.48"E	Non-Wetland / Pasture Exclusion
P02	1843029E, 5801643N	37°54'1.12"S, 175°45'50.64"E	Non-Wetland / Pasture Exclusion
P03	1843122E, 5801956N	37°53'50.89"S, 175°45'54.06"E	Wetland
P04	1842915E, 5803005N	37°53'17.10"S, 175°45'44.33"E	Non-Wetland / Pasture Exclusion
P05	1842932E, 5803008N	37°53'16.96"S, 175°45'45.02"E	Wetland

Photo 6: (O-P) Wetland vegetation plots considered during the site assessment.

Photo O: Example of plot placement within an area of wet pasture. Note the pugging and standing water nearby, however exotic pasture grasses were dominant.

Photo P: Plot placement within an area dominated by FACW species, meeting the threshold for hydrophytic vegetation indicators on both the prevalence and dominance indexes.

Appendix C Wetland Plots Overview Map

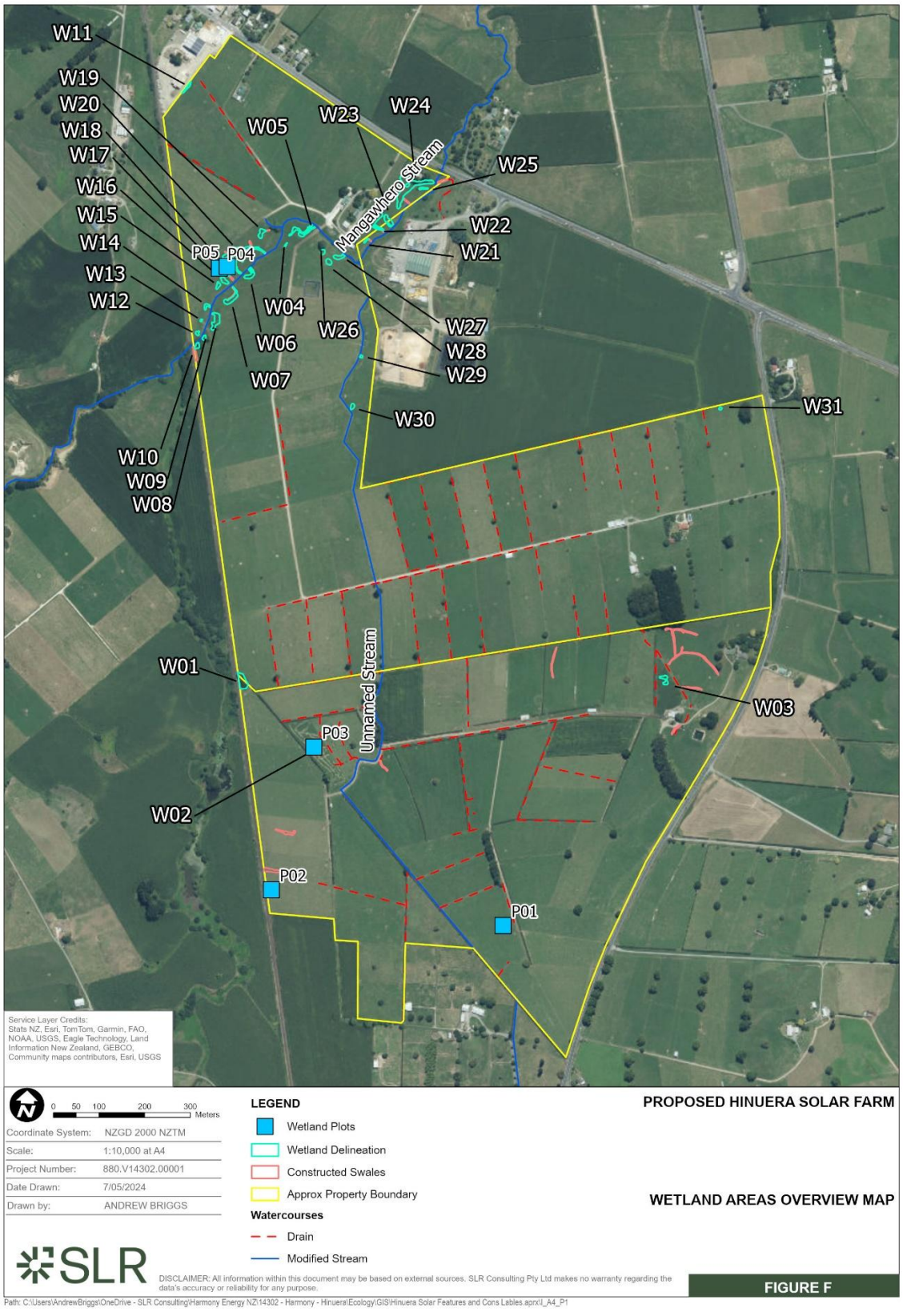
Ecological Impact Assessment

Harmony Hinuera Solar Farm

Harmony Energy NZ #6 Limited

SLR Project No.: 880.016894.00001

23 June 2026


W11
W19
W20
W18
W17
W16
W15
W14
W13
W12
W05
W23
W24
W25
Mangawhero Stream
W22
W21
P05
P04
W04
W26
W27
W28
W29
W06
W07
W30
W31
W10
W09
W08
W01
Unnamed Stream
W03
P03
W02
P02
P01
Service Layer Credits: Stats NZ, Esri, TomTom, Garmin, FAO, NOAA, USGS, Eagle Technology, Land Information New Zealand, GEBCO, Community maps contributors, Esri, USGS
0 50 100 200 300 Meters
Coordinate System: NZGD 2000 NZTM
Scale: 1:10,000 at A4
Project Number: 880.V14302.00001
Date Drawn: 7/05/2024
Drawn by: ANDREW BRIGGS
LEGEND
Wetland Plots
Wetland Delineation
Constructed Swales
Approx Property Boundary
Watercourses
Drain
Modified Stream
PROPOSED HINUERA SOLAR FARM
WETLAND AREAS OVERVIEW MAP
SLR
DISCLAIMER: All information within this document may be based on external sources. SLR Consulting Pty Ltd makes no warranty regarding the data's accuracy or reliability for any purpose.
FIGURE F
Path: C:\Users\AndrewBriggs\OneDrive - SLR Consulting\Harmony Energy NZ\14302 - Harmony - Hinuera\Ecology\GIS\Hinuera Solar Features and Cons Lables.aprx\l_A4_P1

Appendix D Individual Wetland Characteristics Table

Ecological Impact Assessment

Harmony Hinuera Solar Farm

Harmony Energy NZ #6 Limited

SLR Project No.: 880.016894.00001

23 June 2026

Wetland Identifier	Location	Hydrosystem and Class	Form	Primary Vegetation Structure	Composition and Description	Total Area m² (area outside of legal boundary)	Plot	Rapid Test	Dominance Test	Prevalence Test	Planned Works – Within or Within 10 m	Potential Effects
W01	Western extent of parcel	Palustrine Swamp	Channel	Grassland / Sedgeland	[*Phormium tenax*] – [*Salix cinerea*] – [*Populus spp.*] – [*Salix matsudana*] / *Carex geminata* – *Lolium arundinaceum* grass swamp. Small wetland area within a cut off section of a wider elongated wetland / stream complex. Railway built through wetland area. Open water within the wetland surrounded by marginal herbaceous vegetation and a mix of native / exotic woody species. Duckweed (*Lemna* spp.) present on open water surface.	504 (0)	No	Pass	Pass (from cover estimates)	Pass (from cover estimates)	No construction works proposed – allow for 10m buffer for the erection of panels.	No direct effects, indirect effects highly unlikely.
W02	Within development area	Palustrine Marsh	Flat	Hygrophilous Grassland	*Agrostis stolonifera* – (*Ranunculus repens)* grass marsh. Small wetland dominated by grasses and herbaceous vegetation within low-lying area, surrounded by pasture. Open water and bare mud also present.	99 (0)	Yes	Uncertain	Pass	Pass	Panel erection and cabling	Direct effects likely, potential for full or partial drainage due construction of roads / hard infrastructure in vicinity of wetland.
W03	Within development area	Palustrine Marsh	Flat	Herbfield	*Ranunculus sceleratus* – (*Lolium spp.*) herb marsh Small wetland area within disturbed pasture area. Evidence of recent use as a maize field (short stalks present). Open water and bare mud also present.	174(0)	No	Pass	Pass (from cover estimates)	Pass (from cover estimates)	Panel erection and cabling	Direct effects likely, potential for full or partial drainage due construction of roads / hard infrastructure in vicinity of wetland.
W04	Adjacent to Mangawhero Stream, within restoration area	Palustrine Marsh	Floodplain	Hygrophilous Grassland	*A. stolonifera* – *Glyceria maxima* grass marsh Narrow wetland area near Mangawhero Stream, within macro channel. 20 m² within proposed restoration area.	20(0)	No	Pass	Pass (from cover estimates)	Pass (from cover estimates)	No construction works proposed. A planned restoration area.	Positive effects.
W05	Adjacent to Mangawhero Stream, within restoration area	Palustrine Marsh	Floodplain	Hygrophilous Grassland	*G. maxima* – *A. stolonifera* grass marsh Wetland located within the macro channel of the Mangawhero Stream. Minor swale has been excavated within former wetland extent and is excluded from delineation. 373 m² within proposed restoration area.	373(0)	No	Pass	Pass (from cover estimates)	Pass (from cover estimates)	No construction works proposed. A planned restoration area.	Positive effects.
W06	Adjacent to Mangawhero Stream, within restoration area	Palustrine Marsh	Floodplain	Hygrophilous Grassland	*G. maxima* grass marsh Wetland located within the macro channel of the Mangawhero Stream. Minor swale has been excavated within former wetland extent and is excluded from delineation. 217 m² within proposed restoration area.	217(0)	No	Pass	Pass (from cover estimates)	Pass (from cover estimates)	No construction works proposed. A planned restoration area.	Positive effects.
W07	Adjacent to Mangawhero Stream, within restoration area	Palustrine Marsh	Floodplain	Hygrophilous Grassland	*G. maxima* – (*A. stolonifera*) – (*Glyceria declinata*) grass marsh	322(0)	No	Pass	Pass (from cover estimates)	Pass (from cover estimates)	No construction works proposed. A	Positive effects.

Wetland Identifier	Location	Hydrosystem and Class	Form	Primary Vegetation Structure	Composition and Description	Total Area m² (area outside of legal boundary)	Plot	Rapid Test	Dominance Test	Prevalence Test	Planned Works – Within or Within 10 m	Potential Effects
					Wetland located within the macro channel of the Mangawhero Stream. Minor swale has been excavated within former wetland extent and is excluded from delineation. Seepage from bank evident. 322 m² within proposed restoration area.						planned restoration area.	
W08	Adjacent to Mangawhero Stream, within restoration area	Palustrine Marsh	Floodplain	Hygrophilous Grassland	*G. maxima* – (*Persicaria* spp.) grass marsh Wetland located within the macro channel of the Mangawhero Stream. 399 m² within proposed restoration area.	399(0)	No	Pass	Pass (from cover estimates)	Pass (from cover estimates)	No construction works proposed. A planned restoration area.	Positive effects.
W09	Adjacent to Mangawhero Stream, within restoration area	Palustrine Seepage	Slope	Hygrophilous Grassland	*G. maxima – R. repens – (Dactylis glomerata)* grass seepage; palustrine. Small seepage wetland located within the macro channel of the Mangawhero Stream. 59 m² within proposed restoration area.	59(0)	No	Pass	Pass (from cover estimates)	Pass (from cover estimates)	No construction works proposed. A planned restoration area.	Positive effects.
W10	Adjacent to Mangawhero Stream, within restoration area	Palustrine Marsh	Floodplain	Hygrophilous Grassland	*G. maxima – G. declinata – Paspalum distichum* grass marsh Wetland located within the macro channel of the Mangawhero Stream. Minor swale has been excavated within former wetland extent and is excluded from delineation. 97 m² within proposed restoration area.	97(0)	No	Pass	Pass (from cover estimates)	Pass (from cover estimates)	No construction works proposed. A planned restoration area.	Positive effects.
W11	Adjacent to Mangawhero Stream, within restoration area	Palustrine Marsh	Flat	Hygrophilous Grassland	*P. distichum* grass marsh. Small wetland dominated by FACW grass within a low-lying area, surrounded by pasture. Appears to have formed adjacent to fill material associated with a platform.	88(0)	No	Pass	Pass (from cover estimates)	Pass (from cover estimates)	No construction works proposed – allow for 10m buffer for the erection of panels.	No direct effects, indirect effects highly unlikely.
W12	Adjacent to Mangawhero Stream, within restoration area	Palustrine Marsh	Floodplain	Hygrophilous Grassland	*P. distichum* grass marsh Small wetland located within the macro channel of the Mangawhero Stream. 57 m² within proposed restoration area.	57(0)	No	Pass	Pass (from cover estimates)	Pass (from cover estimates)	No construction works proposed. A planned restoration area.	Positive effects.
W13	Adjacent to Mangawhero Stream, within restoration area	Palustrine Marsh	Floodplain	Hygrophilous Grassland	*P. distichum* grass marsh Small wetland located within the macro channel of the Mangawhero Stream. 18 m² within proposed restoration area.	18(0)	No	Pass	Pass (from cover estimates)	Pass (from cover estimates)	No construction works proposed. A planned restoration area.	Positive effects.

Wetland Identifier	Location	Hydrosystem and Class	Form	Primary Vegetation Structure	Composition and Description	Total Area m² (area outside of legal boundary)	Plot	Rapid Test	Dominance Test	Prevalence Test	Planned Works – Within or Within 10 m	Potential Effects
W14	Adjacent to Mangawhero Stream, within restoration area	Palustrine Marsh	Floodplain	Hygrophilous Grassland	*G. maxima – G. declinata – P. distichum* grass marsh Wetland located within the macro channel of the Mangawhero Stream. 82 m² within proposed restoration area.	82(0)	No	Pass	Pass (from cover estimates)	Pass (from cover estimates)	No construction works proposed. A planned restoration area.	Positive effects.
W15	Adjacent to Mangawhero Stream, within restoration area	Palustrine Marsh	Floodplain	Hygrophilous Grassland	*A. stolonifera – G. declinata – P. distichum* grass marsh Wetland located within the macro channel of the Mangawhero Stream. 86 m² within proposed restoration area.	86(0)	No	Pass	Pass (from cover estimates)	Pass (from cover estimates)	No construction works proposed. A planned restoration area.	Positive effects.
W16	Adjacent to Mangawhero Stream, within restoration area	Palustrine Marsh	Floodplain	Hygrophilous Grassland	*G. maxima* grass marsh Wetland located within the macro channel of the Mangawhero Stream. 146 m² within proposed restoration area.	146(0)	No	Pass	Pass (from cover estimates)	Pass (from cover estimates)	No construction works proposed. A planned restoration area.	Positive effects.
W17	Adjacent to Mangawhero Stream, within restoration area	Palustrine Marsh	Floodplain	Hygrophilous Grassland	*G. maxima* grass marsh Wetland located within the macro channel of the Mangawhero Stream. Minor swale has been excavated within former wetland extent and is excluded from delineation. 98 m² within proposed restoration area.	98(0)	No	Pass	Pass (from cover estimates)	Pass (from cover estimates)	No construction works proposed. A planned restoration area.	Positive effects.
W18	Adjacent to Mangawhero Stream, within restoration area	Palustrine Marsh	Floodplain	Hygrophilous Grassland	*G. declinata – G. maxima* grass marsh Wetland located within the macro channel of the Mangawhero Stream. 38 m² within proposed restoration area.	38(0)	Yes	Uncertain	Pass	Pass	No construction works proposed. A planned restoration area.	Positive effects.
W19	Adjacent to Mangawhero Stream, within restoration area	Palustrine Marsh	Floodplain	Hygrophilous Grassland	*G. maxima – G. declinata – P. distichum* grass marsh Wetland located within the macro channel of the Mangawhero Stream. Minor swale has been excavated within former wetland extent and is excluded from delineation. 167 m² within proposed restoration area.	167(0)	No	Pass	Pass (from cover estimates)	Pass (from cover estimates)	No construction works proposed. A planned restoration area.	Positive effects.
W20	Adjacent to Mangawhero Stream, within restoration area	Palustrine Marsh	Floodplain	Hygrophilous Grassland	*G. maxima – G. declinata – A. stolonifera* grass marsh Wetland located within the macro channel of the Mangawhero Stream. Multiple swales excavated within former wetland extent and is excluded from delineation. 1181 m² within proposed restoration area.	1181(0)	No	Pass	Pass (from cover estimates)	Pass (from cover estimates)	No construction works proposed. A planned restoration area.	Positive effects.

Wetland Identifier	Location	Hydrosystem and Class	Form	Primary Vegetation Structure	Composition and Description	Total Area m² (area outside of legal boundary)	Plot	Rapid Test	Dominance Test	Prevalence Test	Planned Works – Within or Within 10 m	Potential Effects
W21	Located on adjacent legal parcel	Palustrine Marsh	Floodplain	Hygrophilous Grassland	*P. distichum* grass marsh Wetland located within the macro channel of the Mangawhero Stream. Minor swale has been excavated within former wetland extent and is excluded from delineation. 30 m² within proposed restoration area.	30 (30)	No	Pass	Pass (from cover estimates)	Pass (from cover estimates)	No construction works proposed. A planned restoration area.	Positive effects.
W22	Adjacent to Mangawhero Stream, within restoration area, partially on adjacent legal parcel.	Palustrine Marsh	Floodplain	Hygrophilous Grassland	*G. maxima* grass marsh Wetland located within the macro channel of the Mangawhero Stream. Minor swale has been excavated within former wetland extent and is excluded from delineation. Seepage from bank evident. 593 m² within proposed restoration area.	593 (28)	No	Pass	Pass (from cover estimates)	Pass (from cover estimates)	No construction works proposed. A planned restoration area.	Positive effects.
W23	Adjacent to Mangawhero Stream, within restoration area, partially on adjacent legal parcel.	Palustrine Marsh	Floodplain	Hygrophilous Grassland	*A. stolonifera* grass marsh Wetland located within the macro channel of the Mangawhero Stream. Minor swale has been excavated within former wetland extent and is excluded from delineation. 240 m² within proposed restoration area.	240 (111)	No	Pass	Pass (from cover estimates)	Pass (from cover estimates)	No construction works proposed. A planned restoration area.	Positive effects.
W24	Adjacent to Mangawhero Stream, within restoration area	Palustrine Marsh	Floodplain	Hygrophilous Grassland	*G. maxima – A. stolonifera* grass marsh Wetland located within the macro channel of the Mangawhero Stream. Minor swale has been excavated within former wetland extent and is excluded from delineation. Seepage from bank evident. 1421 m² within proposed restoration area.	1421(0)	No	Pass	Pass (from cover estimates)	Pass (from cover estimates)	No construction works proposed. A planned restoration area.	Positive effects.
W25	Adjacent to Mangawhero Stream, within restoration area	Palustrine Marsh	Floodplain	Herbfield	*Persicaria spp. – G. maxima* herb marsh; palustrine Wetland located within the macro channel of the Mangawhero Stream. 64 m² within proposed restoration area.	64(0)	No	Pass	Pass (from cover estimates)	Pass (from cover estimates)	No construction works proposed. A planned restoration area.	Positive effects.
W26	Northern extent of parcel	Palustrine Marsh	Floodplain	Hygrophilous Grassland	*G. maxima grass* marsh Wetland located within the macro channel of the Mangawhero Stream. 86 m² within proposed restoration area.	86(0)	No	Pass	Pass (from cover estimates)	Pass (from cover estimates)	No construction works proposed. A planned restoration area.	Positive effects.
W27	Northern extent of parcel	Palustrine Marsh	Floodplain	Hygrophilous Grassland	*G. maxima grass* marsh Wetland located within the macro channel of the Mangawhero Stream.	166(0)	No	Pass	Pass (from cover estimates)	Pass (from cover estimates)	No construction works proposed. A planned	Positive effects.

Wetland Identifier	Location	Hydrosystem and Class	Form	Primary Vegetation Structure	Composition and Description	Total Area m² (area outside of legal boundary)	Plot	Rapid Test	Dominance Test	Prevalence Test	Planned Works – Within or Within 10 m	Potential Effects
					166 m² within proposed restoration area.						restoration area.	
W28	Northern extent of parcel	Palustrine Marsh	Floodplain	Hygrophilous Grassland	*G. maxima* grass marsh Wetland located within the macro channel of the Mangawhero Stream. 122 m² within proposed restoration area.	122(0)	No	Pass	Pass (from cover estimates)	Pass (from cover estimates)	No construction works proposed. A planned restoration area.	Positive effects.
W29	East of the unnamed stream, between stream and legal boundary	Palustrine Marsh	Floodplain	Hygrophilous Grassland	*G. declinata* grass marsh Wetland located within the macro channel of the unnamed tributary of the Mangawhero Stream. High intensity pugging and small areas of standing water noted. 26 m² within proposed restoration area.	26(0)	No	Pass	Pass (from cover estimates)	Pass (from cover estimates)	No construction works proposed. A planned restoration area.	Positive effects.
W30	East of the unnamed stream, between stream and legal boundary	Palustrine Marsh	Floodplain	Hygrophilous Grassland	*G. declinata* grass marsh Wetland located within the macro channel of the unnamed tributary of the Mangawhero Stream. High intensity pugging and small areas of standing water noted. 40 m² within proposed restoration area.	81(0)	No	Pass	Pass (from cover estimates)	Pass (from cover estimates)	No construction works proposed. Partially within a planned restoration area.	Positive effects.
W31	Not in development area	Palustrine Marsh	Flat	Hygrophilous Grassland	*A. stolonifera* grass marsh Small wetland dominated by FACW grass within low-lying area, surrounded by pasture.	29(0)	No	Pass	Pass (from cover estimates)	Pass (from cover estimates)	No construction works proposed	No direct or indirect effects anticipated.

Appendix E Full Bird Species List

Ecological Impact Assessment

Harmony Hinuera Solar Farm

Harmony Energy NZ #6 Limited

SLR Project No.: 880.016894.00001

23 June 2026

Common name	Scientific name	Threat status (Robertson et al. 2021)	Nearby records		
			eBird (within 10km)	Proposed Solar Farm Site Observations	eDNA Sample (21st June 2023)
Australasian shoveler | Kuruwhengi	*Spatula rhynchotis*	Not Threatened	X		
Australian coot	*Fulica atra*	At Risk: Naturally Uncommon	X		
Australian magpie | Makipai	*Gymnorhina tibicen*	Introduced: Naturalised	X	X	X
Barbary dove	*Streptopelia roseogrisea* var. *risoria*	Introduced: Naturalised	X		
Bellbird | Korimako	*Anthornis melanura*	Not Threatened	X		
Black shag | Māpunga	*Phalacrocorax carbo*	At Risk: Relict	X		
Black swan | Kakīānau	*Cygnus atratus*	Introduced: Naturalised	X		
California quail | Tikaokao	*Callipepla californica*	Introduced: Naturalised	X		
Canada goose | Kuihi	*Branta canadensis*	Introduced: Naturalised	X		
Chaffinch | Pahirini	*Fringilla coelebs*	Introduced: Naturalised	X		
Common myna | Maina	*Acridotheres tristis*	Introduced: Naturalised	X	X	
Common starling | Tāringi	*Sturnus vulgaris*	Introduced: Naturalised	X	X	
Dunnock	*Prunella modularis*	Introduced: Naturalised	X		
Eastern rosella | Kākā uhi whero	*Platycercus eximius*	Introduced: Naturalised	X	X	
Eurasian blackbird | Manu pango	*Turdus merula*	Introduced: Naturalised	X	X	
Eurasian skylark | Kairaka	*Alauda arvensis*	Introduced: Naturalised	X	X	
European goldfinch | Kōurarini	*Carduelis carduelis*	Introduced: Naturalised	X	X	
European greenfinch	*Chloris chloris*	Introduced: Naturalised	X	X	
Grey duck | Pārera	*Anas superciliosa*	Threatened: Nationally Vulnerable	X		
Grey teal | Tētē-moroiti	*Anas gracilis*	Not Threatened	X		X
Grey warbler | Riroriro	*Gerygone igata*	Not Threatened	X	X	
House sparrow | Tiu	*Passer domesticus*	Introduced: Naturalised	X	X	
Redpoll	*Acanthis cabaret*	Introduced: Naturalised	X		
Little black shag | Kawau tūī	*Phalacrocorax sulcirostris*	At Risk: Naturally Uncommon	X		
Little shag | Kawaupaka	*Microcarbo melanoleucos*	At Risk: Relict	X		
Domestic Mallard	*Anas platyrhynchos domesticus*	N/A		X	
Mallard | Rakiraki	*Anas platyrhynchos*	Introduced: Naturalised	X	X	X
New Zealand falcon | Kārearea	*Falco novaeseelandiae*	Threatened: Nationally Vulnerable	X		
New Zealand fantail | Pīwakawaka	*Rhipidura fuliginosa*	Not Threatened	X	X	
New Zealand dabchick | Weweia	*Poliocephalus rufopectus*	Threatened: Nationally Increasing	X		
New Zealand pigeon | Kererū	*Hemiphaga novaeseelandiae*	Not Threatened	X		
New Zealand pipit | Pīhoihoi	*Anthus novaeseelandiae*	At Risk: Declining	X		
New Zealand scaup | Pāpango	*Aythya novaeseelandiae*	Not Threatened	X		

North Island robin | Toutouwai	*Petroica longipes*	At Risk: Declining	X		
Paradise shelduck | Pūtangitangi	*Tadorna variegata*	Not Threatened	X		
Pied shag | Kāruhiruhi	*Phalacrocorax varius*	At Risk: Recovering	X		
Pied stilt | Poaka	*Himantopus leucocephalus*	Not Threatened	X		
Pukeko	*Porphyrio melanotus*	Not Threatened	X	X	X
Rock pigeon | Kererū aropari	*Columba livia*	Introduced: Naturalised	X	X	
Sacred kingfisher | Kōtare	*Todiramphus sanctus*	Not Threatened	X	X	
Shining cuckoo | Pīpīwharauroa	*Chrysococcyx lucidus*	Not Threatened	X		
Silvereye	*Zosterops lateralis*	Not Threatened	X	X	
Song thrush | Manu-kai-hua-rakau	*Turdus philomelos*	Introduced: Naturalised	X		
Southern black-backed gull | Karoro	*Larus dominicanus*	Not Threatened	X		
Spur-winged plover	*Vanellus miles*	Not Threatened	X	X	
Swamp harrier | Kāhu	*Circus approximans*	Not Threatened	X	X	
Tomtit | Miromiro	*Petroica macrocephala*	Not Threatened	X		
Tui	*Prosthemadera novaeseelandiae*	Not Threatened	X		
Welcome swallow | Warou	*Hirundo neoxena*	Not Threatened	X	X	X
White-faced heron | Matuku moana	*Egretta novaehollandiae*	Not Threatened	X	X	
Yellowhammer | Hurukōwhai	*Emberiza citrinella*	Introduced: Naturalised	X	X	
Wild turkey | Korukoru	*Meleagris gallopavo*	Introduced: Naturalised	X		

Appendix F Waikato Regional Policy Statement: Section 11A – Criteria for Determining Significance of Indigenous Biodiversity

Ecological Impact Assessment

Harmony Hinuera Solar Farm

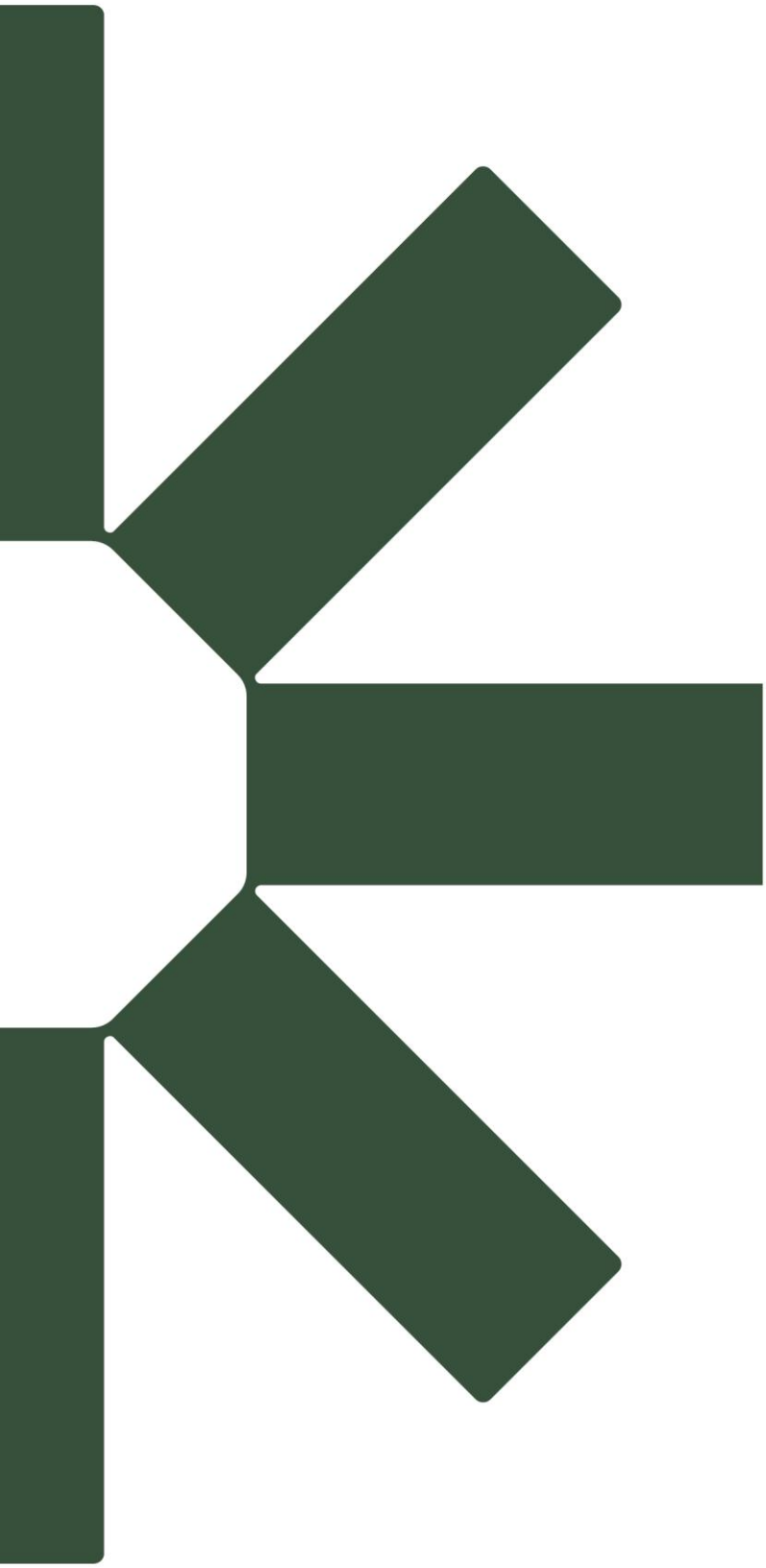
Harmony Energy NZ #6 Limited

SLR Project No.: 880.016894.00001

23 June 2026

Previously assessed site	
1	It is indigenous vegetation or habitat for indigenous fauna that is currently, or is recommended to be, set aside by statute or covenant or by the Nature Heritage Fund, or Ngā Whenua Rāhui committees, or the Queen Elizabeth the Second National Trust Board of Directors, specifically for the protection of biodiversity, and meets at least one of criteria 3-11.
Ecological values	
2	In the Coastal Marine Area, it is indigenous vegetation or habitat for indigenous fauna that has reduced in extent or degraded due to historic or present anthropogenic activity to a level where the ecological sustainability of the ecosystem is threatened.
3	It is vegetation or habitat that is currently habitat for indigenous species or associations of indigenous species that are: • classed as threatened or at risk, or • endemic to the Waikato Region, or • at the limit of their natural range.
4	It is indigenous vegetation, habitat or ecosystem type that is under-represented (20% or less of its known or likely original extent remaining) in an Ecological District, or Ecological Region, or nationally.
5	It is indigenous vegetation or habitat that is, and prior to human settlement was, nationally uncommon such as geothermal, chenier plain, or karst ecosystems, hydrothermal vents or cold seeps.
6	It is wetland habitat for indigenous plant communities and/or indigenous fauna communities (excluding exotic rush/pasture communities) that has not been created and subsequently maintained for or in connection with: • waste treatment; • wastewater renovation; • hydro electric power lakes (excluding Lake Taupō); • water storage for irrigation; or • water supply storage; unless in those instances they meet the criteria in Whaley et al. (1995).
7	It is an area of indigenous vegetation or naturally occurring habitat that is large relative to other examples in the Waikato region of similar habitat types, and which contains all or almost all indigenous species typical of that habitat type. Note this criterion is not intended to select the largest example only in the Waikato region of any habitat type.
8	It is aquatic habitat (excluding artificial water bodies, except for those created for the maintenance and enhancement of biodiversity or as mitigation as part of a consented activity) that is within a stream, river, lake, groundwater system, wetland, intertidal mudflat or estuary, or any other part of the coastal marine area and their margins, that is critical to the self -sustainability of an indigenous species within a catchment of the Waikato region, or within the coastal marine area. In this context "critical" means essential for a specific component of the life cycle and includes breeding and spawning grounds, juvenile nursery areas, important feeding areas and migratory and dispersal pathways of an indigenous species. This includes areas that maintain connectivity between habitats.

9	It is an area of indigenous vegetation or habitat that is a healthy and representative example of its type because: • its structure, composition, and ecological processes are largely intact; and • if protected from the adverse effects of plant and animal pests and of adjacent land and water use (e.g. stock, discharges, erosion, sediment disturbance), can maintain its ecological sustainability over time.
10	It is an area of indigenous vegetation or habitat that forms part of an ecological sequence, that is either not common in the Waikato region or an ecological district, or is an exceptional, representative example of its type.
Role in protecting ecologically significant area	
11	It is an area of indigenous vegetation or habitat for indigenous species (which habitat is either naturally occurring or has been established as a mitigation measure) that forms, either on its own or in combination with other similar areas, an ecological buffer, linkage or corridor and which is necessary to protect any site identified as significant under criteria 1-10 from external adverse effects.



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