

Meridian Energy Ltd
Proposed Ruakaka
Solar Park

– Ecological Review –



Meridian Energy Ltd Proposed Ruakaka Solar Park (APP.045014.01.01) – Ecological Review

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A handwritten signature in black ink on a light green rectangular background. The signature reads "Jack Warden".

04/07/2024
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1.0 INTRODUCTION

My full name is Jack Oliver Warden. I am a Senior Ecologist and Restoration Manager at Rural Design 1984 Ltd (RDL). I hold a Bachelor of Applied Science (BASC) in Biodiversity Management from Unitec.

I have 8 years' experience as an ecologist and ecological consultant. I am a skilled botanist and have over 8 years of experience working in environmental restoration and ecological consultancy settings. Currently, I work on a range of ecological assessments for both public and private organisations, and am well versed in local, regional and national planning matters and the Resource Management Act. I have experience working within both terrestrial and aquatic environments and I specialise in detailed botanical surveys and wetland delineation assessments. Through Manaaki Whenua, I contributed to the development and in-situ testing of the NZ Wetland Delineation - Vegetation Tool and Pasture Exclusion Assessment methodology in Northland. I also tested determining the indicator status of many wetland and non-wetland plant species.

On the 1st of September 2023, RDL was engaged to undertake an Ecological Peer Review on behalf of Whangārei District Council (WDC) and Northland Regional Council (NRC) relating to a solar energy farm development proposal (WDC-LU2300093 and NRC-APP.045356.01.01) by Meridian Energy Ltd (MEL) ('the Applicant') at three sites between Ruakākā township and Marsden Point ('the Site').

I am familiar with the area to which the Application for Resource Consent relates. Since receiving the Application, I have visited the site on three separate occasions: the 28th of September 2023, the 5th of October 2023 and the 9th of May 2024.

Although this is not a hearing before the Environment Court, I record that I have read and agree to and abide by the Environment Court's Code of Conduct for Expert Witnesses as specified in the Environment Court's Practice Note 2023. This evidence is within my area of expertise, except where I state that I rely upon the evidence of other expert witnesses as presented at this hearing. I have not omitted to consider any material facts known to me that might alter or detract from the opinions expressed.

2.0 SCOPE

As part of the ecological peer review process, RDL carried out a peer review of the Ecological Effects Assessment (dated 28th of August 2023) prepared by Boffa Miskell Limited (BML) and prepared a S92 request relating to ecological matters (dated 3rd of October 2023). A joint site visit was undertaken with Tanya Cook (BML) and Andrew Guerin (Meridian) on the 28th of September 2023. Furthermore, RDL revisited the site visit on the 5th of October 2023 to undertake a more thorough review of the ecological features. A consolidated response to



the ecological matters raised by RDL was received on the 9th of October 2023 (prepared by Reyburn and Bryant with input from BML).

Other dates that are relevant to assisting the peer review process included:

- 9th November 2023 – Meeting with BML, Council’s appointed Planner (Alister Hartstone) and the Applicant’s Planner (Brett Hood) at Boffa Miskell Limited office to discuss difference in wetland extents.
- 27th November 2023 – Review of memo provided by Department of Conservation.
- 30th November 2023 – Meeting at NRC with Katie McGuire (NRC) and Council’s appointed Planner (Alister Hartstone).
- 11th December 2023 – Provided Ecological memo regarding peer review findings.
- 15th January 2024 – Review of Ruakākā Solar Farm Consent Application – Notification Advice prepared by Chapman Tripp and Summary of BML position regarding the Council Ecologist’s review for Ruakākā Solar Park development.
- 30th January 2024 – Informal chat without prejudice regarding ecological effects of Ruakākā proposed development with BML.
- 23rd February 2024 – Meeting with Micah Sherman (Meridian), BML and Council’s appointed Planner (Alister Hartstone) to discuss ecological effects and functional needs.
- 3rd May 2024 – Meeting at NRC to discuss and review publicly notified submissions with Council’s appointed Planner (Alister Hartstone) and Stuart Savill (NRC Consents Manager).
- 9th May 2024 – Site visit with Lisa Forester (NRC), Katrina Hansen (NRC) and Tanya Cook (BML) to discuss and review the wetland extents.

This report provides a summary and conclusions related to the proposal from an ecological perspective.

This report will address the following:

- NATURAL INLAND WETLAND EXTENT (Section 3.1)
- NPS-FM FRAMEWORK CONSIDERATIONS (Section 3.2)
- ASSESSMENT OF ECOLOGICAL SIGNIFICANCE (Section 3.3)
- ECOLOGICAL EFFECTS ASSESSMENT AND MANAGEMENT (Section 3.4)
- PROPOSED OFFSET PACKAGE (Section 3.5)
- EFFECTS ON FAUNA & FLORA (Section 3.6)
- COMMENT ON ISSUES RAISED BY SUBMITTERS (Section 4)
- PROVIDE A BRIEF CONCLUSION (Section 5)



3.0 ECOLOGICAL SUMMARY

3.1 NATURAL INLAND WETLAND EXTENT

The primary point of disagreement between RDL and BML arises from the natural inland wetland extent mapped on Site 1 (BML's map in Figure 12 of the EEA). Figure 1.

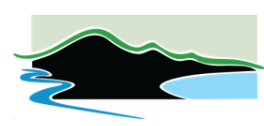
I continue to disagree with the BML mapped extent of natural inland wetland areas, as defined under the National Policy Statement for Freshwater Management 2020 (NPS-FM), within Site 1 boundaries. BML's wetland determination has taken place over a 3-year period (being 2021–2023) and while the methodology outlined within the Ecological Effects Assessment (EEA) follows the key steps of the Ministry for the Environment (MfE) wetland delineation protocols (2022), I have multiple concerns regarding the accuracy and validity of their findings. My main concerns relate to the timeframe of the wetland delineation assessments, location and number of wetland delineation plots conducted, the misidentification of wetland plant species and the dependency on outdated aerial imagery.

Timeframe

It is common to conduct large-scale wetland delineation assessments on complex sites over several days or weeks within the same year to account for seasonal variations in wetland extent, unless extreme weather conditions occur, requiring a two-week standdown period as per MfE guidelines. While the MfE guidelines do not explicitly bind specific timeframes on the duration of wetland delineation in the field, splitting in-situ delineation over multiple years in my opinion is highly unusual. BML have attributed this departure from standard protocols due to unseasonal weather conditions, i.e. 'non-normal' conditions, albeit upon further review of the dates BML carried out site surveys, it is considered that many of their site visits and wetland delineation assessments actually took place when 'elevated' conditions were present.

Wetland delineation methodology

In my opinion, BML's on-site delineation methodology deviated from MfE standard wetland delineation protocols (2022) by delineating only a "representative selection" of wetland features in the field while using satellite, drone imagery, and topography data for the remainder of the wetlands mapped. BML's report lacks clarity on what this "representative selection" was, and which wetland areas were delineated in the field versus which areas were mapped using aerial imagery. This approach is not robust and diverges from best practice, as wetland extent can change due to seasonal changes in weather conditions and land management, especially so, dune slack wetlands which have a high level of dynamism.



Dune slacks are described by Manaaki Whenua as “... *small, nutrient-enriched, vegetated, moist depressions between shore dunes or in a sandbank, especially those which periodically hold slack (scarcely moving) water at times of highest tides (Johnson & Rogers 2003). In a broader sense these ecosystems include dune hollows, deflation hollows, and swales.*” Furthermore, Dune slacks are listed as “endangered.” (Manaaki Whenua, 2004).

Accurate delineation requires detailed field investigations (to examine the vegetation, soil and hydrological conditions) while analysis of geospatial data should only be used as supplementary tools. Given the proposed large-scale wetland levelling, all potentially affected wetlands on Site 1 should have been delineated in the field to ensure that a robust assessment is provided. Additionally, classifying wetlands into exotic or indigenous species-dominated requires ground-truthing, which cannot be done through aerial imagery, and therefore calls into question the accuracy between BML’s classification of exotic and indigenous species dominated wetlands.

Aerial imagery

BML report suggests that *where the vegetation and/or hydrology has changed over the last two years, the results of the most recent site visit were used.* According to the EEA prepared by BML the most recent site visit to delineate wetlands on Site 1A was conducted on March 22nd, 2023, and Site 1B on the 7th & 8th of March 2023. However, their mapped wetland extent as shown within the EEA does not reflect the drone imagery from September 2022 or the Google aerial image from March 24th, 2023, as shown in Appendix 2 of their Ecological Effects Assessment (EEA). This imagery (drone and google aerial) indicates a more extensive wetland area than BML’s map in Figure 12 of the EEA. Additionally, BML used outdated 2014–2016 LINZ aerial imagery for Figures 12 and 13 instead of the latest drone imagery, which appears inconsistent with the methodology BML have outlined within the EEA. This inconsistency in my opinion suggests BML’s methodology for wetland delineation is not robust, especially given that BML wetland delineation reiterates that the wetland assessments provided in their reporting were carried out utilizing recent satellite and drone imagery, and topography data. Furthermore, the wetland delineation during this period has since been described by BML as ‘non-normal’ circumstances.

BML assessment identifies approximately 19 ha of natural inland wetlands (both exotic and indigenous species dominated) between Sites 1 and 3 (BML wetland determination extent for Site 1 is shown under Figure 1), while I am of the opinion that the true wetland extent on site is closer to 29–30 ha (as determined utilising a combination of site visit observations, GPS data (applying the MfE rapid test) and analysis of current and historic aerial imagery).

The difference between the BML and RDL wetland extent assessment is summarised under Figure 2, Figure 3, Figure 4 and Figure 5. These figures show a visual representation between the wetland extent, showing the wetland edge (i.e. boundary between wetland and non-wetland vegetation) as mapped by BML (purple outline) and RDL (red outline). It is evident



that the wetland areas on Site 1 as mapped by BML show a high degree of separation, whereas RDL observed that nearly all the wetland features on Site 1 have clear signatures of wetland plant communities, palustrine and lacustrine which form structural and hydrological connections with one another and create an extensive mosaic of wetland features that show a high degree of interconnectedness. Furthermore, the BML vegetation plot locations and observations within “Appendix 5: Wetland plot locations” and subsequent wetland delineation assessment contained within the EEA show that large areas of the site (~36ha) were not assessed in-situ using vegetation plots. These same non ground-truthed areas by BML are areas that contain the largest discrepancy between BML and RDL in terms of wetland mapping (Figure 6).

Plant identification

It is also noted that there is disagreement between RDL and BML in respect to the correct identification of plant species recorded within the natural inland wetland areas delineated on site by BML. During a site visit carried out on September 28th, 2023, RDL noted that some of the BML mapped natural inland wetland areas contained several additional plants that had been either misidentified or not recorded at all. Of note, RDL noted that a small population of the ‘At Risk’ tassel sedge (*Carex fascicularis*) was present within multiple wetland areas on site which had been identified by BML as the far more common and ‘Not threatened’ rautahi (*Carex lessoniana*). The native slender knotweed (*Persicaria decipiens*) was incorrectly identified as the exotic willow weed (*Persicaria hydropiper*) in many instances. Other indigenous wetland indicators noted by RDL included water milfoil (*Myriophyllum propinquum*) and nahui (*Alternanthera nahui*). The latter considered “At Risk – Declining” in the Northland Region due to the lowland development of wetlands M. Ford (personal communication, July 3, 2024).

Other species that may have been incorrectly identified and noted as pasture species (under the ‘pasture exclusion’ or ‘prevalence index’) include common wetland indicator grass species such as creeping bent (*Agrostis stolonifera*), mercer grass (*Paspalum distichum*) and glaucous sweet grass (*Glyceria declinata*) found throughout the RDL wetland extents during the site visits. On further analysis, some of the hydrophytic vegetation I have noted is completely absent from all BML vegetation plots e.g. hydrophytic wetland grass species such as creeping bent and glaucous sweet grass.

Furthermore, from a review of the iNaturalist.nz (citizen science data recording website) it was noted that BML ecologists (who undertook the wetland delineation field work) had uploaded multiple plant observations from within the Site 1 boundaries that they could not identify, many of these being common and typical species associated with wetland environments. Incorrect plant species identification can lead to errors in delineating the boundaries of wetlands, resulting in areas being incorrectly classified as wetlands or non-wetlands and can lead to an inaccurate assessment of their significance, potentially underestimating the wetland’s ecological value.



Wetland assessments

For clarity, RDL were not engaged by NRC to carry out a full wetland re-assessment based on standard MfE (2022) wetland delineation methodology. RDL engagement was limited to carrying out a peer review of the findings of the BML assessment, and a series of site visits. Based on the findings of the RDL peer review, the BML wetland assessment was deemed flawed based on the parameters of the existing environment. As part of the S92 process, when queried about the significant differences between mapped wetland extent between RDL and BML mapping, BML deemed the methodology they had utilised was sound and did not consider that further assessment or reassessment was required. BML instead argued that RDL's assessment regarding the wetland extent on site was based on the site being assessed under non-normal circumstances with higher-than-normal seasonal fluctuations in rainfall and water table observed and the reliance on using google aerial imagery from 24 March 2023.

I'd like to note that the same google earth aerial image (dated 24 March 2023) has been attached under Appendix 2 of the EEA prepared by BML. The information provided within the EEA states that BML's wetland delineation had also utilised both the most recent drone imagery (collected September 2022) and satellite imagery of the site (dated 24 March 2023), however the later supplied information provided in RFI Response No#5 seems to contradict this. In addition, Table 1 of the EEA suggests that multiple site visits to Site 1A, 1B and 1C to conduct in-situ wetland delineation on site had been carried out during elevated hydrological conditions following heavy rainfall 7 days prior to site visits carried out between 27 October and 2 November 2021, 20 June 2022, 7 & 8 March 2023, 22 March 2023 and 15 November 2022. MfE wetland delineation protocols suggest that in-situ wetland delineation should take place a minimum of two weeks after extreme weather events, and therefore it is unclear why in-situ wetland delineation was not delayed or rescheduled to provide a more reliable assessment.

While it is noted that 2022 and 2023 experienced several heavy rainfall events, it is considered that dune slack wetlands naturally have high levels of dynamism and are characterised by a pattern of pronounced annual fluctuation of the water table. This is further evidenced by the assessment of historic aerial imagery, which shows the wetland extent contracting and expanding year on year representative of seasonal fluctuations. I do not consider that the natural dynamism of the dune slack wetlands has been appropriately recognised within the BML wetland delineation assessment, attributing the change in wetland extent to 'non-normal' conditions and extreme weather events.

The Assessment of likely groundwater levels at site 1 for Proposed Ruakākā Solar Farms prepared by Beca provides the case of 'elevated' hydrological conditions during the RDL and BML assessments. The Ruakākā Solar Farms – Review of Assessment of likely groundwater levels report prepared by NRC provides further commentary on the ground



water levels. Based on reviewing both documents, it is my opinion that the hydrological conditions even if 'elevated' do not constitute 'non-normal' circumstances under the wetland delineation protocols. Even if it can be agreed that 'non-normal' existed during both the BML and RDL surveys the clear and distinctive differences in wetland extents presented by RDL are based on the presence and persistence of hydrophytic vegetation since the application was lodged.

No agreement of the wetland extent could be reached following a meeting with BML on the 9th of November 2023 and a further site visit on the 9th of May 2024 with NRC specialists.

RDL remains of the opinion that BML reporting has not accounted for the true wetland extent on site, and that the natural inland wetland extent on Site 1 is much greater (approximately 10 ha more) than that provided within the BML reporting and mapping. The wetland extent is crucial for aligning the subsequent ecological value/significance assessments, ecological effect evaluations, and mitigation proposals. Given that the Application strongly relies on offsetting to account for the proposed wetland loss, the required offset cannot be accurately assessed given that the true wetland loss on Site 1 is likely much greater than that shown in BML reporting.



Figure 1: Showing BML mapped natural inland wetland extent (reproduction of Figure 12 of EEA prepared by Boffa Miskell)

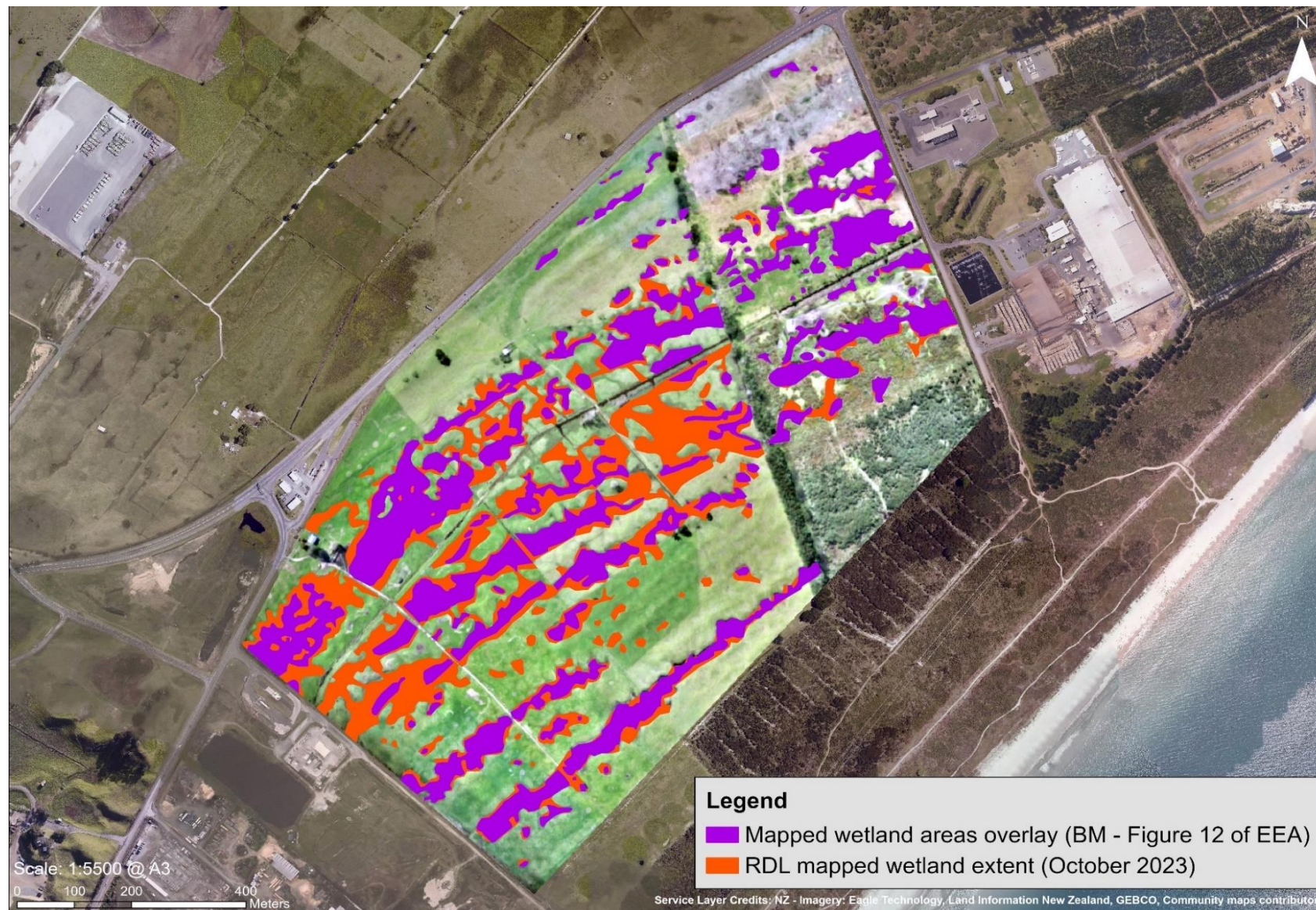


Figure 2: Showing the differences between wetland vegetation extent mapped by BML (purple) and RDL (red)



Figure 3: Showing the approximate 'edge' between wetland and non-wetland vegetation - BML mapped wetland edge shown as purple line, RDL mapped wetland edge shown as red line (9th May 2024). Note distinctive difference in vegetation signatures.



Figure 4: Showing the approximate 'edge' between wetland and non-wetland vegetation - BML mapped wetland edge shown as purple line, RDL mapped wetland edge shown as red line. Black circles showing GPS points of the different wetland extents (9th May 2024). Note there is no distinctive difference in vegetation signatures.



Figure 5: Showing a zoomed in image which shows the difference between BML (purple outline) and RDL (green outlined) mapped wetland extents on the north-western corner of Site 1

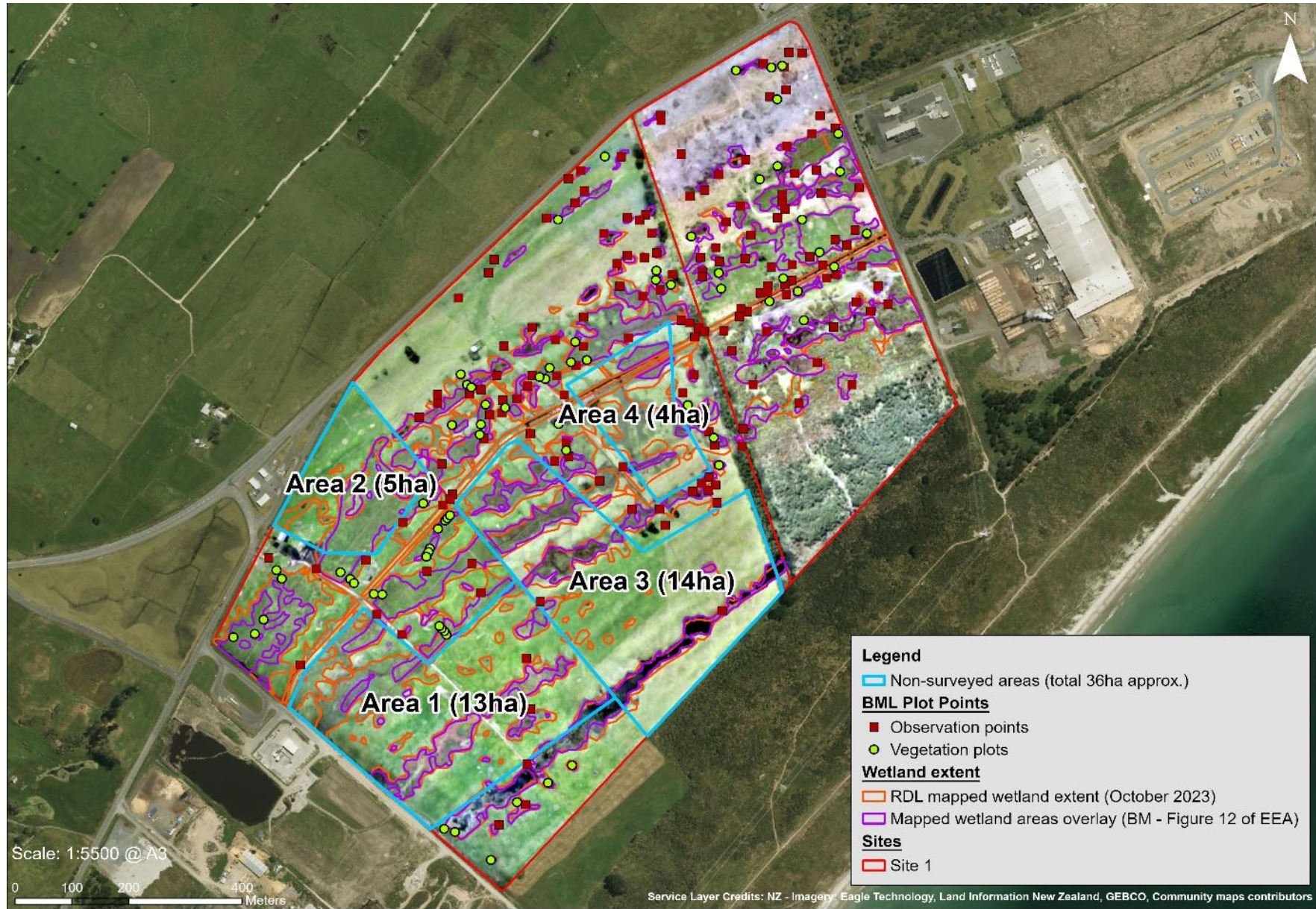


Figure 6: Showing BML vegetation plot and observation point locations with approximate areas of Site 1 not sampled shown in blue

3.2 NPS-FM AND NES-FM CONSIDERATIONS (ECOLOGY)

Northland Regional Council & Effects Management Hierarchy considerations

The primary aspect to consider in the remit of NRC is NPS-FM (2020) related matters.

In relation to the construction of specified infrastructure, Section 3.22 subclause (1)(B)(iv) outlines that Regional Council need to be satisfied that (iv) the effects of the activity are managed through applying the effects management hierarchy. While it is considered that the application briefly considers avoidance, remediation and mitigation, a large focus of the application has been placed on biodiversity offset. Biodiversity offsetting should only be considered after actions to avoid, remedy, or mitigate where practically feasible have been exhausted, and thus applies only to residual biodiversity impacts.

Section 3.22 subclause (3) requires that

(3) Every regional council must make or change its regional plan to ensure that an application referred to in subclause (2) is not granted unless

(a) the council is satisfied that:

- (i) the applicant has demonstrated how each step of the effects management hierarchy will be applied to any loss of extent or values of the wetland (including cumulative effects and loss of potential value), particularly (without limitation) in relation to the values of: ecosystem health, indigenous biodiversity, hydrological functioning, Māori freshwater values, and amenity values; and
- (ii) if aquatic offsetting or aquatic compensation is applied, the applicant has complied with principles 1 to 6 in Appendix 6 and 7, and has had regard to the remaining principles in Appendix 6 and 7, as appropriate, and
- (iii) there are methods or measures that will ensure that the offsetting or compensation will be maintained and managed over time to achieve the conservation outcomes;

Appendix 6 – Principles for aquatic offsetting of NPS-FM outlines that aquatic offsets are not appropriate in situations where, in terms of conservation outcomes, the extent or values cannot be offset to achieve no net loss, and preferably a net gain, in the extent and values. Examples of an offset not being appropriate would include where residual adverse effects cannot be offset because of the irreplaceability or vulnerability of the extent or values affected.

In my opinion, the proposal to remove over 17 ha of dune slack wetlands (please note the wetland extent/wetland loss on Site 1 is still in dispute between RDL and BML) through aquatic offset may be considered inappropriate altogether, given that the wetland habitat types identified on Site 1 are dune slack wetlands, which are rare and nationally threatened ecosystem types and are considered irreplaceable. These ecosystem types cannot be readily offset given that they rely on a range of complex ecological, geological, and hydrological conditions. Irreplaceability is a consideration both under RPS and NPS-FM.

This is relevant to the Application in question given that it will result in permanent, irreversible loss of interconnected dune slack wetland habitat on site, which is a rare ecosystem in the Waipu Ecological District (Lux et al, 2007) and a 'Nationally Endangered' ecosystem (Holdaway et al., 2012) and is also a habitat for several 'At Risk' and 'Threatened' flora and fauna.

I briefly discuss Appendix 6 of NPS-FM Principles for aquatic offsetting in the context to the Application. Although all principles are relevant, I draw particular attention to principle 1, 2, 3, 6, 7 and 8.

1. Adherence to effects management hierarchy:

No clear and concise assessment has been presented in the EEA prepared by BML relating to how effects management hierarchy has been applied to decision making. It is noted that parts of the wetlands and the kanuka shrubland on Site 1 have been avoided, but the remaining habitats of Site 1 including the balance of wetlands are proposed to be levelled (i.e. lost in perpetuity) and off-set elsewhere. It is uncertain how the steps for avoidance, remediation or mitigation have been exhausted in the first instance, no justification for this is provided in the EEA. The Proposal largely relies on biodiversity off-set, which is considered a last resort under the RMA, because it reflects the principle that direct impacts on the environment should be avoided or minimized as much as possible before considering off-setting and compensatory measures.

2. When aquatic offsetting is not appropriate:

2a, 2b and 2c in my opinion are all relevant based on the information provided in this report specifically relating to irreplaceability, uncertainty and timeframes.

3. No net loss and preferably a net gain:

This principal remains uncertain due to discrepancies in mapped wetland extent and values.

6. Long-term outcomes:

RDL has concerns that the proposed offset site (being Site 3) is located at the intersection of two major roads (Marsden Point Road and McCathie Road) as well as being located beneath high voltage power lines/pylons. These factors raise concern around long-term outcomes and the likelihood that these constructed wetlands would over time be able to become self-sustaining systems which facilitate natural succession processes of taller growing indigenous wetland species (Figure 7). In my opinion, it is unlikely that a self-sustaining wetland system will be able to persist in this location due to various factors. These include inadequate hydrological conditions (significant modification to existing baseline setting will be required to adequately artificially raise the groundwater table in this area), design flaws (selected location will require ongoing human intervention), continuous interference required below power lines and within the existing drainage network on site, as well as lack of ecological connectivity. This is particularly important as built structures such as roads, urban development, and other barriers can prevent wildlife from accessing offset wetlands, reducing their long-term ecological viability.



Figure 7: Wetland offset concept prepared by Littoralis on Site 3

7. Landscape context

It is considered that the offset site cannot recreate the complex interactions present on Site 1 due to the difference in habitat types, current and historic ecosystem types, species composition, ecosystem function and services.

8. Time lags

A significant lag time is expected between the loss of wetland habitat at Site 1 and the development of new artificial wetland habitat at Site 3. This lag time could have significant adverse effects on species such as the 'Threatened/Nationally Critical' matuku/Australasian bittern (*Botaurus poiciloptilus*).

3.3 ASSESSMENT OF ECOLOGICAL SIGNIFICANCE/VALUE

The Ecological Effects Assessment (dated 28th of August 2023) prepared by Boffa Miskell Limited sets out a complex approach to determining the ecological value and significance of habitats and species present on site, mixing the non-statutory EIANZ framework (under Sections 5.1-5.7 of EEA), with statutory framework for assessment of ecological significance (Section 5.8 of EEA), i.e. the ecological significance criteria as described under Appendix 5 of the Northland Regional Policy Statement (NRPS). The overall assessment of ecological value presents confusing and conflicting results with the overall ecological value/significance difference between the EIANZ framework assessment and the NRPS significance assessments (please refer to Table 12 of EEA).

Based on EIANZ criteria, BML have assessed that the open water habitats and indigenous wetlands on Site 1 are of high ecological value, while the exotic wetlands are assessed as being of moderate ecological value. BML only briefly considers the ecological significance of the Site 1 wetland areas against NRPS. While acknowledging that the open water habitats meet the ecological significance criteria under NRPS, BML state that the value of the identified exotic and indigenous wetland features as habitats for indigenous fauna is uncertain, but due to their degraded condition and small size, they are unlikely to contain resident populations of any threatened or at-risk species, and therefore are not assessed as meeting any of the ecological significance criteria under NRPS.

I disagree with this, and in my opinion, the BML assessment has not considered the highly interconnected and interlinked nature of the wetland areas of Site 1, with BML assessment and associated mapping showing wetland areas on site as small, isolated areas within the landscape. In my opinion, the majority of the onsite wetland areas (exotic and indigenous) form an interconnected wetland feature and therefore would likely meet the ecological significance criteria *2a(iii)(f) "Marsh; Fen; Ephemeral wetlands or Seepage / flush greater than 0.05 hectares in area"* and therefore should be considered as significant under Appendix 5 of NRPS. This combined with the misidentification and under-recording of plant

species within the wetland areas on Site 1 presents what in my opinion is potentially an assessment of ecological value/significance that is incomplete and underestimates the actual ecological value and significance of the mapped wetland areas on Site 1.

I consider that all wetland habitats (both indigenous and exotic species dominated wetlands) recorded on site are representative of a complex interlinked system of dune slack wetlands (seasonal wetlands). The wetlands associated with the coastal interface are a rare ecosystem in the Waipu Ecological District and a 'Nationally Endangered' ecosystem of high ecological significance when considered in both a Regional and National context. While the onsite dune slack wetland areas are largely modified in nature, they have been assessed as habitat for 'Threatened/Nationally Critical' matuku/Australasian bittern, among other 'At Risk' and 'Threatened' flora and fauna such as tassel sedge (*Carex fascicularis*). Dune slack wetlands have unique characteristics and naturally have high levels of dynamism and are characterised by a pattern of pronounced annual fluctuation of the water table, related to the landform of the dune system as well as climate and the nature of the underlying geological features. My opinion therefore is that all wetland areas on Site 1 are of high ecological value and significance.

3.4 ECOLOGICAL EFFECTS ASSESSMENT AND MANAGEMENT

The EEA prepared by BML sets out a complex approach to determining the level of effects, following the non-statutory EIANZ framework. The methodology involves use of a matrix with the assignment of ecological value on a five-point scale, combined with the magnitude of effect, to determine the overall level of ecological effect (loss or alteration). While RDL agrees in principle with the magnitude of effect assessment (Section 7.9 of EEA), we consider that BML's assigned level of ecological effects with recommended effects management in place (Table 17 of EEA) is being overly optimistic regarding the potential offset package in reducing the potential level of ecological effect to 'low' or 'very low' given the complexities and uncertainties involved in ecological mitigation and offsetting strategies. This is despite BML's ecological values assessment of each affected habitat or species ranging from moderate to very high, all of which will be either permanently lost or adversely affected by the proposed development. There is a risk that BML's assessment underestimates the residual ecological impacts even with proposed off-set measures in place.

I consider that adopting the BML resulting assessment and offset package would result in the loss of part of a 'rare' ecosystem type in the Waipu ED contained within a 'chronically threatened' land environment.

RDL's assessment regarding adverse ecological effects emphasizes that these cannot be adequately mitigated through offset measures elsewhere on a like-for-like basis. This conclusion stems from the recognition that the dune slack wetland ecosystems present on

site are not only rare within the Waipu Ecological District but are also classified as 'Nationally Endangered'. These wetlands are characterized by a complex interplay of ecological, geological, and hydrological factors, rendering them irreplaceable.

The unique ecosystem type found on Site 1 cannot feasibly be replicated elsewhere due to its intricate ecological dependencies. While there is a possibility that Site 3 could potentially support some type of a wetland habitat, achieving this would necessitate extensive earthworks and modifications to the existing hydrological regime. Even under these circumstances, it remains highly improbable that the diverse mosaic of the existing dune slack wetland system present on Site 1 could be re-created.

Therefore, RDL asserts that the adverse effects associated with the Proposal are more than minor and have the potential to result in significant ecological impacts that have not been adequately addressed by the Proposal. The complexity and rarity of the affected ecosystem type on Site 1 underscore the importance of cautious consideration and comprehensive mitigation strategies to safeguard biodiversity and ecosystem integrity.

3.5 PROPOSED WETLAND OFFSET

The Regional and District Plans do not provide a framework for evaluating offset or compensation. However, the Regional Policy Statement for Northland (RPS) states that biodiversity offsets must ensure there is no net loss of biodiversity and should preferably deliver a net gain for biodiversity. The RPS also states that there are limits to what can be offset when affected biodiversity is irreplaceable or vulnerable. In such circumstances offsetting cannot be considered as a means of dealing with adverse effects. The RPS further states that what will be an "appropriate" offset will depend on the case-by-case circumstances and current best practice.

It is considered that principles for aquatic offsetting in Appendix 6 of the NPS-FM are deemed relevant given this reflects a best practice standard.

Appendix 6: Principles of aquatic offsetting of NPS-FM clause 2 states that aquatic offsetting is not appropriate where:

- (a) residual adverse effects cannot be offset because of the irreplaceability or vulnerability of the extent or values affected;
- (b) effects on the extent or values are uncertain, unknown, or little understood, but potential effects are significantly adverse;
- (c) there are no technically feasible options by which to secure proposed no net loss and preferably a net gain outcome within an acceptable timeframe.

In addition, Section s6(c) of the RMA requires the protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna, therefore, offset or compensation may not be appropriate because it is not in accordance with s6(c) of the RMA.

Even with the offset/compensation package offer presented within the Application package, the Proposal would still lead to a loss and overall reduction of irreplaceable and vulnerable biodiversity, threatened and at-risk species and endangered ecosystems and land environments. Therefore, biodiversity offset is not appropriate in this instance. The complex nature of dune slack ecosystems has been highlighted above and should be taken into consideration when assessing whether offset is an appropriate mechanism to be utilised in this application.

Irrespective of the above and should offset/compensation be considered applicable in this instance, RDL is of the opinion that an insufficient offset package has been offered to account for the permanent loss of a rare wetland ecosystem type. This is partly due to disagreement between the 'true' wetland extent on site, with BML identifying approximately 19 ha of wetlands, while RDL is of the opinion that the true wetland extent on site is closer to 29-30 ha (as determined utilising a combination of site visit observations and analysis of current and historic aerial imagery). Therefore, the fundamental disagreement remains between what is an appropriate offset for the potential wetland loss.

Putting aside the disagreement between BML and RDL regarding the wetland extent on Site 1, It is understood that the wetland offset calculations as presented within the BML reporting are based on the non-statutory Biodiversity Offset Accounting Model (Maseyk *et al.* 2015). Firstly, I'd like to note that there isn't a nationwide statutory biodiversity offsets accounting model mandated across all of New Zealand and therefore there is not a single, uniform accounting model that can be readily applied to calculating offsets. Non-statutory models like Maseyk *et al.* (2015) often rely on standardized assumptions and methodologies that may not fully capture site-specific complexities or the unique characteristics of ecosystems, such as the dune slack wetlands.

According to the EEA, the proposal would result in approximately 17 ha of wetland loss, and 19 ha of wetland offset (i.e. existing natural inland wetlands artificially expanded on site 1 and artificial wetland created on Site 3). This is a ratio of approximately 1.11-1 of wetland habitat created to wetland habitat lost. Having reviewed the wetland offset calculations provided by BML, I would disagree over the valuation of several variables of the exotic wetland habitats on Site 1 being valued as "low," including hydrological intactness, species diversity and connectivity. I believe BML have undervalued the exotic wetland systems on Site 1, despite their classification as dune slack wetlands which is a rare ecosystem type in the Waipu ED and is 'Nationally Endangered.' In my assessment, the biodiversity offset model presents overly optimistic assumptions regarding the proposed wetland offset area,

which assumes high ecological value without adequately addressing uncertainties in restoration outcomes or the lag time between wetland loss on Site 1 and the creation of a new artificial wetland habitat on Site 3 that provides suitable habitat for a variety of the affected species on Site 1.

International literature suggests that appropriate ratios for wetland offsetting vary depending on factors such as the type of wetland, its ecological value, and the specific circumstances of the development impact. However, general guidelines and best practices often suggest ratios of 2:1 to 5:1 or even higher, particularly for compensating for the loss of high-quality or rare wetland habitats. These ratios aim to ensure that the ecological values lost due to development are adequately compensated for through restoration, creation, or enhancement of wetlands elsewhere.

In summary, a no net loss or net gain cannot be achieved if offsets are generally allowed in habitat types that differ from the habitat type being disturbed or lost (Gerbeaux 2012). Allowing offsets in these circumstances would not maintain indigenous biological diversity in the Region. In my opinion, the proposed wetland offsetting should be considered inappropriate altogether, given that the wetland habitat types identified on Site 1 are dune slack wetlands, which are rare and nationally threatened ecosystem types and are considered irreplaceable. Irreplaceability is a consideration both under the RPS and NPS-FM. If a component of biodiversity, for example, a habitat type or a population of a threatened species is represented by a single site, then irreplaceability is maximal because no other site can contribute to the biodiversity it contains.

3.6 EFFECTS ON FAUNA & FLORA

I consider that the fauna assessments contained within BML reporting are limited in some way. The BML reporting does not provide sufficient information as to the freshwater fish presence within Site 1 boundaries and lack of any freshwater or terrestrial invertebrate assessments. Therefore, it is possible that the ecological values of Site 1 are likely to be higher than documented by BML reporting, and currently the potential effects on these species' groups are unknown, but potentially significant.

In respect to avifauna, BML surveys confirm that matuku/Australasian bittern are present on Sites 1 and 3. The proposal would result in permanent loss of foraging and breeding habitat to Australasian bittern, which is currently relatively undisturbed (apart from ongoing farming operations). Site 1 has a strong natural connectivity with the wider natural Ruakākā beach and Ruakākā estuary, and it is not currently bisected by any formed roads, with minimal traffic within the site boundaries. Irrespective of the disagreement between RDL and BML regarding the proposed wetland offset area size, it is deemed that the location of the proposed wetland offset area on Site 3 is located between two major roads (Marsden

Point Road and McCathie Road), thus increasing bird collision risk with vehicles that could lead to increased mortality.

The proposal will lead to permanent loss of wetland habitats used by indigenous bird species, many of which have been classified as 'At Risk'. This is especially important if the area contains nesting sites, feeding areas, or is part of a migratory route. The wetlands on Site 1 are part of the coastal ecotone environment, frequently used by migratory bird species as resting and feeding grounds during their journeys between marine and terrestrial environments. Therefore, the impact on migratory birds could be significant.

From reviewing BML reporting and proposed offset package, the primary mitigation measure is through the construction of an artificial wetland habitat at Site 3. Having reviewed the application, it appears that the Applicant proposes that the offset wetland on Site 3 will only be created once the wetland areas at Site 1 are leveled to facilitate solar array construction. No binding timeframes for the creation of the offset wetland at Site 3 were found within the Application. Therefore, a significant lag time is expected between the loss of avifauna habitat at Site 1 and the development of new artificial wetland habitat at Site 3 to a level where it forms a suitable nesting, feeding and breeding habitat for impacted avifauna.

I consider that the potential effects on avifauna include permanent habitat modification/loss, habitat fragmentation, displacement resulting from construction works, impacts on breeding birds, and impact trauma (bird strike) with panel arrays and increased risk of vehicle-bird collisions within the proposed offset area on Site 3. My conclusion with respect to adverse ecological effects on avifauna, in particular the 'Threatened/Nationally Critical' matuku/Australasian bittern, is that they will be more than minor and potentially significant.

4.0 ISSUES RAISED BY SUBMITTERS

I have reviewed the submissions received which relate to ecological aspects of the Proposal. Seven submitters identified concerns related to ecological matters, which I have at large already covered in the body of this report. However, I briefly address the key points raised in the submissions, as follows.

Submitter – Jessie Card

Summary: Submitter Jessie Card outlined concerns regarding earthworks and building on wetlands and flood prone areas and suggests that developments should instead be re-establishing wetland areas. Submitter supports the proposed wetland offset proposal, however notes that they would like to see a higher ratio for offset applied at a ratio of 9:1 for reestablishing previous wetlands, and 12:1 for new engineered/artificial wetlands.

Response: The submitter raises key areas of concerns that have been addressed in detail within the body of this report. In respect to the wetland offset ratio recommended by the submitter, internationally the most common ratio for wetland offsetting is between 2:1 to 5:1 ratio, and while a higher ratio would be beneficial to be applied, there is no basis for a higher ratio to be required. This range is commonly used for wetland offsetting, where for every hectare of wetland lost due to development, two to five hectares of wetland are restored, created, or enhanced elsewhere.

Submitter – Mangawhai Ecology Inc

Summary: Mangawhai Ecology Inc has concerns whether the Application has a ‘functional need’ to occur within the natural inland wetland areas located on Site 1. The submitter is concerned regarding wetland flora identification, wetland delineation methodology and accuracy, and overall mapped wetland extent and considers that an independent ecological survey of the natural inland wetland extent may need further consideration and assessment. The submitter is also concerned about the limited fauna assessments carried out, potential adverse effects on fauna (in particular Australasian bittern) and inadequacy of the proposed offset mitigation measures offered by the Applicant.

Response: The submitter raises key areas of concerns that have been addressed within the body of this report, and therefore I will not repeat those. I agree that there are conflicts between the mapping of the extent of the wetland areas between BML and RDL assessments, which are still in dispute. At present, I consider that the continued disagreement between RDL and BML regarding the full wetland extent on Site 1 is a major point of contention which creates a cascade effect on other matters such as assessment of ecological value/significance, assessment of overall ecological effects and offset mitigation proposal raised both by RDL and this Submitter.

Submitter – Northland Fish and Game Council (NFGC)

Summary: Northland Fish and Game Council strongly oppose the application to permanently remove more than 17 hectares of rare wetland to facilitate the proposed solar development. The area includes extensive wetland ecosystems which have important ecological functions in the context of an expansive modified environment. They consider that the adverse effects are such that they cannot be offset elsewhere on a like for like basis. The submitter also raises a concern regarding the impact that the solar farm itself may have on birds and other wildlife. NFGC do not support offset and mitigation measures and consider that these are insufficient to account for the permanent loss of a rare wetland ecosystem.

Response: The submitter raises key areas of concern that have already been addressed within the body of this report. I agree with NFGC concerns regarding the lack of robust assessment regarding potential effects of solar array panels on bird migratory patterns and potential collisions. In New Zealand, the establishment of solar and wind farms is relatively new, and there has been limited research conducted on their impacts on wildlife. This lack of research poses challenges in understanding how these renewable energy developments might affect local ecosystems and species, especially in key ecotone transitional areas between marine and terrestrial environments such as the site in question. Without comprehensive studies, it's difficult to assess potential risks such as habitat disruption, changes in wildlife behavior, or direct impacts on species populations.

Submitter – Forest and Bird

Summary: Forest and Bird outline a concern regarding the real and potential ecological effects of the proposal, including wetland disturbance and removal, the proposed offsetting, and the consistency of the activity with the RMA, the regional plan and policy statement, the NPS-FM and NES-F (including NPS-FM section 3.22 Natural inland wetlands and the 'functional need' test). The submitter is also concerned about the discrepancies in wetland mapping, impacts on indigenous fauna.

Response: The submitter raises key areas of concern that have already been addressed within the body of this report or responded to within the above responses.

Submitter – Ross and Norma Scobie

Summary: The submitter is concerned about wetland loss on Site 1 and the establishment of wetlands on Site 3 which will occur after the development of the solar farm. The submitter seeks that the construction of the proposed wetland in Site 3 is completed and planted before any further earthworks, other activities that impact on drainage, and disruption of sensitive habitats are started. The submitter seeks that the maintenance of the proposed offset wetland is subject to bond.

Response: The submitter raises key areas of concern that have already been addressed within the body of this report.

Submitter – Mere Kepa

Summary: The submitter is concerned about wetland loss, proposed offset and the potential effects on waterways.

Response: The submitter raises key areas of concern that have already been addressed within the body of this report.

Submitter – Shaun Erickson

Summary: The submitter is concerned that the EEA does not adequately and fully address the actual and/or probable effects on neighbouring properties, animals, biodiversity and flora and fauna. The submitter also expresses concern about wetland loss and whether the proposal to create the solar farm over wetland areas has a ‘functional need.’ The submitter seeks that precautionary principle is applied and considers the application as incomplete.

Response: The submitter raises key areas of concern that have already been addressed within the body of this report. I agree with the submitter that wetland loss to development should be avoided at the first instance, and that the EEA does not adequately provide information on certain species groups which may be present on site (including aquatic and terrestrial invertebrates as well as fish fauna).

5.0 CONCLUSION

In my opinion the Proposal will result in permanent and irreversible loss of dune slack wetlands which is a rare and nationally threatened ecosystem type, and loss or displacement of Threatened and At-Risk indigenous flora and fauna species from Site 1. Dune slack wetlands are considered ‘irreplaceable’ and cannot be readily offset given that they rely on a range of complex ecological, geological, and hydrological conditions. Irreplaceability is a consideration both under RPS and NPS-FM.

The extent and ecological values of the existing wetland habitats of Site 1 are likely to be higher than documented by BML reporting. In my opinion, the wetland delineation and classification, and aquatic fauna surveys were all limited in some way, and no invertebrate assessments have been provided as part of the ecological reporting. Wetland species classification and delineation remains the major point of contention between RDL and BML, and no agreement has been reached to the natural inland wetland extent within the Site 1 boundaries. In respect to aquatic fauna surveys, BML has been overly reliant of data collected by other consultants in the past (surveys carried out in 2020) or relied on NZ Freshwater Fish Database records in making their assumptions that no ‘At Risk’ or ‘Threatened’ aquatic fauna is likely present on Site 1. No terrestrial or aquatic invertebrate surveys were carried out by BML. Therefore, the potential effects assessment presented by BML is considered incomplete and the effects on many habitats and species groups that may be present on site are unknown.

The discrepancy between RDL and BML assessments concerning the complete natural inland wetland extent on Site 1 is a pivotal issue. Wetland delineation determines the boundaries of the wetland area, which directly influences several subsequent assessments and decisions such as adequate effects management measures and considerations under

the effects management hierarchy. The wetland extent is crucial for aligning the subsequent ecological value/significance assessments, ecological effect evaluations, and effects management proposals.

In my opinion many adverse ecological effects of the Proposal could be avoided or minimised by locating the proposed solar arrays on converted (agricultural) land void of natural inland wetlands elsewhere on the site (e.g. Site 3) or directly adjacent farmland which is relatively free of ecological constraints. Ecological effects would need to be assessed at any alternative location.

My conclusion in respect to adverse ecological effects associated with the Proposal is that they will be more than minor and potentially significant, and they have not been adequately addressed by proposed effects management proposals put forward by the Applicant.

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