Before the Independent Hearings Commissioners appointed by Northland Regional Council

under:	of the Resource Management Act 1991 (**RMA**)
between:	**Meridian Energy Ltd (the Applicant)**
and:	**Northland Regional Council (the Consenting Authority)**
In the Matter of:	an application by Meridian Energy Limited for resource consents for earthworks, associated stormwater diversion and discharges and vegetation clearance for the construction of a solar farm at Ruakākā, Northland (APP.045356.01.01)

Rebuttal Evidence of Jack Warden on behalf of Northland Regional Council

(ECOLOGY)

Dated 2 August 2024

Introduction

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

1.2 I prepared a memorandum provided in support of the section 42A Report in this matter addressing Ecology dated 4 July 2024.

1.3 Whilst this is a Council hearing, I confirm that this rebuttal evidence has been prepared in accordance with the Environment Court's 2023 Practice Note and that in giving this evidence I continue to adhere to the requirements of the Practice Note.

Scope of Rebuttal Evidence

1.4 In this rebuttal evidence, I wish to respond to matters raised in the evidence of:

(a) Tanya Cook (Ecology)

(b) Sarah Flynn (Ecology)

(c) Stephen Fuller (Ecology – Wetland Restoration)

(d) Lee Shapiro (Ecology - Avifauna)

1.5 The matters I wish to respond to include the following:

(a) Dune slack ecosystems

(b) Long term prognosis for wetland features within site 1

(c) Natural inland wetland extent

(d) Proposed offset proposal considering national and international literature

(e) Effect managements hierarchy and EIANZ

(f) Site suitability and long-term viability of offset site (Site 3)

2. DUNE SLACK ECOSYSTEMS AND THEIR ECOLOGICAL SIGNIFICANCE

2.1 I consider that all wetland areas on Site 1 are dune slack wetlands, which is a rare and nationally threatened ecosystem type. While their description and ecological value and significance has been described in detail under Section 3.3 of the Appendix 3 of S42A Report[1] I would like to emphasize the complexity involved in describing such ecosystems and note that the degree of modification should not be the primary factor in assessing their ecological value or significance. The intrinsic qualities of dune slack wetlands, including their unique geomorphic features and ecological roles, are crucial for their overall assessment.

2.2 I note throughout the evidence of both Dr Flynn and Ms Cook, they continue to describe each of the natural inland wetland features on Site 1 as standalone features, rather than recognising the interconnected nature of the dune slack wetland areas. In my assessment nearly all the wetland features on Site 1 form structural and hydrological connections with one another creating an extensive mosaic of wetland features, showing a high degree of interconnectedness. Acknowledging the interconnected nature of the wetlands on Site 1 is essential for accurately assessing their ecological value, understanding their hydrological dynamics, protecting biodiversity, and implementing effective management and restoration strategies.

2.3 In my opinion and as highlighted in the evidence of Dr Flynn[2] although 'modified', Site 1 contains relatively intact identifiable geomorphological features. These features better known as 'dune slacks' associated with the coastal interface are a nationally 'Endangered' ecosystem type[3]. Regionally these features are considered of high ecological significance because of the rarity of the geological formation and associated fauna and flora values.

2.4 The degradation of these ecosystems due to grazing pressures, in my opinion does not diminish their inherent value. Despite the impacts, dune slack wetlands remain crucial and unique components of the

[1] Appendix A - NRC Internal Technical Advice – Rural Design Limited regarding ecological effects

[2] Refer to Statement of Evidence of Dr Flynn at Para [12; 21; 53; 166]

[3] Holdaway R.J., Wiser S.K., Williams P.A. (2012) Status assessment of New Zealand's naturally uncommon ecosystems

landscape, and their ecological significance and irreplaceability factor persists. Even when dominated by exotic species and degraded by stock grazing pressures, dune slack wetlands remain rare, unique and irreplaceable ecosystems. Their distinctive geomorphic and ecological characteristics make them invaluable, and their replacement or off-set is not readily achievable.

2.5 I have considered Dr Flynn's[4] literature research and concise explanation of the site's ecosystems. I agree with much of the justification in relation to the national classifications and interpretations. My opinion differs from that of Dr Flynn[5] because ecosystems consist of both their physical (geomorphic) characteristics and their biological (flora and fauna) components.

2.6 I consider that maintaining and preserving the geomorphic characteristics is crucial for maintaining any ecosystem. The temporal vegetation does not diminish the geomorphic importance and location in the landscape especially considering this is one of the last dune slack remnants in the Waipu Ecological District. Furthermore, these dune slack features provide habitat for several 'At Risk' and 'Threatened' flora and fauna. Based on these facts I remain of the opinion that in the context of the application that these features are irreplaceable.

2.7 Northland Regional Council (NRC) needs to consider that the ecological significance of a dune slack wetland is distinct from its current ecological condition or floristic diversity present. Even if Dr Flynn's evidence suggests that the condition of these wetlands may be compromised, their intrinsic ecological value—such as their unique geomorphic features, their role in supporting regional biodiversity, and their importance in ecological processes—remains substantial. It is important for NRC to recognize that while the condition of a wetland may influence its immediate ecological health, it does not diminish its inherent ecological significance or its potential for future restoration and conservation.

[4] Refer to Statement of Evidence of Dr Flynn at Para [156-162]
[5] Refer to Statement of Evidence of Dr Flynn at Para [166]

3. LONG TERM PROGNOSIS FOR WETLAND FEATURES WITHIN SITE 1

3.1 Dr Flynn[6] expresses the opinion "…that the long-term prognosis for wetland features within site 1 if the status quo remains is poor."

3.2 In my opinion there are several factors to consider when considering the status quo which include:

(a) The Resource Management (Stock Exclusion) Regulations 2020[7] come into effect on 1 July 2025 (which is less than 1 year from now). As there is no disagreement that the wetlands on Site 1 support Threatened/Nationally Critical' matuku/Australasian bittern (*Botaurus poiciloptilus*) it is considered that the Exclusion of stock from natural wetlands (Regulation 17 of Resource Management (Stock Exclusion) Regulations 2020) would apply to the subject site.

(b) Proposed Regional Plan for Northland (PRPN)[8] also contain stock exclusion provisions which state that access of livestock to a natural wetland that is larger than 500 square metres is a discretionary activity under Rules C.8.1.2 and C.8.1.3, which come into effect 1 January 2025.

3.3 As noted throughout the Application and subsequent evidence[9] stock have been attributed to the ongoing degradation of the natural inland wetland features on site, notably on site 1B & 1C. Site 1A has been free of stock for some time, which has resulted in the natural regeneration of indigenous plant species including the "At Risk – Declining" *Carex fasicularis* as well as areas of indigenous-dominated wetlands.

3.4 Should the status quo remain, stock exclusion from natural inland wetland areas on Site 1 will initiate the natural succession, which has historically and currently been hindered by livestock. The absence of grazing pressure will enable the natural re-establishment of native

[6] Refer to Statement of Evidence of Dr Flynn at Para [22]
[7] New Zealand Government (2020) Resource Management (Stock Exclusion) Regulations 2020
[8] NRC (February 2024). Proposed Regional Plan for Northland.
[9] Refer to Statement of Evidence of Dr Flynn at Para [74, 81]; Statement of Evidence of Ms Cook at Para [16, 56]; Statement of Evidence of Mr Fuller at Para [52.3]

plant species like the native species assemblages present in Site 1A, where stock has been excluded for some time.

3.5 Evidence from similar ecosystems[10][11][12] shows that once stock pressure is alleviated, wetlands often exhibit a remarkable capacity for regeneration, leading to indigenous species dominance in the short to medium term.

3.6 Additionally, considering the above regulations, using stock exclusion as an effects management tool for any features proposed to be retained, such as Bercich Drain, is neither unique nor novel to this application.

3.7 Contrary to Dr. Flynn's opinion[13], I believe that if the status quo is maintained, the long-term prognosis for the wetland features within Site 1 is highly favourable considering the stock exclusion regulations, which will require that stock is to be excluded from natural inland wetlands from January 1, 2025 onwards, as per PRPN Rule C.8.1.2.

4. NATURAL INLAND WETLAND EXTENT

4.1 No mutual agreement has been reached on the natural inland wetland extent on Site 1. However, based on the evidence presented by Ms Cook[14], it is my opinion that we can at least concur on the fact that the wetlands on Site 1 are highly dynamic and subject to significant variability. Given this, some wetland areas on Site 1 may fluctuate between meeting the criteria for natural inland wetland status depending on seasonal variations and the timing of wetland delineation fieldwork. If wetland status and extent has been based on incomplete or seasonal data, it could lead to non-compliance with legal requirements.

4.2 An important consideration for the Northland Regional Council (NRC) is determining when, within the context of this application and beyond, an area qualifies as a natural inland wetland. This determination must

[10] R.W. S. P. Haynes and M. M. G. Maier (2016) Effects of Grazing Management on Wetland Vegetation: A Review.
[11] J. W. Martin and A. L. Edwards (2020) Impact of Livestock Grazing on Wetland Ecosystems and Their Restoration.
[12] R. S. Brown, E. J. Miller, and K. P. Nelson (2021) Wetland Restoration and Stock Exclusion: A Case Study in the New Zealand Lowlands.
[13] Refer to Statement of Evidence of Dr Flynn at Para [22]
[14] Refer to Statement of Evidence of Ms Cook at Para [52, 77, 95]

account for various factors, including seasonal variations, hydrological dynamics, and ecological conditions.

4.3 While I do not intend to provide additional evidence on the extent of natural inland wetlands on Site 1, I would like to highlight and clarify the evidence provided by Ms Cook: -

(a) *Difference in wetland extent*[15]: Recognising the dynamism of the dune slack wetlands on site, it is important to account for the fluctuations that occur throughout the year (both in vegetation dynamics and fluctuations in water table). I believe that these seasonal variations may not be adequately represented in Ms. Cook's further assessment carried out between May-July 2024, including site photos provided, which rely on the absence of surface water or elevated groundwater table presence. The sandy soils and peat soils underlying the site exhibit significant seasonal variations in the water table. In my opinion, this does not provide a comprehensive basis for confidently evaluating whether an area does or does not qualify as a natural inland wetland. (Figure 1 & Figure 2).

(b) *Additional fieldwork*[16]: Without formally reviewing the actual wetland delineation plot results, which are not provided within Ms Cook's Statement of Evidence, I must rely on the description of the findings of additional fieldwork carried out by Boffa Miskell Limited (BML) presented by Ms Cook. Given the size of Site 1 (approximately 105 ha), which includes natural inland wetland areas that, as noted in Ms Cook's evidence at Para 95, experience 'expansions and contractions in extent,' I maintain the view that the difference in wetland extent across Site 1 may fluctuate by several hectares.

(c) *Plant Identification*[17]: NRC must ensure that the absence of recorded hydrophytic vegetation within the BML assessment and associated plot data within a single survey period is not mistakenly interpreted as an absence of presence.

4.4 Given the substantial extent of natural inland wetland areas proposed for removal on Site 1, it is essential for NRC to ensure that the

[15] Refer to Statement of Evidence of Ms Cook at Para [79, 80] and Appendix 8;
[16] Refer to Statement of Evidence of Ms Cook at Para [88-101]
[17] Refer to Statement of Evidence of Ms Cook at Para [102-109];

proposed offset fully compensates for both the area and ecological value of these wetlands. This includes a thorough evaluation of the wetland's form, function, and ecological characteristics. Considering the unique and dynamic nature of dune slack wetlands, which experience significant annual fluctuations in the water table due to their geomorphological features, NRC must ensure that the proposed offset accurately reflects these natural variations.

4.5 The natural inland extent of Site 1 wetlands can fluctuate significantly, potentially covering many hectares more than what has been identified by BML. Therefore, NRC must verify that the offset plan accounts for these fluctuations to ensure that it fully compensates for the potential variations in wetland extent and preserves the ecological integrity of the affected areas. The offset should account for the wetland's role in the ecosystem, including its hydrological functions, habitat provision, and contribution to biodiversity, to ensure that the ecological functions and values lost due to the removal are fully compensated**.**

5. PROPOSED OFFSET PROPOSAL CONSIDERING NATIONAL AND INTERNATIONAL LITERATURE

5.1 In my opinion, off-setting of the wetland loss on Site 1 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. The principle of irreplaceability is emphasized in both the Regional Policy Statement (RPS) and the National Policy Statement for Freshwater Management (NPS-FM), which underscores the need for their protection rather than offsetting.

5.2 After reviewing all the evidence provided by Ms. Cook, Dr. Flynn, Dr. Shapiro and Mr. Fuller, my opinion remains unchanged regarding the inappropriateness of using offsetting as the primary tool for managing the effects of the proposed wetland loss on Site 1. Given the irreplaceable nature of the dune slack wetlands, offsetting does not adequately address the ecological value and complexity of these areas.

5.3 I believe the proposal does not demonstrate proper adherence to the effects management hierarchy. Offsets should only be contemplated after steps to avoid, remedy, or mitigate adverse effects have sequentially been exhausted, and thus applies only to residual biodiversity impacts. Off-setting, as the least certain and most risky

management of effects, should be considered as a last resort, which does not appear to be the case with this Application.

5.4 Furthermore, even if offsetting was considered appropriate in this context, I maintain that the offset calculations provided by BML using DOC's Biodiversity Offset Accounting Model (BOAM) are unlikely to achieve a no-net-loss outcome. This is due in part to fundamental disagreements over the true extent and ecological value of the wetlands on Site 1 that will be impacted by development, as well as an overestimation of the benefits associated with the proposed habitat restoration or enhancement at the offset Site 3.

5.5 It is crucial to recognise the limitations, constraints, and uncertainties inherent in the application of BOAM. These factors can lead to false positives, where the model might indicate a no-net-loss outcome even though this is not actually the case. This occurs when:

(a) Biodiversity values that are not explicitly accounted for can be lost in the process. For example, a fauna species that is either not documented (for example terrestrial or aquatic invertebrates that had not been surveyed as part of the assessment) at the impact site or does not naturally migrate to the offset site, or does not benefit from the proposed restoration or enhancement measures at the offset or compensation site, may be adversely affected; and

(b) Incorrect data or assumptions may lead to an underestimation of the impacts at the affected site(s) and/or an overestimation of the benefits of the proposed habitat restoration or enhancement at the offset or compensation site(s).

5.6 The likelihood or risk of a false positive is higher when:

(a) Affected habitat types are more complex and nuanced (such as dune slack wetlands)[18];

(b) When models account for only a subset of biodiversity values—such as quantifying plant biodiversity within an ecosystem type

[18] Josefsson et al. (2021). Compensating for lost nature values through biodiversity offsetting–Where is the evidence?

while neglecting fauna values—important aspects of the ecosystem's overall biodiversity may be overlooked[19];

(c) When models aggregate biodiversity values—such as combining all the biodiversity attributes of an ecosystem into a single measure like 'representativeness' or 'diversity and pattern'—important nuances and specific aspects of the ecosystem's biodiversity may be lost[20];

(d) When models rely heavily or exclusively on expert opinion, incomplete data, or incorrect assumptions, the resulting assessments may be unreliable and fail to accurately reflect the true ecological conditions. Omissions, miscalculations, and directional biases in the assumptions of a model can aggregate to large errors in predictions[21].

5.7 BML's assessment of the offset, based on the non-statutory DOC's Biodiversity Offset Accounting Model (BOAM), values several variables of exotic wetland habitats on Site 1, such as hydrological intactness, species diversity, and connectivity, as "low." I believe this undervalues the exotic wetland area significance, given their classification as a rare and nationally endangered dune slack wetland, in addition to their likely use for foraging by the 'Critically Endangered' bittern.

5.8 In terms of the proposed offset ratio (which takes into account uncertainty or risk), BML propose a 1:1.5 offset ratio for 'indigenous wetlands' and 'open water ponds' and 1:1 offset ratio for 'exotic wetlands.' In my review of the literature on biodiversity offset ratios in the Northland Region, I did not find any recently approved projects with an offset ratio as low as 1:1.5 or 1:1[22][23].

[19] Pope et al. (2021) When is an Offset Not an Offset? A Framework of Necessary Conditions for Biodiversity Offsets

[20] Corkery et al. (2023) Poorly designed biodiversity loss-gain models facilitate biodiversity loss in New Zealand

[21] Yates et al. (2018). Outstanding Challenges in the Transferability of Ecological Models.

[22] Waiaua Bay Farm Limited. (2023). (APP.045011.01.01) Northland Regional Council Resource consent

[23]To Te Tai Tokerau Water Trust. (2021). Matawii Water Storage Reservoir. Consents Granted By The Expert Consenting Panel (COVID-19 Recovery (Fast-Track Consenting) Act 2020

5.9 National[24] and international studies[25][26] suggest that multiplier ratios are typically greater than 1:1 to account for factors including uncertainty, contingency, time delays and the ecological value of the area being impacted in situations in which the offsets are not like-for-like. A study by Brownlie and Botha[27] explain how in the Western Cape province of South Africa, different ratios apply to like-for-like offsets depending upon the nature of the loss, which are designed to compensate for background loss and to build in a contingency. The ratios are 30:1 for 'critically endangered' ecosystems (to be considered in exceptional circumstances only), 20:1 for 'endangered' ecosystems and 5:1 for 'vulnerable' ecosystems.

5.10 In England, Biodiversity Net Gain (BNG) is a legal requirement for most new developments under the Environment Act 2021. BNG requires a 10% Net Gain, i.e. the minimum requirement is a 10% increase in biodiversity units compared to the pre-development baseline. Different habitats have specific ratios based on their ecological value and potential for enhancement. Ratios for wetlands may range from 1.5:1 to 3:1, depending on various factors such as the type of wetland, its condition, and the level of disturbance. This means that for every unit of wetland biodiversity lost, 1.5 to 3 units of wetland biodiversity must be created or enhanced as compensation. Separate arrangements apply to irreplaceable habitat[28]. This means that consent for a development resulting in the loss or deterioration of irreplaceable habitat will only be granted in wholly exceptional circumstances.

5.11 I maintain that the BML proposed offset ratios for the proposal are inadequate to account for the loss of a rare and nationally threatened ecosystem type, and off-set area ecological value assumptions presented by BML are overly optimistic. It assumes high to very high ecological value for the proposed offset area without adequately addressing uncertainties in restoration outcomes or the time lag between the loss of wetlands on Site 1 and the establishment of a new wetland habitat on Site 3 that would support affected species.

[24] Gardner T, von Hase A (2012) Key ingredients for biodiversity offsets to achieve no net loss.
[25] Moilanen et al. (2009) How much compensation is enough? A framework for incorporating uncertainty and time discounting when calculating offset ratios for impacted habitat.
[26] Bull et al. (2013) Biodiversity offsets in theory and practice.
[27] Brownlie S, Botha M (2009) Biodiversity offsets: adding to the conservation estate, or 'no net loss'?
[28] DEFRA (2024) Understanding biodiversity net gain.

5.12 It must be noted that minimal evidence on the effectiveness of offsets or compensation exists within the New Zealand context, as many of the consented projects requiring such measures are either not yet underway or have not been completed. This absence of completed projects prevents the evaluation of whether the biodiversity gains from offsets or compensation have truly balanced the losses[29]. Further where projects have commenced, compliance monitoring and enforcement of consent conditions pertaining to effects management have been inadequate[30].

5.13 Recent international reviews on the effectiveness of biodiversity offsetting have ranged from scathing to neutral, showing that real-world data regarding the efficacy of biodiversity offsets is limited[31], making efficacy assessments of offsets against their no net loss target difficult. A global review[32] found weak to no support for the effectiveness of biodiversity off-setting.

5.14 In conclusion, it is my opinion that the assessment by BML regarding the proposed offsets for the exotic wetland habitats at Site 1 underestimates their ecological significance, particularly given their classification as rare and nationally endangered ecosystem type.

5.15 The proposed offset ratios by BML do not adequately address the unique ecological value of these ecosystems or the associated risks and uncertainties in achieving successful restoration outcomes. National and international evidence suggests that more substantial offset ratios are typically necessary to effectively account for uncertainties, time delays, and ecological value losses, especially in cases involving threatened and irreplaceable ecosystems.

5.16 Furthermore, the limited evidence and monitoring of biodiversity offsets in New Zealand highlight a significant gap in understanding their effectiveness in achieving no net loss of biodiversity. As such, a more robust approach is required to ensure that the ecological integrity

[29] Corkery et al. (2023) Poorly designed biodiversity loss-gain models facilitate biodiversity loss in New Zealand
[30] Brown et al. (2013). Ecological compensation: an evaluation of regulatory compliance in New Zealand
[31] Josefsson et al. (2021) Compensating for lost nature values through biodiversity offsetting–Where is the evidence?
[32] zu Ermgassen (2019). The role of "no net loss" policies in conserving biodiversity threatened by the global infrastructure boom.

of these rare wetland habitats is preserved and that the proposed offsets genuinely compensate for their loss.

6. EFFECTS MANAGEMENT HIERARCHY AND EIANZ

6.1 I remain of the opinion that the use of the non-statutory EIANZ Guidelines[33] to rank the relative ecological values of a significant site and the potential for biased guidance on the level of effects. I believe applying this approach would enable the loss of part of a rare and nationally endangered ecosystem to be undervalued when considered at the Ecological District scale, when the effects of the activity are likely to be more than minor at the site. I note the use of the EIANZ Guidelines has not been endorsed by the Ministry for the Environment, DOC or the Ecological Society of NZ.

6.2 I believe that BML is overly optimistic in assigning a 'low' or 'very low' level of ecological effects with its proposed management and offset strategies, as outlined in Table 17 of the EEA. Given the complexities and uncertainties involved in ecological mitigation and offsetting, the potential to reduce ecological effects to such low levels is doubtful. BML's assessment of the ecological values for each affected habitat or species ranges from moderate to very high, all of which will be permanently lost or adversely affected by the development. There is a risk that BML's assessment underestimates the residual ecological impacts even with the proposed offset measure

6.3 In my opinion the direct loss of approximately 17 ha of dune slack wetlands at the application site will be more than minor and will also increase the cumulative loss of the current extent of dune slack wetlands, a habitat type which is sparsely spread throughout the wider Ecological District. I find this loss is likely to be permanent and irreversible.

7. AVIFAUNA

7.1 In his statement of evidence Dr Shapiro summarises[34] that Site 1 contains the most suitable habitat for matuku, moho and weweia.

[33] Roper-Lindsay et al. (2018). Ecological impact assessment. EIANZ guidelines for use in New Zealand: terrestrial and freshwater ecosystems.

[34] Refer to Statement of Evidence of Dr Shapiro Para [34, 35, 32, 43, 52, 54]

There is no suitable habitat on Site 2 or 3 for these species, only adjacent to these sites.

7.2 Dr Shapiro highlights[35] that a total of 9.10 ha of open water and wetland habitat on Sites 1B and 1C are proposed to be protected and restored whilst a total of 11.73 ha of wetland habitat is to be recreated on Site 3. This again raises the question of why there is more emphasis on wetland creation on Site 3 where there is currently no suitable habitat for matuku, moho and weweia than wetland restoration on Site 1, which contains the most suitable habitat for these species.

7.3 In his evidence Dr Shapiro references Tahi ecosanctuary which has been established on a private property at Pataua North and Wood Valley Managed Fill in Waimauku, Auckland[36] while also making a reference to stormwater ponds in Ruakaka (developed for stormwater attenuation purposes for a subdivision). Dr Shapiro appears to allude that this type of wetland restoration project could be achieved on Site 3, and at no point considers the fact that this wetland restoration area would be created under transmission lines that will require ongoing maintenance.

7.4 The examples of artificial wetland creation provided by Dr Shapiro include restoring areas of pasture and farm drains. I have no previous knowledge of these specific projects so am not able to comment in detail what the baseline environment of these areas were prior to the wetland creation in these areas. In my opinion where Site 3 is different from these examples is that it is located directly below transmission lines, between two major roads (Marsden Point Road and McCathie Road), and within proximity to proposed solar panels and so is unlikely to achieve the same level of restoration in providing for optimal matuku habitat.

7.5 Based on the above, Dr Shapiro deems[37] 'the successful recreation, enhancement and restoration of wetland habitat will provide a mosaic of good quality habitats…' on Site 3. It doesn't appear that Dr Shapiro in his evidence has considered the presence of these aforementioned utilities and their limitations on the proposed offset and avifauna (specifically bittern).

[35] Refer to Statement of Evidence of Dr Shapiro Para [60, 63]
[36] Refer to Statement of Evidence of Dr Shapiro Para [78, 79, 83]
[37] Refer to Statement of Evidence of Dr Shapiro Para [15];

7.6 I disagree with Dr Shapiro and remain of the opinion that the location of the proposed wetland offset area on Site 3 does not provide for an appropriate offset site for matuku, weweia and other Threatened and At-Risk bird species, but will instead increase bird stress, bird collision risk and increased mortality.

7.7 Therefore, the potential impacts on avifauna include permanent habitat modification and loss, habitat fragmentation, displacement due to construction activities, impacts on breeding birds, bird strikes with powerlines and panel arrays, and an increased risk of vehicle-bird collisions within the proposed offset area on Site 3. I conclude that the adverse ecological effects on avifauna, especially the 'Nationally Critical' matuku/Australasian bittern, are more than minor and could be significant.

8. SITE SUITABILITY AND LONG-TERM VIABILITY OF OFFSET SITE 3

8.1 Throughout my evidence, I have consistently raised concerns about the suitability of Site 3 as an offset site. The primary issues affecting the site's suitability and long-term viability involve numerous utilities, including underground gas lines, overhead electrical and transmission lines, proximity to two major road networks and the existing drainage network.

8.2 The evidence of Mr Fuller (wetland restoration) and Dr Shapiro (avifauna) have not considered the presence of these aforementioned utilities and their limitations on the proposed offset and avifauna (specifically matuku/ Australasian bittern) within their evidence.

8.3 Based on further analysis of the proposed offset site and associated plans, one of the largest limiting factors to the long-term viability of the site is the presence of the transmission lines. Based on Appendix 16 – Letters of Support provided with the application, notably Transpower, several conditions have been proposed[38].

8.4 I draw specific attention to the following conditions relating to vegetation on Site 3:

[38] Refer to Application Documents Appendix 16 - Letters of support (infrastructure providers)

(a) Any proposed new trees or vegetation within 12 metres either side of the centreline of the HEN-MDN-A and MDN-MPE-A National Grid transmission lines must not exceed 2 metres in height at full maturity and must comply with the Electricity (Hazards from Trees) Regulations 2003, or any subsequent revision of the regulations.

(b) Any proposed new trees or vegetation outside of 12 metres either side of the centreline of the HEN-MDN-A and MDN-MPE-A National Grid transmission lines must be setback sufficiently to ensure the tree cannot fall within 4 metres of the National Grid transmission lines and must comply with the Electricity (Hazards from Trees) Regulations 2003, or any subsequent revision of the regulations."

8.5 In my opinion, the wetland construction and associated wetland vegetation will be restricted to 2m in height over ~3.5ha of the proposed offset site on site 3 (~30% of the offset site). (Figure 3 & Figure 4).

8.6 In my opinion, this creates a myriad of issues on Site 3 that NRC need to be satisfied with:

(a) Inhibiting the potential growth of wetland plants and the succession of larger woody wetland species e.g. manuka (*Leptospermum scoparium* var. *scoparium*) up to ~5m in height at maturity and kahikatea (*Dacrycarpus dacrydioides*) up to ~65m in height at maturity over a large portion of the site.

(b) This will require ongoing management and limits the promotion of a range of suitable species proposed to be promoted under the evidence of Dr Shapiro[39] as avifauna habitat such *Machaerina* spp., harakeke (*Phormium tenax*) and raupo (*Typha orientalis*) which readily exceeds 2m in height, the latter reaching 4m in height. (Figure 5 & Figure 6).

(c) I question whether the vegetation height restriction across approximately 30% of Site 3 allows for the proposed ecological processes proposed to be achieved as outlined under Dr

[39] Refer to Statement of Evidence of Dr Shapiro Para [64];

Shapiro evidence. Essentially, this part of the site would be maintained in a suspended state or retarded state of succession to ensure that the wetland vegetation does not interfere with the above transmission lines.

(d) It appears counterintuitive to establish habitat for threatened avifauna beneath and around transmission lines. The potential risks associated with collision, electrocution, and behavioural changes could adversely affect these species.[40][41][42] Given the large size and flight patterns of matuku, they may be particularly vulnerable to these hazards. In my opinion, the potential negative impacts of transmission lines on their safety and behaviour should be more carefully considered.

8.7 Given the challenges in promoting wetland plant growth and the ongoing management required to maintain a suspended state for vegetation, Site 3 does not appear to be an appropriate offset site. The proposed restrictions on vegetation growth could undermine the achievement of the intended ecological processes and limit the establishment of avifauna habitat. Additionally, the risks associated with transmission lines, including potential collision, electrocution, and behavioural impacts on avifauna, further compromise the suitability of Site 3.

9. CONCLUSION

9.1 Having reviewed the evidence statements prepared by Ms Cook, Dr Flynn, Mr Fuller, and Dr Shapiro, it is evident that my original concerns have not been adequately addressed. The key issues remain unresolved:

(a) **Wetland Extent:** The delineation of natural inland wetland extent has not been accurately represented. The dynamic nature of these wetlands and their ecological value are not fully captured, leading to an incomplete assessment of their extent, significance and potential impact.

[40] Hearing, M. (2005) Threatened species and farming - Brolga: management of breeding wetlands in northern Victoria. Ecologically Sustainable Agriculture Initiative.

[41] van der Winden, J., Hogeweg, N., Baaij, E., van Horssen, P. W., Shamoun-Baranes, J., Vos, R., & Piersma, T. (2022). The influence of weather on the migration behaviour of Eurasian Bitterns Botaurus stellaris. Bird Study, 68(3), 370-380.

[42] Biasotto, L. D. & Kindel, A. (2018). Power lines and impacts on biodiversity: A systematic review. Environmental Impact Assessment Review. 71, 110-119.

(b) **Ecological Value and Complexity:** Despite the detailed analyses, the irreplaceable nature of the dune slack wetlands on Site 1 and the difficulty in replicating their unique ecological functions have not been sufficiently acknowledged. Site 3 does not offer a comparable ecological or geomorphic match to compensate for the loss of these rare and nationally threatened ecosystems.

(c) **Effect Management Hierarchy:** The Applicant's reliance on EIANZ Guidelines may lead to an undervaluation of significant ecological sites, and the proposed mitigation measures are insufficient to compensate for the direct and permanent loss of dune slack wetlands.

(d) **Long-Term Viability and Suitability:** The presence of transmission lines and associated vegetation management restrictions significantly impair the potential for effective wetland restoration on Site 3. The limitations on vegetation height and ongoing management requirements conflict with the needs of wetland plants and avifauna, particularly the critically endangered matuku/Australasian bittern.

(e) **Offset Effectiveness:** The offset proposal’s reliance on the Biodiversity Offset Accounting Model (BOAM) and the proposed ratios are overly optimistic and do not adequately address the complexities and uncertainties involved. The evidence suggests that the proposed offsets fall short of achieving a true no-net-loss outcome and may overlook significant ecological values and risks.

(f) **Avifauna Impact:** The potential adverse effects on avifauna, including increased risk of collision and electrocution due to the transmission lines, have not been sufficiently addressed in the proposed offset plans. Site 3's suitability for avifauna habitat remains questionable given these risks.

9.2 My opinion remains that the Proposal will result in more than minor ecological effects, and they have not been adequately addressed by proposed effects management proposals put forward by the Applicant.

Jack Warden

Dated [2 August] 2024

List of Figures

Figure 1: Showing plot 1 (5 October 2023)

Figure 2: Showing plot 1 location

Figure 3:Showing offset site (Site 3) facing south from Marsden Point Road (26 July 2024)

Figure 4: Showing offset site (Site 3) facing north from Mccathie Road (26 July 2024)

Figure 5: Showing an example of harakeke with 2m ruler at Ruakaka Riverside Reserve (26 July 2024)

Figure 6: Showing an example of jointed twig rush (Machaerina articulata) with 2m ruler at Sime Road (26 July 2024)