IN THE MATTER of the Resource Management Act 1991

AND

IN THE MATTER of applications by Waka Kotahi NZ Transport Agency to Manawatu Whanganui Regional Council for resource consents associated with the construction and operation of Te Ahu a Turanga: Manawatū Tararua Highway.

SECTION 87F REPORT OF JAMES STUART LAMBIE – TERRESTRIAL ECOLOGY

A. QUALIFICATIONS / EXPERIENCE

1 My full name is James Stuart Lambie. I am an independent ecologist and biosecurity policy advisor with 20 years of experience in indigenous ecosystems inventory, assessment, monitoring, and pest management. I am also presently engaged as a casual staff member with the Manawatū-Whanganui Regional Council (Horizons) as an advisor (ecology) and have been in this position since July 2017. Prior to this, I was employed by Horizons in the role of Research Associate (ecology), then Environment Scientist (ecology), then Science Coordinator, for 11 years.

2 My work involves project-based technical investigations that include desktop and in-field assessment of effects of proposed activities on terrestrial, wetland, and freshwater ecosystems. Past projects include the design of the sediment trap and lake margin biodiversity package for the consent to harvest aquatic weeds from Lake Horowhenua (2015-16) and assessment of the proposed biodiversity avoidance, remedy, and mitigation packages for Puketoi Windfarm, Project Central Wind windfarm, and Mt Munro windfarm. I also prepared evidence on behalf of Palmerston North City Council, Manawatu District Council and Tararua District Council in relation to the Notices of Requirement (NoR) for Te Ahu a Turanga – Manawatū Tararua Highway Project ("the Project").

3 I hold the qualification of Bachelor of Science (Massey University) and a Master of Applied Science in Resource Management (Lincoln University). I am a member of the New Zealand Ecological Society and a member of the New Zealand Biosecurity Institute.

4 I have been engaged by Horizons to provide ecological expertise on resource consent applications by Waka Kotahi NZ Transport Agency (the "Transport Agency") for resource consents associated with the construction and operation of the Project.

5 I am familiar with the terrestrial, wetland, and stream margin habitats within the Project site, having visited the site on 18 July 2018 with Dr Adam Forbes as part of the NoR process and again on 10 September 2019 with the Applicant and Horizons team members. I am particularly familiar with the most vulnerable indigenous terrestrial and wetland habitats having specifically visited the forest, scrubland and wetland areas between chainages 4000 and 5800 on both occasions. I am familiar with the wider Manawatū Gorge / Te Apiti area and with the indigenous habitats remaining in the Manawatū-Whanganui Region.

B. CODE OF CONDUCT

6 I confirm that I have read and agree to comply with the Code of Conduct for Expert Witnesses contained in the Environment Court Practice Note 2014. I confirm that I have considered all the material facts that I am aware of that might alter or detract from the opinions that I express, and that this evidence is within my area of expertise.

C. SCOPE OF REPORT

7 My report focuses on effects on terrestrial and wetland ecosystems (including observations on natural character effects) and covers the following topics:

(a) One Plan expectations with regard to the maintenance of the Region's indigenous biodiversity;

(b) A review of the ecological evidence (including assessment of ecological values of ecosystems and species within the Project Area) provided by the Applicant;

(c) Measures to avoid or mitigate potential adverse ecological effects, and to manage any residual effects through offsets and proposed compensation;

(d) Submissions as they relate to issues concerning effects on terrestrial and wetland habitats, indigenous flora and fauna, and the preservation of indigenous biodiversity; and

(e) Recommendations for proposed conditions to address any ecological matters.

8 In addition to my own observations, I have reviewed and rely on the assessment reports presented by Dr Matthew Baber and Mr Joshua Markham. In doing so, I have also relied on the information presented by other authors having technical input into Dr Baber's and Mr Markham's reports. I also have referred to the technical assessments and evidence of Dr Forbes prepared for the Applicant in support of the NoR for the Project (together, the "NoR Ecology Assessment"). I have reviewed my evidence from the hearing on the NoRs in April 2019, and having had the benefit of reviewing the updated proposal, detailed design, and the offsetting proposal, I have indicated where my position has changed when reviewing the consent application.

9 I have also reviewed technical reports on stormwater, erosion and sediment control, dust and natural character where they are relevant to terrestrial ecological issues or the management of effects on ecological issues.

10 I have also reviewed and relied on the information provided by the Applicant in its response to Horizons request for further information dated 29 April 2020 ("s92 RMA Response"). The s92 RMA Response details, among other things, the content of Landowner Agreements (and an update on progress with them) with regard to the inception of the proposed offset / compensation measures. I have also relied on the clarification given by the Applicant with respect to the ecological value, magnitude of effect, and residual effect on each of the indigenous habitats affected by the Project. This information was provided by the Applicant in the s92 RMA Response.

11 I have also had regard to the s87F reports of Ms Ryan, Mr Brown, Mr Hudson, and Mr Pearce prepared for Horizons.

D. EXECUTIVE SUMMARY

12 The key conclusions of my report are:

(a) The Applicant has strived throughout the Project to avoid effects on indigenous biodiversity where possible and proposes methods to remedy and/or mitigate many of the direct effects on rare and threatened flora and fauna.

(b) However, the Project will still result in the permanent areal loss of vulnerable indigenous habitats, resulting in more than minor residual effects that cannot be avoided, remedied, or mitigated. The Project must reasonably demonstrate that these residual effects are offset for net gain in indigenous biodiversity and show that there is a significant likelihood of this net gain being achieved.

(c) Subject to further review and modification of the offsetting and compensation proposal (as recommended in my report), and the inclusion of clear standards into conditions of consent (outside of management plans), the Project can be implemented in a way that ensues that the residual effects on biodiversity are managed such that there will ultimately be net gain of indigenous biodiversity within the local range of that biodiversity affected by the Project.

E. BACKGROUND

The Project

13 The Project is defined as the construction, operation, use, maintenance and improvement of approximately 11.5km of new State Highway connection between Ashhurst and Woodville, connecting Woodville and Ashurst, via a route over the Ruahine Ranges. The proposed new section of State Highway links into the western entry to the closed Gorge route, runs through the Te Apiti Windfarm and other land north of the Manawatū Gorge and south of Saddle Road, emerging near Woodville.

14 A description of the Project, including design, existing environment, and potential effects on indigenous habitats, flora and fauna is set out in the Project AEE with (after the amendment referred to as Attachment 7 in the s92 Response) sufficient detail to ascertain the impact of the Project on terrestrial and wetland ecosystems and residual effects on indigenous biological diversity.

15 The Project will have significant ecological effects associated with the loss of around 11.82 hectares of indigenous forest and shrublands and 4.97 ha of wetland habitat[1]. It will adversely affect the ecological values of a number of wetlands, streams and indigenous vegetation and forest ecosystems. The ecological value of these habitats ranges from "moderate" to "very high" when assessed for their representativeness, rarity and/or distinctiveness, diversity and pattern, and ecological context[2].

16 I note that a primary role of Dr Baber's assessment (Technical Assessment G) was *"…to refine and update the assessment of effects on terrestrial ecology from the NoR assessments (and the Designation Conditions) to reflect the updated and more detailed Project design as per the Project drawings and DRR."*[3] I acknowledge that the Applicant has since proposed an updated alignment as part of the Project which avoids a significant amount of the Queen Elizabeth II National Trust (QEIINZ Trust) covenant areas (reducing effects on those covenant areas) with other design changes to either avoid or minimise ecological effects arising from the Project activities.[4] However, I have reviewed the technical information through the lens of a full effects assessment, and not comparative to the anticipated effects identified for the NoR.

[1] Project Technical Assessment F: para 25.
[2] Project Technical Assessment F: Table 2. Pp 38-49 and Attachment 7.
[3] Project Technical Assessment F – para 71.
[4] Project Technical Assessment G: para 34-40.

17 The Applicant concludes that there are significant residual effects that cannot be avoided, remedied or mitigated, and proposes a range of biodiversity offsetting and compensation measures that aim to achieve an overall net-gain in biodiversity in the local landscape as required by One Plan Policy 13-4. The offsets / compensations include like-for-like habitat replacement for those habitats that are readily replaceable (identified as "offsets" in Technical Report G) and trades for the loss of habitat extent with an improvement in the quality of remaining habitats for those habitats that are more difficult to replace (identified as "compensations" in Technical Report G). The improvement in habitat quality compensatory approach also includes 10-years of pest mammal control in the neighbouring Manawatū Gorge Scenic Reserve (MGSR).

18 I discuss the level to which the offset package (inclusive of compensation) provides for or meets Policy 13-4 (d) expectations at paragraph 90 onwards

One Plan - Maintenance of Biological Diversity

19 The past and current indigenous vegetation cover of the Manawatū-Whanganui Region, and justification for regulatory protection of terrestrial biodiversity under the One Plan, is comprehensively reviewed by Dr Fleur Maseyk in a technical report that supported the development of the One Plan policies for biodiversity (Maseyk, 2007)[5]. The report asserts that the total amount of a habitat type is a fundamental determinant for species survival, and applies this aspect of island biogeography theory to identify the vulnerability to loss of biological diversity within habitats according to their current extent as a proportion of former extent.

20 Maseyk (2007)[6] assigns four categories to the status of the habitats remaining – "rare", "threatened", "at-risk", and "no threat category". The "rare" status was assigned to habitat types that were originally (pre-human) uncommon in the landscape. The "threatened" status was assigned to habitat types with 20% or less of their former extent. Because of the high level of rarity (of rare habitats) and representativeness (of threatened habitats) the continued decline in extent and quality of these habitats is considered to have a disproportionate effect on the magnitude of loss of biological diversity at the regional scale.

[5] Maseyk, F; 2007. Past and Current Indigenous Vegetation Cover and the Justification for the Protection of Terrestrial Biodiversity within the Manawatu Wanganui Region. Technical Report to Support Policy Development. Horizons Regional Council report 2007/EXT/790.
[6] Ibid. Table 5.1 pg 17.

21 Schedule F of the One Plan provides a list of all indigenous vegetation types in the Manawatu Region which are considered "threatened" or "rare". Such habitats are pre-determined as being significant habitats meeting Policy 13-5 (a) (ii) (E) (rare habitats) or 13-5 (a) (i) (A) (threatened habitats); subject also to Schedule F thresholds on remnant size or proximity to other habitats (F.2 (a)) and criteria for exclusion from consideration (F.2 (b)). For the Project, eight significant habitat types are identified as either "threatened" or "rare" under the One Plan[7] and I review that assessment in paragraph 32 below.

22 The "at-risk" status is assigned to habitat types that have been reduced to 50% or less of their former extents. These habitats are considered at-risk of trending toward significant loss of biodiversity (conceivably to below sustainable thresholds) if they are not protected today. These habitat types are also listed in Schedule F and, in addition to the application of Schedule F itself, are subject to the tests of significance following Policy 13-5 (a). In terms of the Project, no "at-risk" habitat types have been identified.

23 The "no-threat category" status is assigned to habitat types that are presently greater than 50% of their former extent. These habitats are not listed in Schedule F of the One Plan. For the Project, 5 habitats have been assessed as not significant on the basis of not being listed in Schedule F[8]. I review that assessment in paragraph 33 below.

24 With respect to the rare and threatened habitats identified as impacted by the Project, Rule 13-9 for "some activities within rare habitats and threatened habitats" identifies vegetation disturbance and discharges of water or contaminants (among other activities), as a non-complying activity. This is because such activities are likely to further degrade the ecological integrity of, or hasten the demise of, those habitats.

25 Policy 13-4 guides the decision-making process under Rule 13-9. In the case of the Project, there are two aspects to note with respect to Policy 13-4b. The first is that the One Plan expects Applicants to follow an avoid – remedy/mitigate – offset hierarchy. While the AEE (pg. 128) identifies that the Project has adhered to the 'mitigation hierarchy' "…as a matter of ecological best practice, and in accordance with Designation Condition 24", this is nothing less than expected under the One Plan. The second is that, if offsets are proposed, they must result in a net biodiversity gain

[7] Technical Report F: Paragraph 130.
[8] Technical Report F: Paragraph 132.

(Policy 13-4 (b) (iii)). To avoid doubt, I note that a net biodiversity gain is different to a no net loss approach (as is referred to in places in the technical assessments).[9]

26 There are limits to the offsetting which can be used under Policy 13-4. In particular, Policy 13-4 (d) requires that an offset must (bolded is my emphasis):

> (i) provide for a net indigenous biological diversity gain **within the same habitat type**, or where that habitat is not an area of significant indigenous vegetation or a significant habitat of indigenous fauna, provide for that gain in a rare habitat or threatened habitat type, and
>
> (ii) **reasonably demonstrate** that a net indigenous biological diversity gain has been achieved using methodology that is appropriate and commensurate to the scale and intensity of the residual adverse effect, and
>
> (iii) generally be in the **same ecologically relevant locality** as the affected habitat, and
>
> (iv) **not be allowed where inappropriate for the ecosystem or habitat type by reason of its rarity, vulnerability or irreplaceability**, and
>
> (v) **have a significant likelihood of being achieved** and maintained in the long term and preferably in perpetuity, and
>
> (vi) **achieve conservation outcomes above and beyond that which would have been achieved if the offset had not taken place**.

27 I discuss the degree to which the offsetting and compensation proposals meet these expectations at paragraph 90 onwards.

Approach to Section 87F Report

28 In my report I review the technical material presented with the Application to determine first whether the significant adverse effects on biodiversity have been reasonably avoided, remedied or mitigated; secondly, whether offsetting/compensation is appropriate; and finally, whether the offsets/compensation package reasonably demonstrates net-gain after having considered the level of biodiversity concern for

[9]E.g. Technical Report F, paragraph 82 d) (pg. 25). Technical Report G, paragraph 25 (pg. 8), paragraphs 58 and 62 (pg. 16).

each significant habitat type, the likelihood of offset success following Pilgrim *et al*. (2013),[10] and other matters arising from application of Policy 13-4 to the Project.

F. ECOLOGICAL VALUES & STATUTORY SIGNIFICANCE

29 The ecological values assessment presented in Technical Assessment F Table 2, Table 3, Table 6, and Table 8 follow the Environment Institute of Australia and New Zealand ("EIANZ") Ecological Impact Assessment Guidelines ("EcIAG").[11]

30 I have no concern with the assessment of ecological value. The conclusions as to the ecological value of vulnerable fauna and flora are sound and are consistent with the EcIAG and the New Zealand Threat Classification system.

31 I note that the evaluation of Old-growth treeland habitat value has been reduced since the NoR Ecological Assessment from “high” (Dr Forbes) to “moderate” (Dr Baber). In my opinion, having regard to the further information provided with the application, this change is appropriate. Dr Forbes had compounded his assessment with that of the other Old-growth forest habitat types. That the “treeland” can be distinguished from “forest” is an acceptable differentiation and it is appropriate to consider that the ecological value of treeland is at least one magnitude of value less than “forest”. In every other case Dr Baber has reached either the same or a more conservative conclusion compared to the NoR Ecological Assessment.

Assessment of statutory significance

32 I also agree with the assessment of statutory significance presented in Technical Assessment F (paragraph 128 to paragraph 132) and Table 4. Table 4 transcribes the terms used to describe the habitat types by the Project (e.g. “Old growth forest (alluvial)”) to the terms used to describe the habitat types in Schedule F (i.e. “Kahikatea-pukatea-tawa forest or treeland”). I agree with these observations and for ease of reference, I have replicated the Project terminology instead of that within the One Plan. I am comfortable that there is a correct association with One Plan types.

[10] Pilgrim, J. D., Brownlie, S., Ekstrom, J. M., Gardner, T. A., von Hase, A., Kate, K. T., Savy, C. E., Stephens R. T. T., Temple, H. J., Treweek, J., Ussher, G. T. & Ward, G. (2013). A process for assessing the offsetability of biodiversity impacts. Conservation Letters, 6(5), 376–384.
[11] Roper-Lindsay, J., Fuller, S.A., Hooson, S., Sanders, M.D., and Ussher, G.T. (2018). Ecological Impact Assessment. EIANZ guidelines for use in New Zealand: terrestrial and freshwater ecosystems. 2nd edition.

33 I have considered the descriptions of the habitats that Dr Baber identifies as “not significant” in the context of Schedule F and Policy 13-5 and whether any at-risk habitats have been misclassified. I agree with Dr Baber’s assessment.

34 There is a difference in approach around Dr Forbes’ classification of pasture-dominated wetlands. This has been well described by Dr Baber at paragraph 131 of Technical Report F. I am of the view that Dr Baber’s classification of indigenous-dominated Pasture wetlands as significant is correct. Equally I agree with the classification of exotic-dominated Pasture wetlands as not significant. There are likely to be many instances where the line between significant and not significant pastoral wetland is blurry. However, Dr Baber’s recognition that all of the pastoral wetland habitat within the Project footprint have moderate ecological value resolves any dilemma. Dr Baber is essentially treating effects on non-significant wetlands the same way as significant wetlands. In my opinion, this is a sensible approach.

G. EFFECTS OF PROPOSAL

35 Technical Assessment F (at paragraph 133 to paragraph 165) and associated tables (including Attachment 7) provide a logical assessment of the ecological effects of the Project, including those that are able to be avoided, remedied, and/or mitigated, before offsetting/compensating for the residual effects.

36 As I understand it, the significant effects on biological diversity are (in summary);

(a) The permanent loss of 0.10 ha of Old-growth (alluvial) and 0.85 ha of Old-growth (hill country) forest of very high ecological value. The loss is confined to existing forest edges;

(b) The long-term loss of 0.25 ha of Secondary broadleaved forest with old-growth signatures, of very high ecological value. The loss mainly involves edge-of-forest remnants, with dust deposition also as a potential issue;

(c) Permanent loss of 0.13 ha of Old-growth treelands (with ramarama) of moderate ecological value. The loss mainly involves edge-of-forest remnants;

(d) The long-term loss of 0.04 ha of Advanced secondary broadleaved forest of very high ecological value. The loss completely involves an edge-of-forest remnant, with dust deposition also as a potential issue;

(e) The permanent loss of 1.3 ha of Kānuka forests of moderate ecological value. The loss mainly involves loss of edge area although the exposure of a small area of core forest habitat to new edge effects is also acknowledged;

(f) The permanent loss of 6.705[12] ha of Secondary broadleaved forests and shrublands of moderate ecological value. The loss includes edge and core habitats;

(g) The permanent loss of 2.11 ha of Mānuka / kanuka shrublands of moderate ecological value. The loss includes edge and core habitats;

(h) The permanent loss of 0.33 ha of Divaricating shrublands of moderate ecological value. The loss involves edge-of-forest / highly modified habitats;

(i) The permanent loss of 0.11 ha of Raupō-dominated seepage wetland of high ecological value;

(j) The permanent loss of 0.44 ha of Indigenous-dominated seepage wetlands of moderate ecological value;

(k) The permanent loss of 4.42 ha of Pasture wetlands - some of which are considered dominated by indigenous wetland flora (and therefore are deemed significant following Schedule F of the One Plan) and all of which are of moderate ecological value;

(l) Potential loss of individual specimens of vulnerable indigenous flora and fauna that are unable to move out of the impact zone during construction or at-risk of vehicle collision during highway operation;

(m) Impacts on the communities of vulnerable flora and fauna associated with the loss of habitat; and

(n) Potential impacts on vulnerable fauna associated with proposed habitat restoration sites on the Te Apiti Windfarm.[13]

[12] Attachment 7 identifies this as 6.44 ha. This inconsistency is inconsequential as it does not change the level of the magnitudes of effects assessment.
[13] Boffa Miskell (2020). Te Ahu a Turanga Stormwater Wetlands: Potential effects on bird collisions at Te Apiti Windfarm. Prepared for Meridian Energy Limited.

Review of ecological effects assessment

37 The assessments of effects magnitude contained within Technical Assessment F Table 6, and Table 7, also follow the EcIAG".[14]

38 I have no concerns with the magnitude of effects assessment in the application. Where there has been a considerable (more than 50%) reduction in the anticipated areal loss under the application (when compared with the NoR process), Dr Baber's assessment identifies levels of one magnitude of effect lower compared to Dr Forbes. This is consistent with the calculated reduction in areal loss. Where the areal loss has not changed much, Dr Baber's conclusions are the same as Dr Forbes'.

39 There is a notable exception in the case of the Old growth forest (hill country) where the areal loss has not changed very much (estimated loss of 0.85 ha vs 0.86 ha), yet the magnitude of effects assessment has been down-graded two levels from "very high" (Forbes) to "moderate" (Baber). As I understand it, the effect on the Old growth forest (hill country) is now confined to the edge; with the alignment now avoiding core forest within the QEII covenant areas. This means that the revised alignment avoids habitat fragmentation and occurs in existing edge habitat which is of a lesser quality than core forest. Dr Baber's assessment also highlights that the Project will affect less than 1% of the habitat type within the local landscape. The EcIAG description of this scale of effect is "moderate". On the basis of these changes to the scale of effect, I agree with Dr Baber's' revision of the magnitude of effects.

Dust

40 I have considered the effects of dust on vegetation. As long as dust is actively managed below nuisance thresholds, I am of the opinion that dust deposition is likely to be a minor effect compared to the other effects recognised in Technical Assessment F (Table 6) and particularly those directly associated with areal loss. A condition is proposed by Mr St Clair to address any dust effects, which I agree with.

[14] Roper-Lindsay, J., Fuller, S.A., Hooson, S., Sanders, M.D., and Ussher, G.T. (2018). Ecological Impact Assessment. EIANZ guidelines for use in New Zealand: terrestrial and freshwater ecosystems. 2nd edition.

Residual Effects

41 The assessment of residual effects is detailed within Technical Assessment F Table 8. I concur with the assessment of residual effects and note that there are instances where the residual effects on terrestrial and wetland biodiversity values remain moderate to high after measures to avoid, remedy and mitigate effects are considered.

42 The residual effects assessment follows the EcIAG methodology, which combines the ecological values (as assessed) with the magnitudes of effects to derive a quantum of effects that remain. Based on the EcIAG description of "moderate" to "very high" overall effects, I agree with Dr Baber's assertion that there is a need to offset or compensate for potentially moderate or higher residual effects[15] (and conversely anything considered "low" or below can be assumed to be no more than minor).

43 While there are significant residual adverse effects that cannot be avoided or minimised, the reduction in ecological effects (when compared to the NoR alignment) has led me to consider the appropriateness and feasibility of offsetting more favourably than when reviewing the NoR [16]. While (to avoid doubt) I am not suggesting it is appropriate to use the NoR alignment as an assessment baseline[17], the reduction in effects has meant that some of my concerns around the suitability of offsetting effects of the Project (as recorded for the NoR) have been addressed through the new Northern Alignment, more detailed design, and the further information provided within the applications. However I do still have some reservations around aspects of the offsetting proposal, and how it fits with the One Plan (which I address further below).

Review of offsets and compensations

44 Technical Assessment F and Technical Assessment G correctly identify that there are residual adverse terrestrial ecological effects from the Project that cannot be avoided or remedied, with the Applicant undertaking offset and compensation calculations to support a net indigenous biological diversity gain being achieved for the Project.

45 Technical Assessment G provides a comprehensive calculation of offsets following the guidance of the Biodiversity Offsetting Under the Resource Management Act

[15] Technical Assessment G: Paragraph 164.
[16] Previously I had expressed deep reservations about the appropriateness of offsetting due to the potential irreplaceability of vulnerable habitats combined with the lack of certainty around demonstrating net gain (Lambie 2019; Section 42A Technical Evidence: Ecology; For the Notice of Requirement for Te Ahu a Turanga Highway Project. Paragraphs 27 to 30).
[17] As I acknowledge later in my report I am of the opinion that the application assesses the effects of the proposal afresh, and goes beyond comparison with the NoR alignment.

("BOURMA")[18] and with specific application of the Biodiversity Offset Accounting Model ("BOAM")[19] to guide the type and magnitude of revegetation (and associated habitat enhancement). I am very comfortable that the input metrics Mr Markham has relied on accurately capture the key elements of biodiversity concern.

46 Technical Report G identifies seven habitats for which the calculated net gains are "verifiable". There is (and I concur) a high degree of certainty that the proposed offsets demonstrate net gain.[20] At Paragraph 103 Mr Markham states that these are well within the limits to offsetting. Applying the approach of Pilgrim *et al*. (2013)[21] to examine the level of conservation concern across these seven habitats, I am in agreement with Mr Markham. For these habitats, it is my opinion that the Project reasonably demonstrates that a net gain can be achieved. This is the case despite the Applicant still needing to secure landowner agreements for implementation of the offsetting (which I discuss below), although I have recommended a strengthening of the condition which requires the necessary agreements are in place before any vegetation clearance.

47 Technical Report G identifies five habitats (Old growth forests (alluvial and hill country); and the three wetland habitat types) for which there is an "expected" net gain.[22] Mr Markham identifies that these are technically "compensations" and not offsets because they do not meet the criteria for defining an "offset" under BOURMA. Essentially, the proposals for "expected" net gains result in trades in biodiversity values. For the Old growth forest, it is a trade of the loss of a small amount of older (mainly edge) forest for younger forest for which complete like-for-like restitution is many generations away.[23] For wetlands, it is a trade in loss of extent for gain in quality. I agree with Mr Markham's assessment in this regard.

48 It is notable that these trades aim to replace like-for-like in the distant future and the expectation (calculated through BOAM) of a net gain within a foreseeable (35 year) future. In my mind, the "expected net gain" proposals are more akin to offsets rather than to compensations when considering that a key distinction between an "offset"

[18] Biodiversity Offsetting Under the Resource Management Act – A Guidance Document, 2018. Prepared by Fleur Maseyk, Graham Ussher, Gerry Kessels, Mark Christensen and Marie Brown.
[19] Developed for the Department of Conservation, 2015, Prepared by Fleur Maseyk, Martine Maron, Richard Seaton, and Guy Dutson,
[20] Technical Report G: Paragraph 99
[21] Pilgrim, J. D., Brownlie, S., Ekstrom, J. M., Gardner, T. A., von Hase, A., Kate, K. T., Savy, C. E., Stephens R. T. T., Temple, H. J., Treweek, J., Ussher, G. T. & Ward, G. (2013). A process for assessing the offsetability of biodiversity impacts. Conservation Letters, 6(5), 376–384.
[22] Technical Report G: Paragraph 106.
[23] Technical Report F, Paragraph 109 cites 150-300 years.

and a “compensation” is that compensations are not required to demonstrate net gain. In this case (and to the contrary) the “expected” net gain proposals work in a very similar manner to an offset for the purpose of the One Plan.

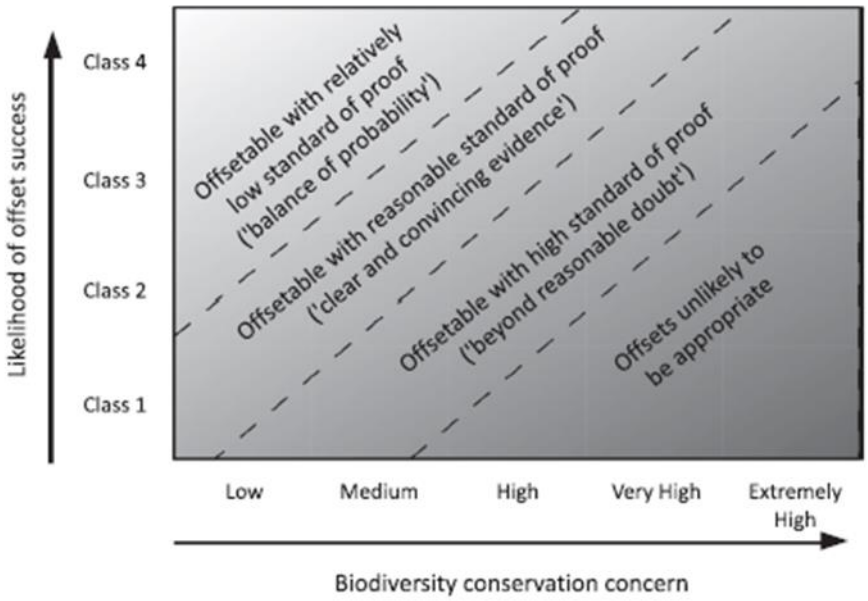
49 However, I am concerned that the proposals may not have adequately demonstrated that the limits to offsetting have been addressed in the first instance. In Paragraph 109, Mr Markham states *“…it is considered that old growth forests would always default to* ***compensation due to the limits to offsetting****.”* This statement would indicate that it is not possible to crest the threshold of Policy 13-4 (d)(iv) which provides that an offset assessed under Policy 13-4 is not allowed where inappropriate for the ecosystem or habitat type by reason of its rarity, vulnerability or irreplaceability.

50 The main analytical problem with demonstrating that the limits of offsetting have been overcome is that the BOAM does not account for the level of vulnerability or irreplaceability of habitat types. So, while the model indicates an “expected” net gain, that net gain does not (in and of itself) confirm that vulnerable habitats are within the limits to offsetting. To my mind, to satisfy Policy 13-4 (d) (iv), an assessment of the limits to offsetting should run independently of the BOAM following a process such as that laid out by Pilgrim *et al*. (2013).

51 When overlying the high levels of conservation concern associated with Old growth forest and wetland habitat types with any uncertainty regarding the likelihood that the offsets will actually achieve net gain, it remains possible that “offsetting is unlikely to be appropriate” when following the process of Pilgrim *et al*. (2013) (see Figure 1 below).[24] In that case, the question of certainty – around the likelihood that the offsets will actually achieve net biological diversity gain – becomes critical to determining whether the offset is appropriate for rare, vulnerable or irreplaceable habitat types.

[24] The offsetability of biodiversity impacts can be assessed by: firstly determining the level of conservation concern (x-axis) of a particular habitat based on rarity and vulnerability to further loss and; secondly establishing the likelihood of success (y-axis) following a classification system (laid out by the authors) that looks at magnitude and duration of effect, ease of offset implementation, and certainty of methods. Offsetting is unlikely to be appropriate for habitats of high to very high value (i.e. the Old growth forest habitats and raupo-dominated wetland) if there is any doubt that the offset will achieve its objectives (in this case net gain).

Offsetability of biodiversity impacts



52 Mr Markham acknowledges that the calculated "expected" net indigenous biological diversity gain for Old growth forest types and wetlands carries more assumption and has a higher risk of having produced a "false positive"[25]. A false positive would lead to a trade between areal extent and habitat improvement which ultimately results in no net gain or (worse) a net loss. To address this, and a recognised short to medium term calculated net loss (lag phase) prior to establishment of replacement vegetation, Mr Markham proposes additional compensation (herein referred to as the over-compensation) and follows a bespoke Biodiversity Compensation Model (BCM) for calculating the size of the over-compensation package.

53 The over-compensation package is calculated to achieve a net biodiversity gain within 10 years. I have no concerns with the assessment methodology nor the input variables used by Mr Markham. However, I am concerned that the package contains further assumptions based on unlikely scenarios. For instance, for the over-compensation to deal with time lags and false positives at the same time, there must have been an inherent assumption that ten years of pest control in the neighbouring MGSR results in biodiversity gains that will not erode back to today's levels before the overall "expected" net gains calculated by the BOAM model are demonstrated. Given some of the indices used in the BOAM have 35-year timeframes, a conclusion that 10 years of pest control is sufficient is not credible. In its current form the over-compensation,

[25] Technical Report G: Paragraph 80.

just adds more layers of uncertainty (one false positive on top of another), and it does not provide any additional confidence that the 'expected' net gain proposals will actually achieve net gain. In this instance, it remains possible that "offsetting is unlikely to be appropriate" for the vulnerable and irreplaceable habitats. I discuss potential solutions at paragraph 94 of my report.

Review of natural character effects assessment

54 The natural character value and effects magnitude are presented in Technical Assessment I. I have reviewed the natural character assessment, and in particular the assessment of attributes and values associated to biodiversity/ecology.

55 There have been areas (including catchments 6 and 7) where there have been reductions in overall pre-construction natural character ratings since the NoR assessment. These changes are the result of a revised matrix/methodology, a change in alignment, and the completion of further investigation (particularly around freshwater). Notably, the assessment approach has also been well documented, in a transparent manner in Appendix I.3 and I.4. Having discussed the technical assessments with Mr Brown, and as further recorded in his s87F report, I am generally comfortable with the approach taken in Technical Assessment I.

56 I note that the assessment of terrestrial biotic and wetland attributes in Catchment 7 has identified that the construction will result in a change from high natural character to moderate natural character[26]. Given the very specific ecological frame of reference of these attributes, the question of whether this change in the inherent natural character of the ecosystems themselves can be remedied is a question related to whether the compensation proposed in Technical Report G would adequately address that issue. I am of the view it does not. While, I am comfortable with the metrics Mr Markham has identified in resolving the effects with eventual like-for-like habitat replacement, if the proposed compensation occurs outside of Catchment 7, the resolution of effects on the natural character of terrestrial and wetland ecosystems specifically associated with Catchment 7 will not occur.

57 As stated earlier, the Applicant has undertaken modification of the proposed road design to avoid some of the effects on the forests and wetlands in this catchment. In doing so, some effects on natural character have been avoided too. I also note that Figure TAT-3-DG-E-4151 shows an intent for landscape planting, compensation sites

[26] Technical Report; I Table 1:14 (pg. 60)

for Indigenous Dominated Seepage Wetland (Moderate) and offset sites for Secondary broadleaf forests and scrublands. If these particular areas are restored as proposed, the overall indigenous ecological natural character of this part of Catchment 7 is likely to be at least as high post-development as it is pre-development.

58 It is clear that, by acknowledging the reduction from high to moderate, the Applicant has not relied on the biodiversity offsets / compensations as a means of remedying effects on natural character. However, if the Applicant can secure these sites (which is not certain at this time), it is my opinion that the effect on the terrestrial and wetland natural character attributes of Catchment 7 are capable of being mitigated.

59 The terrestrial ecological evaluation for Catchment 6 is evaluated as high and remains high post-construction. This is as expected given the emphasis on reducing the magnitude of effect on the Eastern QEII. I note that the contextual problem, as identified above (at paragraph 58), of resolving the ecological component of natural character through offsets that are in a different catchment still applies.

H. SUBMISSIONS

60 I have read the submissions containing reference to matters of terrestrial and wetland ecology. The submissions of relevance to my review are submissions 2 (Dr S. Hill), 6 (Mr K. C. Barnett), 13 (Meridian), 15 (Forest & Bird), 16 (QEIINT) and 19 (DOC).

Dr Hill

61 I acknowledge the sentiment expressed by Dr Hill with regard to vulnerable habitat types and the potential risk of the local extinction of threatened and undescribed flora and fauna that might live in such habitats. It is not unrealistic to consider the Project causing an increased threat to the habitats of undescribed species. To cater for this risk, the Applicant has proposed to avoid the core areas of the most vulnerable habitat types and to minimise as much as possible the incursion into high value wetland systems with a view to preventing disruption to the underlying hydrosystem.

62 To my knowledge, the impacts on vulnerable habitats are now confined to the edge of the remnants. The extinction of undescribed species from loss of these edge habitats alone would be unexpected. Not only are these systems already ecologically compromised by non-indigenous adjacent ecosystems (and so especially rare or sensitive species are unlikely to be present), but there is a lot of forest to pasture edge elsewhere (so the undescribed species can also be living elsewhere).

63 There is one species (the giant maiden hair fern *Adiantum formosum*) which only occurs in the Manawatū Gorge and local environs. As there is a heightened risk for this (and other species identified as threatened under the New Zealand threat classification system), the Applicant proposes measures to avoid or physically move (where sensible and achievable) threatened species into secure (fenced and pest-managed) habitats. In my view, these proposals are adequate for ensuring there will be no local species extinctions.

Mr Barnett

64 Mr Barnett has raised a question regarding the insignificance of bush remnants. I confirm there are both areas of significant and not significant bush within the Project area, as discussed in paragraph 33.

Meridian

65 The submission from Meridian includes expert ecological evidence regarding increased collision risk from the offset / compensation habitat enhancement proposed on Meridian land. Meridian also queries whether the proposed wetland offsets can actually achieve the biodiversity gains expected. On the face of it, it does seem an odd assumption that improved wetland habitat complexity and pest control will provide biodiversity gains, while windfarm collision risk remains low. For the avifaunal community to benefit from wetland habitat creation, birds will inevitably have to migrate through parts of the windfarm from other parts of the surrounding landscape.

66 However, Mr Markham's calculations do not attempt to demonstrate a net gain in avifauna *per se* and while there will be improvement in habitat to birds, it does not necessarily follow that wetland birds will migrate into them. Yet, without an analysis of the specific migration paths that are present or will be formed as a result of habitat enhancements, a precautionary approach would have been for the Applicant to assume that there will be an increase in collisions. This is a problem the Applicant and Meridian are best placed to resolve. Although I note that the issue places uncertainty on the Applicant being able to secure the calculated gain in wetland extent.[27]

[27] With the high likelihood of absence of threatened wetland birds within the Project envelope, it is the indigenous wetland vegetation community, rather than the avifauna, that is the key element of biodiversity concern.

Forest & Bird

67 Forest & Bird take issue with the AEE focus on demonstrating the reduction of effects when compared against the NoR alignment, as opposed to a full re-visit of effects. For this reason, Forest & Bird asserts that the *"…Assessment of Effects on the Environment (AEE) and related reports fail to adequately identify the adverse effects of the proposal…"*[28]. However, I have not read Technical Reports F and G in the same way. Both consider the effects as they land for the proposed alignment and (with reference to Technical Assessment F) refer to the NoR assessment only to explain why they have reached a different conclusion to the Applicant's ecologist at the time, Dr Forbes. I agree that any other approach would be inappropriate.

68 Forest & Bird consider the management of residual effects through compensation to be inappropriate as it does not achieve Policy 13-4[29]. I am not sure if this observation is made because the Policy 13-4 only speaks of "offsets" or because the package includes compensation to address the lack of certainty around net gain, rather than compensating for effects (particularly with regard to the proposal for pest management in the MGSR[30]). As I identify above, I am concerned the "expected" gains do not adequately address the limits to offsetting contained within Policy 13-4. I have suggested some solutions to overcome limitations/information gaps, at paragraph 94.

QEIINZ

69 QEIINZ describes how the Project affects their ability to carry out their statutory function[31] and observes that the covenanting of land/vegetation in non-voluntary scenarios has a lower likelihood of the covenantor complying with covenant conditions and the objective of no net loss is less likely to be achieved.[32] QEIINZ speaks from experience in its role in managing perpetual covenants and is the body who would best know the difficulties in motivating landowners who inherit covenants. The observation demonstrates that there is residual uncertainty that the proposed mitigations, offsetting and compensation package can result in the anticipated resolution of effects if it must rely on the land and cooperation of private landowners.

70 QEIINZ is also concerned that the test for ecological significance undervalues some vegetation and habitat that should be assessed as significant, with particular reference

[28] Forest & Bird (submission 15) par 10.
[29] Forest & Bird (submission 15) par 27.
[30] Forest & Bird (submission 15) 30-31.
[31] QEIINZ (submission 16) par 2.
[32] QEIINZ (Submission 16) Par 5 (j) (ii).

to Advanced secondary broadleaved forest. The submission concludes that this assessment has led to the magnitude of effects and offset/compensation package for the Project being undersized.[33] I disagree. The EcIANZ criteria for describing the magnitude of effect has been applied to all indigenous habitats irrespective of their significance under the One Plan. The EcIANZ effects assessment itself does not contain any refence to statutory significance. The magnitude of effect assessment is therefore independent of the test for significance. The Applicant has identified Advanced secondary broadleaf forest as having very high ecological value - the highest value that can be applied – and has calculated a verifiable offset that is commensurate with the value and with the magnitude of effects on that habitat type. I am satisfied that the offset proposed for Advanced secondary broadleaf forest (and other non-significant indigenous habitats with verifiable offsets) is not under-sized.

71 QEIINZ observe that the benchmark data in the offset/compensation model are overly optimistic, but then proceed to list faults in management regimes rather than faults in the benchmarks themselves. Without QEIINZ providing alternative benchmarks, I have relied on Mr Markham's assessment report. Mr Markham relies on cited references or benchmarks largely obtained on-site and I have no reason to doubt them.

72 Like Forest & Bird, QEIINZ have concerns over inadequacies in the scope and scale of pest management proposals. I cover this issue in the Discussion section below.

Department of Conservation

73 DOC disagrees with the Applicant's suggestion that the existing consents for Enabling Works form part of the existing environment when assessing the Main Works consent applications.[34] DOC suggests that this does not acknowledge an agreed position established during the NoR process.[35] I have been Horizons' lead terrestrial and wetland ecologist in reviewing consents for the Western Access Track and Geotechnical Investigations and can confirm that the affected habitats are accounted for in the assessment of effects and proposed effects management for the respective habitat types in the Main Consent AEE (including the Technical Reports and maps).

[33] QEIINZ (Submission 16) Par 5 (b).
[34] AEE, Section 2.4.2.
[35] DOC (Submission 19) Par 5. The agreed position is: "*Where more than minor adverse effects on indigenous biological diversity are not reasonably avoided, remedied or mitigated, they are offset and, if they cannot be offset, they are compensated to result in a net indigenous biological diversity gain.*"

74 The assessment of both the Western Access Track and the Geotechnical Investigations enabling resource consents concluded that the residual effects on terrestrial ecology were no more than minor. In which case, the issue of offsetting would not have been on the table had it not been for the NoR conditions.[36] Council officers concluded that the offset offered was over and above what was necessary (Western Access Track) or akin to mitigation (Geotechnical Investigations) for each of those consents so as to satisfy the One Plan requirements. As both consents needed to be structured so that they could stand alone in circumstances where the Main Works consent had not been granted, the "offsets" offered were retained as consent conditions (in order to give effect to the designation conditions) in the full knowledge that they would result in a voluntary net gain in kanuka habitat (Western Access Track) or sufficiently mitigate effects on the raupō wetland (Geotechnical Investigations).

75 To ensure consistency with the designation conditions, it was critical that both consents could be revised or not issued pending the main consent be issued. To this end, both enabling consents contain a condition that requires that the consent holder address the clearance of (specified) indigenous vegetation… "…in accordance with a Certified Ecological Management Plan required by the conditions of the designation…". The restitution of ecological effects on those consents therefore is dependent on the certified Ecological Management Plan (EMP).

76 The EMP proposed by the Applicant as part of the current (Main Works) application will ultimately form part of the management plans submitted to the territorial authorities in satisfaction of the designation conditions (Condition 24).[37] As the EMP is proposed to contain an offsetting and compensation package to address all residual adverse effects associated with the terrestrial ecology for both enabling and main work consents, Council Officers took the view that the conditions imposed on the enabling consents created a sensible loop back to the overarching management plan framework for the Project. Mr Markham discusses this relationship further at paragraph 12 of Technical Assessment F. Therefore, while the agreed position is not clearly acknowledged in the AEE[38], I do not see it as having been undermined by the approach.

[36] The offsetting proposals in both consents were based on the Post-Mediation Designation Conditions as they stood circa September 2019. To ensure conditions can stand independently of the main consent (had the main consent not be granted), they include "offsets" calculated from Forbes' original ECRs.
[37] Ecology, Ecological Management Plan and offset and/or compensation measures (Condition 24) approved by Environment Court by Consent Order dated 26 March 2020.
[38] See section 2.4.2, for example.

77 DOC observes the need for certainty in the management plans, including having basic performance measures within consent conditions and not only in management plans. The submission raises the need for consultation with DOC when management plans are being prepared. DOC also submits on the inadequacy of the proposed 10-year duration of pest control regimes, and the lack of certainty of the quantum of existing biodiversity in recipient sites and the lack of baseline data, which together makes the offset assessment less certain than predicted. Finally, DOC highlights the need for (and suggests solutions to provide) more certainty in the consent conditions and suggests further work that could be done to improve certainty around securing offset/compensation sites. I am in agreement with all of these observations, and they are discussed further on in my report when considering the proposed offsetting regime and proposed conditions of consent.

I. DISCUSSION AND CONCLUSION

78 In this section of my report I consider the Proposal more specifically in the context of Policy 13-4, and the limits on what can be provided and counted (or considered) as a net indigenous biological diversity gain in the assessment of a resource consent.

Any more than minor effects are avoided in the first instance, or remedied / mitigated at point of impact in the second, or finally offset for net biodiversity gain

79 Policy 13-4 provides that "more than minor" adverse effects on rare habitats, at risk habitats, and threatened habitats should be "avoided, remedied, or mitigated". If these outcomes cannot be achieved, then an offset resulting in a net indigenous biological diversity gain is expected, and consistent with the matters set out at 13-4(d).

80 Technical Assessment G sets out the Applicant's approach to the effects hierarchy, and refers to any significant residual adverse effect needing to be offset or compensated to provide a net gain in biodiversity values only after options to *avoid – remedy- mitigate* have been exhausted. Further, at paragraph [63], *"…offsetting is preferable and in accordance with the effects management hierarchy (one of the principles of offsetting), compensation should only be considered after the potential for offsetting biodiversity values has been assessed and ruled out as viable option."*

81 Technical Assessment F has provided a summary of the residual adverse effects that have not been able to be practicably avoided or minimised. I am of the view that the Applicant has attempted to avoid ecological effects and impact on key ecological sites through selection of the current alignment option (and related designation boundaries)

and limiting the vegetation clearance footprint through detailed design, such that it reduces the maximum allowable habitat loss for ecosystems.[39]

82 Submitters, in particular Forest & Bird and QEIINZ, have raised concerns over an effects assessment which draws a comparison with a previous alignment (the NoR alignment), with a focus on the reduction of effects, instead of establishing what the adverse effects of the Project are as proposed through the current application.

83 I agree that there would be a risk of underestimating the effects of the Project if a base line of the effects of the NoR alignment was adopted. However, as I have explained earlier in my report, I do not consider the Applicant to have adopted this baseline when assessing terrestrial ecology effects and the resultant residual effects management. There has been a technical assessment of the effects of the Project, as described in the current application, including the DCR and drawings, which does not draw on a comparison with the effects as identified during the NoR process.

84 The Applicant was entitled to have regard to the effects envelopes (for vegetation clearance) set out as upper limits in the designation conditions. In doing so there would always need to have been a level of comparative analysis against the NoR. For instance, it was always anticipated (by Dr Forbes at least[40]) that, for habitats with the "worst case" effects envelopes, a reduction in areal loss compared to the NoR effects envelopes would arise.

85 For significant habitats that were constrained by small effects envelopes under the designation, detailed scrutiny of AEE Table 6-2 reveals that the revised design anticipates that, in contrast to the NoR assessment, losses of around one-tenth of Secondary broadleaved forests with old-growth signatures (0.25 ha vs 2.39 ha), around one-half of Old growth treeland (0.13 ha vs 0.26 ha), and less than one-half of moderate value Indigenous dominated seep wetlands (0.44ha vs 1.12ha). In my opinion the reduction in loss demonstrates that the detailed design has taken into consideration the need to avoid these important habitats, and it has (at least in respect of the Secondary broadleaved forest) led to a change in magnitude in effect.

[39] See Technical Assessment F Table 5 pp 63-64 for the comparative estimates of effects envelopes maxima.
[40] Forbes, 2018, Te Ahu a Turanga: Technical Assessment #6 (NoR Evidence), Par 72.

86 It must also be acknowledged that re-routing the road alignment to avoid severance of the QEIINZ covenant areas and to largely confine the impacts to edge-of-forest, has substantially reduced the effects for Old-growth forest (hill country).

87 I also note that changes have been made by the Applicant to confine effects as much as possible to edge-of-forest and edge-of-wetland for the Old growth forest (alluvial) and the Raupō-dominated seepage wetland habitat-types respectively. While these changes are too subtle to warrant a change in the assessment of the magnitude of effect, it demonstrates a genuine effort by the Applicant to avoid effects as much as they can be without compromising the Project entirely.

88 The Project also describes a versatile set of species avoidance processes to avert local species extinctions, and poses a number of remedies and mitigations that are to occur in areas adjacent to cleared habitats to reduce edge effects and improve habitat.

89 I am of the opinion that the Applicant has appropriately demonstrated a sequential approach to avoiding, remedying or mitigating effects, before considering management of residual effects through offsets and compensation Whether the net gain will be achieved is a matter of further analysis against Policy 13-4(d) below.

Reasonably demonstrates net gain, not be allowed where inappropriate, and have a significant likelihood of being achieved (etc)

90 Policy 13-4(d) provides direction on what offsetting for the purpose of the policy involves. The relevant policy requirements are set out at paragraph 26 above. A number of these matters were discussed during the NoR process. This included the question of whether effects on Old growth forests and wetlands could be offset.

91 The Application states that *"those original effects areas were endorsed by the Council-level hearing panel which, in summary, considered that impacts of that magnitude would be acceptable (subject to appropriate mitigation and offset /compensation measures)."*[41] The Panel was equally clear however that "future decision makers for the Regional Council will make their decisions based on the evidence before them and the effect of a confirmed roading alignment.". It was recognised that different and more stringent conditions may apply in response to effects on indigenous vegetation identified at the time.[42] This is especially the case where the compensation proposals may not have adequately assessed the limits to offsetting, with insufficient certainty

[41] AEE, page 120 paragraph 1.
[42] At [284], Territorial Authorities Recommendation Report, 24 May 2019.

around the delivery of the offset (and in this case, net gain) to properly address the impacts on the rare, vulnerable and irreplaceable habitat.

92 When considering Policy 13-4 the focus is on an outcome that successfully manages residual effects (after earlier steps in the effects hierarchy have been exhausted). Rather than becoming fixated on the technical (literal) distinction between "offset" and "compensation"[43], I am of the opinion that the focus should be on whether there is sufficient evidence that:

(a) the trade for loss of areal extent with habitat improvement and generation of a larger area of new habitat is appropriate;

(b) that averted losses (e.g. providing for faunal gains elsewhere while new habitats evolve) are based on credible accounts that relate to key species; and

(c) there is a significant likelihood of success.

93 There is no escaping the fact that the "offsetting and compensation" package is a trade. However, when considering the key biodiversity indices proposed by Mr Markham in his calculation of the "expected" net gains, then should these gains come to fruition (measured through habitat monitoring and success re-evaluation) they will result in a net gain in areal extent of new habitats that will contain the key aspects that make those habitats valuable. That said, based on the fact that Mr Markham's calculation includes 35-year timeframes on some of those indices, I believe there needs to be a very long-term (35 year) commitment to checking restoration progress and confirming success, with a follow-up process involving further restoration or other measures should monitoring indicate failure. The 10-years posed as a measurement frame for success (scattered throughout the EMP)[44] is unlikely to be long enough to demonstrate success. Should a commitment be in place that extends this timeframe until a net gain is actually calculated (as secured through an appropriate condition of consent), I am satisfied that the trade is acceptable.

94 Until the time an "expected" net gain can be properly demonstrated, there is a need to avert the potential for species loses. I commend the proposal to do this with habitat improvement in the surrounding landscape (the over-compensation) and observe that the calculation used for this also demonstrates net gain. However, in order for this to

[43] Noting that the meaning of "offset" since the One Plan was introduced in 2012 (made Operative in 2014) has been further refined through further analysis by industry experts, best practice and case law.
[44] Refer to the Ecology Management Plan (EMP) Document TAT-0-EV-06030-CO-RP-0011. Table 4.1 (starting pg. 50) outlines the 10-year performance target measures.

adequately achieve its purpose it requires a commitment for the same length of time as it takes to confirm net gain in the offset/compensation restoration sites. To that end, I would expect that the proposed pest control in the MGSR may need to go on for as long as 35 years to be satisfied that there is no net loss in the meantime.

95 Also, while the pest control should have aspects of pest abundance monitoring associated with it (such as the proposed specific residual tracking / trapping index targets for possums), the pest-management averted loss should also have a credible element of measured biodiversity outcome. In my view, the proposal to assess a 5% increase in indigenous bird abundance using 5-minute bird counts is inadequate. Specifically, this index is prone to large amounts of variation around the data and it would be extremely hard to defend (or refute) that a 5% increase in bird abundance has been achieved (Fea; pers. com.).

96 I agree that condition EC 12 b) viii) should specifically focus the measure of success of the over-compensation proposal on key indicator bird species. If this assessment followed a technique less prone to variance (such as fixed bird-call recorders) (Fea; pers. com.), with those gains able to be sustained over the full duration of the time it takes for the "expected" net gains to come to fruition, the compensation package as a whole would at least be clear and convincing (if not demonstrating success beyond reasonable doubt).[45]

97 The Applicant finally needs to be able to demonstrate with some certainty that the proposal is able to be successfully implemented. There are three outstanding issues, which I discuss in sequence below.

98 The first issue is whether the Applicant can secure the land needed for implementing offset / compensation plantings. Drawings 7-TAT-3-DG-E-4150 to 7-TAT-3-DG-E-4157 appear to show a surfeit of potential recipient areas with an indication of which habitats can be supported where. In this regard, the Applicant has shown there is plenty of scope for implementation. The maps do not however depict the underlying landownership and land intended to be acquired (referred to in the s92 RMA response)[46].

[45] Refer to Pilgrim *et al*. (2013). Table 1 (reproduced in paragraph 51 above). The terms "clear and convincing" and "beyond reasonable doubt" are posed by these authors as the level of certainty on the information required to demonstrate the offset will achieve the outcome proposed.
[46] S92 Response. Pg 17. Question 18 paragraph 5.

99 Being familiar with the area, I recognise there is land under the proposed offset areas where landowner / occupier agreement is almost certain (such as other Crown and Territorial Authority estates), however this is not a large balance of the mapped areas and there may be a need to negotiate with potentially less willing occupiers. In light of the submissions from Meridian and QEIINZ, it must be understood that this is a risk to success. On the other hand, I note that the wording of proposed condition EC18 undertakes to ensure that vegetation disturbance and stream diversions will not commence until the Applicant has entered into legal agreements or has acquired the land. If I have interpreted this condition correctly, I conclude that the problem of the occupier unwillingness presents a low risk to success because it is my understanding from the proposed conditions that vegetation clearance cannot commence without it.

100 The second issue revolves around the layer of uncertainty affecting the modelled gains output due to the assumptions of the level of pre-existing biodiversity value of the recipient biodiversity offset sites. In some cases it is assumed zero (planting into pasture for instance) and in other cases, Mr Markham has provided an estimate (for the restoration of "moderate" value wetlands into "high" value wetlands for instance). If the pre-existing biodiversity value of the recipient sites is higher than assumed, in theory, more land would have been required in order to demonstrate the same level of gain. While it is not explicit in any of the technical reporting, I believe Mr Markham wraps the problem into the issue of the "false positive"[47]. While I concur that the proposed over-compensation is a useful approach to averting losses due to lags and certain unknowns, in my opinion it is inappropriate to use that approach to solve an issue that can be resolved with further information. I am of the view that it would be reasonable to expect that the offset calculation is re-run for each recipient site once the pre-existing values at those sites are known, with a view to confirming that the calculated "verifiable" and "expected" net gains remain. This is particularly the case if the Applicant believes it is appropriate to re-calculate the offset should less vegetation be damaged.[48]

101 The third issue is whether the proposed pest control over the MGSR is correctly configured to result in averted losses. The pattern of the proposed bait station regime is certainly intense enough to achieve the proposed 10% chew card output[49] for

[47] Technical Assessment G, Paragraph 80.
[48] See condition EC12 (c).
[49] I note that there could be an unintended discrepancy between Condition EC12 b) viii), which could be read as meaning a "..10% or better chew card index or **[10%]** Residual Trap Catch for possums…", and NoR Condition 19 a) viii which reads "…manage possums …… to achieve and maintain a **5%** or better residual trap catch/tracking index score (or equivalent monitoring method).". A 10% possum

possums and possibly rats. Timing for the protection of nesting birds is also ideal. However, in my experience it is difficult to implement a bait station design in grid format across inaccessible territory. These lands, and any untreated land adjacent to the core site will remain a constant source of invasion. On the other hand, it is premature to suggest it will fail without any attempt. To improve certainty that this part of the over-compensation will result in real net gains, there must be scope within the conditions to require review and amendment of the over-compensation pest animal regime should Conditions EC12 b) vii - xi) not be met.

102 In summary, while adherence to the BOURMA is a very important test of the likely value of an offset or compensation and limits to offsetting, I do not consider that identifying the "expected net gains" as "compensations" necessarily causes the Project to fail to navigate Policy 13-4 (d). This is because, if they are successful in their implementation, they will result in demonstrably beneficial biodiversity trades. However, to satisfy Policy 13-4 (d) more certainty around the likelihood of success is necessary in order to overcome limits to offsetting. One way to do this is to better address the potential for false positives and lag times by reconfiguring the purpose of the "over-compensation" toward managing for (and measuring) an improvement in biodiversity values that are sustained over the duration until the "expected" net gains in the habitat re-planting areas come to fruition. Tweaks to conditions that provide for compliance monitoring and adaptive management will also provide the additional certainty needed to overcome the current information limitations. If these changes are made, I believe the Proposal is better placed to address Policy 13-4.

J. MANAGEMENT PLANS

103 I have reviewed the Construction Environment Management Plan ("**CEMP**") and the Ecological Management Plan ("**EMP**") for matters pertaining to measures to avoid, remedy, mitigate, offset/compensate for effects on biodiversity. I understand that it is the Applicant's intention that these plans and the sub-plans within them will be ultimately approved through the resource consent process.[50]

104 There are site specific elements currently missing from the EMP. In particular, the actual sites for mitigation, offset, and compensation plantings have yet to be identified

chew card index is not the equivalent of 10% possum residual trap catch (RTC) index; a 10% chew card index is likely to be much less (at least as low as 5% RTC equivalent). To avoid doubt and ensure alignment between conditions, I recommend that Condition EC12 be amended to include both the 10% chew card and 5% RTC reference.

[50] Assessment of Environmental Effects (AEE), page 128, paragraph 3.

and legal agreements for such sites are still not secured. These matters have been deferred to the Site Specific Offset and Compensation Plans ("**SSOCPs**"), which under the conditions proposed by the Applicant do not necessarily require certification by Horizons. I am uncomfortable with these issues being left to management plans for a later date, with this information critical to determining whether the offset/compensations will result in net gain and whether offsetting/compensation is likely to be successful. Without this information it is very difficult for the Applicant to reasonably demonstrate that offsetting/compensation package, and that there is the requisite certainty of success to ensure alignment with principles of offsetting.

105 Therefore, at this stage it is not possible to give a definitive view as to whether the EMP is sufficiently complete to be approved thorough the resource consent process. I note that Condition 24(e) of the Designation conditions requires the Transport Agency, in consultation with Project Iwi Partners, the QEII National Trust and DOC, to describe within the EMP the offsetting and compensation measures which will achieve a net indigenous biological diversity gain, with reference to (in summary) the direction provided in Policy 13-4, the conditions of any regional resource consents, and the BOURMA. At the present time there is not sufficient certainty over those matters, with much dependant on the offsetting/compensation being finalised in a manner which resolves concerns around the likelihood of success (for those habitats with "expected" net gain) and other limits to offsetting, including through amendments to conditions.

106 Before the management plans are finalised, I would also expect further information and detail around the SSOCPs (and mitigation planting plans) and in particular how they will be presented to Horizons in complete manner. This is particularly important where key matters have been left to be addressed through these plans under the conditions presently proposed by the Applicant. I have therefore recommended that the management plans be submitted for certification (following any necessary amendments) twenty (20) working days after a decision on the resource consents or commencement in accordance with the RMA.

107 The Lizard Management Plan, Avifauna Management plan (and sub-plans) and Bat Management Plan appear relatively complete when reviewing them against the requirements of the Designation conditions.[51] This is important as I had understood the Applicant to have prepared the plans with those conditions in mind. In some cases

[51] See Conditions 20 to 23 of the Designation Conditions, dated 26 March 2020.

there will need to be revision of the plans on discovery of habitats and there must be provision for MWRC to be able to review changes. I have made some recommendations with regard to the inclusion of key standards in the conditions, moving them from the management plans. The Terrestrial Invertebrate Management Plan appears to be missing a commitment to Designation conditions 23 b) iii and b) v.

108 Similarly, the Planting Management Plan does not appear to have the necessary level of detail required by the Designation conditions, especially in terms of planting spacing, and density. Mr Hudson has identified some of these matters in his report. It also seems that some aspects of the plan (e.g. mulching and pest management) sit within the EMP rather than specifically being covered within the Planting Management Plan itself. As with the EMP and offset sites generally, holding the land / legality of the plantings into perpetuity is also not well covered.

K. RECOMMENDATIONS/CONDITIONS

109 To improve certainty and clarity in the conditions and provide feedback loops for adaptive management I recommend the following:

(a) The CEMP and EMP tables referring to the maximum area of vegetation that is able to be removed are revised to reflect Table EC1 rather than the table from the NoR conditions which has a larger maxima. This is consistent with the assessment of effects reviewed for the Project. It will also avoid confusion when referring only to the CEMP or EMP without reference to the resource consent conditions.

(b) The reference to other conditions in EC1 b) ii) should also reference EC5, EC7, and EC8 as these conditions also have specific vegetation removal references.

(c) Condition EC1 c): should cross references back to all of the vegetation types listed in EC1 a), not just the forest types, because a suitably qualified ecologist is needed to supervise aspects (such as staying within the maxima) of the vegetation disturbance in all of the habitats.

(d) Condition EC1 c) i-iii and d): should maintain what appears to be part of the intent of EC1 c) and introduce reference to “forests” with respect to an arborist and “woody vegetation” with respect to felling.

(e) Add to Condition EC1 the need for edge-effects enrichment (mitigation) planting associated with the edges caused by loss of vegetation. This

mitigation of effects is listed in Technical Report G Table 6 and is a key component of the NoR effects mitigation conditions. As mitigations, these plantings must be in addition to the offsets/compensation planting but in every other way must conform to the same standards as prescribed in Condition EC12 b) i)-ix).

(f) Revise the EMP and add a bullet to Section 2.3 specifically referring to enrichment planting along newly exposed edges as per the mitigations identified in Technical Report F Table 6 as well as Designation condition 24 a) iv).

(g) Add conditions for incident reporting and compliance inspection reporting that specifically apply to reporting the incident and compliance outcomes expressed in the EMP. These should preferably be added at EC1 and quote the specific ecological conditions where incident and compliance reporting are anticipated under the EMP – i.e. EC1 to E18, EC20 and EC21. This is to ensure that the stated EMP commitment to incident and compliance monitoring and reporting are enforceable conditions and not just management aspirations.

(h) Revision of the CEMP and EMP for material changes in wording around monitoring and reporting that are brought about through the introduction of related conditions in the resource consent.

(i) As per the clarification sought by Forest and Bird regarding condition EC2, add to condition EC2 the need to identify recipient sites for salvaged species and add to condition EC16 a) a reference to EC2 and translocation planting areas. In combination, these two conditions make certain that salvage and translocation are linked together and ensures enforceability which would otherwise be left to the EMP to deal with.

(j) Revise EMP (section 12.4.1) to specifically require that a tally be kept of the number of individuals of swamp maire, ramarama, and giant maidenhair affected.

(k) Condition EC6 a): provides for areas less than 100m^2 to be undertaken at any time. This would be inconsistent with Designation 22 iv) which refers to any amount of the listed indigenous vegetation types. I recommend that the reference stating "…not exceed an area of 100m^2 of any…" should be replaced with "…not be undertaken in any…". I agree that direct effects on native birds

should be managed when the birds are most likely to be nesting and there is a risk to unfledged birds. Outside of these dates the risks to birds are much smaller as they can fly away. These remaining effects can be dealt with through the Accidental Harm protocol and the mitigation that occurs as a consequence of possum and rat management across affected habitats.

(l) As per the clarification sought by Forest and Bird regarding condition EC10 a), I agree, this is confusing. Since the critical habitat types are listed (including the exotic forests in specific locations that also need to be included), the reference to the map is unnecessary. If the reference to the map is deleted, or there is a clearer distinction that the exotic habitats are not mapped, the intent of the condition is clear.

(m) With regard to Forest and Bird's concern regarding the inadequacy of condition EC11 to protect at-risk or threatened terrestrial invertebrates, I agree in as much as there are monitoring and reporting aspects proposed within the EMP that are more specific and help (possibly) with identifying and managing areas and species of interest once they are discovered. There are also quite specific conditions in Designation condition 23 (23 b) i) to v)) that aid in adding certainty to an (as yet unfulfilled) information requirement regarding the discovery of At-Risk or Threatened taxa. Add to EC11 the need to describe the monitoring and reporting requirements of the Terrestrial Invertebrates Management Plan for each 'At-Risk' or "Threatened" taxon present. Add to EC11 cross-reference to Designation condition 23 b) i) to v).

(n) Condition EC12: Change all references to 10 years of mammalian and plant pest control to 35 years. This is the timeframe over which the "over-compensation" needs to avert losses until the replaced habitats demonstrate 'expected' net gain.

(o) Condition EC 12 b) viii): delete the reference to 5-minute count and replace with "fixed recorders" and also include "…measured annually before and after…" each puled control effort. This is to provide for a less variable monitoring method and resolves potential misunderstanding of monitoring frequency.

(p) Condition EC 12 b) ix): add (after Chew Card Index) "…or 5% or better Residual Trap Catch…". Add "measured annually". This is to resolve the potential for misunderstanding as to the expected Residual Trap Catch

performance target when compared to the Chew Card index. Also resolves potential for misunderstanding around monitoring frequency.

(q) Condition EC 12 b): add the performance measures detailed in Table 4.1 of EMP at pages 50-55. These are auditable measures that are needed to help ascertain whether the offset / compensation plantings are heading along the intended trajectory.

(r) Condition EC 12: (somewhere between EC12 b) and EC12 c): I recommend that a review condition is added that will require the pest management programme to be reviewed and amended if conditions EC 12 b) vii) to ix) are not being achieved and the problem is linked to pests.

(s) Condition EC 12: add a condition that requires that the BOAM model be re-run at year 10 to determine whether the trajectory toward the outcome state confirms a net gain at year 10. If the model does not demonstrate net gains have been achieved, there is a need to review the compensation proposals and recommend further management that will result in demonstration of net gain. These are matters for conditions, not management plans.

(t) With regard to Forest and Bird's submission on EC12 (and with comment only on two aspects of that submission), the numbers presented in EC12 a) are consistent with Technical Report F. There is no condition requiring the Applicant to replant failed plantings, but I am of the view that the 80% canopy cover measure for year 10 provides sufficient impetus for the Applicant to re-visit and resolve failed plantings. (Note: the requirement to re-plant failed planting appears in the Designation conditions (Designation19 a) vii)).

(u) Condition EC16 b): Given the super-critical need for the offset/compensation (and now also translocation) planting plans to result in emulating lost habitats, these plans probably should be submitted for certification, not just information.

(v) Condition EC16 c) (and also comment from Forest and Bird regarding ultra vires conditions): It would provide greater clarity if EC16 c) i) was to specifically include that the plans describe which habitat types are being emulated, and the area of resulting habitat type(s) anticipated, for each site / each plan. This would clarify that the SSEOCPs are the "implementation" point of the offset/compensation plantings and are not an "after the fact" vehicle to describe different offsets / compensations than those already tabled.

(w) Condition EC16 c): At the moment, there is a large assumption in the BOAM regarding the pre-existing indigenous biodiversity in the offset/compensation recipient sites. It is suggested that a clause is added to Condition E16 that the pre-existing biodiversity at each site be measured and that figure specifically run though the BOAM model (for the particular habitat to be emulated) to check that the model still anticipates net gain.

(x) Condition EC17: Given the super-critical need for the offset/compensation plans to continue to demonstrate net gain is anticipated, these plans should be submitted to Horizons for certification, not just information.

(y) Condition EC18: Add to the title of this Condition (after "Sites for…") "…Mitigation …" ("…Offset and Compensation Measures…") so that this condition applies to all anticipated measures including mitigations.

(z) Condition EC18: Add the relevant clauses from Designation Condition 19 b) so there is no misunderstanding that the intention is for all planted areas to be retained in perpetuity.

(aa) Condition EC20: Add further clauses with reference to obligations under Horizons' Regional Pest Management Plan ("**RPMP**") to avoid and/or manage the spread of pest plants caused by the Project. The conditions need to reflect that the Biosecurity Management Plan ("**BMP**") must specify how material (including gravel), machinery and other vectors of pest plants listed in Horizons' RPMP, that are not on the site (such as *Equisetum arvense*), will be checked to ensure pests are not imported into the site. Also the conditions need to be to the effect that the BMP will specify management regimes for pest plants listed in Horizons' RPMP that are on site (such as gorse) so that they are not spread or are contained, or are eliminated (whichever is the specification for such pests in the RPMP). The BMP should be certified by Horizons after consultation with Horizons pest management team.

(bb) Condition EC21: This condition needs to be time bound. Given the high level of sensitivity that should attend the discovery of at-risk or threatened flora and fauna, I recommend 10 working days.

JAMES LAMBIE

25 May 2020