IN THE MATTER OF	The Resource Management Act 1991
AND	
IN THE MATTER OF	Notices of requirement for designations under section 168 of the Act, in relation to Te Ahu a Turanga; Manawatū Tararua Highway Project
BY	**NEW ZEALAND TRANSPORT AGENCY** Requiring Authority

STATEMENT OF EVIDENCE OF ANDREW RUSSELL BLAYNEY (TERRESTRIAL FAUNA) ON BEHALF OF THE NEW ZEALAND TRANSPORT AGENCY

8 March 2019

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INTRODUCTION

1. My full name is **Andrew Russell Blayney**.

2. I prepared (together with my colleague Karin Sievwright) "*Report 6B: Terrestrial fauna ecological effects assessment report*" ("**Terrestrial Fauna Report**"). The Terrestrial Fauna Report assesses the effects of the Project on invertebrates, reptiles, birds, and bats, and is an appendix to the overview "*Technical Assessment #6: Terrestrial Ecology"* ("**Technical Assessment 6**"), which was prepared by **Dr Adam Forbes.**

3. Technical Assessment 6, and the Terrestrial Fauna Report, are in Volume 3 of the Assessment of Environmental Effects ("**AEE**") which accompanied the Notices of Requirement ("**NoRs**") lodged in respect of Te Ahu a Turanga; Manawatū Tararua Highway Project ("**the Project**").

Qualifications and experience

4. I have the following qualifications and experience relevant to this evidence:

   (a) Master of Science – Zoology (1st class Honours), Massey University (2013) and Bachelor of Science - Ecology & Zoology, Massey University (2010).

   (b) Member of Society for Research on Amphibians and Reptiles in New Zealand (SRARNZ).

   (c) I am a senior terrestrial ecologist at Boffa Miskell Limited, in Hamilton. I have held this role since January 2017. Prior to that date I was employed by the Bay of Plenty Regional Council as Subject Matter Expert – Integrated Catchments (February 2016 to December 2016) and Land Management Officer (June 2012 – February 2016).

   (d) My experience includes the following:

      (i) Whangarei to Te Hana indicative and detailed business cases, 2017-2018. Carried out indicative and detailed business case multi-criteria assessment for Whangarei to Te Hana roading project options for terrestrial and wetland ecology (vegetation, herpetofauna, bats, invertebrates, but excluding avifauna and fish).

      (ii) SH12 Matakohe Bridges Project, Matakohe, 2017. Assessed the terrestrial ecological values over a new 2.75 km section of highway. The ecological assessment included native vegetation

patches, potential native lizard habitat, and wetlands and addressed the potential effects of the proposed highway. I also contributed to an environmental management plan to detail how the effects on these aspects of terrestrial ecology were to be addressed.

(iii) Amberfield development, Hamilton, 2017 – ongoing. Acting as terrestrial ecologist expert addressing potential effects and mitigation strategies on vegetation, herpetofauna, and birds strategies for a large (~1000 dwelling units) proposed subdivision project.

(iv) NZ Transport Agency - Captive management of salvaged lizards, Waikato Expressway (multiple sections) – 2016-2017. Kept in captivity for up to a year lizards salvaged from sections of the Waikato Expressway. Included multiple species of geckos and skinks.

(v) Post-graduate research on terrestrial invertebrate communities in native tussock grassland and scrubland communities.

5. In preparing the Terrestrial Fauna Report and my evidence I have:

(a) undertaken site visits to visually assess habitat values for terrestrial fauna and deploy automatic bat monitors ("**ABMs**") on the following days 17-18 July 2018, 27-28 November 2018, and 10-11 December 2018;

(b) read Wildland Consultants' ("**Wildlands**") (on behalf of the Department of Conversation ("**DOC**")) review of ecology reports for the Project;

(c) met (via teleconference) with DOC representatives on 8 November 2018 to agree on a survey and management approach for bats in the Project area;

(d) reviewed the evidence of **Dr Adam Forbes**;

(e) reviewed the submissions received related to terrestrial fauna for the Project; and

(f) reviewed the Council Section 42A Reports.

Code of Conduct

6. I confirm that I have read the Code of Conduct for expert witnesses contained in the Environment Court Practice Note 2014. My evidence has been prepared in compliance with that Code, as if it were evidence being given in Environment Court proceedings. In particular, unless I state otherwise, this evidence is within my area of expertise and I have not omitted to consider material facts known to me that might alter or detract from the opinions I express.

Assumptions and exclusions in my assessment and my evidence

7. The assumptions and exclusions I (and Ms Sievwright) applied in preparing the Terrestrial Fauna Report are set out in that assessment.

8. The detailed design of the Project has not yet been undertaken. At this point, the Project includes a designation corridor within which the road is to be constructed (subject to detailed design, resource consents and the outline plan process). The assessment of effects on terrestrial fauna has, therefore, taken into account the flexibility inherent to the designation corridor, and the potential for effects on terrestrial ecology anywhere within the designation.

Purpose and scope of evidence

9. My evidence does not repeat in detail the technical matters set out in the Terrestrial Fauna Report, or the detailed summary set out in Technical Assessment 6. Rather, in this evidence I:

    (a) present a summary of the key findings of the Terrestrial Fauna Report, updated to take into account information received more recently, in an executive summary;

    (b) provide a brief update on the results of bat surveys over the summer of 2018-2019, and note the measures discussed for addressing any potential effects of the Project on bats;

    (c) comment on submissions received in respect of the NoRs that relate to terrestrial fauna; and

    (d) comment on the Council Section 42A Reports.

10. In his evidence **Dr Forbes** discusses the Project's effects on terrestrial ecology as a whole. My evidence should be read together with Dr Forbes' evidence.

EXECUTIVE SUMMARY

11. The proposed designation area contains:

    (a) potential populations of non-threatened and At-Risk lizard species;

    (b) terrestrial invertebrate values ranging from Negligible to High;

    (c) Threatened and At-Risk bird species using shingle riverbed, wetland, forest and grassland habitats; and

    (d) potential habitat features that could be utilised by long-tailed bats.

12. Intensive acoustic monitoring, including over the summer of 2018 – 2019, has not detected any bats. In the absence of bat detection, but accepting the result cannot be considered absolute, I have recommended a management approach which is the implementation of an incidental discovery protocol. If bats are detected in late March 2019 (the last programmed survey) this recommendation may change. The key actual or potential effects of the Project on terrestrial fauna include:

    (a) injury or mortality to fauna during vegetation clearance and earthworks;

    (b) disturbance during critical nesting periods (birds);

    (c) permanent loss of habitats; and

    (d) modification of habitats in the form of:

        (i) increased fragmentation and isolation due to reduced habitat connectivity;

        (ii) creation of edge effects and consequential effects to composition, structure and food sources in retained habitats; and

        (iii) invasions and corresponding impacts of non-native plant and animal species.[1]

13. Without avoidance, remedy and mitigation, the magnitude of these effects varies between Negligible and High, resulting in an overall level of effects (applying the EIANZ[2] Ecological Impact Assessment Guidelines) ranging between Very Low and Very High.

[1] Another potential effect of the Project relates to sedimentation, arising from construction of the Manawatū River crossing, of foraging areas along the riverbed, which in turn could impact dotterel foraging. This potential effect will be considered in the context of the regional resource consents required for the Project, in light of the precise bridge configuration and construction methodology proposed.
[2] Environment Institute of Australia and New Zealand.

14. Adverse effects on fauna from vegetation and habitat loss are directly addressed through the avoidance, remedial and offset measures discussed in Technical Assessment 6 and in the evidence of **Dr Forbes**.

15. Disturbance of fauna (particularly lizards and birds), including during critical bird breeding seasons, will be addressed through provisions detailed in the Ecological Management Plan regarding effects management (e.g., preconstruction surveys and salvage) and scheduling of works outside of critical periods or, if not possible, through preconstruction surveys and constraints on works during specific time periods of high sensitivity.

16. Following full implementation of mitigation and offset measures, the overall level of adverse effects on terrestrial fauna (invertebrates, reptiles, birds, and bats) will be between Very Low and Low. In the long term, because of increased habitat (through the Ecological Compensation Ratio (ECR) approach), reduced predation of native fauna, and increased ecosystem health, there is likely to be a net increase in the ecological value of terrestrial fauna within and surrounding the Project. That is aligned with Policy 13-4 of the Horizons One Plan, and provided for in the proposed designation conditions put forward by **Ainsley McLeod**.

LONG-TAILED BATS

17. The ecological investigations within the Project area found no suitable habitat for short-tailed bats[3] and therefore long-tailed bats are the only bat species discussed within my evidence.

18. The Terrestrial Fauna Report recorded that survey work in early 2018 did not detect the presence of any bats within the designation (or local) area, but found that more detailed detection surveys were required to allow for an understanding of:

    (a) whether long-tailed bats are present (at low density) in the area, the likelihood of which was considered to be low; and

    (b) if long-tailed bats are present, how they are using the habitat, what features are being used and whether there is a resident population.

19. The Terrestrial Fauna Report recommended that surveys be carried out in two survey periods: November – December; and March. The outcome of

[3] However, the automatic bat monitors deployed as part of the ongoing bat surveys will detect short-tailed bat calls as well.

those surveys would then inform what management and mitigation, if any, would be required for any effects of the Project on long-tailed bats.

20. I completed the November – December 2018 survey. 20 ABMs were deployed throughout the Manawatu Gorge area for 13 consecutive nights (27/28 November to 10/11 December). Out of the 13 nights, 11 nights were fine weather nights providing optimal weather conditions for potential bat emergence.[4] No bat passes were detected by any of the 20 deployed bat recorders in any of the survey nights.

21. A further survey is to begin on 26/27 March 2019. That survey is due to be completed by 09/10 April 2019. The survey methodology and locations of ABMs are to be replicated from the November-December survey. This duplication of survey is to account for the potential temporal change in habitat use by long-tailed bats such as dispersing young. This survey approach was developed in consultation (8 November 2018) with DOC, who have supported the methodology and approach to bat management and survey.

22. As set out in the Terrestrial Fauna Report, should the March - April 2019 survey not detect any bats, that will indicate that bats are not present at detection level density and therefore risks to bats, associated with this Project, are very low. This is stipulated within the draft conditions presented through the evidence of **Ms McLeod**.

23. Given the current non-detection of bats my recommended management approach is the implementation of an incidental discovery protocol. If bats are detected in March/April 2019 this recommendation may change.

24. The incidental discovery protocol will detail the steps that need to be taken in the unlikely event a long-tail bat is found in the process of vegetation clearance. The implementation of an incidental discovery protocol is a common approach to managing the residual risk to fauna from construction projects (that otherwise have not been detected or assumed to be present during the ecological investigations and effects assessment process).

25. If a bat was to be found during vegetation clearance, that would trigger a further review of the appropriate bat management approach for the project.

[4] With temperatures not falling below 10°C from sunset until four hours after sunset; no rainfall occurring in the first two hours after dusk; mean overnight wind speeds not exceeding 20 km/h; and maximum overnight wind gust below 60 km/h.

COMMENTS ON SUBMISSIONS

26. A number of submissions raise issues related to the potential ecological effects of the Project. Those submissions are primarily addressed by **Dr Forbes**. I wish to respond to the specific submission points by DOC (submitter 369) in respect of habitat values for invertebrates and herpetofauna.

27. I also respond briefly to the submission of the Royal Forest and Bird Protection Society of New Zealand Incorporated ("**Forest and Bird**", submitter 295) on the detection of bats and herpetofauna.

DOC: habitat values for invertebrates

28. In its submission, DOC seeks the reassessment of:

    (a) "*the invertebrate values of young successional vegetation*";

    (b) "*the indigenous invertebrate and herpetofauna values of "divaricating Corposma shrubland", as these values can occur outside intact forest communities*"; and

    (c) "*the indigenous fauna habitat values of exotic woody vegetation and rank grassland*".

29. DOC, through its ecological advisers Wildlands, provided additional detail on these points in its review of the Project ecological assessments provided in November 2018, as follows:

> "*Section 6.B.3.2.1 of the [Terrestrial Fauna Report] states that the high-quality invertebrate habitats within the project footprint are mature forest, older secondary forest, and the Manawatu Gorge Scenic Reserve. The Applicant then applies the ecological scoring guide to prioritise "intact forest invertebrate communities", and fails to consider the high invertebrate values that can be supported by relatively young successional vegetation. In Section 6.B.5.2, the "rest of the designation", which includes all shrubland areas in the eastern rise area, are described as having "Low-Negligible" value for terrestrial invertebrates.*
>
> *Some of the areas of "divaricating Coprosma shrubland" species, including Coprosma, Melicytus, small-leaved Olearia species, and Muehlenbeckia, Parsonsia, and Rubus. These genera are associated with specialist indigenous insect species including moth and butterfly*

species (c.f. Allen et al. 2003, Derraik et al. 2003). Many of the insect species associated with these plant genera are local endemics as they are only found in certain parts of New Zealand, and some are classified as nationally 'Threatened' or 'At Risk'. The Application needs to reconsider the assessment of invertebrate habitat values, and this should be undertaken by a terrestrial invertebrate specialist."

30. **Dr Forbes** provided an overall response to the Wildlands review. I provided the text for the response to the above comment. That text is largely reproduced in the paragraphs below; in simple terms I do not consider any reassessment is necessary or appropriate.

31. I acknowledge that local endemic, "At Risk", and "Threatened" invertebrate species can be associated with the plant genera *Coprosma, Melicytus, Olearia, Muehlenbeckia, Parsonsia*, and *Rubus*.

32. However, this pattern of conservation valued invertebrate presence is more prevalent in the South Island, in more "unusual" environments where the shrublands present are longer seral stage type (i.e. the shrublands persist in the environment due to climatic conditions rather than relatively rapid transition to forest). These invertebrate species generally occur in association with similarly range-restricted, "At Risk", and "Threatened" plant species of these genera.

33. The plant species of the genera present on the Te Ahu a Turanga site are all common and widespread. Research on these genera (predominately *Coprosma propinqua* and *Olearia bullata*[5,6,7]) rightly concludes that they should be considered for their conservation value. However, the research offers no comparison nor provides any conclusion that should be used to give shrublands or successional habitats importance or value over and above other native habitats for terrestrial invertebrates.

34. The assessment of ecological value of terrestrial invertebrate communities considered several factors that are known to influence the health and diversity of terrestrial invertebrate communities. The plant species of the six

[5] Derraik, J. G., Dickinson, K. J., & Closs, G. P. (2003). Invertebrate diversity on Olearia bullata and Coprosma propinqua in a modified native shrubland, Otago, New Zealand. New Zealand Journal of Ecology, 55-60.
[6] Derraik, K. J. D., Derraik, J. G., Rufaut, C. G., & Closs, G. P. (2005). Ground invertebrate fauna associated with native shrubs and exotic pasture in a modified rural landscape, Otago, New Zealand. New Zealand Journal of Ecology, 129-135.
[7] Derraik, J. G., Barratt, B. I., Sirvid, P., Macfarlane, R. P., Patrick, B. H., Early, J., ... & Henderson, R. (2001). Invertebrate survey of a modified native shrubland, Brookdale Covenant, Rock and Pillar Range, Otago, New Zealand. *New Zealand Journal of Zoology*, *28*(3), 273-290.

genera identified by Wildlands are a common component of most native vegetation types present in the designation area.

35. Additionally, there is a greater abundance of plants of these genera in other identified habitats than in the identified *Coprosma rhamnoides* shrublands. The identified area represents the smallest, most fragmented, degraded and modified example of a habitat that contains these plant genera across the site. It would be inconsistent and inappropriate to attribute a higher ecological value for terrestrial invertebrates to this area due to the presence of these plant genera while ignoring these plant genera's abundance in most of the other habitat types.

36. I would also consider it unlikely that this small degraded example would have any special significance for any potential high-value invertebrate species. This is due to the large abundance of the same plant genera within the other habitat types assessed and in the wider area, such as large areas of shrubland and regenerating vegetation on the faces above the Manawatū river (where these plant genera are a significant component of the habitats). Unlike the area in question, these other areas are in relatively good condition and in large areas protected from the impacts of stock grazing (and other anthropogenic impacts). If high value invertebrate species are present they are more likely to occur in these other areas.

37. It is my opinion that the scoring methodology employed is appropriate. While not explicitly identifying plant genera of potential value, it appropriately attributes value to habitats with characteristics that contribute to them being the most likely to have conservation important invertebrate taxa, will be the hardest to replace/restore, and are rarest within the wider area. The examples identified as high and moderate value include an abundance of plants within the genera *Coprosma, Melicytus, Olearia, Muehlenbeckia, Parsonsia*, and *Rubus*.

38. Additionally, I note that there is very high endemism of New Zealand's terrestrial invertebrate fauna (90%[8]), high rates of host specificity in several orders and lack of research on most plant genera's invertebrate fauna or equally the taxonomy of this fauna. With that in mind, it is my opinion that assessments of ecological value, in the absence of known conservation

[8] Wallis, G. P., & Trewick, S. A. (2009). New Zealand phylogeography: evolution on a small continent. Molecular ecology, 18(17), 3548-3580.

important taxa, should consider but not focus on plant genera/species-specific values.

39. I do not consider any change to the assessed value of this habitat for terrestrial invertebrates to be necessary or appropriate. I consider this habitat to be consistent with the scoring guidance for “low” ecological value provided in the Terrestrial Fauna Report (Table 6.B.1).

40. In my view, the overall ecological value of these shrublands, which accounts for “low” terrestrial invertebrate, flora, and avifauna values and “high” herpetofauna values, is "moderate".

41. In recognition that divaricating shrublands are generally of an older age and more floristically diverse than equivalent areas of kānuka and mānuka, these divaricate shrublands have been mapped as a distinct ecosystem type, and a 1:3 replacement planting ratio is proposed for mitigation. In my opinion this replacement ratio, in the context of the site’s current degradation, would also be effective in mitigating for fauna habitat values. This recommended replacement ratio is reflected in **Dr Forbes’** statement of evidence.

42. The potential terrestrial invertebrate habitat values potentially associated with the plant genera *Coprosma, Melicytus, Olearia, Muehlenbeckia, Parsonsia*, and *Rubus* beyond the identified divaricate shrublands should be recognised. As such, I recommend that within the Ecological Management Plan (to be developed in consultation with the DOC and tangata whenua), plant lists for offset and replacement plantings should have high representation of these genera, reflecting their current abundance across multiple habitat types. That recommendation has been reflected in the draft conditions presented through the evidence of **Ms McLeod**.

Values of exotic woody vegetation and rank grassland[9]

43. The indigenous fauna habitat values of exotic woody vegetation and rank grassland are covered throughout the Terrestrial Fauna Report, with specific descriptions provided in Section 6.B.5. In summary for these habitats:

    (a) Herpetofauna values I have considered High for these areas (except for grazed pasture). As specified in draft Condition 14 these areas will be further identified as part of the development of a Lizard Management Plan;

[9] This text is not captured in the response provided to the November 2018 Wildlands’ review.

(b) Invertebrate values I considered Low-Negligible;

(c) Bat values are potentially Very High (noting my comments above about the fact that to date no bats have been detected in this area); and

(d) Avifauna values are moderate for riverbed habitat (which contains non-native vegetation), and low for grazed pasture, farm ponds, and pine and scrub (which includes non-native vegetation).

Forest and Bird: detection of fauna and herding of dotterels

Detection of fauna

44. Forest and Bird state that they are "*concerned the presence of some species may not have been detected to their full extent across the designation area, in particular (but not limited to) bats, herpetofauna, and freshwater macroinvertebrates*."

45. As discussed above, there have been extensive efforts to detect bats within the designation corridor (and wider area). These have so far not detected any bats; one further survey will be carried out shortly. The outcome of the final survey will determine the management steps taken in respect of any potential effects on any bats that may be present (even if below detection levels).

46. A conservative approach to effects management for lizards (herpetofauna) is being taken. Despite the non-detection within all daytime and nocturnal surveys carried out, I have assumed that all seven potentially-present lizard species may be present within the designation area. A Lizard Management Plan will be prepared to tailor effects management measures to ensure adverse effects to lizards are addressed. Details of what the Lizard Management Plan would cover are specified in draft Condition 14.

47. This approach has been taken because undertaking further lizard surveys across the designation area would not conclusively resolve the presence/absence and distribution of affected lizards. Due to their cryptic behaviour and typically low population densities, lizards are notoriously difficult to detect across large tracts of land, such as the designation area, where habitats are modified, and predators are uncontrolled[10].

[10]Hitchmough, R. A., Adams, L. K., Reardon, J. T., & Monks, J. M. (2016). Current challenges and future directions in lizard conservation in New Zealand. *Journal of the Royal Society of New Zealand, 46*(1), 29-39.

48. The measures proposed will directly address potential effects on lizards at the finer more-manageable scale that effects occur.

49. **Dr Forbes** notes that freshwater matters (including effects on freshwater macroinvertebrates) will be dealt with during the regional consent process.

Herding of dotterels

50. Forest and Bird's submission raises a concern with the draft condition relating to the proposed condition dealing with the hearing of dotterels.[11]

51. Following review of this condition and advice from Karin Sievwright (author of the avifauna content of the Terrestrial Fauna Report) we agree there was ambiguity in the proposed wording of Condition 16 (c) iii which as originally worded specified the herding of actively nesting dotterels. As such it has been amended to clarify that nesting dotterels would be protected with an exclusion area and would only be relocated (by herding) if not actively nesting, and this would be done under the supervision of a suitably qualified person.

RESPONSE TO QUESTIONS FROM THE HEARING PANEL

52. I respond below to the questions posed by the Hearing Panel as they relate to my evidence.

How does the bat survey period of November to March relate to NZTA's desired construction commencement date? [Asked by reference to draft condition 15(a) as lodged]

53. As discussed above, the bat survey period is November 2018 – March / April 2019. As such there will be no impact on the intended construction commencement date.

Would it be more certain to require the [EMP] to specify where and when the clearance or mowing of rank grass will occur? [Asked by reference to draft condition 16(e) as lodged]

54. The specification of exactly where and when mowing rank grass can occur would be unnecessarily restrictive compared to the low risk of nesting pipit being present in any area or during any time. The condition allows for flexibility while ensuring that in the rare circumstance of nesting pipits being present they are not disturbed by mowing.

[11] At paragraph 33 of their submission.

Do the freshwater ponds actually contain coot and dabchick habitat? [Asked by reference to draft condition 16(g) as lodged]

55. The ponds have potential habitat for coot and dabchick (i.e. these two species could inhabit these ponds). The condition referenced is part of a precautionary approach I (and Ms Sievwright) have recommended in line with our stated assumptions and exclusions.

If disturbance is to be minimised, what does that mean in practice? [Asked by reference to draft condition 16(g) as lodged]

56. During detailed design phases and implementation steps should be taken to design the road and plan construction to minimise the area of the ponds and nearby vegetation that directly impacted. Also, during the construction phase steps should be taken to maximise the distance of machinery and earthworks from these ponds to reduce indirect impacts on the areas.

Have any At-Risk lizard species actually been identified/observed within the designation corridor?

57. No, however even with intensive surveys it is not uncommon to fail to detect lizards. New Zealand lizards have very cryptic colouration and behaviourally are very secretive (hiding, thick habitats, etc.) and often, when in the presence of mammalian predators, exist at very low levels. This cryptic colouration and behaviour means that it is difficult to detect lizards.

58. We have made the assumption of presence based on historical (1990s[12]) records of the species listed within the technical report and the presence of suitable habitat. I consider this to be a conservative and appropriate approach.

59. It is my opinion that there is a very high likelihood of low density populations of lizards existing within the proposed designation corridor, and that the proposed management that is targeted at identified impacted areas is the most effective way to survey for and manage these populations.

Have any marsh crake or Australasian bittern actually been identified/observed within the seepage wetland at chainage 4110-4200?

60. No. Due to time constraints bird surveys have not been intensive, and have not targeted the best time of year to detect these species (such as their breeding season where they call more often). To reduce the risk of previously

[12] The age of these records should not be interpreted as to reduce their relevance. Survey effort across New Zealand for lizards is patchy and in most areas almost non-existent. Any confirmed sighting should be treated as indicating potential current presence.

undetected wetland bird species proposed Condition 16 (f) requires that prior to any clearance of these species' habitat (in this area most likely the raupo dominated wetlands) a cryptic bird (which includes Australasian bittern and marsh crake) survey methodology must be developed and implemented.

Can you please update us on the results of the 2018/2019 bat surveys?

61. This question is addressed in the section my evidence on long-tailed bats, above. To reiterate, no bats were identified in the November / December 2018 survey. A final survey is scheduled for March / April 2019.

What would be suitable mitigation of the fragmentation of lizard habitat?

What would be suitable mitigation of the fragmentation of terrestrial invertebrate habitat?

62. I have chosen to address these two questions jointly as they deal with similar concepts and have similar answers.

63. Ecological context is important when considering this question. The current landscape is quite fragmented already with large amounts of pasture between fragments. Pasture can be a considerable barrier to many lizard and invertebrate taxa that would normally inhabit forest. The Project would add a potential obstacle to this already fragmented landscape; the overall severity of this ecological effect would be relatively low.

64. Once the Project is constructed there is little than can be done to mitigate for this obstacle in respect of reconnecting forest fragments that are located on either side of the road. Attempts have been made both internationally and in New Zealand to provide "wildlife bridges" and other mechanisms that facilitate the movement of fauna over or under roads. These require significant financial investment and are variably successful (and tend to be very site-specific in their success). Given the current fragmented landscape I would not recommend an attempt to mitigate this effect by a "wildlife bridge" as it would be unlikely to have any meaningful benefit.

65. As the road does add an additional obstacle to dispersal in the landscape and it is not practicable to be directly mitigated for; there is a minor residual adverse ecological effect. This effect in my opinion is addressed by the ECR approach for replacement of impacted habitats and the proposed pest control, which would increase overall ecological health. This approach would, in my opinion, in the long-term be net-beneficial to both native invertebrates and lizards despite the residual effect of fragmentation.

66. Also important in this context is the ecological context/location of the proposed planting which will be targeted towards providing additions and connections to existing vegetation. This will improve the connectivity and reduce the fragmentation of habitats in the existing landscape.

COMMENTS ON COUNCIL SECTION 42A REPORTS

Terrestrial Ecology (James Lambie)

67. I respond to several points raised by **James Lambie** below. I group my responses by topic with reference to specific paragraphs of **Mr Lambie's** report.

68. I will address each fauna type in turn, and then l cover pest control in general (which is applicable to all fauna) as a separate section.

Avifauna

69. **Mr Lambie** indicates uncertainty in paragraphs 160 & 161 around the general conclusion of the Terrestrial Fauna Report (with reference to section 6.B.7.5, page. 67) regarding whether the avoidance activities stipulated are required, or are not required but would help reduce effects. I agree this is poorly worded. To clarify, the habitat avoidance considerations are presented as recommendations to reduce effects. Those measures are necessary to achieve the assessed post-mitigation level of effect (negligible to low effects). As Mr Lambie identified in paragraph 162 the recommendations have been included in the Avifauna Management Plan, and there is no intention to dismiss them as optional.

70. Mr Lambie identifies the lack of detail in the Terrestrial Fauna Report around potential avian mortality related to traffic striking birds (Paragraphs 47,80 & 115-117). This lack of detail was due to the relatively small contribution to the level of effect bird strikes would have compared to the other identified effects further outlined.

71. Mr Lambie makes a note that there is a lack of vehicular traffic in the existing environment (Paragraph 47). I do not agree with this observation. While the immediate Project location is almost devoid of vehicular traffic (beyond vehicles on windfarm and farm roads) the Saddle Road is a short distance to the north of the Project alignment and has, since the closure of the old SH3, had a significant increase in traffic volumes.

72. However, to provide additional information that is not covered in detail in the Terrestrial Fauna Report, I note that operational bird strike can occur through/by:

(a) The use of transparent noise/visual barriers either side of the road – this is not proposed, so this risk is avoided.

(b) Inappropriate lighting – operational strike from lighting that is not downcast is an issue with seabirds, particularly petrels. There is no petrel habitat along the alignment, so the risk is avoided.

(c) Native birds scavenging roadkill (e.g. harriers, pukeko) – this is likely to already occur on the existing Saddle Road so is not a new threat, and there is no evidence of mortality of birds scavenging on roads causing population level effects.

(d) Birds foraging adjacent to the road – habitat directly adjacent to the road edge constitutes a very small proportion of the habitat available in the wider area for foraging, so the risk of strike is low. As mentioned, by Mr Lambie, it is best to avoid planting plants that are attractive to birds by the road edge and I agree this should be considered in the planning and location of planting areas.

(e) Severance of core and/or seasonal habitats that birds traverse through:

(i) There is some potential risk to birds using the farm ponds if they are moving between these habitats. However, there are few ponds along the proposed alignment relative to the large network of ponds in the wider area, so this is unlikely to affect large numbers of birds (i.e. not at a population level, particularly given that most of the birds observed using these habitats are Not Threatened).

(ii) There are no seasonal movements for pipit using the farmland habitat.

(iii) There is potential risk if bittern, crake are present in the raupo wetland, however this is a degraded wetland that provides marginal habitat and their presence/use of the wetland is possible, but likely low.

(iv) There will be severance of some native vegetation, particularly the western rise section and the Manawatu Gorge Scenic Reserve ("**MGSR**"), but not severance of seasonal habitat. That is, there will be no requirement of birds to traverse to and from these areas for breeding and/or foraging, which reduces the risk of bird strike. Also, some of the native forest species of concern generally avoid traversing open spaces e.g. roads, again reducing risk.

73. Overall, while there is an increase in the potential for bird strikes, this effect is likely to be limited and is unlikely to have population level impacts. Further consideration of this effect does not indicate a change to the assessed levels of effect or recommended avoidance/mitigation strategies provided in the Terrestrial Fauna Report is required.

Bat related conditions

74. In paragraphs 85-87 Mr Lambie expresses concerns regarding the bat management plan condition (Condition 15) that it pre-supposes the response to bats. I do not agree with Mr Lambie that this is the case - the condition requires the bat management plan to manage the potential adverse effects of the Project on bats. This would then require that this management process would still be subject to the hierarchy of mitigation with avoidance as the preference. Further guidance on the bat management plan is provided within the Terrestrial Fauna Report (section 6.B.7.4, page 66-67) which includes the requirement for a detailed approach to avoid, remedy, or mitigate the assessed effect of the road designation on bats.

75. The specific requirement to include a bat roost removal procedure is not intended to be restrictive to this method as the only method of bat management. It instead reflects the best practice approach of identifying potential roost sites in any potential vegetation clearance area and managing them appropriately. (As Condition 15 (b) iii stipulates, this includes retaining and monitoring active roosting sites).

76. I agree with Mr Lambie (paragraph 178) that a need to demonstrate a net-gain with regards to bats does not yet exist, and I will refrain from assumptions or assessment until such time the required survey information is collected to inform this. I note my comments in my evidence above on the ongoing bat surveys.

Native lizards and frogs

77. **Mr Lambie** in paragraph 95 identifies an inconsistency in the description of benefits of pest control for herpetofauna. This is a result of the Terrestrial Fauna Report not adequately describing the difference in the expected outcome between the two different aspects of pest control – pest control in new plantings (provide habitat), and pest control in retired areas (reduce predation on remaining populations). I note that the proposals around pest control have been updated since the Terrestrial Fauna Report was completed. Those updates are described by **Dr Forbes**, and covered further in my evidence below.

78. In paragraph 96 Mr Lambie addresses risks to native frogs. I agree with Mr Lambie that it is highly unlikely that native frogs are present in the project area. Mr Lambie presents only avoidance as an option in the unlikely case of detection. I consider that while avoidance should be the preferred approach, the management of native frog effects should be managed through a mitigation hierarchy like any other effect, and the appropriate approach should not be pre-supposed.

Terrestrial invertebrates

79. Regarding the scoring process used to evaluate terrestrial invertebrate values, Mr Lambie (paragraph 99) identifies that the approach taken is not a nationally standard scoring process, which I agree with. However, I am not aware of any such national standard scoring process for terrestrial invertebrates existing, hence the development of the bespoke solution.

80. Mr Lambie in paragraph 100 gives an opinion that the Terrestrial Fauna Report was never going to identify Very-high value habitats. I disagree. Existing information (all be it limited) was reviewed and in the circumstance of identifying a threatened or at-risk species a very-high score would have been given. Additionally, in response to the limited information the scoring framework provided was conservative in comparison to the EIANZ (2018) standard (which for fauna species attributes high value for at-risk declining taxa, and moderate values for any other category of at-risk). The scoring framework enabled the scoring of high value based on habitat characteristics alone, without identification of a threatened or at-risk species actually being present.

81. I consider the scoring for terrestrial invertebrate values to be conservative. However, I agree with Mr Lambie (paragraph 101) that in the event of a

threatened invertebrate species being present with no existing data on its presence, there is a risk the value of habitats is underestimated. In respect of at-risk species presence, I would still consider the scoring to be adequately conservative, as such species would, based on the EIANZ (2018) standard, be attributed as high value for at-risk declining taxa, and moderate values for any other category of at-risk.

82. As such, I would support a condition requiring an investigation into the terrestrial invertebrates. In this instance I would consider the requirement for terrestrial invertebrate management plan (consistent with the other fauna groups) to be prepared would be an appropriate approach. I provide further detail on what this management plan could include below.

83. In paragraph 102 Mr Lambie identifies a perceived contradiction in the mitigation strategy for terrestrial invertebrates. However, I consider that Mr Lambie has over-emphasised "*is to create new habitats*" at the expense of the following text "*enhance remaining habitats*" in coming to this conclusion. I would consider that the enhancement of existing habitats to be of equal importance and emphasis, particularly for terrestrial invertebrates, due to the fact identified (and text quoted by Mr Lambie) in the Terrestrial Fauna Report that "…*the replacement of sufficient vegetative diversity is not standard in mitigation practices, and standard revegetation approaches are unlikely to achieve the restoration of the invertebrate communities lost in a timely fashion*." (Section 6.B.2.1.2, page 2).

84. While creating new habitats is important, I would consider the protection and enhancement of remaining habitats to be of high importance for terrestrial invertebrates due to the limitations identified with revegetation and subsequent response of invertebrate communities.

85. Mr Lambie goes on to say in paragraph 141: "*it is likely that any response to terrestrial invertebrate diversity will result in some kind of trade in the relative abundance of invertebrate species*".

86. I do not agree. With the two aspects of the response to terrestrial invertebrates, habitat creation and habitat enhancement, there should be no requirement to consider the proposal a trade of relative abundance of invertebrate species. Instead, existing diversity can be preserved, and the abundance of the existing taxa can be increased, through the enhancement of existing habitats (primarily by pest control). New habitat that is provided is likely in the short and medium term to have a different invertebrate

community composition than those habitats lost / retained and enhanced. However, that should not be considered a trade but an addition to that preserved and enhanced.

87. In paragraphs 196 to 202, Mr Lambie again appears to put the majority of the emphasis with regards to his conclusions on pest control and habitat improvement in "replacement planting" areas, while ignoring the proposed protection and enhancement of existing habitats. Again, I consider there is no requirement to consider the proposal a trading of relative abundances of terrestrial invertebrates. The enhancement of existing/remaining habitats is directly targeted at those taxa that are rare and/or slow dispersers. I would consider the enhancement of existing habitat to be the most appropriate way to mitigate for effects on these types of terrestrial invertebrate taxa.

88. As stated above I would support a terrestrial invertebrate management plan condition. I would consider the evaluation of terrestrial invertebrate communities with regard to rare or threatened taxa, and assessment of community composition at a guild level, to be an appropriate method to provide further information, and useful benchmarking information to assess the progress and success of the proposed mitigation strategies. A terrestrial invertebrate management plan could include (but not necessarily be limited to):

    (a) The methodology for targeted surveys in assessed high value habitats in the confirmed impact areas. Methods should include pitfall and flight intercept trapping (or combined pitfall and intercept traps). The surveys would be for the purposes of determining the presence of at-risk or threatened taxa, morpho-species[13] richness and abundance, and invertebrate community composition (at a feeding guild level and potentially higher taxa group level).

    (b) The methodology for targeted surveys and continued monitoring program in high value habitats (following scoring criteria in the Terrestrial Fauna Report) which are to be retained and enhanced. Again, methods should include pitfall and flight intercept trapping (or combined pitfall and intercept traps). The surveys would be for the purposes of determining the presence of at-risk or threatened taxa, morpho-species richness and abundance, invertebrate community

[13] I have recommended morpho-species because outside of already described common, at-risk, and threatened species it is likely the monitoring will encounter a significant proportion of taxa with poor available taxonomic information/resolution.

composition (at a feeding guild level and potentially higher taxa group level), providing a bench mark of the terrestrial invertebrate community composition, determining similarity to impacted terrestrial invertebrate communities, and continued monitoring of the outcome of enhancement measures.

(c) Any such baseline and success monitoring methods should be designed to be robust to the expected high variability of invertebrates caught in pitfall and flight intercept during each trapping period.

(d) Methods to be employed to improve the habitat of newly planted areas and to encourage the dispersal of terrestrial invertebrates (particularly non-flying taxa) into newly planted areas (for example; the location of plantings, wood disk steeping stones and long grass corridors[14]).

(e) Information on where and when it might be appropriate to transfer woody debris such as rotten logs and leaf litter into newly planted areas. This approach should include the management of risk of transferring unwanted animal (including invertebrates) or plant pests into newly planted areas via this mechanism.

Pest control

89. Mr Lambie has outlined concerns for the ability of the Project to provide additionality in terms of pest control for the purposes of off-setting. Below I outline current state and the scope for additionality in the wider Project area.

90. Current state outside of the MGSR:

(a) Horizons Regional Council population estimates put possums at 2.3% residual trap capture ("**RTC**") in their control area on the north side of the gorge which includes the entirety of the Project's area. Horizons have covered this area well with a bait station network and treated this area for possums for the first time in 2014-15 (and annually since then).

(b) There is no information available for rodent or mustelid numbers. While it is likely the possum control bait station network has resulted in some control of rodents, it would be unlikely to have meaningfully suppressed

[14] Keesing, V., & Wratten, S. D. (1998). Indigenous invertebrate components in ecological restoration in agricultural landscapes. New Zealand Journal of Ecology, 99-104.

rodent numbers and unlikely to have had much of an effect on mustelids.

91. Current state inside the MGSR:

(a) As part of the battle for our birds campaign pest numbers were monitored in the both the north (the side where the majority of the Project is located) and south part of the MSGR. That monitoring found:

(i) possums to be at 18% and 8% RTC on the north and south side of the gorge respectively (monitoring carried out in December 2018);

(ii) rats to be at 93% and 46% residual tracking index (RTI) on the north and south side of the gorge respectively (monitoring carried out in June 2018);

(iii) no information on mustelid numbers is available but given the high rodent numbers it would be safe to assume mustelids are also at high density.

(b) There were plans to control rodents and possums in the MGSR in 2018 via aerial 1080 application. However, lack of a clear weather window during the appropriate application time frame prevented this occurring. This aerial pest control is intended to be carried out now in 2019.

92. The current state of pest numbers suggests there is significant scope to provide a net-gain in terms of pest control in the wider Project area, particularly with regards rodents and mustelids. The high rodent and likely high mustelid numbers would be significantly detrimental to fauna present in the Project area.

93. As an example of a potential pest management approach, with **Dr. Forbes** I have been exploring an option with **Siobhan Lynch-Karaitiana** and **Paul Horton** (of Rangitāne) of developing a pest control package that focuses on providing pest control within an area south and inclusive of the Project's designation area to the MSGR's boundary. This pest control would target rodents and mustelids and would have multiple benefits in terms of reduction of pests within the control area.

94. Most importantly in my opinion, it would provide a significant pest control buffer to the planned control operations in the MGSR. This buffer would reduce re-invasion of pest animals into the MGSR and mitigate somewhat for the relatively high edge-to-area of the MGSR's shape (long and narrow) which could lead to rapid reinvasion of pest animals. This additional buffer area could increase the feasibility and sustainability of mustelid[15] control in the MGSR as well. The efficacy of this buffer approach relies on the sustainable implementation of control within the MSGR, but by its nature of slowing re-invasion will also improve the sustainability and efficacy of pest control in the MSGR.

95. Given the scope for additionality in terms of pest control in the wider Project area I would consider that appropriate pest management measures (as provided for in Condition 17 b) ii) have significant scope to provide for net-gains in indigenous biodiversity in the wider Project area, and particularly scope for improving existing fauna values.

Andrew Russell Blayney

8 March 2019

[15] Which have large home ranges up to 200ha and range long distances (2+km) and are difficult to control effectively in relatively small areas or areas with high edge-to-area ratios.