BEFORE THE TARANAKI REGIONAL COUNCIL AND NEW PLYMOUTH DISTRICT COUNCIL

MT MESSENGER BYPASS PROJECT

In the matter	of the Resource Management Act 1991
and	
In the matter	of applications for resource consents, and a notice of requirement by the NZ Transport Agency for an alteration to the State Highway 3 designation in the New Plymouth District Plan, to carry out the Mt Messenger Bypass Project

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STATEMENT OF EVIDENCE OF SIMON PERCIVAL CHAPMAN (BATS AND HERPETOFAUNA) ON BEHALF OF THE NZ TRANSPORT AGENCY

25 May 2018

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QUALIFICATIONS AND EXPERIENCE

1. My full name is Simon Percival Chapman.

2. I am Principal Ecologist at Ecology New Zealand Limited. I have a Bachelor of Science and a Postgraduate Diploma in Applied Science from Lincoln University. I have worked full-time as a professional ecologist since January 2001.

3. The main focus of my work is the assessment and management of ecological effects of development, with an emphasis on infrastructure and other large-scale developments. I am a generalist terrestrial ecologist with specialist expertise in bats and lizards. Examples of major projects on which I have provided ecological advice and/or implemented ecological management during the past decade include:

    (a) SH1 Northern Corridor Improvements (2018-ongoing);

    (b) SH1 Puhoi to Warkworth (2017-ongoing);

    (c) SH3 Awakino Realignment (2017-ongoing);

    (d) Newmarket Level Crossing (2017-ongoing);

    (e) Waikato Expressway – Hamilton and Huntly Sections (2016-ongoing);

    (f) Sumner Rd 3B (2016);

    (g) Western Ring Route - Waterview Connection (2008-2016);

    (h) SH1 Southern Corridor Improvements (2015);

    (i) SH1 Wainui Interchange (2013-2014);

    (j) Christchurch Southern Motorway – Stage 2 (2013-2014);

    (k) Escarpment Mine Project (2011-2013);

    (l) Mokihinui Hydroelectric Project (2010-2011);

    (m) Transmission Gully Project (2009-2012);

    (n) Te Uku Windfarm (2008-2013);

    (o) SH1 Waitiki Landing to Cape Reinga Seal Extension (2008-2009);

    (p) SH1 Avalon Drive Bypass (2007);

    (q) SH1 Northern Busway (2005-2009); and

    (r) SH1 Northern Gateway Toll Road (2004-2010).

4. I have implemented numerous biodiversity studies, surveys and monitoring programmes. Highlights include trapping and radio-tracking long-tailed bats at locations in the Auckland, Waikato, Hawkes Bay and Canterbury Regions, a decade-long biodiversity monitoring programme at over 50 sites across the former Waitakere City, and an ongoing biodiversity project in Vanuatu during which I successfully trapped bats and a wide range of reptile and amphibian species as part of a multi-agency project investigating coastal management and climate change adaptation in North Efate.

5. I am a Department of Conservation ("**DOC**") approved competent bat ecologist and I hold DOC Wildlife Act herpetologist permits for handling, holding and relocating native lizards.

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. In particular, unless I state otherwise, this evidence is within my sphere of expertise and I have not omitted to consider material facts known to me that might alter or detract from the opinions I express.

EXECUTIVE SUMMARY

7. Acoustic surveys for bats carried out within the Mt Messenger bypass project (**"Project"**) footprint detected long-tailed bats at 99 of 105 survey sites. No short-tailed bats were detected. No bats were captured during nine nights of attempted trapping, despite a substantial effort at 11 trapping sites.

8. None of the 11 native herpetofauna species (including nine native lizard species and two native frog species) known to occur within 50km of the Project footprint were found within the footprint despite a substantial survey effort involving three survey methodologies:

   (a) artificial refuge surveys using artificial cover objects ("**ACO**s") and closed cell foam covers ("**CCFC**s");

   (b) visual encounter surveys ("**VES**") including manual daytime searching and nocturnal spotlighting; and

   (c) funnel trapping.

9. A colony of copper skinks was found during manual daytime searching approximately 600m west of the Project footprint.

10. For bats, a 'value' assessment of 'High' (short-tailed bat) to 'Very High' (long-tailed bat) combined with an unmitigated 'magnitude of effects' assessment of 'Low-Moderate' correlates to a conservative overall level of effects of 'Moderate' for long-tailed bat and 'Low' for short-tailed bat, when applying Step 3 of the EcIA guidelines. This assessment has been carried out on a conservative, precautionary basis.

11. For herpetofauna, a 'value' assessment of ‘High’ combined with an unmitigated 'magnitude of effects' assessment of ‘Low’ correlates to a conservative overall level of effects of 'Moderate', when applying Step 3 of the EcIA guidelines. This assessment has been carried out on a conservative, precautionary basis.

12. Measures to avoid, mitigate and/or offset potential effects of the Project on bats include:

    (a) avoiding effects through Project route selection and design, the implementation of vegetation removal protocols (**“VRP”**) to avoid the felling of occupied bat roosts; and

    (b) pest control and habitat enhancement to mitigate and offset the overall effects of the Project on ecological values which will also provide an overall benefit to bats within the pest management area.

13. Measures to avoid, mitigate and/or offset potential effects of the Project on herpetofauna include:

    (a) avoiding effects through Project route selection and design;

    (b) the implementation of a Herpetofauna Management Plan (**“HMP”**) aimed at salvaging and relocating native lizards to suitable habitat(s), ideally outside the Project footprint (see the following paragraph); and

    (c) pest control and habitat enhancement to mitigate and offset the overall effects of the Project on ecological values which may also benefit some herpetofauna species.

14. As there is some uncertainty as to the precise level of effect the Project on herpetofauna, an area of known significance for herpetofauna outside the Project footprint will be selected in consultation with DOC for NZ Transport Agency ("**Transport Agency**") funded predator-proof fencing and pest eradication to offset the Project’s possible residual effects on herpetofauna. The location and fence specifications for the significant lizard habitat are the subject of ongoing discussions between the Transport Agency and DOC. The Ecology and Landscape Management Plan ("**ELMP**") will be updated to include these details once the discussions have been completed.

15. I support the mitigation and offset package which has been proposed by the Transport Agency, which in my opinion represents an appropriate response to the Project’s actual and potential construction and operational effects on bats and herpetofauna. In my opinion, any effects of the Project on bats and/or herpetofauna will be appropriately addressed. I consider the Project will result in the Project having no net loss for bats (and possibly a net positive effect), and no net loss for herpetofauna.

BACKGROUND AND ROLE

16. The NZ Transport Agency has engaged me to advise it on its proposed Mt Messenger Bypass Project ("**Project**") to improve the section of State Highway 3 ("**SH3**") between Ahititi and Uruti, to the north of New Plymouth.

17. I authored:

    (a) the Assessment of Ecological Effects – Bats ("**Bat Report**") included as Technical Report 7f, Volume 3 to the AEE;

    (b) the Assessment of Ecological Effects – Herpetofauna ("**Herpetofauna Report**") included as Technical Report 7d, Volume 3 to the Assessment of Environmental Effects ("**AEE**") for the Project; and

    (c) supplementary reports on bats (dated March 2018; "**Bat Addendum"**) and herpetofauna (dated February 2018; "**Herpetofauna Addendum**") investigations.

18. I have had input into the ELMP prepared for the Project, particularly as it relates to bats (Chapter 5) and herpetofauna (Chapter 7).

19. I participated in the first of two multi-criteria analysis (MCA) workshops during which I provided expert input on the implications of bats and herpetofauna for the selection of road alignment options, alignment optimisation and construction methodologies.[1]

SCOPE OF EVIDENCE

20. The purpose of my evidence is to outline the potential effects construction and operation of the Project could have on bats and herpetofauna. I then discuss the mitigation, offset and monitoring measures proposed, and captured in the ELMP, to address those potential issues, and assess the overall effects on bats and herpetofauna with those measures in place.

21. My evidence addresses:

    (a) a background to the existing bat and herpetofauna ecology in the Project area;

    (b) the methodology I followed in identifying the bat and herpetofauna ecology values of the Project area and the effects the Project could potentially have on those values;

    (c) the results of my investigations into the bat and herpetofauna ecology values and potential effects of the Project;

[1] At the second (shortlist) MCA workshop, bat and herpetofauna inputs were provided by Dr Matt Baber – a suitably qualified and experienced terrestrial ecologist.

(d) my assessment of the effects of the Project on bats and herpetofauna, including by reference to the proposed measures to mitigate, offset, and monitor effects; and

(e) responses to submissions (specifically the DOC submission) and the Section 42A Reports.

BACKGROUND TO THE EXISTING BAT AND HERPETOFAUNA VALUES IN THE PROJECT AREA

22. Mt Messenger is within the North Taranaki Ecological District, which has a total area of 259,740 hectares including approximately 30,000 hectares of indigenous forest. The wider Project area (4,430 hectares) has varied terrain and ecosystems including native forest, wetlands and farmland.[2] The Project footprint includes approximately 31.7 hectares of forest, scrub, wetland and cliff vegetation communities as described by Mr Singers' in his expert evidence on vegetation.[3]

23. Little information relating to the wider Project area's bat and herpetofauna populations was available prior to the commencement of ecological investigations to the Project. However, the areas of indigenous forest and scrub provide habitats with characteristics often associated with the presence of bats and herpetofauna in other parts of New Zealand.

Bats

24. Acoustic monitoring carried out by volunteers in Taranaki since 2012 has detected long-tailed bats and short-tailed bats at a number of locations including several records within 15km of the Footprint project. The known hotspots for bats in Taranaki are the Whanganui National Park and adjoining forests (long-tailed bats only), and the Waitaanga Forest 15-20 km east of Mt Messenger (short-tailed and long-tailed bats).

Herpetofauna

25. While there were no previous herpetofauna records from within the Project footprint or wider Project area. Nine native lizard species and two native frog species have been recorded within 50km of the Project footprint. The most significant herpetofauna species present within Taranaki's indigenous forest habitats is the striped skink, a species known from widely scattered locations across the North Island and with fewer than 150 individuals ever recorded. The goldstripe gecko occurs primarily within the Taranaki Region but, in contrast to the striped skink, it has secure populations on offshore island sanctuaries (Kapiti Island and Mana Island).

INVESTIGATION METHODOLOGIES

[2] The wider Project area is described in Mr Singers' evidence.
[3] The Project footprint is within the wider Project area, which is in turn part of the North Taranaki Ecological District.

Bats

26. As described in detail in the methodology sections of the Bat Report and Bat Addendum, bat investigation methodologies included:

    (a) desktop reviews of literature and the Department of Conservation's database of bat records, as well as discussions with Conrad O'Carroll of Ngāti Tama, a DOC bat specialist (Moira Pryde), and local residents;

    (b) acoustic surveys of bat activity at 105 sites across the wider Project area using Automated Bat Monitoring ("**ABM**") units; and

    (c) a 9-night harp-trapping programme aimed at radio-tracking bats to find roosts and other important bat habitats.

Field investigations

27. The field investigation methodologies in respect of bats focussed on ABM surveys, as well as (attempted) trapping and radio-tracking.

28. ABMs are recognised as the most effective method for undertaking baseline presence/absence surveys for bats in New Zealand conditions. ABM surveys were carried out at a total of 105 sites, in the following phases:

    (a) 35 ABMs deployed in January and February 2017, then a further six ABMs deployed in April and May 2017, along and adjacent to the preliminary 'MC23' route to the west of the current Project footprint;

    (b) 20 ABMs deployed in winter 2017 along the Project footprint as well as in old-growth forest in the Waipingao Valley (to the west of the Project footprint);

    (c) 8 ABMs deployed along the Project footprint as well as in old-growth forest in the Waipingao Valley during the first two weeks of Spring 2017; and

    (d) ABMs deployed across 21 sites across the Project footprint (and to the west) during mid-September to late November 2017.

29. Trapping and tracking of long-tailed bats (whose presence had been confirmed through the ABM surveys) was attempted over nine nights in late November and early December 2017. This included the use of five harp traps, with sites selected based on:

    (a) high-activity locations identified through ABM survey results; and

    (b) reconnaissance site visits followed by additional ABM use to identify activity.

30. A single night of mist netting was also employed in an effort to supplement the main harp trap programme.

Herpetofauna

31. As described in detail in the methodology sections of the Herpetofauna Report and Herpetofauna Addendum, herpetofauna investigation methodologies included:

    (a) desktop reviews of literature and the Department of Conservation's herpetofauna database, as well as discussions with Conrad O'Carroll of Ngāti Tama, a DOC herpetofauna specialist (Lynn Adams), and local residents;

    (b) artificial refuge surveys using ACOs and CCFCs;

    (c) visual encounter surveys (VES) including manual daytime searching and nocturnal spotlighting; and

    (d) funnel trapping.

Field investigations

32. Field investigations were carried out in three broad stages:

    (a) investigations prior to mid-2017, which were focussed to the west of the existing SH3, along the previously proposed 'MC23' alignment (within the wider Project area, but not the Project footprint). These investigations included remote habitat assessments, artificial refuge surveys, and VES;

    (b) investigations in winter and early spring 2017, which focused on the Project footprint. These included remote habitat assessments and opportunistic habitat searches; and

    (c) more detailed investigations focussing on the Project footprint during spring and summer 2017. These included:

        (i) the use of a total of 259 artificial retreats across a range of habitat types (182 ACOs across 14 transects; and 77 CCFCs across eight transects);

        (ii) VES, including both passive and active daytime searches across the Project footprint and wider Project area;

        (iii) nocturnal spotlighting surveys across the Project footprint over three periods of five consecutive nights;

        (iv) the use of 17 funnel traps in epiphytic habitat; and

        (v) the use of four tracking tunnels in terrestrial habitats (three within the Project footprint and one to the west of the Project footprint).

INVESTIGATION RESULTS

Bats

33. Detailed results of the bat survey and trapping efforts are set out in the Bat Report and in the Bat Addendum Report. Long-tailed bats were detected at 99 (94%) of the 105 ABM sites across the Project footprint and wider Project footprint (Figure 1). Long-tailed bat activity levels and locations indicate that they roost and forage within the wider Project area and possibly the Project footprint.

34. No short-tailed bats were detected at any of the ABM sites, during any of the survey periods. This is despite specific targeted efforts aimed at detected short-tailed bats.

35. **Figure 1** below shows locations where long-tailed bats were (blue circles) and were not (yellow circles) detected.

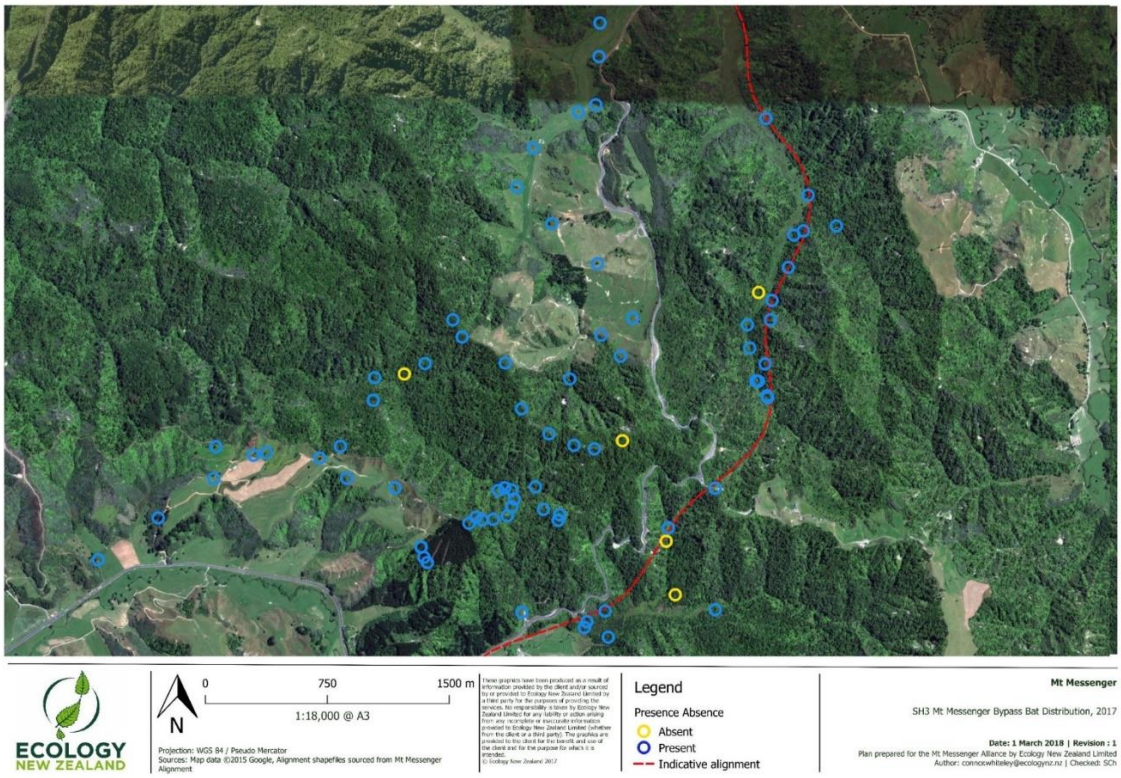

Figure 1: Distribution of long-tailed bats across the wider Project area (blue circles = bats present; yellow circles = bats not detected during surveys

36. No bats were captured during the nine nights of attempted trapping, despite a significant effort involving 11 trapping sites. ABMs set up during trapping detected bats very near to one trap.

Herpetofauna

37. Desktop investigations highlighted nine native lizard species and two native frog species most likely to occur within the Project footprint based on their presence within 50km together with the habitats present.

38. No herpetofauna species were found within the Project footprint using any of the methodologies applied. There were two key finds / potential finds outside of the Project footprint:

    (a) a colony of copper skinks was found during manual daytime searching in the wider Project area approximately 600m west of the Project footprint (under building debris, in a paddock); and

    (b) the tail of an unidentified lizard was observed as the animal fled into dense vegetation when it was disturbed by an experienced herpetologist during lizard surveys to the west of the Project footprint.

39. These sightings are shown, along with a representation of the field investigation efforts, in **Figure 2** below.

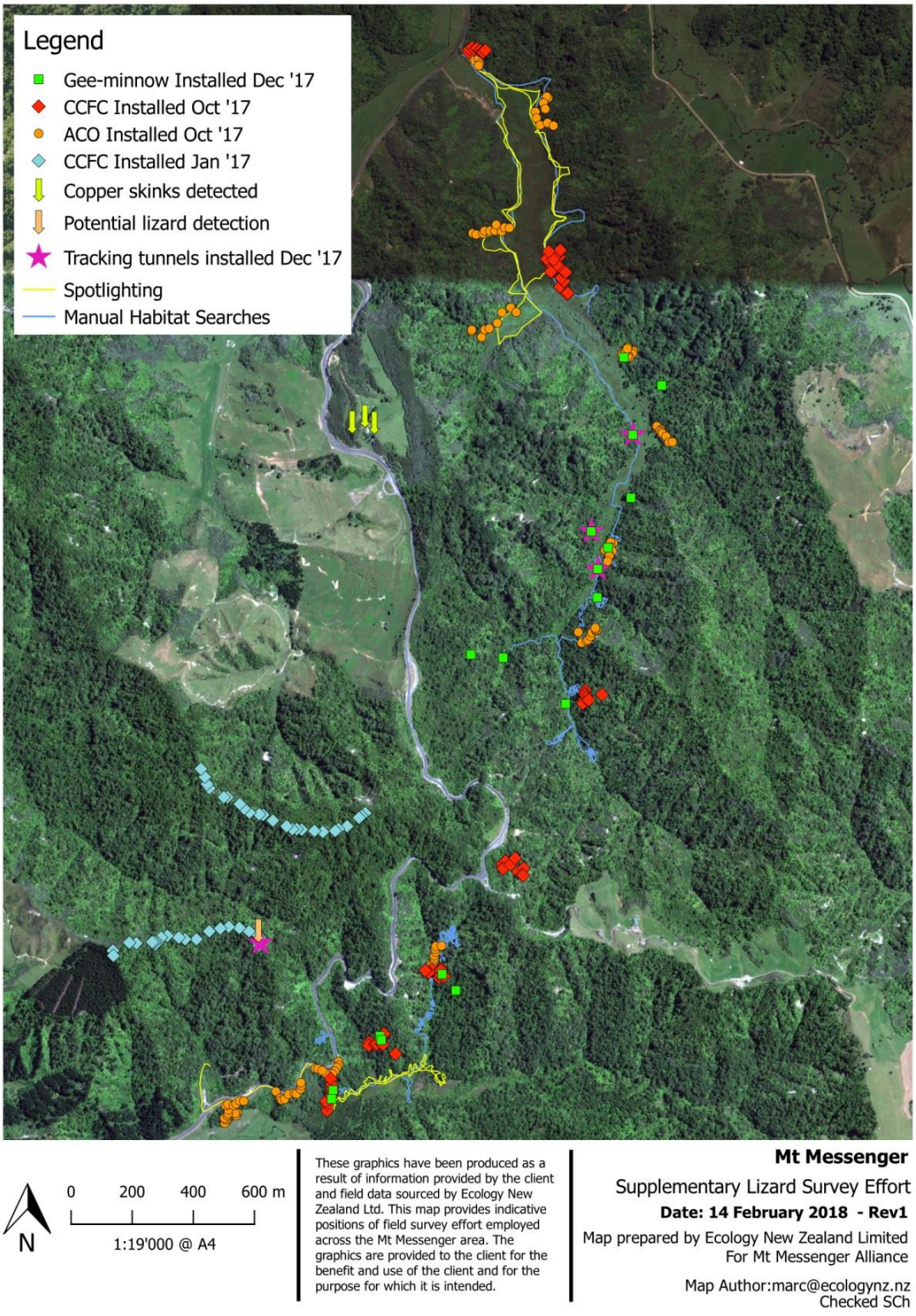

Figure 2: Herpetofauna survey effort and herpetofauna finds / potential sightings

EFFECTS ASSESSMENT INCLUDING MITIGATION, OFFSETTING AND MONITORING: BATS

"Unmitigated" effects assessment under EcIA guidelines

40. As described in detail in Section 4 of the Bat Report, the assessments of ecological effects on bats broadly followed the Environment Institute of Australia and New Zealand's ("**EIANZ**") Ecological Impact Assessment ("**EcIA**") guidelines[4], with some adaptation, including allowance for expert opinion to be applied within the context of the EIANZ framework.

41. Broadly, the EIANZ EcIA methodology involves the following steps:

    (a) ecological values are assigned a level on a scale of 'Low', 'Moderate', 'High' or 'Very High' based on assessing the values of species, communities, and habitats identified;

    (b) unmitigated magnitude of effects on ecological values are evaluated based on Project footprint size, intensity and duration as being either 'No Effect', 'Negligible', 'Low', 'Moderate', 'High' or 'Very High'; and

    (c) the overall level of effect is then determined using a matrix that is based on the ecological values and the magnitude of effects on these values in the absence of any efforts to avoid, remedy or mitigate for potential effects. Level of effect categories include No Ecological Effect, Very Low, Low, Moderate, Moderate/High, High and Very High.

42. As described in the Bat Report and Bat Addendum, I applied the EcIA guidelines in order to determine the overall potential magnitude of the Project's "unmitigated" effect on bats. By way of summary:

    (a) I assessed the ecological value of the wider Project area for long-tailed bats as "Very High", noting that:

        (i) the long-tailed bat is a 'Threatened: Nationally Critical' species[5]; and

        (ii) surveys confirmed the long-tailed bat is present in the wider Project area, including the Project footprint;

    (b) I have assessed the ecological value of the wider Project area for short-tailed bats as "High", noting that:

        (i) the short-tailed bat is a Nationally 'At Risk: Declining' species;

[4] EIANZ, 2015. Ecological impact assessment (EcIA): EIANZ guidelines for use in New Zealand: Terrestrial and freshwater ecosystems. Melbourne: Environment Institute of Australia and New Zealand. 100 p.
[5] The threat status for long-tailed bat changed from 'Threatened: Nationally Vulnerable' to 'Threatened: Nationally Critical' during early 2018, i.e., after the assessments were completed.

(ii) surveys and trapping efforts have not confirmed the presence of the species in the Project footprint or wider Project area;

(iii) in my view it is unlikely they are present in the Project footprint, but it is not possible to completely rule out their presence; and

(iv) I have applied a conservative approach in assuming their presence, and given a "High" values rating;

(c) I have assessed the magnitude of unmitigated effects on both long-tailed and short-tailed bats to be "Low", noting that:

(i) the likely most significant effect of the Project on bats would be the loss of roost trees (including possible mortality) during construction, though it is unlikely roost availability is a limiting factor on the bat population in the general area;

(ii) construction of the Project, and the operation of the highway following construction, will also lead to the loss of some potential foraging habitat. However, it is important to note that the construction of the Project will result in the loss of less than 1% of the potential habitat for bats in the wider Project area;[6]

(iii) the introduction of the highway could create a habitat fragmentation effect, though studies on this effect have produced mixed results and indicate effects are site and context specific. I note also that the existing SH3 already creates a fragmentation effect, to a large degree the Project will relocate the source of that effect;[7]

(iv) the (unmitigated) use of construction and operational lighting could have some adverse effects on bats; and

(v) I consider the magnitude of all of the above effects to be low, both individually and cumulatively;

(d) the value and magnitude assessments lead to an overall level of effects assessment of "Moderate" for long-tailed bats, and "Low" for short-tailed bats.

43. My assessment of the overall level of effects on bats was made with the proviso that if any maternity roost trees were felled within the Project footprint, the level of effects on bats would be higher. As discussed below, this is a potential effect that can be avoided through standard mitigation measures (i.e. VRP), and a range of other measures are being put in place to address the effects of the Project on bats.

[6] The wider Project area is approximately 4,430ha.
[7] Presuming it is retained as a local road, the bypassed existing section of SH3 would see a greatly reduced level of traffic.

Measures to avoid, mitigate and offset potential effects on bats

44. Measures put in place to avoid, mitigate or offset potential effects of the Project on bats include:

    (a) measures that avoid effects through Project route selection and design;

    (b) measures specifically targeting bats, and the potential effect of the Project on bats including Vegetation Removal Protocols and the management of construction lighting to minimise effects on bats and other ecological values; and

    (c) the broader pest control and habitat enhancement measures proposed to mitigate and offset the overall effects of the Project on ecological values, and which will have beneficial effects for bats.

Avoiding effects through route design and selection

45. The potential adverse effects of the Project on bats were minimised by selecting alignment and design options to avoid impacts on the highest quality forest and freshwater ecosystems present in the wider Project area.

46. The selected road alignment requires less forest removal than others that were previously considered. In particular, the alignment avoids the high-quality forest (and potential habitat for bats) to the west of the existing SH3. I note that Long-tailed bat home ranges are among the largest recorded for microbats, with individual home ranges of over 5000 hectares being recorded.[8] In Fiordland, median long-tailed bat home range size was 1589 hectares (sample size = 50 bats radio-tracked) and in South Canterbury smaller home ranges of 322 to 642 hectares. It is worth noting that the total amount of vegetation impacted within the Project footprint (31.676 hectares) is less than 10% of the smallest home ranges estimated for long-tailed bats. Home ranges for long-tailed bats in the wider Project area are likely to be larger than those recorded in South Canterbury.

47. Potentially greater habitat fragmentation effects have also been avoided through the choice of alignment, and inclusion of design features including the bridge and tunnel. Those structures (which were not included with a number of the Project options previously considered) have the effect of improving ecological connectivity for bats. The tunnel preserves a likely important east-west habitat linkage for bats, while the bridge preserves a likely flight path over the high value kahikatea swamp forest to the south of the tunnel.

48. As well as the bridge and tunnel, other design measures have been incorporated that reduce potential effects on ecological values, including the

[8] C. F. J. O'Donnell (2001) Advances in New Zealand mammalogy 1990–2000: Long-tailed bat, *Journal of the Royal Society of New Zealand, 31(1)*: 43-57.

potential effects on bats. These are discussed in general terms in the evidence of Mr MacGibbon.

Vegetation removal protocols

49. The primary mitigation measure to specifically address the potential effects of the Project on bats is the adoption of VRPs.[9] VRPs are aimed at ensuring that no occupied bat roost trees are removed during the construction of the Project. They were developed by the Transport Agency in consultation with DOC to minimise the effects of roads on bats. The protocols typically involve identifying high-risk roost trees and applying a range of methodologies to ensure that high-risk trees are only removed if it can be confirmed that no bats are roosting. VRPs have been applied successfully on other roading projects including SH1 Puhoi to Warkworth, and the Hamilton Section of the Waikato Expressway. The proposed VRPs for the Project are set out in in the bat management chapter of the ELMP (Chapter 5 - Bat Management).

50. The application of the VRPs will appropriately address what I consider (as is noted above) to be the most significant potential effect of the Project on bats, being the loss of occupied roosts.

51. I note that there are other possible methods, as alternatives to VRPs, for achieving positive bat outcomes. Discussions to this end are continuing with DOC and the Councils' ecological consultants (Wildlands). However, my assessment and this evidence presumes the VRPs will be in place.

Other mitigation measures that specifically target bats

52. Construction lighting will be managed (selection and design/layout of lighting) to minimise effects on ecological values including bats. For example, directional lighting will be used to avoid/minimise light spillage as described in section 5.20 of the Construction Environmental Management Plan ("**CEMP**").

The broader ecological mitigation, offsetting and compensation programme

53. The broader ecological mitigation, offsetting and compensation programme (referred to by Mr MacGibbon as the "**Restoration Package**") has been designed to achieve a no net loss in overall ecological values as a result of the Project within 10 years and a net gain by year 15. This is discussed by Mr MacGibbon in his evidence, with the proposed actions set out in the ELMP.

54. These actions will have beneficial effects for bats. Of most benefit will be the establishment of a pest management area ("**PMA**") of approximately 1,085 hectares in close proximity to the existing area (approximately 1,500 hectares) of pest control already undertaken in Parininihi, to the west of SH3.

[9] Also known as tree removal protocols.

55. I consider that the proposed PMA will more than make up for any residual effects the Project will have on bats (once the VRPs in particular are taken into account). I also consider that collectively, the current and proposed pest control will be of a scale sufficient to significantly slow the current likely long-tailed bat population decline in the wider Project area. The combined pest control area may in fact be sufficient to halt the decline or possibly even reverse it – though I do not think that is itself necessary in order to address the effects of the Project. I discuss this in more detail below, and later in response to DOC's submission points regarding bats.

56. The results of one of the only published studies to have investigated the recovery of long-tailed bat populations with pest control[10] provide a strong indication that population declines can be reversed with sustained pest control. That study, conducted in Eglinton Valley, Fiordland, used a 100 x 100 m bait station grid across a contiguous area that was increased during the study period from an initial 650 hectares in 2006/07 to 4800 hectares in 2011/12. While not designed to detect the area threshold above which populations increase, the authors suggested that areas of greater than 3,000 hectares of pest control are sufficiently large to provide for long-tailed bat population growth. During the study, the pest management area was increased rapidly from 1,500 hectares to 3,350 hectares during the 9-month period from September 2009 to May 2010.

57. Despite the authors' recommendation of 3,000 hectares of pest control to reverse long-tailed bat population declines, the actual area required could be anywhere between 1,500 hectares and 3,350 hectares. It is also worth noting that pest management across 1,500 to 3,350 hectares was sufficient (based on population modelling) to recover all three long-tailed bat colonies within the pest management area. It is possible that smaller areas of pest control may have been sufficient to recover one or two of the long-tailed bat colonies present.

58. In addition to the combined area of approximately 2,400 hectares of intensive pest control, this year (2018) DOC is planning an aerial 1080 toxin application over 13,584ha of conservation land immediately to the south of the Project area. This is part of DOC's "Battle for Our Birds" programme, and will potentially be repeated on a 5-yearly basis.

59. It is worth noting that a recent (2017) DOC report[11] described the halt (and probable reversal of) a decline in the long-tailed bat population in the Iris Burn Valley (also in Fiordland) using a 100 x 100 pindone bait station grid for rat control across a 550 hectare area, together with aerial 1080 drops across 11,200 hectares in the wider area. While the study is best described as

[10]O'Donnell, C., Pryde, M., van Dam-Bates, P. Elliott, G. (2017). Controlling invasive predators enhances the long-term survival of endangered New Zealand long-tailed bats (*Chalinolobus tuberculatus*): Implications for conservation of bats on oceanic islands. *Biological Conservation 214*: 156-167.
[11] Jackson, B. (2017) Long-tailed Bat Monitoring Report, Iris Burn Valley, Fiordland 2017. Department of Conservation document DOC-5457876. 12 p.

informal, the results do provide a further indication that the proposed pest management combined with other existing and planned pest control will provide significant benefits for long-tailed bats.

60. In addition to the PMA, the proposed restoration planting and habitat enhancements will, in the long-term, contribute to addressing the effects of the loss of bat habitat within the Project footprint (and more generally provide a benefit to the bat population in the wider Project area). Planting and habitat enhancement will provide foraging habitat in the short- to medium-term, and some of the planted trees will eventually develop the characteristics required for bat roosts.

Post-construction monitoring

61. Post-construction bat monitoring with ABMs is not necessary or appropriate because monitoring bats with ABMs does not provide reliable information on population size or trends. Acoustic monitoring with ABMs has been carried out on a number of roading projects (e.g., multiple sections of the Waikato Expressway) and other projects (e.g., the Te Uku Wind Farm). However, to the best of my knowledge, the data generated by that acoustic monitoring, while of academic interest, have not been used for any practical or meaningful purpose relevant to the effects of the projects concerned.

62. An extensive trapping and mark-recapture programme would be required to monitor bat population size and trends, but would be difficult and might need to be implemented for many years to obtain accurate population size and trend information. Given that the Project footprint represents only a relatively small proportion of the available habitat for bats in the wider Project area, and the benefits of large-scale long-term predator management for bats have been confirmed by at least one published study (O'Donnell et al 2017), a post-construction programme is not considered necessary.

Overall conclusion on effects on bats

63. Overall, the avoidance of the wider Project area's highest quality habitats, in conjunction with the proposed and recommended measures to address potential effects on bats, will result in the Project having no net loss (and possibly a net positive effect) for bats.

EFFECTS ASSESSMENT INCLUDING MITIGATION, OFFSETTING AND MONITORING: HERPETOFAUNA

"Unmitigated" effects assessment under EcIA guidelines

64. As described in section 4.2 of the Herpetofauna Report, I also applied the EcIA guidelines in order to determine the overall potential magnitude of the Project's "unmitigated" effect on Herpetofauna. In doing so, I carried out an

individual assessment for each of the 13 species identified in the literature as being potentially present within the wider Project area.[12] By way of summary:

(a) I assessed the overall ecological value of hereptofauna in the Project footprint as 'Moderate-High', noting that:

(i) the likelihood of the 13 species actually being present in the Project footprint ranges from 'high' to 'marginal', based on habitat types; and

(ii) with that in mind, I assigned value ratings for each species. Ten of these ratings were 'High', three of the ratings were 'Low';

(b) I assessed the overall magnitude of unmitigated effects of the Project on herpetofauna as 'Low-Moderate', noting that:

(i) again, taking the likelihood of each species being present into account, I assessed the magnitude of unmitigated effects on each species. These assessments were either 'Moderate' or 'Low';

(ii) the herpetofauna population across the wider Project area is unlikely to be affected in any meaningful way by the Project, noting in particular the relatively small amount of habitat that will be cleared in comparison to the available habitat in the wider Project area;

(iii) the key potential effects of the Project on herpetofauna are:

(1) habitat removal during construction;

(2) injury or death as a result of habitat removal;

(3) habitat fragmentation through the introduction of a new highway, though noting the barrier effect of the new highway will be somewhat reduced by the removal of most traffic from the existing (bypassed) section of SH3; and

(4) vehicle strikes, though this effect would be unlikely to pose a population level threat; and

(c) I assessed the overall unmitigated effects of the Project on herpetofauna as 'Moderate'. The level of effects on each species varies from 'Very Low' (three species) to 'Low' (nine species) to 'High' (one species – Archey's frog).

65. Adopting an overall level of unmitigated effects rating of 'Moderate' is a conservative approach, in light of the uncertainty as to what species of herpetofauna are actually present in the Project footprint. This meant

[12] Including the copper skink, which was confirmed as being present within the wider Project area – but not the Project footprint – through the field investigations.

assuming that at least one threatened herpetofauna species population is present within the Project footprint and that mitigation and compensation will be required regardless of whether adverse effects are confirmed.

66. While the Project footprint represents only a small proportion of the available habitat in the wider Project area, the unmitigated removal of 31.676 hectares of habitat may adversely impact a potentially significant herpetofauna community. It is also possible that the Project footprint contains critical habitat for one or more very rare species (e.g. striped skink).

Measures to avoid, mitigate and offset potential effects on herpetofauna

67. Measures put in place to avoid, mitigate or offset potential effects of the Project on herpetofauna can also be categorised into:

    (a) measures that avoid effects through Project route selection and design;

    (b) measures specifically targeting herpetofauna, and the potential effect of the Project on herpetofauna. A Herpetofauna Management Plan ("**HMP**") aimed at salvaging and relocating native lizards to suitable habitat(s) outside the Project footprint is proposed to mitigate the effects of the Project on lizards).[13] Essentially, the HMP prescribes methodologies to salvage and relocate native lizards to suitable alternative habitat away from the Project footprint; and

    (c) the broader pest control and habitat enhancement measures proposed to mitigate and offset the overall effects of the Project on ecological, and which will have beneficial effects for herpetofauna.

Avoiding effects through route design and selection

68. As with bats, the potential adverse effects of the Project on herpetofauna were minimised / avoided by:

    (a) selecting alignment and design options to avoid impacts on the highest quality forest and freshwater ecosystems present in the wider Project area (in particular the high-quality habitat to the west of the existing SH3); and

    (b) inclusion of design features including the bridge and tunnel to reduce fragmentation effects, thereby preserving habitat linkages, and other features that reduce potential effects on ecological values, including the potential effects on herpetofauna.[14]

Herpetofauna Management Plan

69. The HMP sets out protocols and methodologies for the salvage of native lizards within the Project footprint, and their relocation to suitable habitat

[13] See chapter 7 – Herpetofauna Management Plan – in the ELMP.
[14] Discussed in Mr MacGibbon's evidence.

outside the Project footprint. As described in the HMP, the primary focus of salvage efforts will be searches for striped skinks (this is the most significant species likely to occur within the Project footprint) and other arboreal lizards during vegetation removal. In particular, epiphyte habitats will be targeted during searches for striped skinks.

70. Additional focal areas for salvage efforts include nocturnal spotlighting for arboreal geckos of all scrub areas within the Project footprint and manual/destructive searches of debris around the residential property at the northern end of the Project footprint.

71. The HMP also provides for predator-proof fencing (including mice) to be installed, and pest eradication to be carried out, in an area of known significance for herpetofauna (e.g. a known striped skink population), outside the Project footprint, to offset the Project's potential but unquantifiable residual effects on herpetofauna. That area will be selected following discussions with DOC.

72. Ideally, this pest-free area will also be utilised as a release site for lizards salvaged from within the Project footprint (especially striped skink). Alternative release sites, within suitable habitat near the Project footprint, may be utilised for salvaged common lizard species (e.g., copper skink) or lizard species for which no suitable habitat (or an insufficient amount of habitat) is available within the pest-proof enclosure.

73. If a suitable site of existing significant herpetofauna cannot be identified for pest-proof fencing, the pest-proof fence (and the pest eradication therein) will be installed in suitable habitat within the PMA near the Project footprint. While the concept of a pest-proof enclosure to protect existing known significant herpetofauna values (i.e., a known striped skink population) was agreed with DOC during formal meetings,[15] the details of the pest-proof enclosure (e.g., location and design) are the subject of ongoing discussions with DOC. I discuss the prioritised lizard enclosure location options (as agreed with DOC during formal meetings) in more detail in my response to the DOC submission below.

The broader ecological mitigation and offsetting programme

74. The overall ecological mitigation and offsetting programme is likely to have beneficial effects for some herpetofauna species (e.g., arboreal lizards).

75. Revegetation to mitigate the Project's effects on vegetation will, in the medium-to long-term, contribute to mitigating the effects of the loss of herpetofauna habitat within the Project footprint. In particular, the highest population densities of arboreal gecko species such as forest gecko and green gecko are often found in scrub and regenerating forest ecosystems – including

[15] Facilitated by Mr Roan, and by DOC's consultant planner Mr Ben Inger.

my own observations of arboreal geckos colonising revegetation plantings unassisted. While this may be because lizards are easier to find in such vegetation, it does demonstrate that revegetation can benefit native lizards in relatively short timeframes (provided that they are present in the area in the first place).

76. Pest control may benefit some lizard species (e.g., arboreal lizards), and while there is some anecdotal evidence (including my own observations) to support that view, no published studies have confirmed whether or not that is the case. While some species (e.g. forest gecko and green gecko) can thrive in the presence of mice, populations of other species, especially ground-dwelling skinks (e.g. shore skink[16]), are vulnerable to predation by mice. The proposed pest control does not include the control of mice. Mouse populations may in fact increase once populations of rats and other predators are controlled and potentially have an adverse effect on lizards.

77. Overall, the revegetation and pest control detailed in the ELMP, and Mr MacGibbon's evidence, are likely to have a neutral to slightly beneficial effect on herpetofauna, with arboreal geckos more likely to benefit from pest control and terrestrial skinks more likely to be adversely impacted by any spikes in mouse numbers following rat control.

78. As discussed in detail above and below, the HMP provides for the Transport Agency to fund / arrange for fencing and pest control of an area of important existing habitat for herpetofauna (outside the Project footprint) as identified in consultation with DOC. While still the subject of discussions with DOC, this provision in particular is important in ensuring that any residual effects of the Project on herpetofauna are addressed, noting that there is some uncertainty as to the precise level of effect the Project will have.

Overall conclusion on effects on herpetofauna

79. The Project has avoided the wider Project area's highest quality herpetofauna habitats. There are specific measures to address the potential effects of the Project on herpetofauna (as set out in the HMP). The broader offset programme (pest control and revegetation) combined with the protection of an existing site of herpetological significance with predator-proof fencing and pest eradication therein will provide an overall benefit to herpetofauna.

80. Taking all these measures into account, in my view the Project will result in no net ecological loss for the area’s herpetofauna populations.

[16] Wedding C.J. (2007) Aspects of the impacts of mouse (*Mus musculus*) control on skinks in Auckland, New Zealand. M.Sc. thesis. Massey University, Auckland, New Zealand.

RESPONSE TO THE DIRECTOR-GENERAL OF CONSERVATION'S SUBMISSION

Bats

81. DOC's submission raises a number of points in respect of bats, including:

    (a) the need for a pre-consenting mark-recapture study;

    (b) the measures needed to address effects on bats; and

    (c) the need for post-construction monitoring.

82. I set these out below, followed by my response.

Mark-recapture study

83. DOC's submission notes that the planned (at the time the Transport Agency's applications were lodged) mark-recapture study:

> *"…should be completed prior to decisions being made on the resource consent application to enable the effects of the Project works on bats to be fully assessed and properly understood (this will enable maternity roost trees to be detected and provide an idea of the size of the social colonies within the Project area)*."

84. The mark-recapture study for bats was attempted over a 9-day period during December 2017 as described in section 2.2.2 of the Bat Addendum. Unfortunately, and as discussed above, no bats were captured therefore the potential benefits of such a study could not be achieved.

85. It is not uncommon to encounter difficulties in trapping bats. The development of the bat mitigation package was completed without the additional information that such a study could have provided for the Project. In the absence of the additional information that a successful bat trapping and radio-tracking study could potentially provide, it is not possible to target mitigation efforts, particularly in respect of VRPs, towards particular areas within the Project footprint.

86. As such, a conservative approach is required, and has been adopted. Trees of a similar or larger trunk diameter known to be used as roosts by long-tailed bats anywhere in New Zealand will be assumed to be high risk trees for bat roosting unless it can be confirmed that they are unoccupied. In my opinion the conservative approach adopted is appropriate, reflects the information obtained from the ABM surveys, and will ensure that potential effects on bat roosts will be appropriately avoided / mitigated.

Measures to address effects on bats

87. DOC's submission then addressed the proposed measures (beyond VRPs) that address potential effects and / or will have beneficial effects for bats. DOC's submission states:

    (a) *"… there will still be effects which will need to be mitigated, and residual effects which will need to be offset or compensated. This is acknowledged by the Applicant in the resource consent application."*

    (b) That DOC supports "*pest management for rats, mustelids, cats and possums in perpetuity as part of the proposed effects compensation, but it must be undertaken in a location that is linked to other pest managed areas in order to be fully effective.*"

    (c) That DOC supports "*revegetation as part of the proposed compensation, however, this is only likely to benefit bats as a long-term strategy*."

88. While I consider VRPs to be effective at minimising direct effects on bats during vegetation removal, as stated above there may be some residual, albeit minor and short-term effects on bats as a result of the Project. Those potential effects stem from the loss of roosting and foraging habitat and fragmentation effects of the Project.

89. Given the uncertainty around quantifying the residual effects of the Project on bats, it is appropriate to compensate for those potential effects by implementing pest control of the type and scale likely to provide long-term benefits to the local long-tailed bat population(s). Long-tailed bat conservation status is classified as 'Threatened Nationally Critical' because the species is thought to be declining throughout most of its range due to predation and competition from introduced mammals, habitat degradation and disturbance.

90. As discussed above, the results of one of the only published studies to have investigated the recovery of long-tailed bat populations with pest control provide a strong indication that population declines can be reversed with sustained pest control over large areas. Furthermore, the 1,085-hectare PMA proposed for the Project adjoins the 1,332-hectare Parininihi forest area already under pest control. Once the PMA is implemented, the combined area under pest management will total approximately 2,400 hectares. While this is less than the >3,000 hectares suggested by the authors of the Eglinton Valley study, that study focused rat control efforts on rat population irruptions caused by beech mast seeding rather than perpetual rat control as is proposed to be implemented within the PMA.

91. As discussed above, the combined area of approximately 2,400 hectares of intensive pest control will be built upon with an aerial 1080 toxin application DOC is planning to carry out over 13,584ha of conservation land immediately to the south of the Project area.

92. It is my view that the proposed 1085 hectares pest control will provide substantial benefits to the local long-tailed bat population(s), especially given the location of the PMA linking Parininihi with the >13,500 hectare area to the south where DOC is planning to carry out aerial 1080 application. Taking into account the uncertain, but likely relatively minor and short-term nature of any residual effects of the Project on bats, I consider that providing a 1,085ha PMA, adjacent to the existing area of pest control at Parininhi and DOC's proposed 1080 treatment area, is comfortably sufficient to address and counteract the Project's effects.

93. It is not necessary for the Project to reverse the likely decline in the local bat population in order to address the effects of the Project specifically. Any effects of the Project would only be one factor (and likely a minor one) contributing to a likely existing long-tailed bat population decline.

94. The PMA probably would not, in isolation, be sufficient to reverse the likely existing long-tailed bat population decline in the wider Project area. However, in combination with existing and planned pest management in the wider area, the PMA may well be sufficient to halt the decline, or possibly even take the local population(s) from negative growth to positive population growth. That would amount to a significant benefit to the local bat population.

95. In terms of the revegetation proposed as part of the broader offset programme for the Project, I agree that revegetation is a longer-term mitigation strategy for bats. However, I have often observed long-tailed bats foraging above young regenerating forest and shrublands in several regions (Auckland, Waikato and Hawkes Bay). Such observations indicate that revegetation areas may provide foraging habitat in relatively short timeframes. Native bats typically prefer to roost in old trees, meaning it may take many decades before revegetation areas provide roosting habitat. That is why I consider, as set out above, the proposed pest management and the benefits that provides to vegetation within the PMA to be an important component in addressing potential residual effects on bats.

96. DOC's submission contends that:

    (a) monitoring of bats should be carried out for at least 15 years following completion of the Project works; and

    (b) if monitoring shows the bat population is declining, there should be provision to require the Transport Agency to take "*appropriate measures*".

97. In my view, monitoring should only be required:

    (a) as a reflection of the level of effects of a project on bats; and

    (b) where monitoring results can be tied to the effects of the Project.

98. I consider the proposed extensive pest management and revegetation programme will be more than sufficient to address any residual effects of the Project on bats.

99. Acoustic monitoring for bats only allows bat activity patterns and relative habitat use to be assessed. While such information is of scientific interest, it has limited applicability in situations where population monitoring is required. In other words, acoustic monitoring cannot provide information on population size (i.e. abundance) or population trend (decreasing, stable or increasing). On that basis, it is not appropriate to use acoustic monitoring in an attempt to quantify or monitor the Project's effects on bats or to trigger any additional mitigation measures.

100. I am not in support of carrying out monitoring for the sake of monitoring. In the context of roading projects, acoustic monitoring is primarily useful as part of VRPs (e.g., to determine if bats are present in trees scheduled for removal).

Herpetofauna

101. DOC's submission raises a number of points in respect of herpetofauna, including:

    (a) the need for a precautionary approach, noting that there may be low density populations of lizard species present, that the Project footprint includes suitable habitat for lizards, and that such habitat often contains lizards which are not able to be easily detected;

    (b) that DOC agrees with the focus to avoid and then mitigate effects on lizards, but that DOC considers a "*compensation approach*" is required in addition to the mitigation measures proposed;

    (c) that pest management might create *"unintended outcomes for lizards by freeing mice from competition and predation from rats and allowing mouse plagues resulting in increased predation on lizards"*; and

    (d) that "*further specific measures for herpetofauna should form part of the Ecology and Landscape Management Plan (ELMP) and the Pest Management Plan (PMP)."*

102. I respond to these points in turn below. In doing so I note that DOC's submission was lodged before a detailed draft of the ELMP was provided to the Councils, DOC and others.

103. As detailed above, I agree that there is uncertainty around the effects of the Project on Herpetofauna. I also acknowledge that habitats suitable for herpetofauna are present within the Project footprint. That is why a conservative approach was adopted to the assessment of effects on herpetofauna, and the measures to address those effects. In particular, it was assumed that at least some native herpetofauna species are present within

the Project footprint (despite them not being found during the surveys that have been undertaken).

104. I agree that mitigation options available for herpetofauna are limited. However, in my opinion the avoidance and minimisation achieved through the selection and design process, combined with a Restoration Package comprised of lizard salvage and relocation, revegetation, large-scale long-term pest management and a predator-proof lizard enclosure (the options for this enclosure are described below), will appropriately address the Project's actual and potential effects on herpetofauna.[17]

105. As explained in my evidence above, while there is some uncertainty as to whether some of the proposed offset measures (e.g. pest management) will be effective for herpetofauna, in my opinion the benefits in terms of vegetation and habitat enhancement provided for by pest management will provide a benefit for herpetofauna through habitat enhancement. This is especially so given the poor state of the existing habitat in the targeted area due to the effect of pests (and grazing animals).

106. Whether the pest management approach is called 'offset' or 'compensation', my focus has been to ensure that the effects of the Project on herpetofauna are appropriately avoided, remedied or mitigated and that residual effects on herpetofauna (if any) are addressed. In my opinion, irrespective of the terminology used, the residual effects (if any) of the Project on herpetofauna are appropriately addressed through the proposed Restoration Package.

107. In terms of any unintended consequences of the proposed pest management, I agree that mice are known to predate on some native herpetofauna species. However, at least some species that occur in North Island native forest areas (e.g., forest gecko and green gecko) appear to be able to thrive in the presence of mice. Given the concerns raised by DOC regarding the impacts of mice, the HMP provides for the release of salvaged lizards into a pest-free and pest-proof fenced area containing suitable habitat(s) for the species concerned.

108. I note that the fenced release area(s) for salvaged lizards was referred to as a "soft-release pen" in the Herpetofauna Addendum, but its primary function is to provide a pest-free area of core habitat for herpetofauna. As described above, there are several options for the location of the pest-proof fenced area. All options would require that the fencing is mouse-proof (in addition to the other major predators), and that mammalian predators are eradicated from the fenced area. As agreed in formal meetings with DOC, but noting that discussions with DOC about the options are ongoing, the options (from highest to lowest priority) are:

[17] I note that there are other possible options to specifically target herpetofauna, which are being discussed with DOC and Wildlands

(a) a predator-proof fence to be constructed around a known local population of striped skink, and all striped skink (and arboreal gecko species if suitable habitat is present) salvaged from the Project footprint to be relocated to this enclosure; or

(b) a predator-proof predator fence to be constructed around a known but more distant population of striped skink and, subject to consultation with Ngāti Tama, all striped skink salvaged from the Project footprint to be relocated to it; or

(c) translocation of all captured lizards into a predator-proof fenced enclosure (containing suitable habitat for the relocated species) located within the PMA.

109. The focus on striped skink is because, of all the At Risk and Threatened herpetofauna species likely to occur within and/or adjacent to the Project footprint, it is among the rarest nationally, and it does not have a known secure breeding population on an island or sanctuary free of predators.[18] Individuals of this species salvaged from within the Project footprint would have the greatest chance of survival if they could be released into a predator-proof enclosure that surrounds a known existing population of striped skink. It was agreed with DOC during formal meetings that eradicating predators from within the enclosure would be likely to increase the carrying capacity sufficiently to accommodate the relocated individuals. Populations of striped skink are known to exist in the Taranaki region.

110. I do not consider that general mice control (extending across the entire PMA) is necessary to mitigate effects of the Project on herpetofauna. That is the basis upon which I recommend limiting the control of mice to specific areas where salvaged lizards are released (i.e., within the predator-proof enclosure).

111. The HMP contains the specific measures for herpetofauna, including the lizard salvage and relocation requirements.[19] The PMP is focused on pest management and is addressed in the evidence of Mr MacGibbon.

RESPONSES TO NPDC SECTION 42A REPORT

112. The NPDC Section 42A Report raises the following points regarding the Project's potential impacts on bats and herpetofauna:

(a) operational and construction lighting may adversely affect bats (paras 248 and 303e);

(b) it would be appropriate to update the ELMP to reflect the correct conservation status of long-tailed bat to avoid any downplaying of risks posed by the project to this species (para 303a);

[18] Some individuals have been found on Little Barrier Island, but the status of the population there is unclear.
[19] See chapter 7 of the ELMP.

(c) a range of mitigation measure should be applied to address effects on bats (para 303p);

(d) evidence is required to verify that a 1,000 hectare area of pest control will result in long-tailed bats increasing in number (para 303t);

(e) a range of mitigation measure should be applied to address effects on herpetofauna (para 303r);

(f) the area of proposed pest control is too small to result in the prescribed outcomes for that pest control (e.g. a population of long-tailed bats that is increasing in size);

(g) consent conditions should include pre-construction, during-construction and post-construction monitoring for bats and lizards (para 315);

(h) all designation conditions regarding herpetofauna should refer to both lizards and frogs (para 315); and

(i) the Pest Management Area should cover a total of 3,000 hectares (Para 388).

113. The ELMP and the CEMP have been updated to address several of the points raised in the Section 42A Report. The issue of construction lighting effects on nocturnal fauna is addressed in section 5.10 of the CEMP. The updated conditions proposed by Mr Roan in his evidence are appropriate to ensure that operational phase lighting design will take potential effects on nocturnal fauna into account. The ELMP has been updated to specify that the conservation status of long-tailed bat is now Nationally Critical.

114. The ELMP includes vegetation removal protocols to minimise effects on bats. As discussed above, the protocols combined with the proposed 1,085 hectare pest management area are adequate to address the effects of the Project on bats. The VRP provided in the ELMP are the version that DOC's bat expert requested be included in the ELMP during conferencing.

115. DOC's bat expert stated during formal meetings that DOC will provide the final version of the VRP as an attachment to the Wildlife Act permit for bats. Discussions to finalise the specifications of the VRP had not been completed at the time of preparing this evidence. As above, there are other options that can have beneficial outcomes for bats and this forms part of the ongoing discussions with DOC.

116. Regarding the request for evidence that a 1,000 hectare PMA will increase the local bat population, my opinion is that the requirement in this case is to address the Project's adverse effects on bats. The request implies that the Council's bat reviewer holds the view that the Project is responsible for reversing a decline caused by introduced predators across the wider Project area - well beyond the effects of the Project itself. Even slowing a bat

population decline across the wider area can be considered a benefit. As I discussed above, while not claiming 'credit' for existing or planned pest control in the wider Project area, adding 1,085 hectares of pest management creates an adjacent total area within the range of pest management area sizes considered to reverse any population declines.

117. I agree that a range of measures are required to avoid and mitigate (or offset / compensate) the Project's adverse effects on herpetofauna. I have outlined those matters in the Technical Reports and my evidence above, and they are contained in the ELMP.

118. I accept that larger areas of pest control are nice to have, but the effects of the Project are not such that it is necessary to resolve the conservation issues of the wider area. I would be delighted if the long-tailed bat population increases to the point where carrying capacity over 1085 hectares is achieved (noting the actual wider managed area is larger). I would expect bat population growth to stop once the population reaches carrying capacity.

119. I do not agree that monitoring for bats and herpetofauna should be included in the Project. As discussed above, acoustic monitoring of bat activity reveals very little, if anything, about population size and trends. On that basis, bat monitoring data cannot be used for anything useful other than monitoring for the sake of monitoring, or as a form of compensation but with no ecological outcome or benefit. Regarding herpetofauna monitoring, the substantial survey effort (by several recognised leading herpetologists) during the assessment fieldwork failed to produce a single record of any native herpetofauna species within the Project footprint. Given those results, I do not consider herpetofauna monitoring will provide any worthwhile information in this case.

120. The ELMP has been updated to refer to herpetofauna rather just lizards. The effect of that change is that that native frogs are no longer excluded.

121. The total pest management area of 3,000 hectares specified in the conditions listed in the Section 42A Report reflects the assumption above that the Project is single-handedly responsible for reversing a likely local bat population decline across the wider Project area. As discussed above, the mitigation/compensation only needs to account for the effects of the Project. The 1,085 ha of pest management in the location proposed is, in my opinion, likely to go a long way towards reversing any decline.

Simon Chapman

25 May 2018