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

17 July 2018

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INTRODUCTION

1. My full name is Simon Percival Chapman.

2. My supplementary evidence is given in relation to applications for resource consents, and a notice of requirement by the NZ Transport Agency ("the **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 ("the **Project**").

3. I have the qualifications and experience set out in my statement of evidence in chief ("**EIC**") dated 25 May 2018.

4. I repeat the confirmation given in my EIC that I have read the 'Code of Conduct' for expert witnesses and that my evidence has been prepared in compliance with that Code.

5. In this evidence I use the same defined terms as in my EIC.

SCOPE OF EVIDENCE

6. The purpose of my supplementary statement of evidence is to update my EIC in light of the updated ecological Restoration Package now proposed by the Transport Agency.

7. My supplementary evidence addresses:

   (a) the details of the updated ecological Restoration Package;

   (b) the implications of the updated ecological Restoration Package for bats; and

   (c) the details of the Restoration Package in relation to herpetofauna, in particular in relation to a predator free relocation area.

UPDATED RESTORATION PACKAGE

8. The updated ecological Restoration Package proposed by the Transport Agency is set out in the supplementary evidence of Mr MacGibbon. The key feature is an increase in the area of the Pest Management Area ("**PMA**") from 1,085 to 3,650 hectares.

9. Aside from the increase in area, the nature of the proposed pest management within the PMA remains unchanged (i.e., intensive ground-based pest control targeting rats, mustelids, cats and possums). As with the previous version of the PMA, the vast majority of the area is native forest.

10. However, for reasons explained below, given that the increased PMA is likely, based on scientific literature, to secure the sustainable population of long-tailed bats in the wider area, a scaled-back version of the Vegetation Removal Protocols ("**VRP**") is proposed.

REVISED RESTORATION PACKAGE - BATS

Benefits of the larger PMA

11. In my EIC I stated that while halting or reversing the likely current decline in North Taranaki's long-tailed bat populations would be a highly desirable outcome, it exceeds the requirement to avoid/mitigate/offset the effects of the Project on bats by a substantial margin. That is primarily because I do not consider that the Project would, with the Restoration Package proposed, have resulted in adverse bat population level effects. I remain of that opinion.

12. However, despite my opinion, following the technical and management meetings with the Department of Conservation ("**DOC**") during the recent adjournment of the hearing date, the Transport Agency has decided to increase the PMA to 3,650 hectares.

13. This, in my opinion, means that the Project will go substantially beyond mitigating/offsetting/compensating the effects of the Project on long-tailed bats. The revised Restoration Package will secure the long-term future of the long-tailed bat population in North Taranaki. None of the large-scale projects I have provided bat expertise on (e.g., SH1 Puhoi to Warkworth project, multiple sections of the SH1 Waikato Expressway project, Te Uku Wind Farm, etc.), or any other large-scale projects I am aware of, have provided much in the way of mitigation/compensation for effects on bats other than standard VRP and monitoring. The provision of a suitably large area of pest control (in perpetuity) aimed at recovering and sustaining a long-tailed bat population as mitigation/compensation for adverse effects on bats in New Zealand is, in my experience, unprecedented.

14. As explained in my EIC (at paragraphs 56 and 57), a peer-reviewed published study demonstrated that all three long-tailed bat colonies present within the study area had positive growth as a result of pest management within an area of between 1,500 and 3,350 hectares. The authors specifically mention "> 3,000 ha" as the area of pest management above which population occurs (page 163, second to last paragraph). While the study went on to further increase the area of pest control to > 4,500 ha, the bat population was already recovering at that point.

15. The published information (see Appendix 1) available relating to the benefits of pest control for long-tailed bats[1] ("**Fiordland study**") includes the following comment (page 163):

> *"long-tailed bat population growth rate was positive in the three study-colonies (λ = 1.05−1.09), with rat control using bait stations once the management area was sufficiently large (> 3000 ha; 2009/10, 2011/12)."*

[1] 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.

16. The area of pest control implemented in the Fiordland study during 2009/10 *"covered 1500 ha at the beginning of the breeding season, and was gradually expanded throughout the summer*" (footnote to Table 1 on page 159) to 3,350 hectares. The following season (2011/2012), the PMA was increased to 4,800 hectares.

17. The Fiordland study relied heavily on population modelling but the authors noted the following (also on page 163):

> *"Predictions from our population growth models reflected what was happening in the recovering bat colonies."*

18. The 3,650-hectare PMA now proposed exceeds the upper extent of the range of area of pest management (1,500-3,350 ha) documented as successfully recovering the long-tailed bat population in the Fiordland study by approximately 300 hectares. As discussed in my EIC, another Fiordland study[2] provided evidence that a core area of intensive ground-based pest control together with a wider area of aerial application of 1080 toxin can also stabilise long-tailed bat populations. In that study, an intensive 550 ha area of ground-based control was combined with an aerial 1080 application over 11,200 ha.

19. There are two notable differences between the DOC study sites and the PMA that mean a smaller PMA may be required to recover bat populations. Firstly, the two Fiordland studies were conducted in South Island beech-dominated forests which are subject to pest population irruptions following beech mast seeding events. Pest control operations in the Fiordland studies focused on controlling pest population irruptions. In contrast, as mast seeding and subsequent pest population irruptions are not major factors in the forests of the wider Mount Messenger Bypass Project area, the pest control proposed for the PMA is based on sustained control rather than the period control used in the DOC studies. I expect that sustained pest control (in the absence of pest population irruptions) as proposed for the PMA will be more effective in recovering bat populations in comparison to periodic pest control carried out in response to population irruptions as was done in the Fiordland studies.

20. A second notable difference between the Fiordland study sites and the PMA is the quality and extent of the native forest present. The forests present at the Fiordland study sites are of high quality with many mature trees present across large areas. In contrast, the PMA is comprised of a patchwork of forest and shrubland fragments of varying size and quality. Studies of long-tailed bat home ranges conducted where habitat is fragmented or patchy have typically found that home ranges are substantially smaller compared with the home ranges recorded in Fiordland. Examples of long-tailed bat home range recorded in fragmented, patchy and/or lower quality habitats include maximum

[2] Jackson, B. (2017). Long-tailed Bat Monitoring Report, Iris Burn Valley, Fiordland 2017. Department of Conservation document DOC-5457876. 12 p.

home range sizes of 642 ha in rural South Canterbury[3], 871 ha in urban / peri-urban Hamilton[4], and approximately 1,800 ha in plantation forest at Kinleith, South Waikato[5]. In contrast, maximum long-tailed bat home range size in Fiordland was well over 5,000 ha and the median was 1,589 ha for adult males and 1,361 ha for post-lactating females. While there are differences between the studies, on the basis of home range size, I expect that a PMA of 3,650 hectares (of patchy habitat quality) will recover multiple long-tailed bat colonies (sub-populations). It is possible that more colonies will be recovered than could be achieved with the same area of pest control in Fiordland.

21. Further, while the Project cannot claim credit for pest management carried out by others, as mentioned in my EIC (at paragraphs 54 and 58), the intended PMA adjoins:

    (a) the 1,332-hectare Parininihi forest area already under intensive pest control (to the west of the PMA); and

    (b) an area of approximately 10,000 hectares of conservation land over which DOC is planning to carry out an aerial 1080 operation.

22. The scale and location of the revised PMA adjoining other large-scale pest control projects means that the total area of intensive pest management in the wider Project area is approximately 5,000 hectares plus > 10,000 ha of aerial 1080-based pest control.

23. As mentioned above, the Restoration Package is aimed at providing a more certain outcome by providing predator control at a scale that will provide for the long-term survival of the local bat population in northern Taranaki. The more traditional approach adopted in recent years has been to implement VRP and undertake monitoring after the road has been built. As set out in my EIC, the traditional approach does not, in my opinion, provide direct meaningful outcomes for the local bat population.

24. The driver for the Transport Agency in more than tripling of the PMA area to 3,650 ha of pest control in perpetuity is to secure the long-term survival of the bat population(s) in the wider Project area. While I do not consider such a large PMA is necessary to avoid, remedy or mitigate the effects of the Project on long-tailed bats, in my opinion the revised Restoration Package will deliver a fantastic sustainable long-term positive outcome for North Taranaki's long-tailed bat population. Without the Project it is likely the current decline, consistent with that across New Zealand except where predator control is occurring,[6] in the north Taranaki bat population will continue, even if DOC

[3] Griffiths, R. (1996). Aspects of the ecology of a long-tailed bat, *Chalinolobus luberculatus* (Gray, 1843), population in a highly fragmented habitat. Unpublished MSc thesis, Lincoln University, New Zealand.
[4] Dekrout, AS. (2009). Monitoring New Zealand long-tailed bats (*Chalinolobus tuberculatus*) in urban habitats: ecology, physiology and genetics. Unpublished PhD thesis. Auckland, University of Auckland.
[5] Borkin KM. (2010). Ecology of New Zealand long-tailed bat (*Chalinolobus tuberculatus*) in exotic plantation forest. PhD, University of Auckland, Auckland
[6] O'Donnell, CFJ. Borkin, KM, Christie, JE, Lloyd, B, Parsons, S, Hitchmough, RA. (2018). Conservation status of New Zealand bats, 2017. New Zealand Threat Classification Series 21. 4 p.

carries out occasional aerial drops of 1080. As far as I am aware no other large-scale bat recovery programme is planned for north Taranaki.

Vegetation removal protocols (VRPs)

25. The benefits of the revised Restoration Package for long-tailed bats are, in my opinion, substantial and will provide for the growth of, and long-term sustainability of the long-tailed bat population in North Taranaki. This might call into question the need to retain the VRPs in order to address the effects of the Project on bats. That is, strictly speaking, even if bat mortality occurred during vegetation clearance, the PMA is of such scale that there will be growth, and long-term sustainability of the local bat population.

26. Having said that, I do not support removal of the VRPs. I do however support revising the VRPs proposed in my EIC, and contained in the ELMP as filed with my EIC. The reduced VRP now proposed appropriately retains the focus on minimising the risk of communal roosts being felled while occupied by bats.

27. The change in emphasis from full VRP and a smaller PMA to a reduced VRP and a much larger PMA represents a pragmatic approach in which resources are targeted more towards ecological management certain to have substantial benefits for bats.

28. This shift is in line with the preferred approach (see below) to the lizard mitigation/compensation package in which costly onsite lizard salvage protocols (which may not identify any lizards) are reduced and the effort is put into pest management that can provide certain and long-term outcomes.

29. The revised VRP, as now contained in the revised ELMP, includes an increased minimum DBH threshold for high risk trees of 80+ cm (cf. 15 cm in the unmodified VRP). The Project bat ecologist may, at their discretion, select additional trees in the 50-80 cm DBH range for inclusion in the VRP. The additional trees will be those with characteristics considered suitable for bat roosting (e.g., cavities/crevices, abundant epiphyte clumps, etc.). This will ensure that the oldest/tallest/largest trees within the Project footprint, which are those most likely to contain communal/maternity roosts, will have the VRP applied to avoid felling occupied trees.

30. Some research has shown that long-tailed bats may select smaller diameter trees in highly modified/fragmented landscapes (e.g., South Canterbury[7], Kinleith exotic plantation forests near Tokoroa[8]). However, the trees they select for their communal/breeding roosts (cf. solitary/non-breeding roosts) are invariably among the largest cavity-bearing trees available in the landscape.

[7] Sedgeley JA, O'Donnell CFJ. (2004). Roost use by long-tailed bats in South Canterbury: Testing predictions of roost site selection in a highly fragmented landscape. New Zealand Journal of Ecology 28:1-18.
[8] Borkin KM, Parsons S (2011). Sex-specific roost selection by bats in clearfell harvested plantation forest: improved knowledge advises management. Acta Chiropterologica 13: 373–383.

31. Long-tailed bat research in larger, more intact areas of native forest (including similar forest types and sizes to many of the forest areas present in North Taranaki) has shown that trees > 80cm in diameter are preferred by long-tailed bats when such trees are available. For example:

    (a) in a King Country study on long-tailed bat roosts (the nearest such study to the Project area), most roosts were in live rimu, kaihikatea, tawa, puketea or standing dead trees with a range of 79-189 cm DBH;[9]

    (b) in the Waitakere ranges, long-tailed bat roosts trees had an average DBH of 186 cm with a range of 87-309 cm DBH[10];

    (c) at Balls Clearing in Hawkes Bay, mean bat roost tree diameter was approximately 92 cm with a range of 46-130 cm DBH[11]; and

    (d) at Pureora (<100 km to the north-east of Mt Messenger) mean roost tree DBH was approximately 113 cm (range: 34-340 cm).[12]

32. While there are exceptions, long-tailed communal/breeding roosts (cf. solitary or non-breeding roosts) tend to be more towards the upper end of the reported DBH ranges.

33. In my opinion, the revised VRP will make a valuable contribution towards minimising/mitigating the direct adverse effects of vegetation clearance of the Project on long-tailed bats. The revised VRP means that the adverse effects of vegetation clearance on long-tailed bats is likely to be negligible, and based on the scientific literature the likely outcome of the Project is highly beneficial, securing long-tailed bat population with multiple colonies thriving in perpetuity.

REVISED RESTORATION PACKAGE - HERPETOFAUNA

34. The three aspects of the revised Restoration Package most relevant to herpetofauna are:

    (a) the enlarged PMA from 1,085 to 3,650 hectares;

    (b) the pest-free lizard enclosure; and

    (c) revised vegetation removal protocol (VRP).

35. Following discussions with Lynn Adams (DOC's herpetofauna expert), the on-site lizard salvage effort proposed in the ELMP has been reduced. Specifically, given that the lack of confirmed lizard sightings combined with the fact that the difficult terrain and dense vegetation would likely render lizard

[9] O'Donnell CFJ. (2005). Order Chiroptera. In. King CM ed. The handbook of New Zealand mammals 2nd ed. South Melbourne, Oxford University Press. Pp 95-109.
[10] Alexander J. (2001). Ecology of long-tailed bats *Chalinolobus tuberculatus* (Forster, 1844) in the Waitakere Ranges: implications for monitoring. Unpublished Master of Applied Science thesis, Lincoln University, Lincoln, New Zealand.
[11] Gillingham, NJ. 1996: The behaviour and ecology of long-tailed bats (*Chalinolobus tuberculatus* Gray) in the central North Island. Unpublished MSc thesis, Massey University, Palmerston North, New Zealand
[12] A. Quinnell (DOC) personal communication).

salvage efforts unproductive, it was agreed that on-site efforts should be targeted towards the few areas/habitats most likely to yield good results (and the ELMP has been amended to reflect these changes). It was agreed that three areas/habitats should be targeted:

(a) manuka/kanuka forest/shrubland would be searched by spotlighting for arboreal geckos;

(b) the buildings, sheds, debris, etc., around the Pascoes' dwelling would be manually searched for copper skinks; and

(c) selected epiphyte-laden trees would be searched for striped skink during felling.

36. In my EIC I commented that the Restoration Package, including the 1085 ha PMA, was "*likely to have a neutral to slightly beneficial effect on herpetofauna*." Despite a paucity of published information, I continue to hold the view I expressed in my EIC which is that some lizards – especially arboreal species – are likely to benefit (e.g., improved recruitment/survival due to reduced predation) from the PMA even though the control of mice will not be a focus of the pest control. I expect that those benefits will be boosted by more than tripling the PMA area from 1085 to 3650 hectares.

37. Since my EIC I have had further discussions with Lynn Adams. I have identified up to 10 potential sites for a pest-free lizard enclosure, primarily based on previous striped skink sightings. Four sites that are presently being explored are at Waitaanga (approximately 22km east of Mt Messenger). Two of those sites are >1 ha in area, have striped skink records, and are suitable for predator-proof fencing (without requiring native bush clearance for installation). I understand that discussions have commenced with at least one of the potential enclosure sites' landowners.

38. The installation of-predator-proof fencing and the eradication of mammalian predators (including mice) at any site with a striped skink population would be of immediate benefit to the existing lizard populations, and would benefit lizards relocated from within the Project area. However, even if the final area chosen does not contain an existing lizard population, maintaining a pest-free area will benefit all lizards (and other herpetofauna) within that are located within, or relocated to, that area. The lizard populations within the predator-proof fenced enclosure may potentially be suitable for use as a source for future reintroductions (e.g., (back) to the Parininihi area).

39. While the final enclosure location has not yet been selected, it is important that a minimum sized predator-free area be specified in the conditions. I consider that the minimum area of a predator-proof fenced lizard enclosure required to mitigate the potential adverse effects of the Project on lizards (if any) should be set at 1 ha. Population densities for striped skink are unknown. However, some records are of multiple individuals coexisting in the same tree.

Population densities reported for other native skink species indicate that population density can be relatively high (i.e., hundreds or thousands per hectare) – especially in the absence of predators. Based on those indications, I am confident that an enclosure of a minimum 1 ha with suitable habitat (i.e., large native trees with abundant epiphytes) will provide habitat for a viable striped skink population.

40. The change in focus away from likely unproductive and costly on-site lizard salvage to an emphasis on a predator-free lizard enclosure with a very high probability of benefits for known native lizard values is in line with the outcomes of the collaborative and cooperative discussions held with DOC in relation to lizard mitigation/compensation. I consider that the mitigation/compensation package as it relates to potential effects of the Project on lizards will be more than adequate as it will provide:

    (a) avoidance/mitigation of direct effects on-site by salvaging key species in key habitats/areas;

    (b) 3,650 ha of pest control likely to benefit at least some lizards; and

    (c) a pest-free lizard enclosure that will provide protection for existing significant lizards (striped skink) and function as a safe and secure release site for any lizards salvaged.

41. While it is not possible to quantify the effects of the Project on lizards, to the best of my knowledge the lizard mitigation/compensation proposed for this project represents a substantial step up from that proposed or implemented on any other project in New Zealand. In particular, the inclusion in the Restoration Package of a compensation measure (a >1 ha pest-free lizard enclosure) that will make a substantial contribution towards the conservation of a poorly-known ‘At-Risk’ lizard species with few known strongholds (striped skink) means that the Project will benefit lizard conservation locally, regionally and nationally, long into the future.

Simon Chapman

17 July 2018

Appendix 1

(See separate document)