BEFORE 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 JOHN ALEXANDER MCLENNAN (AVIFAUNA) ON BEHALF OF THE NZ TRANSPORT AGENCY

Dated 25 May 2018

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QUALIFICATIONS AND EXPERIENCE

1. My Name is John McLennan.

2. I am Managing Director of John A. McLennan Environmental Services Ltd, and have been so for the past 11 years.

3. Between 1973 and 2007 I worked as a scientist for DSIR and Landcare Research New Zealand Ltd.

4. I have a Bachelor of Agricultural Science degree with first class honours from Lincoln University and a Ph.D in Zoology from Aberdeen University.

5. I was awarded the Queens Service Medal in 2004 for services to conservation.

6. I have spent most of the past 38 years studying various species of kiwi in the wild:

   (a) Between 1992 to 2002 I measured the effect of mammalian predators on North Island brown kiwi at Lake Waikaremoana, and the response of the kiwi population to predator control.

   (b) Between 1990 to 2008 I was the Department of Conservation's Kiwi Recovery Group external scientific advisor and helped write various editions of the Kiwi Recovery Plan.

   (c) I am a trustee of the Kiwis for Kiwi Trust and its scientific advisor. I was also a trustee for 10 years on the BNZ Kiwi Trust, the predecessor to the Kiwis for Kiwi Trust.

   (d) I have published more than 50 reports, scientific papers and conference abstracts on matters relating to kiwi ecology or kiwi conservation.

7. My work as an ecologist has also included:

   (a) studies on the impacts of introduced predators on native fauna;

   (b) the life-history characteristics of fauna that make them vulnerable to predators; and

   (c) the responses of threatened fauna to predator control.

8. In the past 12 years, I have helped establish three mainland sanctuaries for endangered fauna, including New Zealand's largest privately funded conservation initiative at Cape Kidnappers in Hawke's Bay. I designed and implemented the predator control programmes in each of these sanctuaries, and wrote the restoration plans that guide their species recovery programmes.

9. I have also been involved in various projects that have evaluated the effect of windfarms on birds, the effect of coal mines on giant land snails and native birds, the effect of hydro-development on blue duck; and (on one occasion) the effect of road construction on kiwi. I am also currently a trustee for two privately-funded conservation Trusts, and Managing Director of Pestproof Fences Ltd, a small company which builds fences to protect endangered wildlife from predators.

10. I am an experienced bird counter and am currently contracted by BT Mining Ltd to monitor bird abundance in the Oparara Sanctuary in Kahurangi National Park; and the Hawke's Bay Regional Council to monitor bird abundance in a 26,000 ha study site in coastal hill country in Hawke's Bay. I developed the call counting method that is currently used to monitor kiwi nationwide, and I helped Dave Dawson and Peter Bull test and refine their 5 minute count bird monitoring technique when they developed it in the early 1970s. This technique is still the standard method for measuring bird abundance in New Zealand.

11. 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

12. The avifauna community in the Project area comprises a mix of native and introduced species, and a mix of forest, farmland and wetland species. Native forest-dwelling species predominate, reflecting the predominance of native forest in the Project area.

13. The community is typical of those in mixed habitats elsewhere in northern Taranaki and the lower North Island; and its constituent species are generally typical of those that survive in places where pest control has been either sporadic or non-existent. The community is dominated by 'safe and secure' species whose populations are not regulated by introduced mammalian predators.

14. The conservation 'value' of the community is currently moderate to high, mainly because eight of its constituent species have a conservation threat ranking. North Island brown kiwi are widespread and relatively abundant in the Project area. The population of NI robin in the Project area is also of special interest, because the birds are locally abundant there, despite being near their distribution limit.

15. Some of the potential effects of the Project on avifauna were avoided by selecting a route that avoided habitats with high ecological values, by using bridges and tunnels to minimise the size of the footprint, and by selecting construction techniques that will help to reduce habitat disturbance.

16. The potential effects of the Project, in the absence of mitigation, offsetting and compensation, were considered to be 'high' for kiwi, robin and whitehead; 'moderate' for Australasian bittern, tui, bellbird and kereru; and 'low' or 'very low' for all other avian species.

17. An intensive radio-tagging and tracking programme is proposed to avoid the potential effects of road construction on kiwi. This involves mapping the territories of kiwi along the length of the alignment, determining which kiwi are potentially at risk of harm from vegetation clearance and earthworks, monitoring potentially vulnerable individuals when machines are working in their territories, and moving those individuals to safe places (elsewhere in their territories) when necessary. It also involves uplifting eggs from nests that are at risk of being disturbed, hatching them in a captive breeding facility, and then returning the offspring to the wild.

18. The risks of vehicle strike on kiwi on the completed road will be reduced by erecting low fences in some places to prevent kiwi accessing the road, or to guide them to culverts which will allow safe passage underneath it. The territory mapping programme will indicate where fences are required. Signage will also be erected, warning motorists of the possible presence of kiwi on the road.

19. The residual effects of the Project on avifauna, resulting mainly from the permanent loss of 31.676 ha of forest, will be offset and compensated for by intensive and long-term pest control in a 1085 ha area bordering the alignment. Calculations indicate that the kiwi population in the pest management area is likely to increase from approximately 80 to 400 over the first 30 years of the pest control programme, a gain that will far outweigh the theoretical losses (about 22 kiwi) resulting from the permanent removal of 31.676 ha of forest.

20. The potential gains for kiwi resulting from pest control are especially large because the kiwi population in the treatment area is currently well below carrying capacity. More modest increases in population size, in the range of 20%-100% over the first 12 years of the programme, are also expected for another 7 native bird species in the offset area. For each of these species, the gains in the offset area are also large enough to offset the losses resulting from habitat removal.

21. The 1085 ha offset area may also eventually benefit a further four native bird species that are currently not resident in the Project area, but are present in other parts of Taranaki. Kōkako are likely to colonise the pest

management area over the next 10-20 years, further increasing the overall conservation value of the Mt Messenger avifauna community. Kōkako colonisation would not occur in the absence of predator control.

22. The avifauna community in the offset area will be monitored for at least 12 years after road completion, to check that agreed performance targets for key indicator species are being achieved, and to help guide and refine (if necessary) the pest management programme. The pest management programme is required to increase the abundance of key indicator species by at least 20% over 12 years, and the monitoring programme has been designed to detect population changes of this size.

23. In my opinion, the existing avifauna values in the Project area can be protected and enhanced with appropriate management and offset/compensation programmes; and that the programmes covered in this evidence and required through section 6 of the Ecology and Landscape Management Plan ("**ELMP**"), will do that. If the Project proceeds, native species dominance should increase in the Project area in the first 30 years of predator control, driven mainly by increases in the abundance of threatened avifauna.

BACKGROUND AND ROLE

24. The New Zealand Transport Agency ("**Transport Agency**") 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.

25. Along with Dr Baber, I prepared the Assessment of Ecological Effects - Avifauna included as Technical Report 7e, Volume 3 to the Assessment of Environmental Effects ("**AEE**") for the Project. I wrote the supplementary avifauna report in February 2018, and I helped prepare the section relating to avifauna in the ELMP.

26. I have visited the Project footprint and the proposed Pest Management Area ("**PMA**") on four occasions. I was one of eight team members who counted birds in both the Project footprint and PMA in November 2017; one of six team members who assessed kiwi abundance in the Project footprint and its immediate surrounds in December 2017; and one of nine team members who undertook a baseline call count kiwi survey in the proposed PMA in May 2018.

SCOPE OF EVIDENCE

27. The purpose of my evidence is to outline the potential effects construction and operation of the Project would have on avifauna (birds). I then discuss the mitigation, offset/compensation and monitoring measures proposed,

and captured in the ELMP, to address those potential issues, and assess the overall effects on avifauna with those measures in place.

28. My evidence addresses:

(a) an overview of the existing avifauna values of the Project area;

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

(c) the results of the investigations into the avifauna values and potential effects of the Project;

(d) my assessment of the effects of the Project on avifauna, considering the proposed measures to mitigate, offset and monitor effects; and

(e) responses to submissions and the s42A officer's reports.

OVERVIEW OF THE EXISTING AVIFAUNA VALUES OF THE PROJECT AREA

Investigations and methodologies

29. Full explanations of the methodologies employed are set out in Technical Report 7e attached to the AEE and the Avifauna Supplementary Report dated February 2018.

30. The following investigations were undertaken to identify the characteristics and conservation significance of the avifauna community within the Project area and wider surrounds:

(a) a desktop assessment that included a review of websites, publications, reports and discussions (in particular with Ngāti Tama and DoC);

(b) field surveys undertaken by Opus in 2016 and 2017 along an old route option (MC23) alignment through Parininihi, involving:

(i) a spring survey of birds of the farmland and stream environments using the standard 5-minute bird count method (17 and 18 October 2016);

(ii) a summer survey of forest birds using the standard 5-minute bird count method (8-10 February 2017); and

(iii) North Island Brown Kiwi surveys involving:

(1) a three-hour call count survey at two sites (18-19 October 2016); and

(2) a two-hour call survey at five sites (6-9 February);

(c) field surveys undertaken by myself and others, involving:

(i) daytime 5-minute bird counts in and around the Project footprint and Pest Management Area (20-24 November 2017); and

(ii) searches for spotless crake and fernbird in wetland areas using broadcast taped calls to elicit responses (22 and 23 November 2017); and

(iii) nocturnal kiwi call surveys (18-20 December 2017 and 21-23 May 2018).

31. The potential effects of the Project on avifauna were evaluated using a combination of Environment Institute of Australia and New Zealand Impact Assessment Guidelines[1] ("**EIANZ Guidelines**") and expert opinion. As set out in section 2.3 of Technical Report 7e, the EIANZ Guidelines assess:

(a) ecological values (very high to low);

(b) the magnitude of unmitigated effects (very high to negligible); and

(c) an unmitigated effects assessment (very high to no effect).

32. The potential level of unmitigated effects as assessed using the EIANZ guidelines varied between species depending on their ecological value. Ecological levels were assigned as detailed below:

(a) native species were assigned higher ecological value than introduced ones;

(b) native species with a threat status were assigned higher ecological value than those without a threat status;

(c) species with a critical or high threat status were assigned a higher value than species with a less severe threat status;

(d) keystone species that contribute to ecosystem functioning were assigned a higher value than non-keystone species; and

(e) species with local populations of special ecological significance (eg. robin) were assigned higher ecological value than species without such populations.

Existing avifauna values

33. The bird community in the Project area comprises a mix of native and introduced species, and a mix of forest, wetland and farmland species. The community is dominated by forest birds because forested habitats predominate in the footprint and PMA. The community is moderately rich in

[1] 2015.

terms of species representation, and moderately rich in terms of the number of threatened species known to be present. It is typical of those found in mixed habitats in the wider Taranaki region. Avian species known to be present in the Project footprint are shown in **Table 1** below (Table 3.1 of the Technical Report 7e.)[2]. Also shown are possible occasional visitors, and possible colonisers that may establish in the PMA following the onset of predator control.

Broad habitat association	Common name	Scientific name	Threat Status	Detected in field surveys	Mean No. detected during five minute bird counts in forest sites	Mean No. detected during five minute bird counts in farmland sites
Wetland bird species	Australasian bittern	*Botaurus poiciloptilus*	Threatened - Nationally critical	No	-	-
	Fernbird	*Bowdleria punctata*	At Risk - declining	No	-	-
	Spotless crake	*Porzana tabuensis*	At Risk - declining	No	-	-
Forest bird species	New Zealand falcon	*Falco novaeseelandiae*	At Risk - recovering	No	-	-
	North Island brown kiwi	*Apteryx mantelli*	At Risk - declining	Yes (via calls)	-	-
	Long-tailed cuckoo	*Eudynamys taitensis*	At Risk - Naturally uncommon	Yes	0.03	-
	Rifleman	*Acanthisitta chloris*	At Risk - declining	No	-	-
	North Island kōkako	*Callaeas wilsoni*	At Risk - recovering	No*	-	-
	North Island Kākā	*Nestor meridionalis*	At Risk - recovering	No	-	-
	North Island robin	*Petroica longipes*	At Risk - declining	Yes	0.24	-
	Whitehead	*Mohoua albicilla*	At Risk - declining	Yes	0.95	-
	New Zealand fantail	*Rhipidura fuliginosa*	Not Threatened	Yes	1.43	0.13
	Grey warbler	*Gerygone igata*	Not Threatened	Yes	1.49	1.13
	Tomtit	*Petroica macrocephala*	Not Threatened	Yes	0.44	-
	Tūī	*Prosthemadera novaeseelandiae*	Not Threatened	Yes	0.56	-
	Kererū	*Hemiphaga novaeseelandiae*	Not Threatened	Yes	0.37	-

[2] Assessment of Ecological Effects - Avifauna Technical Report 7e, pg 18.

Broad habitat association	Common name	Scientific name	Threat Status	Detected in field surveys	Mean No. detected during five minute bird counts in forest sites	Mean No. detected during five minute bird counts in farmland sites
	Bellbird	*Anthornis melanura*	Not Threatened	Yes	1.62	0.25
	Shining cuckoo	*Chrysococcyx lucidus*	Not Threatened	Yes	-	0.22
	Silvereye	*Zosterops lateralis*	Not Threatened	Yes	1.6	0.44
	Ruru	*Ninox novaeseelandiae*	Not threatened	Yes	Incidental sighting	-
	Sacred kingfisher	*Todiraphus sanctus*	Not Threatened	Yes	0.08	0.25
Farmland species	New Zealand pipit	*Anthus novaeseelandiae*	At Risk - declining	Yes	-	0.06
	Welcome swallow	*Hirundo neoxena*	Not Threatened	Yes	0.02	0.19
	Paradise shelduck	*Tadorna variegata*	Not Threatened	Yes	0.03	1.06
	Spur-winged plover	*Vanellus miles*	Not Threatened	Yes	0.17	0.69
	Swamp harrier	*Circus approximans*	Not Threatened	Yes	0.03	0.06
	Pukeko	*Porphyrio melanotus*	Not Threatened	Yes	-	0.19
	White-faced heron	*Egretta novaehollandiae*	Not Threatened	Yes	-	0.03
	Southern black-backed gull	*Larus dominicanus*	Not Threatened	Yes	0.05	-
	Black shag	*Phalacrocorax carbo*	At Risk - Naturally uncommon	Yes	-	0.03

Table 3.1 - Avian species known to be present, possibly present on occasions, or with potential to establish in the Project footprint in future (noting threat status)* The field surveys (column 5) were undertaken before North Island kōkako were released in Parininihi. Kōkako were not, however, detected in the project footprint during a repeat survey in November, 2017 (Supplementary avifauna report).

34. The assemblage of small forest insectivores within the footprint and PMA is nearly intact, with rifleman the only exception. All nectarivores, omnivores, frugivores and carnivores typically found in large forest patches are present, including both species of cuckoo. Native parrots and NZ falcon are currently absent, though kaka and falcon may visit the Mt Messenger area occasionally. Eastern rosella, an introduced parrot, has colonised the Project area, probably recently.

35. Six resident native species (North Island brown kiwi, fernbird, spotless crake, North Island robin, whitehead and pipit) one native seasonal migrant (long tailed cuckoo) and one native occasional visitor (black shag) have a threat ranking. The critically endangered Australasian bittern may also visit the Project area occasionally, though it hasn't been detected there yet. The threatened kōkako is also a potential inhabitant of the Project area in the next decade or so if the newly established population in Parininihi expands and eventually spills out into neighbouring forests.

36. The populations of fernbird and spotless crake are small and confined to wetlands in the Mimi catchment at the southern end of the alignment. All known individuals of both species (six pairs of fernbird and one or two pairs of spotless crake) live outside of the Project footprint. The pipit is also rare in the Project area and may be absent altogether: it has been recorded on the western side of Mt Messenger, but not the eastern side.

37. The avian species of greatest conservation value in the Project footprint are North Island brown kiwi and North Island robin - the former, because of its taxonomic significance, iconic status and extensive distribution in the Project area; and the latter because robins are surprisingly abundant at Mt Messenger, despite being near a distribution limit.

Composition of the bird community in the project footprint and PMA

38. The surveys of Nichol (2017)[3] and McLennan (2018) produced similar results even though they sampled different combinations of habitats in different parts of the Mt Messenger area. The two surveys recorded similar numbers of native species (22 and 23 respectively) and similar species lists. Pipit was recorded only by Nichol (2017) and fernbird and spotless crake only by McLennan (2018). The two surveys also produced nearly identical lists of introduced species, with 13 species detected by Nichol (2017) and 12 by McLennan (2018). Again, the composition of the list varied slightly between the two surveys.

39. Equally important, neither Nichol (2017) nor McLennan (2018) detected rifleman, kaka, falcon and kakariki, even though they are still present in other parts of Taranaki (Robertson, 2007: Bird distribution Atlas). Rifleman appear to have become locally extinct in the Mt Messenger area in the last decade.

40. The Mt Messenger community is typical of those in mixed habitats elsewhere in the North Island, as indicated by: the total number of species present (36); native species dominance (approximately 64% native, 36% introduced); species abundance (described below); and trophic structure (i.e. the representation of insectivores, omnivores, carnivores, frugivores and nectarivores). It has no obvious omissions or additions. Furthermore,

[3] This report assessed the old MC23 route through Paraninihi and is referred to above as Nichol 2017.

its constituent species are not unexpectedly abundant or rare, with three exceptions: robins are more abundant than expected given that they are near a distributional limit; and the introduced dunnock and the introduced redpoll appear to be unusually scarce.

41. The Mt Messenger avian community is also typical of those in mixed habitats in the North Island where pest control has been either sporadic or non-existent. It is overwhelmingly dominated by 'safe and secure' species whose populations are not regulated by predators. They include: greywarbler; silvereye; fantail; kingfisher; harrier; welcome swallow; thrush; blackbird; chaffinch; and magpie.

42. Amongst native species, the proportion of threatened (33%) to non-threatened (67%) species at Mt Messenger is comparable to that in mixed habitats in the wider Taranaki region. Currently, the Mt Messenger avian community has 'moderate to high' conservation value, mainly because of its widespread and relatively abundant population of North Island brown kiwi. The localised populations of fernbird and spotless crake in the Mimi catchment, and the widespread populations of robin and whitehead in the Mt Messenger area, also contribute towards its overall conservation ranking.

Species abundance in the Project area

43. The Ecology Supplementary Report: avifauna (McLennan, 2018) provides detailed information on the abundance of individual species in the Project area, as measured by the 5-minute count technique (day active birds); responses to broadcast calls (wetland species); or nocturnal call counts (kiwi and morepork mainly).

44. Grey warbler was the most frequently recorded species in 5-minute counts (detected in 94% of 355 counts) followed by: tui (74%); bellbird (70%); chaffinch (65%); fantail (58%); and silvereye (53%). Rewarewa was flowering heavily in the Project area during the November 2017 survey, which may have attracted honeyeaters in from neighbouring areas and inflated their local abundance. At the other extreme, long-tailed cuckoo were recorded in 5% of counts, and black shag and fernbird in less than 1% of counts.

45. The species that were recorded most often in counts also had the highest average count values. Again grey warbler topped the list, with an average value of 1.89 detections per 5-minute count. Tui was next with a mean of 1.5 per count.

46. Amongst day-active species with a threat ranking, robin had the highest average count (0.61 per 5-minute count) followed by whitehead (0.21), long tailed cuckoo (0.05) and fernbird (0.005).

47. The 'broadcast call' surveys indicated that 5 pairs of fernbirds currently inhabit the Mimi wetland (about 6.2 ha) immediately below the southern end of the alignment; and another pair inhabits a small wetland further up the Mimi River, several hundred metres east of the alignment. No fernbirds were found in the Mangapekepeke catchment, probably because the wetland vegetation there is sparse and degraded by livestock.

48. The Mimi wetland also has at least one pair of spotless crake, and possibly two pairs. Singers (2017) heard them calling there and moving near him; and McLennan (2018) saw their footprints in soft mud, but failed to obtain any responses to broadcast calls.

49. The nocturnal surveys indicated that some 10 pairs of kiwi have territories which straddle or border the proposed alignment. The size and configuration of these territories is not yet known (see below), but they appear to be contiguous, with few or no gaps between them.

50. The 10 or so pairs of kiwi along the alignment comprise about 0.26% of the regional (Wanganui/Taranaki) population (7500 adults) and about 0.1% of the national population of North Island brown kiwi (24,500 adults). These proportions are small in absolute terms, but are nonetheless important in the context of kiwi conservation.

EFFECTS ASSESSMENT INCLUDING MITIGATION, OFFSETTING AND MONITORING

Unmitigated effects assessment

51. As mentioned above, the EIANZ Guidelines were used to guide the effects assessment. The three main potential effects on avifauna associated with Project construction and operation that informed the effects rating were:

    (a) habitat loss and habitat degradation;

    (b) habitat severance; and

    (c) the possibility of direct harm to birds (resulting from disturbance, injury or mortality) during construction and ongoing operation.

52. The probable level of unmitigated effect was considered in Baber & McLennan (2017) to be: '**high**' for kiwi, robin and whitehead; '**moderate**' for Australasian bittern, tui, bellbird and kereru; and '**low**' or '**very low**' for all other avian species. Nothing in McLennan 2018 altered this assessment.

53. Bittern were given an unmitigated '**moderate**' rating because of their critical threat status, but unconfirmed presence in the Project area. Kaka, kōkako, rifleman, pipit and falcon also got relatively low unmitigated effect rankings because of their current absence, or infrequent presence, in the Project area.

Measures to avoid, mitigate, offset and monitor effects on avifauna

Avoiding and mitigating effects through route selection and design

54. The measures that were undertaken during the alternatives assessment and design phase of the Project to avoid or mitigate adverse effects on avifauna (and other ecological values) included:

    (a) selection of an alignment option that avoided the most ecologically valuable forests to the west of Mt Messenger;

    (b) use of a 235 m long tunnel and a 120 m long bridge to avoid effects on the ridgeline and tributary to the Mimi Wetland, and to minimise the loss of habitat from cuts and fills;

    (c) the proposed use of a bridge building technique that reduces vegetation loss and sediment runoff under the bridge while it is being built;

    (d) tweaking of the alignment route to move it further from significant wetlands and reduce the loss of significant trees; and

    (e) the development of various work plans to minimise adverse ecological effects, including:

        (i) minimise the interval between vegetation removal and construction activities to reduce the potential for erosion and sediment generation;

        (ii) manage waste effectively to minimise the attraction of pest mammals; and

        (iii) manage construction lighting to minimise light spill on adjacent habitats.

Avoiding and mitigating effects through pre-emptive management

Pre-construction management of kiwi

55. A pre-construction kiwi catching programme will be undertaken in autumn and spring 2018 with certified specialist kiwi dogs and approved handlers to locate and catch the 10 (or so) pairs known to be living in or near the Project footprint. The methodology for this is set out in section 6.3.1.1 of the ELMP.

56. Once caught, each kiwi will be radio-tagged. Following radio-tagging, each kiwi will be tracked during the day and night for approximately one month to determine the approximate shape and size of its territory, and the extent to which its territory overlaps with the alignment.

57. The tracking locations will also reveal the whereabouts of daytime shelters (roosts), information that could prove useful if the birds ever have to be moved during construction. North Island brown kiwi typically use many different roosts in their territories, seldom using the same one for two days in a row. They do, however, often re-use roosts that they occupied days or weeks earlier.

58. The pre-construction monitoring programme will identify the kiwi potentially at risk of harm from construction activities, and thus the ones that will require monitoring during the construction phase of the Project. The Project is anticipated to take four years to construct, meaning that some kiwi along or near the alignment could be radio-tagged for the length of that period.

Construction management of kiwi

59. The main objective of the 'during-construction' kiwi management programme as set out in section 6.3.1.2 of the ELMP is to prevent kiwi and their eggs and chicks from being harmed or killed by machinery during vegetation clearance and earthworks.

60. When machines are working within or near a known kiwi territory, the kiwi resident in that territory will be radio-tracked each day to check whether or not they are within clearance works. These safety checks will be undertaken at dawn, in a 30 minute to 60 minute window, when kiwi have ceased moving and settled in daytime roosts, but before the onset of the day's construction activities. At the same time, a trained dog will be used to search for dispersing juveniles in the area that is to be disturbed that day as set out in Section 6.3.1.2 of the ELMP.

61. If known territory occupants are found to be at risk of harm, they will be caught, placed in an approved transport box, and moved immediately to another roost in a safe location in another part of their territory. When choice exists, the 'release' roost site will be at least 40 m from construction activities, to minimise exposure to vibration and noise. The whereabouts of alternative roosts will be known from the pre-construction kiwi territory mapping programme (discussed above). Juveniles at risk of harm will be treated in the same way, with no requirement to release them in an existing territory (because they don't have one).

62. Throughout the kiwi breeding season (July to February) the signals from transmitters on male kiwi will be checked weekly to determine which birds are incubating and when they began doing so. Should nesting kiwi potentially be at risk of disturbance (i.e. within 40 m of construction activities) the contents of their nests will be removed, following the procedures and protocols recommended in the Kiwi Best Practice Manual and as set out in section 6.3.1.2 of the ELMP. All eggs and young chicks recovered from nests will be taken to a permitted incubation and chick-

rearing facility, most likely Kiwi Encounter in Rotorua. Later, the resulting offspring will be released back into the PMA, or elsewhere, depending on Ngāti Tama's and DOC's advice.

63. In all cases, eggs will be uplifted only when they have been incubated naturally for at least 40 days. If a recently established nest is found in a disturbance zone, construction activities within 40 m of the nest will cease and not recommence until the eggs can be safely uplifted at over 40 days of age.

Post-construction management of Kiwi

64. Once construction of the road is complete, some parts of it may need permanent kiwi fencing to keep kiwi off the road and prevent them from being injured or killed by vehicles. Kiwi are seen occasionally on the existing Mt Messenger road. The Department of Conservation has no records of kiwi fatalities there, but numerous records of kiwi fatalities on roads elsewhere in the North Island.

65. The information gathered from the pre-construction kiwi territory mapping will be used to identify where fencing may be required as set out in section 6.3.1.3 of the ELMP. Pairs with territories that straddle the new road are likely to be at greatest risk. In these cases, 1.2 m high fences with kiwi-proof mesh netting may be erected along the road edge to restrict the birds to one side of the road, or to guide them to culverts, which will enable them to travel safely under the road without risk of harm.

66. Signage will also be erected along the road alignment alerting motorists of the possible presence of kiwi.

Measures to offset residual adverse effects

67. Technical Report 7h[4] describes the measures proposed to offset the residual effects of the Project on avifauna where those effects cannot be avoided or fully mitigated. Such residual effects include:

    (a) the permanent loss of forest, wetland and farmland habitat;

    (b) partial habitat severance;

    (c) disturbance from construction activities;

    (d) possible harm to eggs and chicks from vegetation clearance; disturbance from traffic on the road; and

    (e) possible increased mortality from traffic strike.

[4] Assessment of Ecological Effects, Mitigation and Offset Report.

68. The main offsetting programme proposed for avifauna is intensive pest control in the PMA, a 1085 ha treatment area surrounding the alignment. Mr MacGibbon describes in his evidence the pest species that will be targeted in the PMA and the methods that will be used to control them.

69. Avifauna will also eventually benefit from the proposed 14.4 ha restoration planting and habitat enhancement programmes in the project footprint.

Avifauna response to PMA

70. Eight of the 23 native bird species currently present in the PMA are likely to respond to intensive pest control. They are NI brown kiwi; fernbird; NI robin; whitehead; long-tailed cuckoo; kereru; tui; and bellbird. The first five of these respondents have a threat status and the last three do not (Robertson et. al., 2016).

71. A further four native species, currently absent in the PMA, are also potential respondents if they establish breeding populations in the PMA following the onset of predator control. They are: falcon, kaka, rifleman and kōkako.

72. The threatened long tailed cuckoo is a potential respondent even though it is a migrant and its threat status and population trends are determined by its fortunes on its overwintering grounds in the Pacific, as well as those here in New Zealand. It is likely to benefit from pest control in the PMA because:

    (a) whitehead, its obligate host in the North Island, is likely to increase in the PMA over time, providing more parasitism opportunities; and

    (b) rates of predation on eggs and chicks in whitehead nests are likely to decline, of which some will be those of the cuckoo.

73. The results from Boundary Stream in Hawkes Bay, which has been subject to continuous pest control for more than 20 years, indicate that the honeyeaters, long-tailed cuckoo and whitehead will more than double in abundance in the PMA in the first decade of control, while kereru are likely to increase by 10%-30%.

74. The demographic responses of robin are more difficult to predict; their nesting success is likely to increase with pest control, but the addition of more young may not necessarily increase the adult population (Innes et. al., 2010).

75. The responses of the two threatened wetland species (fernbird and spotless crake) to predator control will be limited by the scarcity of wetlands in the PMA. The wetlands currently occupied are small, and there are no others elsewhere in the PMA for new population recruits to occupy. The Mimi wetland fernbird population may increase by another one-two pairs following pest control, but not by more.

76. Kiwi will respond significantly to pest control in the PMA if it is sustained and effective. Stoats and ferrets, the two main predators of kiwi in forest habitats, are present in Taranaki (Clapperton and Byrom, 2005) and the degree to which kiwi respond to pest control will largely depend on the residual abundance of these predators in the PMA.

77. At Lake Waikaremoana, sustained predator control from 1995 to 2004 increased average kiwi chick survival from 14% to 56% and doubled the treatment population in 7 years (McLennan et. al., 2004). This study shows that kiwi respond well to low residual pest abundance, even when complete pest elimination is not possible.

78. The treatment area at Lake Waikaremoana was a 750 ha peninsula, surrounded by water on three sides. Its natural barriers helped to keep predators out. The PMA in the Project area is 45% larger but open to predator invasion on all sides; it is, however, part of a larger control network, and is likely to benefit from the collective efforts of those programmes. In my opinion, the chances of achieving sustained and effective stoat and ferret control in the PMA are reasonably high; and accordingly, the chances of obtaining a significant kiwi response in the PMA are also reasonably high.

79. The extent to which kiwi are likely to benefit from pest control in the PMA can be estimated from unpublished information. Robertson, H. (Department of Conservation, unpublished) estimates that North Island brown kiwi populations grow at an average rate of about 6% per annum in the presence of continuous trapping and occasional applications of 1080. This growth rate estimate is directly applicable to the PMA, given that the same blend of trapping and poisoning will be used there (MacGibbon, 2018).

80. Robertson's estimate also enables the net benefits of the offset programme to be calculated for kiwi, taking into account the permanent loss of habitat in the Project footprint, the eventual replacement of some of it with restoration planting, and the additional kiwi that the pest control programme will generate in the 1085 ha PMA over the next two to three decades.

81. The Project will remove 31.676 ha of vegetation, the probable equivalent of about 1.5 kiwi territories currently (McLennan, 1986 and McLennan (2018). The same 31. 277 ha might support four pairs of kiwi if the population in the PMA was fully restored to carrying capacity. Restoration planting in what is now mainly farmland will eventually replace about 14.4 ha of the forest habitat lost in the footprint, with likely permanent occupation of these restoration areas by kiwi in two-three decades time.

82. In the complete absence of both the Project and pest control, the population of adult kiwi in the proposed PMA and proposed footprint (estimated at 80-85 individuals) would decline by about 60% over the next three decades,

assuming an average (and conservative) rate of decline of about 3% per annum (McLennan et al. 1996; Robertson et al., 2011). In absolute terms, the loss would amount to about 48-50 individuals.

83. In the presence of the Project, the living space of approximately three adults will be lost when 31.676 ha of existing habitat is removed (although as above 14.5 ha of this habitat will be restored and eventually again occupied by kiwi). Currently, this living space is shared by approximately 20 kiwi living along the length of the alignment. No kiwi will actually be displaced when the habitat is removed, but its loss will reduce the potential of the Project area to support kiwi in the long term.

84. In terms of kiwi numbers, the loss (assuming the full habitat loss of 31.676 ha) amounts to the three adults mentioned above and the offspring they would have produced over the next 30 years - a total of about 22 kiwi. This calculation is based on survival and reproductive rate measurements in Robertson et al., (2011) and McLennan (in prep).

85. For the 1085 ha PMA, the probable gain over 30 years from predator control is 379 adults, based on 6% per annum growth. These kiwi are additional to the 80 currently estimated to be present. The net benefit of the Project for kiwi over 30 years is therefore at least 355 adults (i.e. 379 - 22) assuming no dispersal losses from the PMA; negligible losses of kiwi from disturbance or vehicle strike on the new road; and negligible benefits for kiwi from restoration planting.

86. This estimate of net benefit is a minimum because it makes no allowance for the losses in the PMA (about 50 kiwi) that would have otherwise occurred in the complete absence of pest control. Technically, these kiwi could also be added to the gain side of the ledger, increasing the total net benefit to about 400.

87. The important conclusion is that the Project should produce a net benefit for kiwi in the PMA and wider Mt Messenger area over a 30 year period. Juveniles will disperse out of the PMA in increasing numbers when the population in the PMA approaches carrying capacity, 20-30 years after the onset of pest control. These dispersers will help to restore kiwi populations in neighbouring forests, including unmanaged ones without predator control. The PMA should therefore benefit kiwi in the Mt Messenger area in two ways, initially by increasing the population in the PMA, and then later by providing colonists for the wider area.

88. The PMA is also likely to function as a source site for a number of other threatened native birds, in addition to kiwi.

89. To summarise, at least eight native forest bird species should increase in numbers in the Project area over the next 10-30 years if the Project proceeds. Another four native bird species may also benefit if they move

into the PMA from other parts of Taranaki. The magnitude and speed of responses will vary between species, depending on the size of their starting populations, their rates of breeding, and the availability of suitable habitat. Kiwi are likely to be the single greatest beneficiary because they are starting from a low population base and can potentially occupy all parts of the PMA. Overall, no native bird species are expected to be affected adversely by the Project.

Post construction monitoring

90. As set out in section 9.5.3.2 of the ELMP, post-construction monitoring will be undertaken in the PMA to document changes in bird abundance, check whether agreed performance targets are being achieved (see below), evaluate the performance of the pest control programme, and identify where the programme can be improved if it fails to deliver its expected benefits for some or all bird species.

91. Post-construction monitoring of kiwi (section 9.5.3.2 of the ELMP) will be conducted at 3-yearly intervals in the PMA for up to 12 years following the onset of predator control. The baseline survey for the PMA was completed in May 2018. Male kiwi generally begin calling at 12-18 months of age, so some population growth should be measurable by the second follow up survey, if the pest control is producing its intended benefits (enhanced rates of survival and population recruitment). The performance target set for kiwi is the same as that for the other indicator species (see below).

92. Post-construction monitoring of forest birds (section 9.5.3.2 of the ELMP) will be conducted in the PMA for 12 years, at 3-yearly intervals, following the onset of predator control. The methodology developed for the baseline survey will be repeated on subsequent surveys. The monitoring programme has been designed to detect a 20+% change in abundance of the seven native diurnal species that are expected to respond to predator control. This level of sensitivity is required to determine whether the performance targets for these species have been achieved - namely, a minimum 20% increase in abundance of each species in the PMA after 12 years of predator control.

93. The small population of fernbirds in the Mimi catchment will also be monitored during the diurnal bird surveys, using the census method and sampling sites selected for the baseline survey (McLennan, 2018). This population is close to the new alignment and its trajectory over the next decade is uncertain; it will benefit from predator control in the PMA but is potentially vulnerable to disturbance and habitat degradation, both during road construction and routine operation. Monitoring will show whether any additional management (habitat enhancement and/or additional pest control) is required to protect the population.

RESPONSE TO SUBMISSIONS AND SECTION 42A REPORT ON AVIFAUNA

Director-General of Conservation's submissions

94. I respond below to avifauna issues raised in Section 8 of the submission on the Project by the Director General of the Department of Conservation. The Director General requested that 12 matters be addressed, labelled 8a to 8l in his submission. On March 26 2018, I met with Dr Rhys Burns from DOC to discuss these issues.

> 8a. *"I request that additional pre-construction monitoring should be completed to enable the effects of the project works on avifauna to be fully assessed and properly understood. Under the current monitoring proposal unless there are very large changes in the abundance of a particular bird species over time, detecting any change will be difficult. Monitoring should be designed to enable a 25% change in any bird species abundance to be detected."*

95. As set out in my evidence above, the pre-construction survey of diurnal birds in the Project footprint and PMA was completed in November 2017 and presented in McLennan (2018): Mt Messenger Bypass project. Ecology supplementary report: Avifauna. Five minute counts were undertaken at 355 sites. Power analyses indicate that this level of sampling should enable a 20% change in bird species abundance to be detected on 90% of sampling occasions. Kiwi abundance in the Project footprint was determined in December 2017 by mapping the locations of calling kiwi over four consecutive nights. Kiwi abundance in the PMA was indexed in May 2018 by counting calls in the first 1-4 hours of darkness on four nights. This sampling intensity should allow a 25% change in kiwi call rate to be detected in subsequent surveys.

96. At the meeting on 26 March 2018, Dr Rhys Burns agreed that this issue had been resolved.

> *8b. "The proposal will result in severance of kiwi territories. I request that kiwi territories directly affected by, and also those adjacent to the proposed road footprint, should be mapped, to enable any change in pair density and territory size to be detected over time. I support the use of radio transmitters to achieve this."*

97. As discussed above, the ELMP includes a programme to map kiwi territories in and near the Project footprint, before construction. The maps will be derived by radio-tracking the occupants of territories and plotting their diurnal and nocturnal locations.

98. At the meeting on 26 March 2018, Dr Rhys Burns agreed that this issue had been resolved.

> *8c. "I support the proposed installation of a fence along the length of the new road to prevent kiwi from accessing the road, where they would then have a high likelihood of being killed by vehicles. I request that DOC be consulted regarding the fence design."*

99. The ELMP incorporates the use of fences to prevent kiwi accessing the road in places where there is a reasonable chance of them doing so. Such places will be identified when kiwi territories are mapped and, as above, where fencing may be required is set out in section 6.3.1.3 of the ELMP.

100. At the meeting on 26 March 2018, Dr Rhys Burns agreed that this issue had been resolved.

> *8d. "I support the use of under-road tunnels to provide crossing opportunities for use by territorial adult kiwi, and dispersing sub-adult kiwi. This mitigation measure should be specifically referenced in the conditions of consent, including minimum requirements for the number and location of the tunnels."*

101. The alignment will have some under-passes (culverts and the intact habitat under the bridge) and one overpass (the intact habitat above the tunnel) that will allow kiwi to move safely from one side of the road to the other. The 18 (or so) stream culverts proposed for the alignment are widely distributed and will only have a small amount of water running through them most of the time. Kiwi with territories severed by the alignment will either be confined to one side of the road with fences, or will be guided by low fences to the existing culvert underpasses.

102. At the meeting with Dr Rhys Burns on 26 March 2018, it was agreed that DOC and the Alliance will work together to find a solution that works best. It was also agreed that trail cameras will be installed in some culverts to confirm that kiwi use them to pass under the road, as set out in section 6.3.1.3 of the ELMP.

> *8e. "I disagree with uplifting of kiwi eggs as described in the application (Section 4.5.1.3), as kiwi eggs should not be lifted earlier than 40 days old, to have a high chance of their survival. The age of the nest can be determined before disturbance if kiwi 'nest transmitters' are attached to male kiwi. Taking kiwi eggs to a suitable incubation facility after each is known to be at least 40 days old (i.e. the nest is at least 60 days old) is supported, as is the return of the hatched kiwi chicks once they have reached >800g."*

103. At the 26 March 2018, meeting it was agreed that Dr Burns and I would contact the husbandry staff at Kiwi Encounter to define the minimum safe age for egg removal based on their experience. This has been done. As set out in my evidence above, their recommendation is eggs should not be transported till they are 40 days old, to prevent damage to internal membranes. The ELMP has been changed accordingly, with the 20 day age requirement for egg uplift being increased to 40 days. Egg timer transmitters will be used in the field so that the age of eggs can be determined. The intent of section 6.3.1.2 of the ELMP is to release captive-raised juveniles only when they exceed a weight of 800 g. In practice, the release weight will generally be >1 kg, to allow for some weight loss following release.

104. This issue was discussed with Dr Rhys Burns on 1 May 2018, and has been fully resolved.

> *8f. "The pest control proposed by the Applicant is unlikely to provide a significant increase in kiwi chick survival as it is too small to control mustelids over the larger landscape area required."*

105. The proposed PMA has increased from 560 ha to 1085 ha since the Director General raised this concern. This increases the chances of successful mustelid control in the PMA. Furthermore, the PMA is not an 'isolated' control site, surrounded by landscapes with little or no pest control. It is instead part of a larger pest control network, flanked to the west by the 1867 ha treatment area at Parininihi. It is also within 'mustelid dispersal distance' of the DOC 1080 operations at Hutawai (on the northern side of the Tongaporutu River) and at Mt Messenger and Makino (to the east of the PMA). The PMA will benefit from 'neighbouring' control operations that reduce rates of stoat invasion into its own protected area; and it will contribute to the success of neighbouring operations by removing potential immigrants from their protected areas. I accept there is still some uncertainty about just how successful the PMA stoat control programme will be, particularly in years following beech seeding. The long term kiwi monitoring programme in the PMA will ultimately show if the population responds to pest control; and provision has been made within section 9.5.3.3 of the ELMP to intensify and change the pest control programme if it fails to achieve its performance targets in respect to kiwi.

106. At the meeting on 26 March 2018, Dr Rhys Burns agreed that this issue had been resolved.

> *8g. "I support the Applicant's consideration of edge effects but disagree that 5m is sufficient. Birds are likely to be affected by the road beyond the 5m edge effects parcel identified by the Applicant. Those effects, which are due to vibration and noise (both during and post-construction), vehicle headlights and*

vehicle induced air turbulence, need to be assessed and mitigated or offset."

107. The ELMP accepts that a 5 m edge effect zone is insufficient for nesting kiwi, and the intervention threshold has been set at 40 m (as described in paragraph 52 of this evidence). For all other birds, it is simply accepted that edge effects exist, that they are difficult to quantify, that disturbance thresholds are likely to vary between species, and that the thresholds are likely to change over time.

108. At the meeting with Dr Burns on 26 March 2018, it was agreed that edge effects vary between species, and are unquantified in New Zealand ecosystems. It was also agreed that if the populations of threatened birds increase in the PMA over time, then edge effects have been adequately addressed, and responsive approach to management will be required if bird populations in the PMA do not increase. (Section 9.5.3.3 of the ELMP incorporates a responsive management approach to pest control.)

109. At the meeting with Dr Burns from DOC on 26 March 2018 it was agreed that this issue is now resolved.

8h. "I consider that Australasian bittern habitat is not just restricted to the wetlands of the Mimi Stream catchment. The sedgeland area of the Mangapepeke Stream has potential to also support foraging, dispersing or breeding bittern. The effects on the likely presence of bittern within this area should be assessed."

110. The supplementary bird report (McLennan 2018) notes that bittern may visit the Mangapepeke stream catchment. At the meeting with Dr Burns on 26 March 2018, it was agreed:

(a) to install one automatic sound recorder in each of the Mimi and Mangapekeke catchments in spring 2018 to listen for the distinctive booming calls of breeding male bitterns;

(b) to report any bittern detections to DOC; and

(c) in the event of a detection, to consider and perhaps implement a practicable method to reduce the risk of bittern fatalities resulting from vehicle strike. One option is a low fence along marshland areas, forcing bittern to fly over the road above vehicle height. The fences proposed for kiwi protection may also produce this outcome, and thus serve to protect bittern too. Section 6.3 of the ELMP has been amended accordingly.

111. At the meeting with Dr Burns from DOC on 26 March 2018 it was agreed that this issue is now resolved.

8i. *"I disagree with the assessments of ecological values for kereru and North Island kōkako ('moderate' and 'high' respectively) set out in the application. I consider that the ecological values for kereru should be 'high' and the ecological values for kōkako should be 'very high'. I also disagree with the assessments of magnitude of effects for Australasian bittern and North Island kōkako (both 'low'). I consider that the magnitude of effects for bittern should be 'high' and the magnitude of effects for kōkako should be 'moderate'. The result of the consequential increases in the level of effect mean that management measures additional to that currently proposed is required in order to achieve a no net loss of biodiversity."*

112. I accept the suggestion to increase the 'ecological value' rankings for kereru and kōkako, as per Dr Burn's recommendations. The definitions of 'high value' or 'very high value' are based on a combination of factors, and opinions vary as to how the factors should be weighted. I agree, though, that both kereru and kōkako are ecologically significant members on the Parininihi/Mt Messenger avian community. I do not, however, agree with the recommendation to increase the 'level of effect values' for bittern and kōkako, as per Dr Burn's suggestions. In my opinion, it is not justifiable to assign a 'high level of effect' to a species (bittern) whose presence in the footprint is possible but unconfirmed; nor is it justifiable to assign a 'moderate' value to a species that is currently not present in the footprint and PMA, and is unlikely to be for at least a decade or more.

113. At the meeting on 26 March it was agreed Dr Burns' suggested level of effects of assessment for bittern and kōkako would be adopted if their presence was confirmed in the Project area; but that no additional management responses would be required, other than those already mentioned in above. The PMA will fully mitigate any potential effects of the new alignment on kōkako.

8j. *"I consider that the following matters require further consideration in terms of the revegetation component of the effects management proposal:*

i. No mitigation or other management measures are proposed for the loss of emergent trees. These trees may be important as perches for falcon.

ii. Standing dead trees (e.g. for use by kaka to extract invertebrates) are not mentioned in the application, but are an important component of old forests. If present within the

project footprint, they should be identified and the effects of their removal should be mitigated or offset.

iii. The time for revegetation to recover to then allow current use by avifauna has not been considered in the application."

114. The offset programme has been designed to offset the permanent loss of habitat in the Project footprint, including emergent and standing dead trees. Most threatened bird species currently present in the Project area are expected to derive a net benefit from the project over the longer term (and none will be adversely affected). Currently, there are no resident falcon or kaka in the Project area, nor have they been recorded there as occasional visitors. There is a reasonable chance that both species will re-establish in the PMA following the onset of predator control.

115. It was agreed at the meeting with Dr Burns on 26 March that the condition of emergent trees in the PMA will improve and the residual effects on avifauna will be compensated for in time and that this matter is now resolved.

8k. *"Further details should be provided regarding post - construction monitoring for avifauna."*

116. The details of the avifauna monitoring programmes are described in section 9.5.3.2 of the ELMP. They are also described in my evidence above.

117. At the meeting on 26 March 2018, Dr Burns agreed that the proposed avifauna monitoring programmes are both appropriate and adequate and the issue is now resolved.

8l. "In summary the application states that all potential impacts on avifauna will be mitigated or offset as a result of the proposed effects management measures. I do not agree, particularly as the offset design has not explicitly incorporated avifauna."

118. The predator control programme in the PMA has been designed to benefit avifauna (and other predation-limited taxa). The potential species that will benefit the most have been identified in this evidence. 'Safe and secure species' are likely to be largely unaffected by the project, while most threatened native inhabitants are likely to increase in number. At a community level, the changes in species representation and abundance will increase native species dominance and increase the overall 'conservation value' of the avifauna community in the Mt Messenger area. Overall, no threatened native species is likely to decline as a result of the Project. The avifauna monitoring programmes described in this evidence, and set out in sections 9.5.3.2 of the ELMP, and the role they play in guiding subsequent management of the PMA is key to ensuring the benefits occur.

119. At the meeting with on 26 March 2018, Dr Burns agreed that the adaptive management programme adopted in the ELMP would ensure avifauna benefited from the pest control programme. The issue was therefore resolved.

Responses to the s42A officer's report

120. The officer's report seeks clarification and additional evidence on the following matters:

(a) the use of fencing for kiwi protection;

(b) the use of inexperienced personnel for kiwi handling and kiwi monitoring;

(c) the post-construction avifauna monitoring programme and the performance targets set for key indicator species;

(d) the adequacy of proposed responses if kōkako are found within the footprint, rather than just near it;

(e) wetland bird management and responses to sediment induced habitat degradation;

(f) the adequacy of the 1085 ha pest control area for offsetting residual effects on kiwi and other birds; and

(g) the use of existing managed areas to achieve mitigation outcomes.

121. I address each of these issues in turn.

> *In sections 3.10 and 3.22, the officer questions whether: a) the fencing will be temporary or permanent (noting the inconsistency between the original AEE and Avifauna Management Plan); b) a map showing fence locations will be provided; and c) anything is proposed to protect dispersing juvenile kiwi that may move into construction areas.*

122. The fencing will be permanent. It will be erected on both sides of the new formation, in places where kiwi are likely to cross. The radio-tracking studies, described in Section 6.3.1.3 of the ELMP will identify where these likely crossing points are. A map of the proposed fence locations will be provided when the radio-tracking studies are completed. The permanent fencing will reduce the chances of both adult and juvenile kiwi being struck by vehicles. Trained kiwi dogs will be used to search for juvenile kiwi in 'works areas' during road construction, as described in Section 6.3.1.2 of the ELMP. These searches will be conducted daily, at the same time (dawn) as the searches for radio-tagged adults. On this basis, I do not consider that that construction areas need kiwi fencing around them (as proposed by the officer in condition 25(g)).

In section 3.22, the officer asks whether experienced kiwi handlers will be hired to undertake the work, or if project ecologists/contractors without experience are to be trained in kiwi handling and monitoring to undertake the work?

123. The work will be undertaken by a mix of experienced kiwi handlers and currently inexperienced contractors who will be fully trained to required standards before undertaking the work. The minimum training standards for such work are defined in the Kiwi Best Practice Manual. The wildlife permit (which has been granted) for the Mt Messenger kiwi work specifies that only people who have been appropriately trained and approved by DOC can undertake the work.

In section 3.21, the officer questions why: a) the post-construction avifauna monitoring programme includes three species of special ecological interest (kiwi, robin, fernbird) but excludes two threatened species (whitehead and long-tailed cuckoo) that are also likely to respond to predator control; and b) the proposed monitoring programme for kiwi is 'for 12 years', while the programme for other forest birds is for 'up to 12 years'.

124. The revised monitoring programme, as described in section 9.5.3.2 of the ELMP, includes whitehead and long tailed cuckoo. Both monitoring programmes (for kiwi and other forest birds) have a 12-year duration.

In section 3.21, the officer questions: a) why kōkako have not been included in the list of species of special interest: and (b) what management responses will be undertaken to protect kōkako if they are found within the project footprint during road construction.

125. Kōkako are not listed as a species of special interest because they have not been detected in the Project footprint or area. They will become a species of special interest when (and if) they are found there. As noted in the Avifauna Management Plan, natal dispersal from Parininihi is not expected for some years yet. Any adult kōkako that moves from Parininihi into the Project footprint will generate the same management response as those found near it: DOC staff will be notified immediately and they will then decide whether to leave the bird(s) there or to attempt to catch and remove it (them).

In section 3.21, the officer questions whether wetlands affected by catastrophic sedimentation (if any) will restored or compensated elsewhere.

126. The avifauna monitoring programme will show whether the Mimi wetlands retain their current bird inhabitants, both during and after road construction. It will also show whether the remnant wetlands in the Mangapepeke catchment are inhabited by fernbird and spotless crake, following

restoration planting and the removal of livestock. Fernbirds are included in the list of performance targets set for the pest management programme; and failure to achieve a 20%+ increase in their abundance after 12 years of predator control will trigger a responsive management response aimed specifically at increasing their abundance. One such response is restoration planting in wetlands (if any) degraded by sedimentation resulting from road construction.

127. The study of Basse and McLennan (2003) identified how large a stand-alone, self-contained, reserve should be in order to support a viable population of kiwi that has a high chance of persisting in the long term. It did not set out to identify how large a pest managed area should be in order to offset population losses somewhere else - the question that is relevant to the Project. As discussed in my evidence above, the increases in kiwi survival and abundance in the pest management area are likely to offset those resulting from habitat loss in the Project footprint - by a considerable margin.

In section 5.8, the officer states that existing managed areas, near the proposed PMA, should not be used to achieve mitigation outcomes.

128. The calculations for offset benefits for avifauna in my evidence assume (for conservatism) that the proposed Pest Management Area is a stand-alone entity, when in fact it is not. As stated in my evidence above, the pest management programme in the Project area will influence, and be influenced, by other pest control programmes in neighbouring areas. The neighbouring control programmes increase the chances of successful pest suppression in the Project area, particularly in respect to mustelids. The potential influence of neighbouring conservation efforts on avifauna in the Project area is also clearly recognised by the officer, with the acknowledgement that kōkako of Parininihi origin may move into the Project area, both in the short term (displaced adults) and the longer term (dispersing juveniles). Juvenile kiwi are also likely to move between the two sites. The lack of independence between the Project Area and neighbouring control areas is a reality that should be considered when evaluating the potential performance of the PMA and the outcomes it will produce for avfiauna.

John McLennan

25 May 2018

References

Baber, M.; McLennan, J. A. 2017: Mt Messenger Bypass: Assessment of Ecological Effects - Avifauna. Technical Report 7e, October 2017. Tonkin and Taylor, Hamilton. 46 pp.

Clapperton, B.K.; Byrom, A. 2005: Feral Ferret. The Handbook of New Zealand mammals. Edited by Carolyn M. King. 2nd edition, Oxford University Press.

Innes, J.; Kelly, D.; McC.Overton, J.; Gillies, C. 2010: Predation and other factors currently limiting New Zealand forest birds. *New Zealand Journal of Ecology 34(1)*: 86-114.

MacGibbon, R. 2018: Mt Messenger Alliance. Ecology supplementary report - ecological mitigation and offset. Unpublished contract report prepared for the NZ transport Agency by Tonkin and Taylor, Hamilton.

McLennan, J.A.; Rudge, M.R.; Potter, M.A.; 1987. Range size and Denning behaviour of Brown Kiwi, *Apteryx australis mantelli*, in Hawkes Bay, New Zealand. *New Zealand Journal of Ecology 10:* 97-107.

McLennan, J.A.; Potter, M.A; Robertson, H.A.; Wake, G.C.; R. Colbourne, R.; Dew L.; Joyce, L.; McCann, A.J; Miles, J.; Miller P. J.; Reid, J. 1996: Role of predation in the decline of kiwi, *Apteryx* spp., in New Zealand. *N.Z. J. Ecology: 20(1)*, 27-35.

McLennan, J.A; Dew, L., Joyce, L.; Miles, J.,; Gillingham, N., Waiwai, R. 2004: Size matters: predation risk and juvenile growth in North Island brown kiwi, *Apteryx mantelli*. *New Zealand Journal of Ecology 20:* 27-35.

McLennan, J.A. 2018: Mt Messenger Bypass project. Ecology supplementary report: Avifauna. Unpublished contract report for the NZ Transport Agency, prepared by John A McLennan Environmental Services Ltd, Havelock North.

Nichol, R. 2017. NZTA Mount Messenger Bypass Investigation: Bird Baseline Survey and Preliminary Assessment of Effects. Unpublished contract report for the

New Zealand Transport Agency prepared by Opus International Consultants. 23 p.

Robertson, C.; Hyvonen, P.; Fraser, M.; Pickard, C. 2007: Atlas of bird distribution in New Zealand (1999 -2004). The Ornithological Society of New Zealand, Inc., Wellington, New Zealand.

Robertson, H.A.; Colbourne, R.M.; Graham, P.J.; Miller, P.J. 2011. Experimental management of Brown Kiwi, *Apteryx mantelli,* in central Northland, New Zealand. *Bird Conservation International 21 (2): 207-217.*

Robertson, H; Baird, K; Dowding, J; Elliot, G; Hitchmough, R; Miskelly, C; McArthur,

N; O'Donnell, C; Sagar, P; Scofield, P; Taylor, G. 2016. Conservation Status of New

Zealand Birds. 2016. New Zealand Threat Classification Series 19. Department of Conservation, Wellington.