BEFORE THE NEW PLYMOUTH DISTRICT AND TARANAKI REGIONAL COUNCILS

IN THE MATTER	of the Resource Management Act 1991 ("The Act")
AND	
IN THE MATTER	of applications from NZTA to alter a designation and for resource consents for the Mt Messenger Bypass Project - SH 3 between Uruti and Ahititi ("the Project")

Rhys James Burns

EVIDENCE ON BEHALF OF THE DIRECTOR-GENERAL OF CONSERVATION (Avifauna)

Dated: 24 July 2018

COUNSEL:
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1. QUALIFICATIONS AND EXPERIENCE

1.1 My full name is Rhys James Burns.

1.2 I am employed as a Technical Advisor with the Department of Conservation (hereafter termed **DOC**) Biodiversity Group, based at Rotorua.

1.3 I was awarded a BSc (Hons) in 1993 from the University of Otago and a PhD in 1997 from the University of Otago in biological sciences.

1.4 I have experience relevant to assessing this application including working in New Zealand forest ecosystems, measuring pest population levels and assessing their effects on native species, such as birds. My current position includes providing advice to DOC staff about the effects that a wide range of different activities and management approaches are likely to have on a variety of New Zealand fauna (e.g. birds, lizards and bats).

1.5 I was employed by DOC during 1997-1999 at Pureora Forest Park to monitor a range of species (robins, kōkako, fernbird, tomtit, fantail, ruru and bats) to assess the impact of pest control on these species, and how they responded to management. During 1999-2004 I monitored a kiwi population in Te Urewera. During 2004-2013 I was a Technical Support Officer (Fauna) for the East Coast Hawke's Bay Conservancy, and then the East Coast Bay of Plenty Conservancy. I have been in my current role (Technical Advisor – Terrestrial Ecology) since 2013.

1.6 My work has included many projects that have monitored the response of a variety of native species to various pest animal control methods.

1.7 I am a member of the New Zealand Ecological Society and the Ornithological Society of New Zealand. I have authored an Eastern North Island Brown Kiwi Taxon Plan (Burns 2013). I have been the leader of the Weka Recovery Group for 13 years, a member of the Native Frog Recovery Group for 14 years and a member of the Kōkako Specialist Group for 4 years.

1.8 I am familiar with the proposed route of the Mt Messenger bypass generally and have undertaken a site visit to the upper Mangapepeke Valley in August 2017.

1.9 I have read the Environment Court's Code of Conduct for Expert Witnesses, and I agree to comply with it. I confirm that the issues addressed in this brief of evidence are within my area of expertise.

1.10 I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed. I have specified where my opinion is based on limited or partial information and identified any assumptions I have made in forming my opinions.

1.11 My opinions rely in part on the Evidence in Chief presented by expert witnesses appearing for Applicant, in particular the statements of evidence of Dr John McLennan, and Mr Roger MacGibbon.

1.12 In addition, in preparing my evidence I have reviewed the relevant documents provided as part of the Mt Messenger Project Notice of Requirement and Resource Consent applications (hereafter termed "NOR") including:

(i) Assessment of Effects on the Environment December 2017 (AEE);
(ii) Technical report 7e – Avifauna December 2017 **(**Baber & McLennan 2017);
(iii) Technical Report 7h – Ecological Mitigation and Offset December 2017 (MacGibbon 2017);
(iv) Ecology Supplementary report – Avifauna February 2018 (McLennan 2018);
(v) Ecology and Landscape Management Plan July 2018 (ELMP);
(vi) Mt Messenger Bypass Project – Draft Designation & Resource Consent Conditions 17 July 2018 (Draft Conditions);
(vii) Officer's report from New Plymouth District Council (Wildlands Consultants 2018); and
(viii) Construction Water Management Plan July 2018 (CWMP).

I participated in discussions with Dr John McLennan and [Mr] MacGibbon on the potential effects of the project on avifauna and produced an 'Outcomes Statement' from a meeting 26 March 2018. I attached this to my evidence.

2. SCOPE OF EVIDENCE

2.1 My evidence will deal with the following issues in relation to the NOR:

2.1.1 The conservation status and protected status of avifauna known, or considered likely to be found, within or adjacent to the Mt Messenger Bypass Project Area (the Project Area);

2.1.2 The habitat requirements of avifauna found in the Project Area;

2.1.3 The significance of the area affected by the Mt Messenger Bypass Project (the Project) for avifauna;

2.1.4 The potential adverse effects of the Project on avifauna;

2.1.5 The adequacy of the proposed mitigation and conditions offered for avifauna;

2.1.6 The adequacy of monitoring pests within the Pest Management Area (PMA).

2.2 Where I am aware that relevant information has been studied but not yet published, I have sought the view of an authoritative party involved in the research and referred to the conclusions of their research as a personal communication. I have listed all personal communications in Section 10. The common names of birds are used in the body of my evidence. To avoid any confusion between species, the scientific names and conservation status of all bird species considered are listed in Appendix 1.

3. KEY FACTS AND OPINIONS

3.1 The Applicant's reports on bird surveys, both along the proposed road footprint, and in the surrounding forests, wetlands and farmland, indicates that native birds are widespread, and several species are common across the Project Area. I consider the diversity of bird species identified is relatively high for North Island forests.

3.2 Eight native bird species have been found, within or adjacent to the Project Area that have a New Zealand conservation threat classification status (Townsend et al. 2008) of Threatened or At Risk, meaning they respectively face a high risk of extinction in the wild or a comparatively slower rate of decline. Another five Threatened or At Risk species could be expected to be present in the Project Area but haven't yet been detected. The lack of detection could be because: they are at very low density and difficult to detect; they use the Project Area intermittently when bird counters have not been present; they are present in the wider area or region but never use the Project Area; or they are locally extinct.

3.3 A further 17 native bird species, are present at or adjacent to the Project Area, and are currently classified as "Not Threatened" (Robertson et al. 2017).

3.4 The presence of Threatened or At Risk native birds and their habitats in the Project Area triggers significance criteria of representativeness, rarity and ecological context from the Taranaki Regional Policy Statement and the New Plymouth District Council's Operative District Plan.

3.5 Adverse effects could include[1]:

3.5.1 the temporary loss of breeding and foraging habitat during construction activities;

3.5.2 the permanent loss of breeding and foraging habitat on the designated road footprint;

3.5.3 the killing, injuring and disturbance of individual birds and their nests when felling trees and undertaking earthworks during the construction phase;

3.5.4 vehicle strike once the proposed road is operational;

3.5.5 severance of territories;

3.5.6 severance of dispersal by interior forest-dwelling birds and the flightless North Island Brown Kiwi (henceforth kiwi);

3.5.7 edge effect impacts on birds that will affect their utilisation of areas near, and possibly at some considerable distance, from the proposed road designation; and

3.5.8 newly created hazards for kiwi (e.g. hillside cuts producing high, sheer cliffs or very steep slopes).

3.6 Such effects could lead to a decrease in the abundance of birds, and a subsequent decline in the ecosystem processes and functions provided by birds.

3.7 In my opinion, the Project is likely to have a high impact on several native or threatened bird species. I have reviewed the impact assessment of Dr McLennan[2] based on the EIANZ Guidelines. At our meeting on 26 March 2018 we discussed the level of effects without mitigation. Dr McLennan agreed to increase the 'ecological value' rankings for kererū and kōkako, however did not agree that the assessment of magntitude of effects for bittern and kōkako should be raised to 'high' and 'moderate' respectively. [3] Dr McLennan did agree to adopt such assessment if their presence is confirmed in the Project Area. I understand that the Applicant has agreed to install an automatic sound recorder in each of the Mimi and Mangapepeke catchments

[1] Refer also McLennan EIC at [67].
[2] McLennan EIC at [31].
[3] McLennan EIC at [112] – [113]

in spring 2018,[4] and to undertake an 'adaptive management' response if bittern are found. I suggest greater survey effort for bittern be undertaken for this purpose.

3.8 The main proposals that would mitigate or compensate for effects on avifauna following construction are:

3.8.1 Pre-construction radio-tracking of kiwi in or adjacent to the road corridor and possible translocation of kiwi/kiwi eggs during construction;

3.8.2 Control of introduced mammalian pests to reduce predation events to low levels; and

3.8.3 A fence to protect kiwi from vehicle strike.

3.9 Successful mitigation and compensation for avifauna will primarily depend upon the success of pest management. I understand that 903.5ha of the proposed 3650ha PMA would be intensively managed annually for all target animal pests, including goats and pigs and the remaining area of the PMA to a lesser intensity for goats and pigs only. Subject to my comments below regarding kiwi, if the pest animal targets are achieved, the proposed management would benefit most forest and wetland birds. Although I agree with Dr McLennan that the increase in the PMA *"has made the attainment of key threshold densities in the PMA much more certain"*[5], I set out why I have doubts around the success of the programme. Best practice methods involving trapping and pest animal monitoring would be difficult to achieve, largely due to the difficult terrain. This means that the "Pest Management Review Panel" would have a very important 'adaptive management' function.

3.10 Animal pest targets are 5% tracking tunnel index for rats and 5% Residual Trap Catch Index (RTCI) or 5% Chew Card Index (CCI) for possums, in an area 200m or greater from the perimeter of the entire PMA.[6] This would effectively provide an area of approximately 2500 ha containing low rat and possum densities.

3.11 Subject to my comments below regarding kiwi, I consider an area of 2500ha within the proposed PMA that has low possum and rat densities to be

[4] McLennan EIC at [110].
[5] McLennan Supplementary evidence at [13].
[6] MacGibbon Supplementary evidence [8(i)], [19] and [25].

sufficient to compensate for effects generally on forest birds and wetland birds (except bittern, if surveys indicate their presence)

3.12 I agree with Dr McLennan[7] that there will be little net gain for fernbird and spotless crake due to natural habitat constraints within the Project Area.

3.13 For effects on kiwi, I consider the PMA is relatively small to provide compensation, and would only be acceptable if a number of requirements are met. For this reason, a robust adaptive management regime would also be essential. Having said that, I agree that the proposed pest management regime, if successful, would result in adequate compensation for effects on kiwi. I disagree with the calculation of the benefits and consider Dr McLennan has significantly over-estimated benefits for kiwi. Dr McLennan's evidence is that the adult kiwi population inside the 3650 ha PMA would total 1220 after 25 years of pest control.[8] I expect the PMA kiwi population to remain close to stable for the first 7-8 years of treatment (i.e. the current decline in the population caused by animal pests is halted). After this lag, I would then expect the kiwi population to increase by a net 3-4 adults per year on average. After 30 years, I estimate the PMA to be producing about 120 kiwi chicks per year, which should result in 9-13 surviving chicks establishing territories as adults within the PMA per year.

3.14 In calculating potential benefits for kiwi, I have assumed that the combination of roadside barrier fencing (to prevent vehicle strike) and culverts/underpasses (to allow continued dispersal of sub-adult kiwi across the landscape) will be successful. I have also assumed no increased death rate from accidental falls from the bluffs that will be created by the construction of the proposed road. If monitoring shows that the erection of a fence to prevent vehicle strike and/or the underpasses (culverts) are not successful, then in my opinion further intensive pest management for mustelids across a larger contiguous area, totalling approximately 5000ha, would be required in order to adequately compensate for the deaths of adult kiwi and/or dispersing juveniles.

3.15 There will be considerable, but uncertain edge effects on birds. This effect is complex and there has been little research into measuring its full extent in New Zealand, so the level of mitigation required is uncertain and has not

[7] Supplementary Evidence at [22].
[8] McLennan Supplementary at [19].

been specifically assessed. Mitigation/compensation for this matter also heavily relies on success of the pest management programme.[9]

3.16 In some cases in his evidence Dr McLennan states issues had been resolved between us (e.g. *"It was agreed with Dr Burns from DOC on 26 March that this issue is now resolved"*). I do not agree that is an accurate reflection of our meeting in all instances. However, given the expanded PMA proposal now put forward by the Applicant, I do not take that issue further here.[10]

4 THE CONSERVATION STATUS AND PROTECTED STATUS OF AVIFAUNA FOUND WITHIN THE PROJECT AREA

4.1 A complete list of all birds detected or mentioned in this evidence is provided in Appendix 1. Thirteen Threatened or At Risk native bird species have been found, or are likely to be found near the Mt Messenger Project area. These species are: Australasian bittern (Threatened - Nationally Critical); fernbird, spotless crake, kiwi, rifleman, North Island robin, whitehead, NZ pipit (At Risk - Declining); long-tailed cuckoo, black shag (At Risk – Naturally Uncommon); NZ falcon, North Island kōkako[11], North Island kākā (At Risk - Recovering). A further 17 native bird species are present at or adjacent to the Project Area, and are currently classified as "Not Threatened" (Robertson et al*.* 2017). Spur-winged plover and black-backed gull are the only native birds likely to be at the Project Area that are not protected (Schedule 5 of the Wildlife Act 1953).

4.2 An additional 12 introduced species, of which only two (mallard and pheasant) have some protection under the Wildlife Act 1953 as game birds (Schedule 1) were also detected by the Applicant's consultant.

4.3 Native avifauna classified as Not Threatened still have considerable benefits for native ecosystem integrity and natural functioning. These birds have been shown to be considerably more abundant and widespread than Threatened

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[9] Outcomes Statement 26 March 2018: *"This effect 'compensated for' in the offset package if population of birds is improving (key indicators bellbird, tūī, kererū, kiwi as per targets in ELMP). If benefits not being seen then adaptive approach to mitigation needed. Addition of other key indicator species is being considered."* (Topic 5)

[10] In some cases our Outcomes Statement, 26 March 2018, states "No unresolved issues" because the issues to be resolved were to be discussed between Dr Barea and Mr MacGibbon, and not because every matter on that topic had been resolved. (Mitigation/offset was to be discussed in the mitigation/offset caucusing meeting.)

[11] The At Risk – Recovering forest bird kōkako has been translocated to Parininihi in the past 12 months. In my opinion, while I accept that it may be several years before a population exists near the Project Area, it is not unreasonable that an individual bird establish a territory near the Project Area before any Works start, or as the Works proceed.

or At Risk species in the Project Area (Table 3.1 Baber & McLennan 2017, Table 2.1, McLennan 2018) and they undertake crucial ecosystem processes and services such as plant pollination (e.g. tūī, bellbird), fruit dispersal (e.g. kererū, silvereye) and invertebrate predation (e.g. tomtit, fantail, ruru) (Clout & Hay 1989).

4.4 Most forest birds are vulnerable to predation by introduced pest mammals, namely ship rats, stoats, weasels, feral cats, and possums (Innes et al. 2010) – particularly those bird species that have a threat classification status of Threatened or At Risk.

4.5 The one flightless bird species present (kiwi) is heavier than all other birds in the Project Area (Heather & Robertson 2015) and is generally only vulnerable to the larger introduced predators – stoats, ferrets, cats, dogs and pigs. In addition, due to their flightlessness, they are also vulnerable to vehicle strike, lethal falls from steep slopes and cliffs and other misadventures such as drowning and falling into inescapable holes (McLennan et al. 1996, Pierce & Sporle 1997, McLennan et al. 2004, Robertson et al. 2011).

4.6 Wetland birds (Australasian bittern, spotless crake, fernbird) can be vulnerable to: vehicle strike, wetland drainage and modification, shooting, flying into powerlines and windows, and mammalian predation (O'Donnell et al. 2015, O'Donnell & Robertson 2016). Australasian bittern can additionally be vulnerable to aerial predation, precarious winter foraging sites and starvation due to disruption of an often tenuous food supply (E. Williams, pers. comm.).

4.7 I agree with Dr McLennan's statement that the population of NI robin in the project area is of special interest because the birds are locally abundant despite being near their distribution limit.[12]

5 SPECIALIST REQUIREMENTS OF AVIFAUNA

5.1 The 30 native bird species found or likely to be found in the Project Area can be classified into three broad groups, the members of which each have broadly similar habitat requirements:

5.1.1 Forest birds (18 species);

[12] EIC [14].

5.1.2 Wetland birds (3 species);
5.1.3 Open space birds (9 species).

Forest birds

5.2 Forest birds found in the Mount Messenger area generally require an intact forest made up 5 forest tiers in order to maximise the number of different habitat niches available, and to maximise bird representativeness and density. Each bird may fulfil one specialist niche within a forest, if this is available, or more generalist species may occupy several niches within a forest. The forests found at Mt Messenger would naturally have 5 height tiers:

5.2.1 Emergent trees (generally 30-50m high);
5.2.2 Canopy trees (generally 30m high);
5.2.3 Sub-canopy trees (generally 10-25m high);
5.2.4 Shrub layer (generally 1-5m high);
5.2.5 Forest floor litter layer (0m high).

In addition, old growth forests have standing dead trees and fallen tree trunks, which also provides specialist food sources and niches for some bird species such as kākā (Greene et al. 2004).

5.3 Some native forest bird species (e.g. fantails) can survive in edge-effected or fragmented habitat (Sullivan 2012) but most native forest bird species have greatest breeding success, attain highest density, and fulfil ecological roles that benefits the natural functioning and maintenance of the whole forest, in forests that retain their structural integrity and have a large spatial area.

5.4 There are a variety of feeding, breeding and survival strategies employed by these 18 forest bird species, so that most niches and food resources within a forest are utilised. Birds can feed directly on plants, as well as their flowers, nectar, fruits, seeds and cones; subterranean, ground, flying or wood-dwelling invertebrates; and even other birds or introduced mammals. These forest bird species utilise a variety of habitats for breeding, including nests that can range from underground to the top of emergent trees, and differ in construction from dug burrows to specially constructed nests or different-sized natural tree cavities. In addition, two cuckoo species parasitise nests, depositing their eggs in other species nests, to be raised by the host at the expense of their own young. Other survival strategies include: strong territorial behaviour to a core area, often accompanied by high mate fidelity between seasons; flocking in large groups to increase food resources and minimise predation; utilisation and defence of intermittent food resources; and long-range dispersal across the landscape to intermittent and seasonal food resources.

5.5 For example, kiwi are large birds, and are strongly territorial (McLennan et al. 1987) and each pair occupies an area of approximately 40-80ha in medium to low-density populations (McLennan et al. 1987, Innes et al. 2015). The strong territorial behaviour of kiwi, in combination with the relatively large area required to support them with sufficient food resources, results in a considerable area being required to support even a small to medium population. In some circumstances with favourable environmental conditions and low predation rates, brown kiwi can attain relatively high densities on the mainland, for example about 5 ha in Northland environments (Potter 1989).

5.6 Each bird species also has diverse strategies to successfully replace individuals, ensuring persistence of the species. For many birds these parameters are not clearly defined. However, for some well studied birds (e.g. kiwi) these are well known and modelled. In order to maintain population stability, in populations with no sub-adult emigration, brown kiwi require a high adult annual survival rate (e.g. 95-98%), coupled with a 19% annual chick survival rate (Basse et al. 1999) beyond a stoat vulnerable threshold (approximately 1kg in weight).

Wetland birds

5.7 Wetland birds are generally found in low-stature vegetation that grows in permanently or intermittently wet locations. These birds require dense vegetation for breeding and predator refugia, and variable gradients of wetland vegetation and water depth associations that enable them to meet often specific food requirements. There are two wetland locations in the Project Area – the permanently wet wetland in the upper Mimi catchment, and the intermittently wet human-induced rushland habitat bordering parts of the Mangapepeke Stream.

Open space birds

5.8 Open space birds are either specialised or have sufficiently adapted to low stature vegetated non-wetland habitat (e.g. grassland, dune or open waterways). Several of these birds are recent natural arrivals to New Zealand (and so are defined as being 'native'), and often do not survive in forested habitats. Due to most of these birds being introduced or Not Threatened (Robertson et al. 2017), and pipit and black shag being found at some distance from the Project Area, I will not consider these birds further.

Ecosystem functions

5.9 Avifauna perform many functions that influences and supports the habitat they occupy. Avifauna provide crucial ecosystem processes and services such as plant pollination (e.g. tūī, bellbird), fruit dispersal (e.g. kererū, silvereye) and invertebrate suppression (e.g. tomtit, fantail, ruru).

6 THE SIGNIFICANCE OF THE AREA AFFECTED BY THE PROJECT FOR AVIFAUNA

6.1 The Project Area is uniquely placed in that it forms an essential link in a more or less contiguous native forest sequence from the coast to tens of kilometres inland. This continuity of forest habitat is rare in New Zealand, and particularly so in the North Island, as most lowland and coastal forests have been removed (Ewers et al. 2006). The Project Area provides substantive links between these coastal forests to the extensive inland forests (Figure 1) of the Waitaanga Conservation Area (16,000 ha), the Moki and Makino Conservation Areas (over 10,000 ha combined) and even Whanganui National Park (74,000 ha). In principle, large contiguous habitat allows birds (and other organisms) to maintain large genetically linked populations, which can maintain genetic diversity in perpetuity. Genetic diversity can be important for the long-term survival of species, to aid overcoming any unexpected, irregular disruptions. Often, more threatened species are at greater risk of fragmentation than more common species. Many New Zealand forest bird species cannot move or disperse across non-forested areas, resulting in isolated populations with lowered genetic diversity. Any disruption of vital corridors between large areas of habitat may have a disproportionate effect on less mobile species found at that site (Tewksbury et al. 2002, Keller & Largiadèr 2003).

Figure 1. Native forest (green) of northern and central Taranaki, indicating some pathways of essentially contiguous native forest from the sea to inland forests (blue lines), and the crucial corridor of the Project Area (red and yellow circle) that maintains this continuity.

6.2 In my opinion, the habitat quality for native birds is high within the Project Area. This is primarily due to the retention of the original forest canopy cover, wetland vegetation and hydrology over substantial portions of the Project Area. Many bird species present are completely reliant on the forest or wetland areas currently provided at this site.

6.3 The Applicant's advisors have found native birds throughout the Project Area, often in high abundance (Table 3.1 Baber & McLennan 2017, Table 2.1 McLennan 2018). For example, grey warbler were detected at 94% of forested survey sites, and both tūī and bellbird at over 70% of forested sites. Other important species include North Island robin at 43% of sites, and kererū at 24%.

6.4 The diversity of birds is relatively high for North Island forests, with just three forest species widely distributed in the North Island (rifleman, yellow-crowned kākāriki and North Island kākā) that have not been detected. Kōkako have also not been recorded but a recently translocated population is located in nearby Parininihi.

6.5 In my opinion, the relatively high number of kererū recorded (24% of monitored sites) indicates that this site may have an important role in providing feeding resources for this gregarious, mobile species that would benefit native forests over substantial parts of the Taranaki region. Kererū are vital in being the only widely distributed bird that is capable of dispersing the larger fruits of some native trees, which is necessary for the maintenance of the current naturally occurring forest types over time (Clout & Hay 1989).

6.6 Kiwi are found throughout the Project Area, and contractors detected at least one adult utilising the rare floodplain ecosystem of the Mangapepeke Stream (Figure 2.4a & b, McLennan 2018). Dr McLennan has estimated 10-15 pairs of kiwi may be present along the proposed road alignment (Figure 2.4a & b McLennan 2018).

6.7 Sub-adult kiwi can readily disperse 6km (Basse & McLennan 2003, Forbes 2009, J. Guillotel pers. comm.). I estimate there is approximately 6000ha of kiwi habitat within 6km of the proposed road. At a moderate density of one pair per 50ha, I estimate there may be approximately 120 pairs of kiwi within 6km of the Project Area. Therefore, the proposed development has the potential to affect the dispersal of the offspring of approximately 120 kiwi pairs every year.

6.8 The kiwi population residing in this area is described as the ‘Western brown kiwi taxon’ (“Western kiwi”) one of four recognised North Island brown kiwi taxa (Holzapfel et al. 2008). The total population of Western kiwi was recently estimated at 7,500 adults (Innes et al. 2015). Of these, approximately 43% were under some form of pest management.

6.9 The kiwi population in northern Taranaki is regarded as substantial and may constitute 2000 adult birds (Scrimgeour & Pickett 2011). The northern Taranaki area, which includes the Project Area, could well contribute approximately 25% of the total Western brown kiwi population.

6.10 The Western kiwi population has substantially contracted since the 1980's, most likely due to the combined effects of habitat loss and fragmentation, and predation by stoats, ferrets, dogs and feral cats (Scrimgeour & Pickett 2011). These agents of decline continue to operate on all Western kiwi populations, including those at Mt Messenger. The kiwi population at Mt Messenger is located towards the periphery of the contracted Western kiwi taxon distribution (Figure 2).

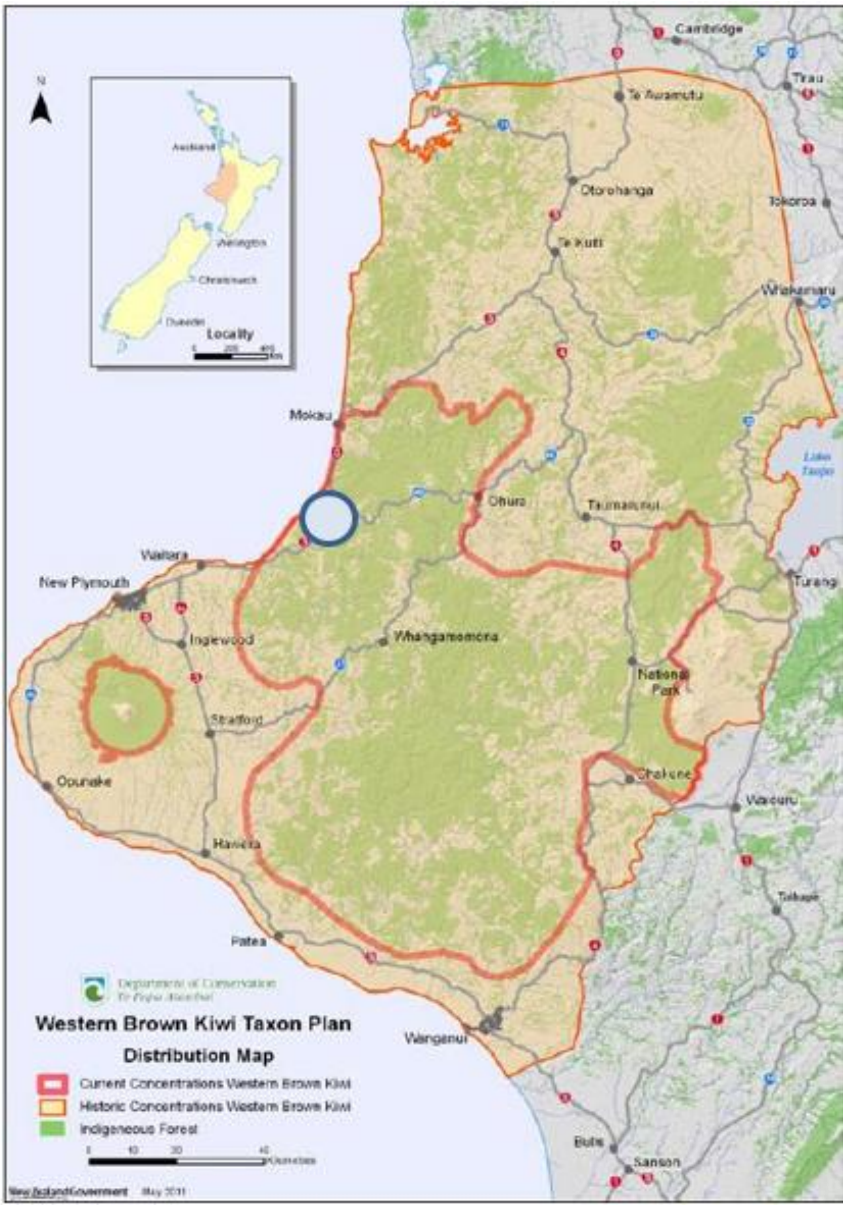

Figure 2. Current and historic Western kiwi distribution (from Scrimgeour & Pickett 2011). The location of the Project Area is shown with a blue circle.

6.11 Forest bird communities, even those species that are considered Not Threatened, have substantive roles within forest ecology. The high number of individuals from Not Threatened bird species in the Project Area indicates that these birds will be contributing a greater number of ecological functions (e.g. eating fruit or invertebrates) than Threatened or At Risk species and are also important for ecosystem functioning.

6.12 Kōkako that have been translocated to Parininihi may use the Project Area when exploring their new habitat. If the Parininihi kōkako project goes well, then the Project Area will become an increasingly important site for kōkako (perhaps in up to 10 years time). I anticipate that kōkako will increase to moderate to high numbers in Parininihi and then begin to disperse into the Project Area. As kōkako hop between trees and fly more by gliding than strong flapping, they require nearly contiguous forested habitat in order to disperse and if they remain off the ground, have limited ability to move across large gaps. While kōkako are known to cross roads on occasion, a wide, busy road without a tall forested margin is likely to be a formidable barrier to this species. As such, I consider the forest that is to remain above the proposed tunnel and under any bridges to be a crucial requirement for any kōkako dispersal from Parininihi.

6.13 The known distribution of bittern (Nationally Critical) in the Taranaki District is shown in Figure 3. Taranaki has the lowest incidence of bittern sightings of any district in New Zealand (O'Donnell & Robertson, 2016). Due to their low numbers and nationally declining population trajectory, I consider every individual bittern and its habitat (even if used intermittently) within Taranaki to be important in order to maintain or increase the bittern population within the Taranaki region. The Mimi and Mangapepeke wetlands may be an important habitat link between known populations immediately to the north and to the south-west of Mt Messenger (Figure 3).

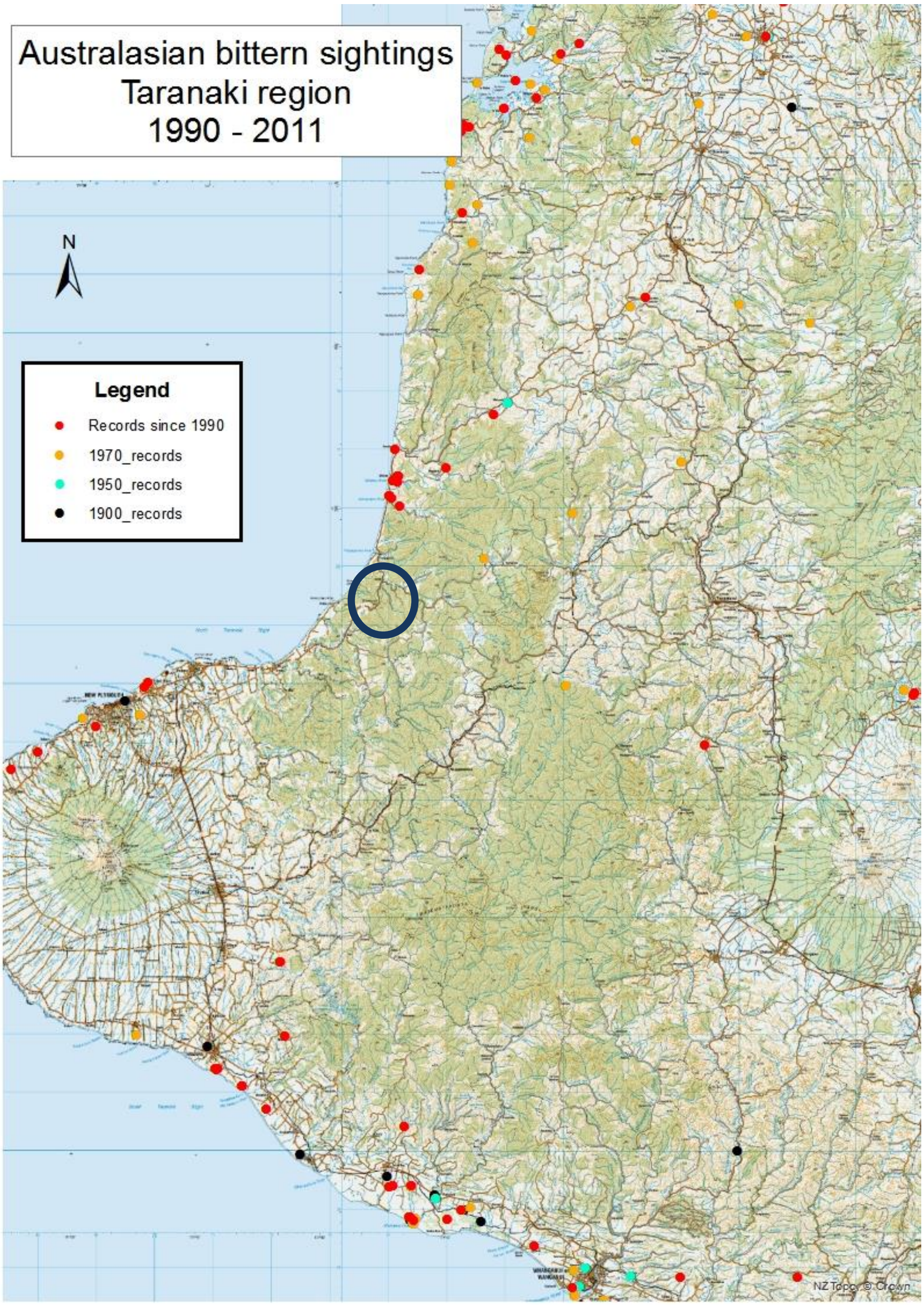

Figure 3. Australasian bittern sightings, Taranaki region, 1990-2011. The dark blue circle shows the location of the Mt Messenger Bypass Project.

6.14 In my opinion, the current failure to detect bittern within the Project Area is likely due to little or no bittern-specific survey effort being made in each season of the year. It is reasonably likely that bittern at least on occasion utilise the Project Area, particularly the Mangapepeke Stream sedgeland area (floodplain ecosystem), and the Mimi catchment wetland.[13]

6.15 The Project Area may provide crucial temporary feeding habitat during the non-breeding season and may be important in the maintenance of the likely very small Taranaki bittern population (E. Williams, pers. comm.).

7 POTENTIAL IMPACTS OF THE MT MESSENGER BYPASS PROJECT ON AVIFAUNA

7.1 There is a considerable international literature on the impact of roads on avifauna (e.g. Summers et al. 2011, Kociolek 2015), but there has been comparatively little study in New Zealand (Sadlier & Linklater 2016).

7.2 I consider the potential impact of the Project on forest birds as being high. Approximately 26 ha of forest considered to be of low-moderate, moderate or high value (Table 2.1 July 2018 ELMP) will be permanently lost, as well as additional areas of sedgeland and secondary scrub. These areas provide habitat for different bird species that will be unavailable as a result of the Project and will result in fewer birds being present in the Project Area. In addition, there will be considerable, but uncertain edge effects on birds.

7.3 The potential impacts on bittern include an increase in vehicle collisions and a decrease or complete loss of seasonal food resources, and increased severance of the Taranaki regional wetland network for this species.

7.4 The potential impacts on kiwi include vehicle strike, severance of current adult territories, severance of dispersal for juvenile kiwi, increased population fragmentation, and increased mortality through falling off the many steep slopes and bluffs that will be created due to the Project. Existing kiwi pairs will potentially be directly affected by severance of their territories, and these adults will also be at greatest risk of vehicle strike once the proposed road is operational to vehicles.

7.5 Other potential impacts are on any adult kiwi that occupy the Mangapepeke Stream floodplain sites. The CWMP indicates that construction infrastructure will disturb the majority of this area (CWMP, Appendix A). The impact of

[13] The supplementary bird report (McLennan 2018) notes that bittern may visit this catchment.

construction and machinery on any kiwi at this location could be substantial and feeding habitat post-construction is likely to be altered due to permanent spoil sites being placed at multiple sites through this valley.

7.6 As stated, Dr McLennan agrees the level of unmitigated effect to be “high” for kiwi.[14]

8 ASSESSMENT OF THE ADEQUACY OF PROPOSED MITIGATION AND CONDITIONS OFFERED FOR AVIFAUNA

8.1 The main mitigation and offset conditions proposed for avifauna are:

8.1.1 Pre-construction radio-tracking of kiwi in or adjacent to corridor and possible translocation of kiwi/kiwi eggs during construction;

8.1.2 Control of introduced mammalian pests to reduce predation level to low levels;

8.1.3 A fence to protect kiwi from vehicle strike, informed by pre-construction kiwi-territory mapping.

I acknowledge the other strategies that Dr McLennan states the Applicant has adopted at [54] of his evidence.

Pre-construction and construction mitigation

8.2 I agree with the adequacy of the proposals for kiwi radio-tracking, mapping of kiwi territories and detection and potential movement of kiwi during construction, as outlined in the ELMP.

8.3 In clarification of McLennan EIC at [63] and Section 6.3.1.2 of the ELMP, as each kiwi egg should not be moved from incubation until it is at least 40 days old and the time between laying of each egg in every two-egg nest is unknown but estimated to be three weeks (Colbourne 2002), then a two-egg kiwi nest should not be disturbed for a minimum of 61 days from the date the first egg is laid (as calculated by the NI brown kiwi ‘smart egg-timer’ transmitter technology).

[14] McLennan EIC at [52].

Adequacy of the Pest Management Programme

8.4 The proposed PMA has increased to 3650 ha from 1085 ha previously. Animal pest targets are a 5% tracking tunnel index for rats and 5% RTCI or 5% CCI for possums, in an area 200m or greater from the perimeter of the entire PMA ([8(i)], [19] and [25] of Mr MacGibbon's supplementary evidence), providing an area of approximately 2500 ha containing low rat and possum densities.

8.5 Subject to my comments below regarding kiwi, I consider an area of 2500ha within the proposed PMA that has continuously low possum and rat densities would adequately compensate for potential effects on forest birds (except kiwi) and wetland birds (except bittern if they are detected in the Mangapepeke valley).

8.6 In addition, the proposed PMA will continually trap or intermittently poison mustelids over the entire 3650 ha area. The target for stoats is a 0% tracking index, performed once in early spring and twice more during the summer period. Attainment of these targets will be of additional benefit generally to avifauna .

8.7 In my opinion, there are five potential deficiencies or uncertainties with the proposed Pest Management Plan for forest and wetland birds that require consideration:

8.7.1 Due to the steep topography of the PMA, I am uncertain if sufficient trapping lines can be placed close enough to each other to achieve the required best practice bait station network of 100m x 100m over the entire PMA. In addition the proposed trap density within the PMA (1 trap/ha) is only half of the recommended best practice to be able to be assured that rats can be maintained below the 5% tracking tunnel rate threshold at all times;

8.7.2 The ability to physically place and access randomly distributed rat and mustelid tracking tunnel lines according to the best practice methodology (Gillies and Williams, 2001) is uncertain due to the steep terrain within the PMA;

8.7.3 The exact timing of when the mustelid tracking tunnel monitoring will be undertaken, or the method to be used, is not stated. In my opinion, one of these monitoring events should occur during the peak stoat dispersal period of early January if a 3-night stoat monitor is to be used; otherwise a 21-night stoat monitor could occur on any dates from spring to autumn. I consider either monitoring option will provide confidence that a 0% tracking rate actually corresponds with a low stoat density within the PMA that is sufficient to benefit kiwi;

8.7.4 The proposed trapping regime for cat control is inadequate. Cat trapping is proposed to be limited to the bush perimeter only (9.4.1.3 ELMP), but cats often occur deep within native forest and can kill kiwi and other native wildlife (McLennan et al. 1996). The control method (trap type), bait to be used and frequency of trap checks is not mentioned.

8.7.5 The method to be employed for cat result monitoring is not mentioned (the management target simply states “no detections”).

8.8 If the pest targets cannot be met due to the methodologies employed, the Pest Review Panel, consisting of the members as described (Condition 33 (a)), must have the ability to develop and ensure an appropriate response.

8.9 If a rat monitor fails to meet the 5% tracking tunnel target, then in my opinion it should be repeated every 6 weeks until rats are confirmed as being present at less than 5% tracking tunnel index.

Kiwi

8.10 Although I disagree with Dr McLennan’s calculations of the benefits of the proposed pest management regime for kiwi, I agree that if the revised proposal, (in combination with a successful roadside fencing and culvert design) successfully reaches the animal pest targets, it is likely to result in sufficient benefit for this species to compensate for the effects of the Project.

8.11 I consider the proposed 3650ha PMA is currently likely to contain approximately 120 adult kiwi (approximately 70 territories of which 70% are paired adults). With productivity of 0.61 live chicks/adult/year (H. Robertson, unpublished data), my expectation is about 75 kiwi chicks would currently hatch each year within this area. Kiwi chicks are exquisitely sensitive to stoats and are continuously vulnerable to predation up to approximately 4 months of age (McLennan et al. 2004). I consider the PMA is likely to achieve mean kiwi chick survival rates of 20-50% for chicks greater than 500m from the PMA boundary in most years (and 10-30% survival for those within 500m of the PMA boundary), resulting in about 10-30 chicks eventually reaching adulthood (at 3-4 years of age) each year. With an assumption that approximately 30% of these surviving chicks will develop a territory within the PMA (with the remaining 70% dispersing), I expect the PMA kiwi population to remain close to stable for the first 7-8 years of treatment (i.e. the decline in the population is halted). After this lag, I would then expect the kiwi population to increase by a net 3-4 adults per year on average. After 30 years, I estimate the PMA to be producing about 120 kiwi chicks per year, which should result in 9-13 surviving chicks establishing territories within the PMA per year. These calculations are based only on the benefits of the PMA itself to kiwi, and do not include any additional benefits to kiwi that may arise from other pest control in the wider landscape (generating kiwi that subsequently disperse into the PMA).

8.12 I consider two aspects of Dr McLennan's modelling[15] to be unrealistic. . The first aspect is that his population model provides for no allowance for kiwi dispersal outside the PMA. The second aspect is the assumption that the carrying capacity of the Project Area will reach a mean of 5ha per pair within 25 years. Both these assumptions have, in my opinion, resulted in an overly optimistic model of kiwi benefits arising from the actions of the PMP within the PMA.[16]

8.13 Dr McLennan mentions unpublished information from H. Robertson of DOC, which indicates a 6% per annum average increase in kiwi populations using a regime of continuous mustelid trapping and occasional aerial 1080 operations.[17] This information appears to have been generated from a combination of two reports (Innes et al. 2015 and Robertson & de Monchy 2012) which calculated this figure from more expansive trapping networks than that proposed in the PMP (these averaged 12,000ha and targeted stoats, cats and ferrets). Aerial 1080 operations repeated every 5 years over significantly larger areas than that proposed in the PMP (e.g. Tongariro

[15] Supplementary Evidence [19] and [24].

[16] In addition, Dr McLennan has not provided an explicit estimated of pair density for the Project Area in general. I have used a figure of 50 hectares per pair, which in my opinion reflects a low to moderate mainland kiwi density that could be expected for a kiwi population such as that found at the Project Area that has likely received limited benefits from predator control in the recent past. Dr McLennan appears to have used a higher kiwi pair density for calculations of both effects of the Project on kiwi and benefits to kiwi as a result of proposed mitigation.

[17] EIC at [79].

Forest at 20,000ha) but without any trapping produced an average 2% annual increase in kiwi populations (Innes et al. 2015, Guillotel et al. 2017). Due to the smaller area of the PMA and its subsequent greater vulnerability to stoat intrusion, I consider it unlikely that kiwi population increase of a 6% per annum will be achieved as Dr McLennan suggests. Further, in Dr McLennan's Supplementary Evidence [18] he considers this growth rate could even reach 7 or 8% per annum. I consider this to be even more unlikely.

8.14 Aerial 1080 operations in Tongariro Forest occur across 20,000 ha, yet stoats still reinvade this large area within 18 months, limiting increased chick survival rates to only one or two seasons immediately following the aerial operation (H. Robertson, pers. comm. & unpublished data). Smaller sized 1080 operations of under 1000 ha have seen stoats invade operational areas within 2 months (Greene et al. 2004). The PMA of 3650 ha is small for a kiwi population. Therefore I regard the continuous operation of intensive mustelid and cat trapping throughout the PMA as essential.

8.15 Dr McLennan seems to assume all kiwi that hatch and survive to adulthood will stay and then breed within the PMA, with no dispersal outside the PMA occurring. However, Basse and McLennan (2003) found the minimum mean distance of dispersal of 11 sub-adults was 5.24 km, with the actual mean likely to be higher, because four kiwi wandered out of the catchment and could not be located. Forbes (2009) found a mean net dispersal distance of 5.5km which includes data from non-territorial birds which may yet disperse further. Fifty-nine birds were followed in Tongariro Forest until confirmed as being territorial, giving a net dispersal of 4.21 km (J. Guillotel, . pers. comm). At Tongariro Forest a large area of predator control suppression would be required in order for sub-adult kiwi to naturally disperse and yet still be contained within a stoat control area, giving their own chicks a similar chance of successfully reaching adulthood. A square-shaped area of 5000ha is estimated to be required to contain 75% of dispersing kiwi (J. Scrimgeour, pers. comm.)

8.16 These studies indicate kiwi sub-adult dispersal from the PMA will be high, and kiwi numbers will not quickly build up within the PMA to nearly the extent proposed by Dr McLennan. A kiwi that hatches in the very centre of the proposed PMA, would only need to walk 3km (in the right direction) in order to leave behind any benefits provided by the PMA.

8.17 In his EIC [87], Dr McLennan suggests juvenile kiwi will increasingly disperse out of the PMA as the population in the PMA approaches carrying capacity, 20-30 years following pest control onset. But substantial dispersal occurs even at low-moderate adult kiwi densities and appears to be largely independent of adult density.

8.18 Resident adult kiwi mortality rates are currently assumed to be low (<5% per year) in the Project Area. However, if adult mortality rates increase for any reason (for example vehicle collisions, a ferret, pig or dog predation event) the resident kiwi population is likely to decline (and depending on the severity of the event may even decline rapidly). I therefore support the need for kiwi call count monitoring to ensure that any such event is recognised and the population can be demonstrated to be stable or increasing over time.

8.19 An incursion by ferrets is, in my opinion, an ongoing threat to kiwi in the Project Area. The range contraction of Western brown kiwi (Figure 2) is likely to be largely due to ferrets killing adult kiwi (Scrimgeour & Pickett 2011). The extent of the Western brown kiwi range, which is presumably where ferrets have dispersed to and extirpated the resident kiwi, is approximately 20km from the Project Area. As juvenile ferrets are known to disperse up to 45km (Byrom 2002), the kiwi population in the Project Area appears to be well within range of a ferret incursion. Where this has occurred at other North Island sites containing kiwi (e.g. Tongariro, Kaweka, Boundary Stream, Pukaha/Mt Bruce), there is often a rapid succession of kiwi deaths (e.g. Blackie 2014), which will be unlikely to be noticed unless kiwi are being closely monitored with radio-transmitters attached to them. In addition, these ferrets are often difficult to catch with current trapping technology, but aerial 1080 operations have been demonstrated to immediately eliminate kiwi deaths as a result of ferret predation, often for several years (Guillotel et al. 2013). As such, I support the updated PMP targeting ferrets using DOC 250 traps.

8.20 The erection of a fence on both sides of the proposed road (see Topic 2 of Outcomes Statement, 26 March 2018) is designed to prevent kiwi gaining access to the road footprint when it is operational. A successful fence design will avoid any accidental kiwi death or injury as a direct result of the operational road. Avoidance of accidental death or injury means fewer kiwi chicks that survive to adulthood will need to be produced within the PMA to mitigate the effects of the Project on the resident kiwi population than would otherwise be required. I consider the proposed 3650ha PMA and the actions described in the PMP are likely to be adequate to mitigate effects of the Project on the resident kiwi population provided that monitoring of the resident and kiwi population demonstrates the fence is effective at preventing roading associated kiwi mortality. As stated in the next section of my evidence, I am comfortable that NZTA determine the exact design of the fence if that is subject to a consultation with DOC through a Review Panel.

8.21 The kiwi road-side fence will, however, also act as a barrier to dispersing sub-adult kiwi. Sufficient under-road passes that allow passage of sub-adult kiwi are crucial in the overall roading design to avoid effects. If post-construction monitoring of kiwi demonstrates the proposed road is a significant barrier for juvenile kiwi dispersal, the fence may need to be dismantled to avoid this effect. I consider the absence of an effective barrier along the proposed road will result in the death and injury of kiwi through vehicle strike, While the rate of vehicle strike is unknown, I consider it will be of such significance that the commensurate area of effective mustelid pest control will need to increase to about 5000ha to compensate for these additional losses. Alternatively, a permanent programme to rear about 15 genetically unrelated kiwi chicks to a 1kg weight each year, and then release them back into the PMA should provide sufficient compensation for this effect.

8.22 The proposed Project will undertake significant works that will result in the Project Area acquiring several new high, sheer cliffs or very steep slopes (CWMP, Appendix A). Kiwi of all ages are known to die from falling off natural cliffs (Robertson et al. 2011). In my opinion, if kiwi fall down these new hazards, they are likely to be fatally injured. This issue has not been considered in the ELMP. However, this issue was raised in my pre-hearing caucus with Dr McLennan (Topic 11) and it was agreed that a Kiwi Monitoring Plan could be developed in consultation with DOC. This plan was agreed to include an adaptive management approach that would address this issue. However, dispersing sub-adult kiwi from outside the Project Area would still be at risk, as they would not be monitored. There is considerable uncertainty about the level of effect this will have on the resident kiwi population, and therefore uncertainty about the level of mitigation that will be required. One suggestion is to construct kiwi-proof fences several metres back from the top of these slopes, and either prevent their access to the cliff edge or guide them to less precipitous areas that are not likely to result in fatal falls.

Bittern

8.23 For survey effort for bittern[18], the Applicant has agreed to install an automatic sound recorder in each of the Mimi and Mangapepeke catchments in spring 2018. But bittern may frequent the Project Area during the non-breeding season, a time of the year when males do not boom or vocalise. Australasian bittern are known to range widely during winter non-breeding times and are reliant upon high value feeding sites during this time (E. Williams, pers. comm.). Moreover, female bittern never vocalise, so they will never be detected by this method.

Establishment of a Pest Management Review Panel

8.24 The Applicant has suggested the assemblage of a Pest Management Review Panel. While I support this development, I regard other ecological aspects of the Project as also being of sufficient complexity to justify the establishment of a Expert Review Panel that addresses all ecological aspects of this Project. For avifauna, these issues include the design of the road-side kiwi fence and culverts, monitoring of kiwi movements relative to the road post-construction, outcome monitoring for kiwi and other birds, surveys for bittern, and bittern mitigation measures (if detected within the Project Area).

9 OTHER COMMENTS ON CONDITIONS

9.1 In his EIC [91], Dr McLennan suggests 3-yearly kiwi call counts, located in the same locations as the baseline call counts (essentially along the proposed road alignment). I consider this to be insufficient to be able to demonstrate any effect on the kiwi population. In my opinion, the kiwi monitoring should be undertaken over the entire 3650ha PMA. In my calculations of likely kiwi responses, I estimate a net gain in the kiwi population only begins to be realised after 7-8 years of pest control, with only a marginal gain after 12 years. Therefore, I consider it is more appropriate to

[18] McLennan EIC at [110].

undertake kiwi call-count monitoring at years 0 (baseline), 5, 10, 15, 20, 25 and 30 years. By this last monitoring period, sufficient increases in the kiwi population should have accrued to be measurable using this methodology.

9.2 At [122] of his EIC Dr McLennan indicates he does not think a kiwi exclusion fence needs to be erected around the construction areas (as proposed by S42A Officer's report, condition 25 (g)). I agree with Dr McLennan, but only to a point. If a kiwi is found near a construction site consistently, and triggers the movement criteria on several occasions, the resulting disturbance to the kiwi will increase the chance the kiwi will become hyper-sensitive to human sounds, smells and other activity. This hyper-sensitivity can lead to a kiwi being disturbed at the slightest approach to its roost or nest. As a consequence the kiwi could run away as handlers approach it, it could abandon the daytime shelter it is rehoused into (thereby endangering it from construction activities), and if it is a male it could abandon a nest if any person happens to venture too close to the nest while it is incubating eggs (i.e. most likely during daylight hours).

9.3 I suggest whenever a kiwi is handled it should be rated on a "stress scale" as agreed with DOC and NZTA (or Ecology Review Panel). If the kiwi exceeds an agreed tolerable stress response (based on its behaviour during and after handling) then an appropriate response must be undertaken for this bird, if it needs to be moved again, and agreed to by DOC. One option may be to construct a kiwi exclusion fence every evening around construction activities, as suggested in the Officer's report.

10 CONCLUSION

10.1 In my opinion, the revised ELMP (17 June 2018) has substantially improved the mitigation by suppression of animal pests, however I have the following reservations: I have uncertainty about the ability of the Applicant to implement and monitor the PMP; the timing and method of the stoat monitoring is unclear; the cat control and monitoring is insufficient; the surveying for Australasian bittern within the Project Area has been insufficient; and the mitigation for kiwi will only result in a stable or slowly increasing population if there is no increase in accidental death or injury to kiwi as a result of the Project.

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12 PERSONAL COMMUNICATIONS

Guillotel, Jerome. Department of Conservation, Whakapapa.

Robertson, Hugh. Department of Conservation, Wellington.

Scrimgeour, Jess. Department of Conservation, Taupo.

Williams, Emma. Department of Conservation, Christchurch.

13 APPENDIX 1 – COMMON NAMES, SCIENTIFIC NAMES AND CONSERVATION STATUS OF PROTECTED, PARTIALLY PROTECTED OR GAME AVIFAUNA FOUND AT THE MT MESSENGER PROJECT AREA, OR USED IN THIS TEXT

Common name	Scientific name	Conservation status (Robertson et al. 2017)
Australasian bittern	Botaurus poiciloptilus	Threatened - Nationally Critical
Bellbird	Anthornis melanura melanura	Not Threatened
Black-backed gull	Larus dominicanus	Not Threatened
Black shag	Phalacrocorax carbo novaehollandiae	At Risk – Naturally Uncommon
Bush falcon	Falco novaeseelandiae ferox	At Risk – Recovering
Fernbird	Bowdleria punctate vealeae	At Risk – Declining
Grey duck	Anas superciliosa	Threatened – Nationally Critical
Grey warbler	Gerygone igata	Not Threatened
Kererū	Hemiphaga novaeseelandea	Not Threatened
Long-tailed cuckoo	Eudynamys taitensis	At Risk – Naturally Uncommon
Mallard duck	Anas platyrhynchos	Introduced and Naturalised
New Zealand kingfisher	Todiraphus sanctus	Not Threatened
New Zealand pipit	Anthus novaeseelandiae novaeseelandiae	At Risk – Declining
North Island brown kiwi	Apteryx mantelli	At Risk – Declining
North Island fantail	Rhipidura fuliginosa placabilis	Not Threatened
North Island kākā	Nestor meridionalis septentrionalis	At Risk – Recovering
North Island kōkako	Callaeas wilsoni	At Risk – Recovering
North Island robin	Petroica longipes	At Risk – Declining
North Island tomtit	Petroica macrocephala toitoi	Not Threatened
Paradise shelduck	Tadorna variegate	Not Threatened
Pheasant	Phasianus colchicus	Introduced and Naturalised
Pukeko	Porphyrio melanotus melanotus	Not Threatened
Rifleman	Acanthisitta chloris granti	At Risk – Declining
Ruru	Ninox novaeseelandiae novaeseelandiae	Not Threatened
Shining cuckoo	Chrysococcyx lucidus lucidus	Not threatened
Silvereye	Zosterops lateralis lateralis	Not Threatened
Spotless crake	Porzana tabuensis tabuensis	At Risk - Declining
Spur-winged plover	Vanellus miles novaehollandiae	Not Threatened
Swamp harrier	Circus approximans	Not Threatened
Tūī	Prosthemadera novaeseelandiae novaeseelandiae	Not Threatened
Welcome swallow	Hirundo neoxena	Not Threatened

White-faced heron	Egretta novaehollandiae	Not Threatened
Whitehead	Mohoua albicilla	At Risk – Declining
Yellow-crowned parakeet	Cyanoramphus auriceps	Not Threatened

Outcomes Statements from meeting with Mr John McLennan, 26 March 2018