

**ENVIRONMENT COURT OF NEW ZEALAND
WELLINGTON REGISTRY**

**I MUA I TE KOOTI TAIAO O AOTEAROA
TE WHANGANUI-A-TARA**

ENV-2023-WLG-000005

Under the Resource Management Act 1991

In the matter of the direct referral of applications for resource consent and notices of requirement under sections 87G and 198E of the Act for the Ōtaki to North of Levin Project

By Waka Kotahi NZ Transport Agency

**STATEMENT OF EVIDENCE OF NICHOLAS PAUL GOLDWATER
ON BEHALF OF WAKA KOTAHI NZ TRANSPORT AGENCY**

TERRESTRIAL ECOLOGY

Dated: 4 July 2023

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INTRODUCTION

1. My full name is **Nicholas Paul Goldwater**.
2. I am a Principal Ecologist with Wildland Consultants Ltd, based in Auckland. I have been employed as a consultant ecologist with Wildland Consultants since 2008.
3. I prepared¹ Technical Assessment J: Terrestrial Ecology (**Technical Assessment J**) as part of Volume IV of the Assessment of Environmental Effects (**AEE**), which accompanied the application for resource consents and notices of requirement for designations (**NoRs**) lodged with Manawatū-Whanganui Regional Council (**Horizons**), Greater Wellington Regional Council (**GWRC**), Horowhenua District Council (**HDC**) and Kāpiti Coast District Council (**KCDC**) in November 2022 in respect of the Ōtaki to north of Levin highway Project (**Ō2NL Project** or **Project**).
4. My qualifications and experience are set out in paragraphs 22 to 29 of Technical Assessment J. My evidence is supplementary to Technical Assessment J.
5. In preparing Technical Assessment J and my evidence, I have:
 - a) Provided advice on terrestrial ecology matters related to the Project to Waka Kotahi since December 2021;
 - b) Participated in three site visits to two wetlands in Koputaroa, including Te Ripo O Hinemata, with members of the Project team, Horizons, and representatives from local iwi.
 - c) Undertaken a site visit to Waiopēhu Scenic Reserve.
 - d) Attended multiple workshops with the Project iwi partners and stakeholders (being the Department of Conservation, Forest & Bird, and Council staff) for the Ō2NL Project.
 - e) Contributed to draft consent conditions relating to terrestrial ecology.

¹ With the support and collaboration of Tim Martin, Keely Paler, Ella Buckley and Sarah Budd.

6. Since the consent applications and NoRs were lodged I have:
 - a) Carried out an additional site visit to Waiopēhu Scenic Reserve with Mr George Calvert (Xcluder Ltd).
 - b) Assisted with the response to a number of questions in the section 92 further information requests from the Councils related to Technical Assessment J.

Code of conduct

7. I confirm that I have read the Code of Conduct for expert witnesses contained in section 9 of the Environment Court Practice Note 2023. This evidence has been prepared in compliance with that Code. In particular, unless I state otherwise, this evidence is within my area of expertise and I have not omitted to consider material facts known to me that might alter or detract from the opinions I express.

Purpose and scope of the evidence

8. Technical Assessment J assesses the effects of the Project on terrestrial and wetland habitat types and associated flora and fauna to inform the resource consent applications for the Project.
9. My evidence does not repeat in detail the matters discussed in Technical Assessment J. Rather, in this evidence I:
 - a) present the key findings of Technical Assessment J in an executive summary, updated to factor in the additional work carried out since lodgement;
 - b) provide a more detailed description of the additional work carried out, information obtained, and discussions held since lodgement, and the implications for my assessment;
 - c) comment on issues raised in submissions received in respect of the Project; and
 - d) comment on the section 87F/198D reports prepared by Horizons, GWRC, HDC and KCDC (**Council reports**).

EXECUTIVE SUMMARY

Existing environment and ecological values

10. The proposed route passes through rural land in the Horowhenua lowlands, between the foothills of the Tararua Range and the sea. Most of the route lies in the southern Manawatū Plains Ecological District, with a small area within the Tararua Ecological District.
11. Prior to human settlement, almost all of the Ō2NL Project Area² would have been densely forested, broken only by rivers and larger streams, and wetlands. The gentle terrain and fertile soils encouraged the conversion of the land to intensive agriculture, and now only small remnants of forest and scrub remain. Many wetland areas have been drained, and most of those that remain are highly degraded by grazing. All areas of indigenous terrestrial vegetation and wetlands within the Ō2NL Project Area lie within an 'Acutely Threatened Land Environment' (less than 10% cover of indigenous vegetation remaining).
12. The area subject to the NoRs covers 618 hectares, within which the Ō2NL Project construction footprint (being actual area of works, such as road surface, earthworks, stormwater treatment devices, along with a 20-metre wide construction buffer on either side of the physical work) covers 348.7 hectares.
13. The Ō2NL Project construction footprint comprises 90.2% (312.8 hectares) pasture and cropping land, with a further 3.5% (12.3 hectares) occupied by houses and associated gardens and quarries, and road and rail corridors occupying 2.1% (7.4 hectares). Terrestrial vegetation dominated by indigenous species, including forest, treeland, scrub, and fernland covers 3.25 hectares (0.1%), with an additional 1.33 hectare (0.4%) of forest and scrub comprising a mix of indigenous and exotic plant species in the canopy. Terrestrial vegetation dominated by exotic species comprise 8.2 hectares (2.4%).
14. Wetland habitats (including open water) within the Ō2NL Project construction footprint cover 3.81 hectares (1.1%), comprising 0.61 (0.2%) hectare of indigenous wetland vegetation, 0.8 hectare (0.2%) of mixed indigenous-

² The Project Area refers to all of the land within the Ō2NL Project designations and, for ecology, any immediately adjacent areas that are of particular terrestrial or wetland ecology value and could reasonably be subject to adverse effects by construction of the road (for example, a forest remnant within 100 metres of the road, but beyond the boundary of the designations). These areas have also been mapped, described, and assessed for effects.

exotic wetland vegetation, 2.06 (0.6%) hectare of exotic wetland vegetation, and 0.34 (0.1 %) hectare of open water habitat.³ The wetland habitats within the Ō2NL Project construction footprint are primarily swamps on valley floors, but there are also smaller areas of oxbow wetlands associated with meandering streams, and hillslope seepage wetlands. Most of the wetlands are grazed, exotic-dominated wetlands of relatively low ecological value.

15. The preferred alignment avoids High and Very High value forest habitats, which has resulted in the selection of a route that inevitably passes through adjacent terrestrial habitats of Low to Moderate ecological value such as mixed indigenous-exotic forest and scrub, and planted indigenous forest.
16. The indigenous terrestrial and wetland vegetation within the Project construction footprint have been assessed as ranging from Negligible to Very High ecological value. This assessment considered the high level of historical loss of habitats in the Horowhenua lowlands, the availability of habitat for common indigenous flora and fauna species, and the presence of Threatened, At Risk, and locally uncommon species. The vegetation and habitats along the route provide habitat for up to 73 bird species (28 indigenous species confirmed by field surveys to date), at least two lizard species, and a wide range of terrestrial invertebrates.⁴ No bats were detected by acoustic surveys and bats are likely to be absent from the Ō2NL Project Area.
17. Threatened or At Risk species confirmed to be present in the Ō2NL Project construction footprint include two Threatened bird species (koekoeā/long-tailed cuckoo, karakahia/grey duck), five At Risk bird species (spotless crane (*Porzana tabuensis tabuensis*), New Zealand dabchick (*Poliocephalus rufopectus*), black shag (*Phalacrocorax carbo novaehollandiae*), koitareke/marsh crane, and pihoihoi/New Zealand pipit), and one At Risk lizard (ornate skink).⁵ *Powelliphanta traversi*, a giant land snail (Threatened - Nationally Critical) was not confirmed as present, but could persist in low numbers in forest remnants adjacent to the Ō2NL Project construction footprint, and is confirmed as being present in Waiopahu Scenic Reserve (approximately 1.3km) to the east of the Ō2NL Project construction footprint. *Wainuia urnula* (ngata; Not Threatened), a large endemic land snail is present in riparian habitats on the banks of the Waikawa Stream and is

³ Technical Assessment J: Terrestrial Ecology at [6].

⁴ Technical Assessment J at [8].

⁵ Technical Assessment J at [9].

regarded as locally uncommon. Habitats dominated by a mix of indigenous and exotic flora species, or exotic flora species, are also likely to provide important habitat for indigenous fauna, including At Risk lizard species.

Effects of the Project and avoidance and mitigation measures

18. The key potential adverse terrestrial and wetland ecological effects of the Ō2NL Project include:
 - a) loss of forest, treeland, scrub and wetland habitats within the Ō2NL Project construction footprint;
 - b) injury or mortality of indigenous fauna during construction;
 - c) alteration of the adjacent retained habitats; and
 - d) potential ongoing effects of the road on fauna populations (for example, by fragmentation of habitats or road kill).
19. These potential effects are addressed by further avoidance measures, where habitats are located within the construction footprint and in particular the construction buffer zone. Where avoidance is not possible, effects are minimised by actions such as:
 - a) clear physical marking of habitats that are to be retained;
 - b) seasonal controls on the timing of vegetation clearance works and draining ponds;
 - c) salvage and relocation of lizards and lands snails within areas of vegetation clearance;
 - d) remedial restoration of habitats within the construction buffer;
 - e) reducing edge effects and effects of dust deposition through buffer plantings; and
 - f) alterations to the Ō2NL Project detailed design to reduce mortality of indigenous fauna, for example, plantings to increase flight heights over roads and directional/ shrouded low UV lighting.
20. The Ō2NL Project design also provides opportunities to retain or restore connectivity of habitats under the highway at the larger river crossings.

21. These measures to avoid or minimise potential adverse effects will be detailed in an Ecology Management Plan (**EMP**) and will reduce the residual adverse effects of the Ō2NL Project.
22. Four indigenous-dominated wetland types will have effects mitigated by undertaking 'direct transfer' at the point of impact.⁶ This involves the translocation of wetland vegetation via excavation from the impact site and replanting it at the mitigation site. The vegetation types are rautahi sedgeland (0.07 hectare), bracken-whekī fernland (0.03 hectare), kiokio-spike sedge- kāpūngāwhā sedgeland (0.04 hectare), and raupō reedland (0.12 hectare).

Addressing residual effects

23. Residual adverse effects that are Low, Moderate, High, or Very High on all terrestrial indigenous and mixed indigenous-exotic vegetation of natural origin, and through the loss of all significant habitats, are addressed by habitat restoration and enhancement at sites within the affected catchments. The quantum of these restoration and enhancement measures have been determined by using a Biodiversity Offset Accounting Model (**BOAM**), which incorporates quantifiable data from the impact sites and the proposed habitat restoration and/or enhancement site. If offsetting could not be verified for any habitat or species, or is not appropriate, biodiversity compensation has been applied.
24. All restoration and/or enhancement measures seek measurable conservation outcomes, and adhere to the key principles of offsetting, including permanence of outcomes, ecological equivalence, additionality, and a Net Gain of indigenous biodiversity. Opportunities being considered include:
 - a) restoration of former hydrology within two wetlands at Koputaroa to reverse historical wetland loss;
 - b) restoration of degraded wetland habitats by fencing, pest plant and animal control, and planting;
 - c) direct transfer of indigenous wetland plants from impact sites to restoration planting sites;

⁶ Technical Assessment J at [13].

- d) revegetation plantings to expand and link isolated forest remnants as well as restore terrestrial-freshwater ecological sequences;
- e) salvaging indigenous lizards and a range of invertebrate species within the Ō2NL Project footprint, and relocating them to appropriate habitats; and
- f) constructing a predator-proof fence around one nominated forest remnant to protect and enhance populations of indigenous skinks and land snails.

25. The BOAM demonstrates that:⁷

- a) 4.1 hectares of restoration planting is required to offset the loss of māhoe-dominant forest and scrub (2.85 hectares);
- b) 1.7 hectares of restoration planting is required to offset the loss of mixed indigenous-exotic forest and scrub (0.80 hectare);
- c) 0.67 hectare of restoration planting is required to offset the loss of planted indigenous forest (0.40 hectare);
- d) 0.68 hectare of restoration planting is required to offset the loss of indigenous vegetation within exotic forest and treeland (0.68-hectare, indigenous component only);
- e) 0.42 hectare of restoration planting is required to offset the loss of exotic riparian forest, scrub and vineland (0.40 hectare);
- f) 0.25 hectare of restoration planting (including direct transfer of vegetation from the impact site) is required to compensate for the loss of 0.12 hectare of raupō reedland;
- g) 4.9 hectares of wetland restoration is required to compensate for the loss of 3.31 hectares of combined wetland habitat; and
- h) 0.48 hectare of open water creation is required to compensate for the loss of 0.34 hectare of ponds.

26. The loss of indigenous treeland (0.23 hectare) will be offset by planting 486 trees (comprising ten species) at three offset locations. A BOAM was not used in this instance; instead, tree replacement ratios were based on

⁷ Technical Assessment J at [16].

trunk diameter and species. Replacement trees will be planted in existing forest and wetland habitats, where they will enhance floristic diversity and structure, and provide additional food and habitat resources for indigenous fauna.

27. While the BOAMs for wetland and open water habitats seek to trade extent for condition (i.e., compensation), the rehabilitation of the three proposed material supply sites will include the establishment of three large areas of open water and several hectares of wetland vegetation. The successful establishment of wetland habitat at these sites will mean that the Project complies with Policy 6 of the National Policy Statement on Freshwater Management (**NPS-FM**), which seeks to avoid loss of extent of natural wetlands.
28. The BOAMs for terrestrial vegetation types indicate that restoration works would achieve an overall Net Gain of biodiversity within 15 years for key attributes such as canopy cover, canopy and sub-canopy species diversity, and ground cover of understorey and ground tier. The BOAMs for wetlands and open water indicate that restoration works would, conservatively, achieve a Net Gain of biodiversity within 8-15 years.
29. The restoration and enhancement measures will require monitoring to track progress of outcomes against the Ō2NL Project conditions and EMP, and to document the ecological gains that have been achieved. The ecological response package (the actions proposed to be undertaken in response to the effects) for the Ō2NL Project has been developed in consultation with iwi Project partners and stakeholders, including the Department of Conservation, the district (KCDC and HDC) and regional (Horizons and GWRC) councils and Forest & Bird. This ecological response package identifies where restoration planting is proposed to occur and how it can be integrated with other aspects of the Project, such as earthworks, stormwater treatment, natural character and landscape planting. The design of the response package has been developed in collaboration with our Iwi Partners and with input from the Department of Conservation and Forest & Bird.

Overall position

30. In my opinion, if the offset and compensation proposal described in Technical Assessment J is appropriately implemented as per the consent conditions and the performance outcomes of an EMP, then the residual effects of the

Project will be appropriately addressed, resulting in a Net Gain of indigenous biodiversity for terrestrial and wetland habitats, as well as for indigenous fauna species such as ornate skinks, forest and wetland birds, and land snails.

31. In this respect, the proposed measures described in Technical Assessment J are considered to satisfy the following key statutory directives: Policy 6 of the NPS-FM; Policy 13-3 and Policy 3-3 of the One Plan (Horizons); and Policy 37, Policy 38 and Policy 40(c) of the Natural Resources Plan – Appeals Version (Greater Wellington).

WORK SINCE LODGEMENT

32. Since the application was lodged, I have been involved in further work related to terrestrial and wetland ecology as set out below.

Response to section 92 requests for further information

33. I have assisted with the response to further information requests from the Councils related to Technical Assessment J. In summary, I was asked to address questions on the following topics:
- a) current state and condition of areas to be restored within Te Ripo O Hinemata wetland;
 - b) consistency of ecological values between particular vegetation types;
 - c) residual effects resulting from the loss of gravelfield;
 - d) establishing connectivity between isolated habitats;
 - e) the direct transfer of wetland vegetation;
 - f) pest plant control within the proposed planting areas;
 - g) maximising opportunities for connectivity between isolated habitats;
 - h) survival rate of natural character and landscape plantings;
 - i) addressing the loss of indigenous treeland;
 - j) potential adverse effects on bittern; and
 - k) retention of water in open water offset areas.

34. My full responses to all questions are provided in the letters to the Councils dated 23 December 2022.

Any further survey / assessment work

35. On 8 February 2023, I carried out an additional site visit to Waiopēhu Scenic Reserve with Mr George Calvert (Xcluder Ltd). The purpose of the visit was twofold: (i) to walk the boundary of the proposed pest-proof fence and identify any constraints associated with vegetation clearance and constructing culverts, and (ii) provide Mr Calvert and opportunity to assess the site and prepare a cost estimate for the fence construction.

Offsetting and compensation update

36. The proposed terrestrial offsetting approach is described in pages 78 to 110 of Technical Assessment J, and the BOAMs are provided in Appendix J.9 of the assessment. Discussions with the Project iwi partners, landowners, Councils, and the Department of Conservation are ongoing and further site visits and fieldwork are anticipated.
37. Additional fieldwork will be required following confirmation of the pest-proof sanctuary. The construction of the pest-proof fence will require some vegetation removal and it is anticipated that fauna management will need to be implemented under the Wildlife Act, e.g., lizard and snail salvage and relocation.
38. It is also expected that, prior to the commencement of restoration (and hydrological) works another visit to Te Ripo O Hinemata wetland will need to be undertaken with various Project specialists (e.g., ecologists, hydrologists, engineers) together with representatives from Manawatu Kūkūtauaki No. 3 Section 2E5 Trust, KiwiRail, and Horizons.

Engagement with stakeholders

39. I have also been involved in ongoing post-lodgement engagement the Project iwi partners, as well as stakeholders including the Department of Conservation and the Councils. Since the consent applications were lodged, this has included:
- a) Discussions with Mr Tom Christie and Ms Ilsa Corkery (Department of Conservation) with regards to potential adverse effects on indigenous lizards, the management of indigenous lizards during vegetation

clearance, and long-term management of the proposed pest-proof sanctuary (also referred to as the 'lizard sanctuary'). Mr Christie has indicated that he and Ms Corkery are satisfied with the approach being taken so long as lizard salvage occurs during vegetation clearance. Lizard salvage is proposed to occur up to two weeks prior to and during vegetation clearance, as per proposed Condition RTE5, noting that lizard salvage will not be required in areas where lizards are not detected.

- b) Responding to a query from Ms Sara Bell (Department of Conservation) with regards to (i) the carrying capacity of lizards within Waiopēhu Scenic Reserve (one of the potential sites to be protected by a predator-proof fence), (ii) options for lizard release sites within the Ō2NL Project designation, and (iii) options for relocating *Powelliphanta traversi* snails, if found during vegetation clearance.
- c) Discussions with Ngā Hapū o Kererū (Ngāti Takihiku and Ngāti Ngarongo) - who are members of the 'Manawatu Kūkutuaki No. 3 Section 2E5 Trust - with regards to the proposed restoration of Te Repo O Hinemata wetland and an adjacent wetland at Koputaroa. Members of the marae are supportive of the proposed wetland restoration strategy and it is now the intention to progress the plan by liaising with Horizons Regional Council and the Department of Conservation regarding resource consents and ensuring consistency with the existing land covenant respectively.

COMMENTS ON SUBMISSIONS

- 40. I acknowledge that the Department of Conservation has decided not to make a submission and instead has sent a letter of support for the Project, which includes confirmation that the Department is comfortable with the proposed conditions. This follows extensive consultation with the Department regarding threatened fauna species and the proposed pest-proof sanctuary, as outlined above.

Nestbox NZ Ltd, 217 Kimberley Road/ 345 Arapaepae South Rd, Levin

- 41. The Nestbox submission addresses potential effects of the Project on the chicken flock that forms the basis of the free-range egg farm business. The concerns raised include noise, dust and light disturbance; and the threat of avian diseases associated with Project wetlands and water features.

42. My response to this submission includes input from my colleague and avifauna specialist, Dr Della Bennet, noting that the issues raised in this submission are outside of my area of expertise. Dr Bennet is the author of Appendix J.5 (Avifauna Ecology) to Technical Assessment J.

Disturbance of the chicken flock

43. International research has shown that major abrupt changes to the day and night cycle of the chickens, such as waking up the chickens at night with loud noises, will lead to stressed and anxious chickens. In addition, studies have shown that loud noises associated with machinery, aeroplanes, and rail road tracks close to the chickens leads to lower egg production, stunted growth, higher blood pressure, stress and fatigue in the chickens. Other studies found noise levels above 85 decibels (dB) level leads to a decreased feed intake of between 15-25 percent⁸.
44. However, as explained in the evidence of **Mr Michael Smith**:
- a) traffic noise levels at the Nestbox property are not expected to increase as a result of the Project; and
 - b) The character of the noise will be less variable than the current noise from State Highway 57.
45. **Mr Smith** also explains that construction noise and vibration effects can be appropriately managed, including via the proposed construction noise and vibration conditions.
- a) Overall, free-range chickens should not be adversely affected during construction or operation of the Project.
 - b) In terms of potential light disturbance, vehicles travelling past the chicken farm along the proposed state highway will essentially be moving in a straight line, (i.e., north-south parallel to the farm), which means the light emitted from vehicles at night cannot spill over into the chicken farm. Overall, in my view there is no need for specific additional management measures to address potential noise, dust and light impacts on the Nestbox operation. My colleague, Dr Della Bennet shares the same view.

⁸ <https://www.thepoultrysite.com/articles/how-to-reduce-negative-effects-of-noise-on-chickens>

Threat of disease transmission

46. With regards to the spread of avian diseases adversely affecting farmed chickens:
- a) the closest proposed stormwater pond to the chicken farm is approximately 800 metres to the northeast; and
 - b) The large spoil site proposed for rehabilitation along the Ohau River to the south is approximately 2.3 kilometres to the south of the chicken farm.
47. It is highly unlikely that any waterfowl attracted to these features will come into contact with the chickens at the Nestbox property. In addition, there do not appear to be any existing ponds or wetlands close to the Nestbox property that would attract waterfowl.
48. Waterfowl would need to come into contact with infected migratory species initially to start the spread of diseases such as avian influenza (e.g., H5N1). Dr Bennet has advised that migratory seabirds and shorebirds are unlikely to be attracted to the stormwater ponds.
49. Importantly, only three outbreaks of avian influenza have ever been recorded in the Southern Hemisphere, whereas hundreds of events have been recorded in the Northern Hemisphere.⁹ On its website, the Poultry Industry Association of New Zealand states that: *“New Zealand is unique in the world in being free of the three major exotic avian diseases – Avian influenza (bird flu), Newcastle Disease and Infectious Bursal Disease (IBD) – which makes it one of the healthiest places to raise chickens”*.¹⁰
50. There are low levels of salmonella in chickens, pigs and cows, and waterfowl are known to carry the disease. Young chickens can be vaccinated against salmonella which, together with low probability of infected waterfowl visiting the farm, means that waterbodies created by the Ō2NL Project are highly unlikely to result in the proliferation of salmonella.

⁹ Chen et al. (2002).

¹⁰ <https://www.pianz.org.nz/who-we-are/bird-flu-and-diseases/>.

Josien Reinalda, Foxton Beach

51. This submitter is generally opposed to non-complying activity resource consents being granted, particularly where those consents relate to rare and / or threatened habitats.
52. The relevant rare and threatened habitats the submitter are natural wetlands, given that no rare or threatened terrestrial vegetation is being removed.
53. The design of the Project has been an iterative process, resulting in the avoidance of all mature indigenous forest and the loss of wetland habitats being minimised. The selected corridor also avoids Te Waiaruhe Swamp, the largest wetland in close proximity to the Project construction footprint, although numerous small wetlands of varying ecological value cannot be avoided without shifting the corridor further to the east.
54. The biodiversity offsetting and compensation package being offered by the Project will far outweigh the extent of loss of terrestrial and wetland vegetation. In particular, the loss of 3.54 hectares of wetlands and open water will be offset by restoring up to 9.5 hectares of degraded wetland and creating up to 7 hectares of open water and wetland habitats within a materials supply site adjacent to the Ohau River.

Maria Storey, 24 Arapaepae Road North

55. Maria Storey raises concerns about:
 - a) pest animal control, and in particular the risk of pest animals consuming baits, then entering neighbouring properties and posing a risk to pets;
 - b) the proposed pest plant control, particularly weed spraying and 'spray drift' damaging neighbouring properties; and
 - c) The proposed wetlands being a potential breeding ground for rats, pūkeko, rabbits and mosquitos.
56. In respect of pest animal control, anticoagulant baits such as brodifacoum are commonly used to control rodents and possums, although there is a risk of secondary poisoning due to the tendency of brodifacoum to bioaccumulate in the internal organs of animals that have consumed it.
57. To address this issue, I suggest:
 - a) that where pest control is being undertaken within close proximity to residential dwellings, toxins such as cholecalciferol, bromadiolone, and

diphacinone should be used. These toxins are less persistent in the environment and have a reduced risk of secondary poisoning. Traps can also be used.

- b) All residents should be notified if poisoning and trapping is being undertaken in adjacent parts of the designation.
58. The potential for spray drift is a matter that should be specifically considered in developing the detailed pest plant control methodology, although it is best practice to only spray herbicides on days with little to no wind.
59. Schedule 7 to the proposed conditions of consent (Ecology Management Plan) requires the development of detailed pest animal and plant management approaches. I have recommended that the specific points I have flagged above are referred to in Schedule 7.
60. In terms of the concern about proposed wetlands, I have assumed that the submitter is referring to the proposed stormwater pond to the southeast of her house rather than a natural wetland. It is possible that rats and mosquitoes may breed in and around the site. I understand the potential issue of mosquitoes is addressed in the evidence of Dr Alex James.
61. As mentioned above, it would be preferable to use toxins that minimise the likelihood of secondary poisoning to control rats around stormwater ponds. In urban areas, bromadiolone and diphacinone are commonly used to control rodents in Council-owned parks and reserves. The toxins are placed in lockable bait stations, which further reduce the risk of pets and non-target species accessing the bait.
62. A potential increase in pūkeko numbers is not particularly concerning from an ecological perspective given it is an indigenous species. However, some pūkeko control may be required prior to and post-planting as this species is known to pull out new plantings (see the new text in Schedule 7 to the proposed conditions). The stormwater pond and surrounding plantings are unlikely to attract rabbits, noting that rabbits will be controlled prior to planting if their numbers are considered a risk factor (as per pūkeko).
63. While not as intensive as at areas specifically planted or protected for ecology reasons, all stormwater ponds as well as the proposed rehabilitated borrow site will be subject to regular pest plant and animal management.

Prouse Trust Partnership / SJ and KM Prouse, 1024 Queen Street East

64. This submission refers to impacts on the bush area on the Prouse property due to the close proximity of the Project, and the proposed use of the Prouse property for an access haul road. It then seeks “*the relocation of any culturally significant species*”. To confirm, the area of indigenous vegetation on the Prouse property has been specifically avoided; there will be no direct effects on that habitat. There is no need, in terms of effects of the Project, to relocate any indigenous species from that area.

Wellington Fish and Game Council (Fish and Game)

65. The Fish and Game submission relates primarily to freshwater ecology. **Dr Alex James** responds to those submission points. There is some reference in the submission to effects on birds, and on wetlands. As a general response, I note that the design of the Project has been a highly collaborative process with input from a wide range of disciplines, the result of which is the avoidance of all areas of mature forest, a minimal loss of wetlands, and the development of offsetting and compensation packages (in partnership with iwi and consulting with stakeholders including the Department of Conservation) that will deliver an overall net increase in biodiversity and habitats.
66. Fish and Game’s submission opposes any impacts on wetlands. The submission refers to opportunities for the creation of wetlands alongside the corridor for filtering road runoff, while adding that those wetlands would not be acceptable as an offsetting requirement for the loss in size, abundance, distribution, connectivity or functioning of natural wetlands.
67. To confirm, the proposed stormwater ponds are not being accounted for in the proposed offsetting for the loss of wetlands within the Project footprint. As described in detail in Technical Assessment J, the Project is proposing to restore up to 9.5 hectares of degraded wetlands and create up to 7 hectares of open water and wetland habitats next to the Ohau River (within a materials supply site) to address the loss of 3.54 hectares of wetland vegetation and 0.34 hectare of open water respectively.
68. Collectively, these actions will result in a significant increase in habitat for waterfowl and wetland bird species, including game birds (which are specifically referenced in the Fish and Game submission). The proposed restoration activities include working with local iwi to restore the hydrology to

a large wetland adjacent to the Koputaroa Stream, with subsequent weed control and enhancement planting.

Forest & Bird

69. Forest & Bird have been involved in the process leading up to lodgement. Their representatives have attended ecology workshops and joined discussions with the Project ecology and planning team. They have provided useful commentary on the ecology reports and draft set of conditions.
70. Forest & Bird are complimentary of the application overall, but state that they *"do not consider that the conditions of consent and duration of said conditions, as written, achieve no net loss of biodiversity"*.
71. The Forest & Bird submission acknowledges that the offset calculations provided for the Project are appropriate, and that the avoidance of effects has been achieved wherever possible. However, Forest & Bird has raised a number of issues that relate primarily to:
- a) the likelihood of the offsets achieving no net loss;
 - b) the long-term endurance of the offsets, including the establishment and survival of offset and mitigation plantings;
 - c) the potential adverse effects of pest plant and animal species on offset and mitigation plantings;
 - d) the suitability of the conditions to ensure net gain outcomes for terrestrial and wetland habitats are achieved;
 - e) the possibility that the direct transfer of wetland vegetation could fail; and
 - f) timing of the proposed predator-proof fence.
72. It is important to emphasise that the proposed conditions are designed to work together to achieve a net gain of indigenous biological diversity, including through appropriate long-term endurance of the offsets proposed. These include:
- a) Condition REM1 - long-term monitoring of restored/planted sites will be detailed in the Ecology Management Plan;

- b) Condition REM12 - provides a range of offsetting performance targets, for example, 90% canopy closure after eight years;
- c) Condition REM13 – requires legal arrangements to be entered into in respect of offsetting and compensation sites that will ensure that planted areas are physically and legally protected;
- d) Condition REM14 – requires Ecology Offset Site Layout Plans that describe methods for the ongoing management of the offsetting measures works; and
- e) Condition REM19 - that sets out monitoring requirements including remedial actions where monitoring identifies inadequate progress is being made towards net gain.

73. I have addressed the specific points raised by Forest & Bird below, generally following the order used in the submission.

Consent / condition duration

74. Forest & Bird states that the conditions addressing offset and compensation measures should be tied to the operational resource consents. To confirm, that is the intention: the conditions are linked to consents with a 35-year duration, if that is of concern, noting that BOAM calculations show net gains are achieved by Year 15.

Planting performance targets

75. Forest & Bird claims that the timeframes in condition REM12 are inadequate to ensure the long-term survival of the offset planting.

76. As an initial point, Forest & Bird cites the example of plantings along Mackays to Peka highway becoming infested by pest plants due to successive droughts and a general lack of maintenance. However, that example is not directly applicable here, because the planting referred to was amenity and landscape planting along the expressway, rather than ecological offset planting. The maintenance requirements of the ecology areas in the Ō2NL Project differ significantly from those for the Mackays to Peka Profuse landscaping areas, which include the areas that are generally visible from the highway.

77. In this case, Condition REM12 requires:

- a) Livestock removed and planting areas to be fenced;
- b) Pest plants eradicated or suppressed after three years from site preparation;
- c) 90% canopy cover of revegetated areas after eight years from planting; and
- d) 90% survival of enrichment plants and replacement trees after five years from planting.

78. I refer also to Condition REM19, which requires review at Year 8 to confirm that offset areas are on track for net gain by Year 15 and, if not, to undertake remedial action. This condition has the effect of incentivising Waka Kotahi to make every effort to establish the offset areas effectively.
79. Furthermore, the EMP will include methodologies for pest plant and animal control, together with a timetable for the maintenance of all offset sites. Typically, if a planted site has been well-maintained for 8 years and the canopy has largely formed, there will be evidence of ongoing viability, for example, through regeneration in the ground cover and suppression of light-demanding weeds.
80. Forest & Bird claims that pest animals need to be explicitly listed in Condition REM12 as needing control, particularly rabbits and hares as they can adversely impact planting establishment and are prevalent within the footprint of the proposed highway.
81. I do not consider it necessary to specifically name each pest animal species in Condition REM12. Rather, this condition sets the terrestrial offset targets that must be met to secure net gain in accordance with the BOAM. Depending on location, management of pest animals is likely required to meet these targets, including survival rates. If present, browsing pest animal species such as rabbits, hares, possums, and pūkeko will either be eradicated or suppressed to low levels prior to planting in order to enhance the survival of the new plants. Methodologies for controlling such pests will be described in the EMP, together with measures for undertaking infill planting to replace browsed plants.
82. The submitter agrees that achieving 90% canopy cover after eight years from planting (as per Condition REM12) seems realistic. However, they claim that monitoring of plantings by Wellington City Council found that some extremely

exposed sites have not achieved canopy closure even after 15 years post initial planting.

83. To clarify, all of the proposed offset planting sites are on low-lying (alluvial) terrain and are not particularly exposed. The soils are also likely to be optimal, which will enhance plant establishment and survival. If required, replacement planting of dead plants would be undertaken during the current or following planting season from the time of inspection.
84. Forest & Bird also seeks clarification on the survival rate of enrichment plants. Specifically, they are concerned that if plants die before Year 5, they may not be replanted. In this context, it is important to distinguish between 'enrichment planting' and 'replacement planting'.
85. Enrichment planting refers to the planting of longer-lived tree species amongst revegetation species, typically undertaken after three years when sufficient shelter is available. Enrichment planting is undertaken to provide diversity and structure within revegetation plantings. Replacement planting, on the other hand, will be undertaken to offset the loss of indigenous treeland at ratios stipulated in REM8. Replacement plants are likely to comprise similar species to those of enrichment plants and will largely be undertaken within habitats that already have a canopy, e.g., Arapaepae Bush.
86. After five years in the ground, it is expected that all surviving enrichment and replacement plant species would have become well-established and resilient to variable climatic conditions. Based on observations of many revegetation sites, it is considered highly unlikely that well-established plants will fail after five years, particularly those planted in sheltered locations amongst an existing canopy.
87. The same monitoring approach can be applied to enrichment and replacement plantings. If more than 10% of enrichment and/or replacement plants have failed at Year 5, replanting will need to be undertaken to bring the overall expected percentage at Year 8 back up to 90%. It may be necessary to extend the originally planned monitoring period of 8 years relative to when replanting occurs, based on the overall survival rates. This would be discussed with the Councils and taking into consideration Year 8 BOAM targets. REM19 cross refers to REM12, which provides performance targets. REM19 provides a monitoring report with reference to REM6 and 11 and requires the EMP (REM1) to be modified if targets are not being met.

Direct transfer of wetland vegetation

88. With regards to the direct transfer of wetland vegetation, while I am confident that this approach will be highly successful, it is possible that the direct transfer of wetland vegetation could fail (at least partially). As such, there should be a contingency that requires the purchase of eco-sourced stock to replace any failed plants at the mitigation sites. Condition REM19 will be used to monitor and ensure the success of direct transfer of wetland vegetation.
89. I note that Wildland Consultants has translocated basal clumps of raupō for several projects, with good success, over a long period of time. The largest project that Wildlands led which involved the direct transfer of raupō was the planting of constructed wetlands at Lake Okaro near Rotorua. For that project Wildlands set up some shallow polythene-lined 'holding' tanks on flat ground with c.150 millimetres of water in them. Raupō and other wetland species were collected from source wetlands (raupō was collected using a digger) and then broken down into smaller sizes before being transported to the receiving site for planting. The relocated plants successfully established.
90. Forest & Bird raises the concern that direct transfer "will almost certainly result in unwanted transfer of weeds between sites, if not via direct transfer of weed plants, then through transfer of weed seeds in the soil". As such, the submitter requests that the performance targets of all wetlands subject to direct transfer need provision of weed control for the duration of consent.
91. I agree that this is a risk of spreading weeds via direct transfer; however, standard methodologies to manage the risk and control pest plants will be provided in the EMP. Irrespective, direct transfer remains as the preferred approach to addressing direct impacts on higher value wetlands.

Future revision of the offsetting scheme

92. Regarding REM19 Offset monitoring, Forest & Bird opposes revising the Ecology Management Plan should there be an indication that net positive ecological outcomes will not be achieved within a specific timeframe. The submitter expresses concern that such an approach would result in a lack of certainty that the offset, as calculated and determined to be appropriate by the Environment Court, will be achieved.

93. The purpose of REM19(d) is to provide the ability to respond if the offset package does not deliver the anticipated and calculated net gain. In this way, the condition provides the certainty of outcome through an adaptive management response. In addition, the condition explicitly directs the need for the Regional Council(s) to be satisfied with any changes through the required certification.

Lizard and snail salvage and relocation

94. The final theme that Forest & Bird has submitted on is the proposed lizard and snail salvage and relocation. Forest & Bird supports the construction of a predator-proof fence around either the restored Arapaepae Bush or Waiopahu Scenic Reserve to provide for relocation, but expresses concern that conditions RTE5 and REM10 create uncertainty around timing of fence construction and its utility as a refuge for salvage of lizards and snails ahead of initiation of road construction. Similarly, the submitter seeks clarity regarding the feasibility of having a predator-proof sanctuary ready to receive animals salvaged ahead of pre-construction habitat clearance. They suggest that Waka Kotahi needs to speak to appropriate experts and determine if an interim measure is required, which in turn can be reflected in the conditions.
95. As I understand it, pursuant to Condition REM10(a), the predator-proof fence must be installed prior to the survey and salvage of lizards and, in turn, the survey and salvage must happen before vegetation clearance in specified habitats.
96. Waka Kotahi could consider setting up a soft release pen (as an interim measure) within Arapaepae Bush or Waiopahu Scenic Reserve while the fence was being constructed, if required. Soft release pens are typically small enclosures used to enable relocated animals such as lizards to become accustomed to new surroundings before release. In New Zealand, soft release pens are commonly made from silt fencing secured in place by steel waratahs and weed mat pins.
97. I note that all activities relating to lizard relocation and soft release pens would need to be detailed and approved through the Wildlife Authority Application process.
98. With regards to the salvage of lizards and land snails within the construction footprint, Forest & Bird asserts that a Lizard Management Plan and Snail

Management Plan should be included in the conditions to ensure they are not overlooked.

99. To clarify, it is intended that the EMP includes management approaches for lizards and snails as part of the wider document, alongside the management of avifauna also. The content of the EMP is set out in Schedule 7.
100. Finally, Forest & Bird seeks a form of guaranteed funding to ensure the upkeep of the predator-proof fence and ensure enrichment of plantings in the event of stochastic events such as flooding or drought.
101. My previous responses have largely addressed concerns about the long-term survival of offsets to ensure no net loss of biodiversity. At this stage, Waka Kotahi cannot add anything more regarding the upkeep of the predator-proof fence as discussions still need to be undertaken with key stakeholders such as Horizons, the Department of Conservation, and Muaūpoko. That said, discussions to try and secure third party responsibility for the upkeep and monitoring of the fence will be ongoing.

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102. This submission has identified an opportunity to restore a wetland opposite the submitters' property.
103. Inspection of aerial photography indicates that the site is subject to flooding/inundation during wetter parts of the year. Analysis by Dr Jack McConchie has also indicated the presence of diffuse and impeded drainage across the wider area.
104. Riparian planting is proposed immediately to the north of the site, which could connect to the drained wetland. There is also the potential to create a linkage to an area of proposed landscape planting further to the north (adjacent to Kuku East Road), which in turn is contiguous with an exotic wetland (Soft rush rushland, habitat type EWRs1d).
105. I am supportive of Waka Kotahi engaging with the submitter during the final detailed design with respect to restoration options for the wetland. However, restoring the wetland is not required to address the Project's effects as it would be over and above the overall mitigation and offset package.

COMMENTS ON THE COUNCIL REPORTS

106. I have read the following two reports from the Council officers with regards to terrestrial ecology:

- a) Section 198D report prepared by Mr Bryn Hickson Rowden for KCDC and HDC.
- b) Section 87F report prepared by Mr James Lambie for Horizons and GWRC.

107. As I explain below, I have carefully considered the various condition amendments proposed by Mr Hickson Rowden and by Mr Lambie. In a number of instances, I have agreed with the proposed amendments (or a variation of what has been proposed). Generally speaking, in my view, the amendments that have been proposed and that I have agreed with do not lead to or reflect any substantive change to the management of actual and potential effects.

108. In some cases, the amendments I have agreed to amount to helpful clarifications / confirmation of what was intended. In other cases, I do not necessarily think the amendments are needed, but I am comfortable that the amendments do not change what was intended and agree to the changes in the interests of reassuring Mr Hickson Rowden and / or Mr Lambie.

109. There are other proposed condition amendments that I do not agree with, and I explain why below.

Section 198D Report: Mr Hickson Rowden

110. I understand that Mr Hickson Rowden is generally comfortable with the approach taken to terrestrial ecology, and the proposed management of effects include the proposed offsetting package. He does raise an issue in terms of the adequacy of the bat survey effort, and he makes some specific comments on the proposed conditions.

Long-tailed bat surveys

111. Mr Hickson Rowden is of the opinion that the one bat survey undertaken in late summer/early autumn 2021 is insufficient to detect long-tailed bats for a roading project of this magnitude.¹¹

¹¹ Paragraphs 26-30 of the Section 198D report.

112. This issue was previously raised during the Section 92 request for further information. The response provided by Wildland Consultants' then bat expert Dr Jamie Mackay is as follows:

"In our opinion, the general paucity of bat roost habitat within the Project footprint, together with an absence of bat records west of the Tararua Range, precluded the need for a follow-up bat survey."

113. Given that this response has not satisfied Mr Hickson Rowden, I have again consulted with Dr MacKay on how to best respond. Firstly, for some context, it is important to note that the Bat Roost Protocols (October 2022) prepared by the Bat Recovery Group directs to "undertake comprehensive survey", not "surveys". The bat survey should take place during the most active period for bats, but the protocols do not stipulate that multiple surveys in one season are required. Secondly, the methodology used for the bat survey and the results of the survey have been accepted by the Department of Conservation, noting that the Department did not submit on the Project.
114. Mr Hickson Rowden, in paragraph 27 of his report, states that "the accepted methodology for long-tail bat detection is in spring/early summer and late summer/autumn", which can be construed as two surveys being required. Mr Rowden Hickson relies on personal communications with Ms Georgia Cummings (bat expert from Titoki Landcare Ltd) for this statement. As Dr MacKay has advised, there does not appear to be a requirement for more than one bat survey in the Bat Roost Protocols.
115. Mr Hickson Rowden recommends that a second ABM12 deployment in late summer/autumn be undertaken "to ensure (in line with best practice) that roosting habitats are not currently used by indigenous bats". It may have been his intention here to refer to deployment in spring/early summer, given that the initial bat survey was undertaken by Dr MacKay in late summer/autumn.
116. Mr Hickson Rowden also acknowledges that the

"discovery of long tailed bats and roost use within the designation may not alter the level of effects predicted because there is an effect management process that should be employed to avoid bat harm regardless of ABM detection results".

¹² ABM refers to Automated Bat Monitoring.

I agree that the results of a second survey would be unlikely to alter the predicted level of effects.

117. Dr Mackay has advised that there is evidence emerging that bats use different areas at different times of the season and it is likely that any future high-risk project such as a wind farm or a road that traverses good quality habitat is going to require three bat surveys to fully assess effects. However, Dr MacKay's opinion is that there is strong evidence that bats are not using the Ō2NL Project area. I would also note the Department of Conservation, Forest & Bird, and the regional councils have not raised any issues associated with the bat survey. Overall, I am comfortable with the survey effort carried out in respect of bats.

Conditions

118. Mr Hickson Rowden makes some minor suggested changes to terrestrial ecology conditions RTE1 to RTE7¹³ to which I respond below.

119. Table RTE1 relates to the limits placed on habitat removal to enable construction of the Project. Mr Hickson Rowden states his preference for the removal of the phrase "or through digital mapping" from RTE1(b) in relation to delineating affected habitats. I agree that physical delineation at the interface between construction activities and the key habitats to be retained is preferable. However, digital mapping is enabled to cater for in situations where access is restricted or deemed too hazardous. The preference for physical delineation where practicable, with digital mapping only if necessary, could be made clearer. Ms McLeod has made that change in the proposed conditions attached to her evidence.

120. I do not agree with Mr Hickson Rowden's proposed changes to conditions RTE2(e), RTE5, and RTE6 with respect to including the specific titles of the fauna specialists who will be engaged to implement the faunal mitigation. 'Suitably qualified person' is defined in the glossary and there is also a condition (RGA6) that requires suitable qualified personnel to prepare and implement the activities listed in the RTE and REM conditions.

121. Mr Hickson Rowden suggests updating RTE7(b)(ii) to include the wording 'where it is practicable to do so' with regards to buffer planting. I can confirm that the condition has been changed so that buffer planting will be

¹³ Table in paragraph 56 of the Section 198D report

undertaken prior to the commencement of construction activities, although the wording 'where it is practicable to do so' is still included.

Section 87F Report: Mr Lambie

122. Mr Lambie has prepared a thorough review of Technical Assessment J and the associated specialist ecology reports. He has raised a number of issues as well as identified minor discrepancies relating to the areas of vegetation affected by the Project. He has also provided comments on submitter concerns and conditions.
123. In my view, the key ecological issues that Mr Lambie has identified relate to the following topics:
- a) Recent amendments to the pasture grass exclusion list and their bearing on the current mapped extent of natural wetlands;
 - b) Discrepancies and omissions with regards to areas of habitat loss within the Project construction footprint;
 - c) Whether reliance on 'worst case' assumptions in the terrestrial assessment has meant that offsetting has been prioritised over avoidance, i.e., how strictly the Project has adhered to the mitigation hierarchy;
 - d) Inconsistency between the ecological values assigned to habitats with regards to particular fauna species when compared with assessing overall ecological values for those habitats;
 - e) The extent to which buffer, landscape, and natural character plantings are relied on in the terrestrial ecology assessment and fauna assessments to address effects; and
 - f) Offsets are to manage a perpetual effect (loss of habitat), therefore pest and plant animal management in the new planted areas should continue in perpetuity.
124. I respond to each issue in the sections below, together with responses to Mr Lambie's comments and recommendations regarding conditions and submissions.

Natural wetlands: amendments to pasture exclusion list

125. In December 2022, the Ministry for the Environment (MfE) published the National List of Exotic Pasture Species. This is intended to provide the full list of species that may be considered under clause e(ii) of the updated "natural inland wetland" definition in the NPS-FM.¹⁴ Mr Lambie expresses concern that some wetlands dominated by exotic grass species, which were not assessed as natural (inland) wetlands in Technical Assessment J, may now be captured under the NPS-FM definition of 'natural wetland' if the pasture species found in the relevant wetland are not included in the updated list.¹⁵
126. To confirm, there are no changes to the revised list that would result in exotic grass dominated wetlands being missed during the field survey.
127. Further, I note that Yorkshire fog (*Holcus lanatus*) is included in the National List of Exotic Pasture Species. This species of exotic grass has a wetland classification of 'Facultative' as per Clarkson et al. (2021), which means it commonly occurs as either a hydrophyte or non-hydrophyte (estimated probability 34-66% occurrence in wetlands). After revisiting the wetland vegetation descriptions in Appendix J.1, it was evident that Yorkshire fog is a dominant or common species in 12 wetland types (exotic and mixed indigenous-exotic systems). This, in my view, means that the total wetland extent for the Project may actually have been over-estimated due to the presence of Yorkshire fog. That said, I have not attempted to revise my original assessment of the extent of natural inland wetlands to exclude Yorkshire fog wetlands.

Discrepancies and omissions re: vegetation impacted by the Project

128. In paragraph 40 of his report, Mr Lambie comments on omissions and discrepancies with regards to the impact areas of certain vegetation types. Firstly, Mr Lambie correctly notes a discrepancy between Table J.2 and Table J.3 of Technical Assessment J regarding the amount of vegetation type ITT01 (Kamahi-kānuka treeland) within the Project construction footprint. I can confirm that approximately 40m² (or 25% of the total area) of ITT01 is within the Project construction footprint (as stated in Table J.3), and that this loss will be offset by replacement planting as per Table J.5a of Technical

¹⁴ Natural inland wetlands factsheet, January 2023. <https://environment.govt.nz/assets/publications/Essential-Freshwater-Natural-inland-wetlands-factsheet.pdf>

¹⁵ Paragraph 38 of the Section 87F report.

Assessment J. I have appended an updated Table J.2 to my evidence in which the amended row is highlighted (Appendix A).

129. Mr Lambie comments on how Table J.4a and Table J.4b of Technical Assessment J only account for habitats where residual effects are “low” or higher, and that this does not account for the loss of exotic habitats where the residual effects are “very low” or “negligible”. As discussed in paragraph 256 of Technical Assessment J, the purpose of the two tables was to group the terrestrial and wetland vegetation types into broad categories to simplify the offsetting and compensation process. As such, only impacted habitats with residual effects of “low” or higher were included in Table J.4a, noting that all impacted natural wetlands were included in Table J.4b.
130. For completeness, I have listed the terrestrial habitats that were not included in Table J.4a (i.e., those of very low or negligible value), together with the areas within the construction footprint:

Habitat type	Area
ETF2 – Eucalyptus forest	0.30 hectare
ETF3 – Radiata pine forest	0.50 hectare
ETS2/ETS3 – Gorse scrub	0.01 hectare
ETV1 – Blackberry vineland	0.93 hectare
EHG – House, gardens and farm buildings	12.3 hectares
ETG1 – Rank grassland	0.48 hectare
ETP – Pasture and cropping land	312 hectares
QRY – Quarry	0.1 hectare
RRR – Road, Rail, Rivers	7.4 hectares

131. In paragraph 46(a) of his report, Mr Lambie has correctly identified an error in Table RTE1. The total loss for indigenous-dominant fernland should be 0.11ha, not 0.07ha. This occurred because wetland type IWSe5 was listed separately when it should have been included in indigenous-dominant fernland. I have discussed these points with Ms McLeod, and Condition RTE1 has been updated.
132. With regard to Mr Lambie’s comment on grouping exotic dominant wetlands in paragraph 46(c) of his report, Mr Lambie states that exotic dominated

wetlands that are not considered under the One Plan should be separated out from wetlands that are significant under the PNRP. However, the fact that some of the exotic wetlands are significant under the PNRP does not confer higher ecological value. All impacted wetlands that are not mitigated by direct transfer will be offset, regardless of their value, and a net gain in wetland values will be achieved. For the sake of completeness, I have worked with Ms McLeod to itemise significant wetland types dominated by exotic species in Table RTE-1 as well as itemising exotic-dominant wetland types that occur in the Paruaauku Swamp. Exotic-dominant wetlands that are not significant have been combined in the table.

Adherence to mitigation hierarchy

133. Mr Lambie reiterates a concern of a submitter that the proposed scale of offset response provides an opportunity to remove all habitat within the effects envelope in preference to avoiding the habitats during construction where possible.¹⁶
134. I would reiterate here that:
- a) all terrestrial habitats with the highest ecological values have been avoided by the Project following consultation with ecological specialists and subsequent successive changes to the design;
 - b) the removal areas listed in Condition RTE1 are maximum areas, which take into account the 20-metre construction buffer; and
 - c) the intention behind the approach to addressing effects within the subsequent footprint plus construction buffer has been to assume the worst-case in terms of clearance, with the offsetting proposal devised on that basis.
135. There will be opportunities for further avoidance and remediation within the construction buffer in particular during the construction phase, particularly for wetlands. However, if my assessment was not carried out on a worst-case basis, it is likely Waka Kotahi would have been criticised for not being sufficiently conservative in terms of the assessment of effects.

¹⁶ Paragraph 42 of the Section 87F report.

Inconsistency between ecological values

136. Mr Lambie discusses what he considers to be discrepancies in the ecological values I have assigned to particular habitat in terms of general vegetation values and how the fauna specialists have assessed that same habitat with respect to its value for fauna.¹⁷ In his opinion, the specific faunal values should have been used for the overall ecological value of the habitat. He provided several examples of such discrepancies, which I expand on below.
137. Mr Lambie identifies that terrestrial vegetation types ITF4 (mahoe forest and scrub) and ITF5 and ITF6 (planted indigenous forest) have been assessed as “high” bird habitats in Table 6 of Technical Assessment J.5 (Effects on Birds), but assessed as “moderate” value in Table J.3 of Technical Assessment J. As I understand, the author of Technical Assessment J.5 assessed these habitat types as “high” value due to their capacity to provide an abundance of fruit, seeds and nectar to a range of indigenous bird species. However, when assessing the overall value of the habitat, a key consideration is whether or not the particular habitat is confirmed as supporting threatened bird species.
138. Based on the EIANZ Guidelines for assigning value terrestrial species¹⁸, species listed as ‘At Risk – Declining’ are assigned a “high” value while Nationally Threatened species are assigned a “very high” value. However, only non-threatened bird species such as pīwakawaka/fantail, tauhou/silvereye, riroriro/grey warbler, pīpīwharau/roa/shining cuckoo, and tui were recorded at habitats ITF4, ITF5 and ITF6 within the designation. Each of these species was assigned a “low” ecological value in Table 7 of Technical Assessment J.5, which should be taken into consideration when assessing the overall ecological values of the habitats (as per Table 6 of the EIANZ Guidelines).
139. Mr Lambie also identifies that open water (OW) was assessed has having “moderate to high” ecological value in Technical Assessment J.5, although it is assessed as having “moderate value” in Table J.3 of Technical Assessment J. It is noted that no bird species with a threat classification of ‘At Risk – Declining’ or higher were recorded in areas of open water, meaning they would be assessed as having “low” to “moderate” value based on the determining factors in Table 5 of the EIANZ Guidelines. I am satisfied that, taking into account other criteria such as representativeness, diversity

¹⁷ Paragraphs 47-55 of the Section 87F report.

¹⁸ Table 5 of EIANZ Guidelines (Roper-Lindsay *et al.* 2018).

and pattern, and ecological context, “moderate” ecological value is appropriate for open water habitats within the Project area.

140. Mr Lambie provides further examples of differences in ecological values between Technical Assessment J.5 (Effects on Birds) and Technical Assessment J with respect to gravelfield and some wetland types and their capacity to support threatened bird species. He also provides examples of differences in ecological values between Technical Assessment J.6 (Effects on Lizards) and Technical Assessment J with respect to rank grassland and residential gardens and their capacity to support lizard species.
141. When assessed using other determining criteria such as representativeness, diversity and pattern, and ecological context, I am satisfied that the overall ecological values of each vegetation type as habitat for indigenous fauna have been appropriately considered in Technical Assessment J. I would add that there is some degree of subjectivity required when using the EIANZ Guidelines and context is of utmost importance. For example, it would not be appropriate to assess all areas of rank grassland in the Project footprint as having “high” ecological value based on one or two records of ornate skink (At Risk – Declining) or northern grass skink (Not Threatened).
142. The discrepancies identified by Mr Lambie are to some extent a moot point: he states that the differences are not of consequence to the proposed ecological effects management package. In other words, the mitigation and offsets proposed will suitably address the effects of all affected habitats regardless of them being assigned a higher ecological value.
143. Mr Lambie emphasises, however, that assigning a higher ecological value in turn means a high standard of proof will need to be applied when demonstrating that the offsets (and mitigation) will deliver functional habitats that replace what has been lost. I agree with this sentiment, but consider that an appropriately high standard of proof is built into the Terrestrial Ecology conditions (RTE1A to RTE7) and Ecology Management, Offset and Compensation conditions (REM1 to REM19), which will carry through to the EMP and future management actions.
144. The proposed plant schedules, for example, provide for a far greater diversity of indigenous plants than what currently exist within habitat types ITF4 and ITF6, including key mature phase canopy species that have largely been extirpated from the Manawatū Plains. Over time, planted areas will provide

birds with optimal food and habitat resources (i.e., more fruiting and flowering plant species, species that attract invertebrates for insectivorous birds). The eventual development of tall canopy species over a diverse sub-canopy and understorey plant species will provide functional bird habitat for range of indigenous forest bird species. Fauna values can be enhanced by undertaking predator control while the planted areas establish.

145. Mr Lambie reaffirms the importance of successfully undertaking direct transfer to wetland vegetation in relation to vulnerability of bird species,¹⁹ with which I agree.
146. The approach to the gravelfield (TG1) habitat warrants particular mention. Mr Lambie highlights how gravelfield has been assessed as having “very high” values for bird habitat in Table 6 of sub-appendix J.5, in contrast to the assessment of “moderate” made in Table J.3 of Technical Assessment J. Using the “very high” value for birds translates to a “moderate” level of effect.²⁰
147. I agree with Mr Lambie in the sense that the final residual effects of the loss of gravelfield cannot be fully determined until the bridge designs have been finalised. As Mr Lambie mentions in paragraph 52(d) of his report, the magnitude of effect could be lowered to “negligible” if the bridge abutments can avoid the loss of gravelfield or only result in very small habitat losses. In my opinion, it is appropriate to create a new condition that requires an accurate delineation of potential loss of gravelfield (and ecological response, if required) once the bridge designs have been completed. This is included in the updated proposed conditions as Condition RTE1C.

Reliance on buffer, landscape, and natural character plantings to mitigate effects on fauna

148. Mr Lambie sets out his understanding that the proposed buffering and linkage planting is needed to mitigate effects on fauna species.²¹ He makes the point that the “*buffer, landscape and natural character plantings are separate to the ecological offset plantings and yet are equally important for mitigating effects on fauna*”. He also refers to the fact that extensive areas of

¹⁹ Paragraph 52(b) of the Section 87F report.

²⁰ Paragraph 52(d) of the Section 87F report.

²¹ Paragraphs 66-77 of the Section 87F report.

landscape and natural character plantings and most of the buffer planting are on private land, and are therefore “*subject to landowner agreement*”.

149. Mr Lambie’s main concern appears to be that if buffer and landscape plantings are not implemented because landowners do not agree to them on their land, then the effects they seek to address are not mitigated as anticipated, leading to higher residual effects.²²

150. With respect to buffer planting specified in Condition RTE7, I note the following:

- a) Buffer planting around the southern remnant of ITF1 (Tawa forest) is entirely within the designation.
- b) Buffer planting around the northern remnant of ITF1 (Tawa forest) is entirely outside of the designation; however, given that this remnant is c.80 metres from the proposed state highway, I view the buffer as over and above what is required for mitigation purposes.
- c) Approximately 40% of the buffer planting around southern remnant of ITF2 (Tawa-kohekohe forest) is within the designation.
- d) While the northern remnant of ITF2 and ten-metre buffer planting is outside the designation, most of the proposed landscape planting is adjacent but within the designation and would form a useful buffer in its own right (up to 77 metres of planting between the ITF2 and the construction buffer).
- e) Most of the buffer for ITT07 (Tawa-titoki treeland) is within the designation. Importantly, the entire treeland will be surrounded by landscaping planting, creating a buffer of up to c.68 metres between ITT07 and the construction buffer.
- f) Arapaepae Bush, which supports five distinct habitat types (ITF7, MTF3, MTF6, MTF7 and MTF8), will be buffered by offset planting to the north and east, and landscape planting to the east and south. All of this planting is within the designation.

151. In summary, while not all proposed buffers are within the designation, I am confident that, in combination with the proposed landscape planting,²³ there

²² Paragraph 73 of the Section 87F report.

²³ Refer to the Planting Concept Plans (as updated and appended to the evidence of Mr Lister).

will be sufficient buffering provided within the designation to address edge effects and effects on fauna.

152. It is also important to note the importance of the terrestrial ecological offset planting and the establishment of a predator-free sanctuary in either Waiopahu Scenic Reserve or Arapaepae Bush in terms of mitigating the residual effects of a permanent barrier on less mobile fauna. Revegetation planting adjacent to Arapaepae Bush, for example, will not only buffer the existing remnant, but will also significantly increase its size and creating important local habitat for indigenous birds, lizards, and invertebrates. Again, this planting is all within the designation.
153. In addition, the proposed creation of up to seven hectares of open water and wetland habitat next to the Ohau River, together with constructed wetlands/stormwater ponds, will significantly increase habitat for indigenous waterfowl and wetland bird species as well as provide north-to-south stepping stone habitat. Again, these restoration works are within the designation.
154. With regards to linkages created by natural character planting (part of the broader landscape planting category as discussed in Mr Lister's evidence), I would emphasise that 23 hectares of the natural character planting falls within the designation, together with 100% of the required terrestrial offset planting²⁴ and a portion of the freshwater ecology offset planting. Combined, these areas of new plantings provide linkages and habitat along and adjacent to the proposed state highway.
155. Even if some areas outside the designation are not planted due to landowners' refusal to allow planting, the net outcome will still provide a buffer from road activity and a flight corridor for birds, together with a marked increase in connected habitat for less mobile fauna such as indigenous skinks and invertebrates.
156. As such, I do not agree that all buffer and landscape planting outside of the designation is required to mitigate effects on fauna, particularly in the context of the raft of other mitigation, offset and compensation measures already proposed for the Project. I am comfortable that effects will be appropriately

²⁴ This does not include wetland offset planting, most of which is outside of the designation in Te Ripo o Hinemata wetland.

addressed notwithstanding the retention of the 'subject to landowner approval' proviso.

Management of offset planting areas in perpetuity

157. Mr Lambie suggests that it would be useful to include a condition that requires ongoing pest animal and pest plant management in order to improve the level of certainty that the ecological values of a particular habitat will be retained in perpetuity. In addressing the submission of Forest & Bird, Mr Lambie reasons that *“because the planting (including landscape and natural character) address perpetual effects, it is reasonable that Waka Kotahi should be responsible for the annual control of invasive exotic weeds within the proposed designation and across all of the planting sites for the life of the highway”*.²⁵
158. I would emphasise that the fundamental nature of the terrestrial ecology offsetting is to plant / establish new habitat. The purpose of the proposed biodiversity offsetting is to establish self-sustaining terrestrial and wetland ecosystems that achieve net gains in biodiversity over time by establishing habitats that are larger, more diverse, and more structurally complex than those that have been removed. That can be distinguished from, for example, the proposed offset for the Mt Messenger project, which specifically included an in-perpetuity pest animal control programme to improve the value of existing indigenous forest habitat.
159. As I understand, there is no precedent for a roading project having to undertake pest management in perpetuity (where a 'planting offset' is proposed). For example, for Te Ahu a Turanga, the conditions require pest plant and animal management in the 'restoration and retirement' offset areas for a set period (generally ten years).²⁶ I note also that none of the areas to be removed within the Ō2NL Project footprint are currently managed for pest plants and animals.
160. In my opinion, to ensure the intended outcomes for the offset, the critical period for pest management – particularly pest plants - is during and up to the point where 90% canopy closure is achieved for terrestrial and wetland habitats after eight years (as per REM12). The modelled net-gain outcomes per the BOAM does not rely on in-perpetuity pest animal control.

²⁵ Paragraph 176 of the Section 87F report.

²⁶ Condition EC12 to the resource consent conditions as approved by the Environment Court.

161. If pest plants and animals are appropriately managed up until the 90% canopy closure standard is met, there is a high probability that the restored habitats will meet key measures used in the BOAMs within 15 years. Such measures include species richness in the canopy and sub-canopy and percentage cover of indigenous species in the understorey and ground tier. I revisit these measures below.
162. As a precautionary measure I am comfortable with adding a condition that requires an annual check of all planted sites for seven years following the eight years of more intensive pest management, i.e., up to year 15. This would be useful in the detection of shade-tolerant pest plant species such as tree privet, sweet cherry, and old man's beard that have the potential to establish in planted areas. This requirement has been added to proposed Condition REM19(e).
163. I do not consider such a condition is necessary to maintain vegetation within Te Ripo o Hinemata wetland or the wetland immediately to the west, both of which are outside the designation. The expectation is that the Manawatu Kukutauaki No. 3 Section 2E5 Trust, as custodian of the land, will take over the long-term management of the site once Waka Kotahi has met its obligations relating to wetland offset targets under REM12.

Matters relating to conditions

164. Beyond the general matters I have addressed above, Mr Lambie makes a number of specific comments in respect of the proposed conditions as they relate to terrestrial and wetland ecology. I respond to these points below, and my responses have been reflected in the updated proposed conditions of consent.
165. In paragraph 123 of his report, Mr Lambie notes that significant exotic-dominated wetlands of Paruaauku Swamp need be to split from the non-significant exotic-dominated wetlands to ensure there is no more loss of the significant wetlands than is already estimated. As discussed above, I am comfortable with listing the area for each significant wetland vegetation type in Table RTE1 (with non-significant wetland vegetation types aggregated).
166. In paragraph 124 of this report, Mr Lambie correctly identifies that Māhoe forest and scrub includes vegetation types ITS1, ITS1d, MTS4, and MTF6d – in addition to ITF4. I support this recommendation for these vegetation types to be listed in Table RTE1.

167. Regarding Mr Lambie's comment on RTE1(b),²⁷ I am supportive of the intent of the physical delineation which is to 'ensure no clearance or trampling of habitat that is to be retained', although I do not think that this need be written into the condition, i.e., it is implied that by delineating the habitats, they will be protected from human disturbances.
168. In response to Mr Lambie's comment on Condition RTE2 in regard to reference to gravelfield habitat rather braided rivers.²⁸ I propose replacing "braided river beds" with "gravelfield habitats (TG1)" in clause (a).
169. I am supportive of Mr Lambie's recommendation to change the wording of RTE4 with regards to New Zealand pipit and height of rank grass.²⁹
170. Mr Lambie makes the recommendation that REM4 should specify that all new plantings of myrtle species (e.g., kānuka and mānuka) undertaken as part of the Ō2NL Project must come from nurseries that are certified myrtle rust-free.³⁰ I agree with his recommendation, although there does not appear to be a government-certified scheme for managing myrtle rust in New Zealand. There is, however, a voluntary biosecurity certification scheme called Plant Pass offered by New Zealand Plant Producers.³¹ Plant Pass certification ensures nurseries meet myrtle rust and all other biosecurity requirements. I am supportive of including a condition that requires nurseries to belong to such a scheme in order to reduce the risk of introducing myrtle rust to planting sites within the Project area.
171. I acknowledge the threat posed by pest plant species listed in the Regional Pest Management Plans as well as those identified in Technical Assessment J; however, I am confident that pest plant incursions can be appropriately addressed in the Ecology Management Plan, i.e., through management actions such as site preparation, site maintenance, and ongoing monitoring. As such, I am not supportive of Mr Lambie's recommendation to include in REM4 pest plant species that are listed in the Regional Pest Management Plans as well as those identified in paragraph 131 of his report.
172. Mr Lambie proposes that the indigenous shrub species, poroporo (*Solanum aviculare* var. *aviculare*), is replaced at a 1:1 ratio if plants are lost during vegetation clearance.³² Given that this species was recorded from at least

²⁷ Paragraph 125 of the Section 87F report.

²⁸ Paragraph 126 of the Section 87F report.

²⁹ Paragraph 128 of the Section 87F report.

³⁰ Paragraph 132 of the Section 87F report.

³¹ <https://nzppi.co.nz/Management-of-myrtle-rust-in-the-nursery/19776-7a0d2cf2-6fdb-4d14-be4f-670395185961/>.

³² Paragraphs 61 and 137 of the Section 87F report.

two habitat types during the preliminary vegetation survey, and it has a threat ranking of 'Threatened – Nationally Vulnerable', I am supportive of a condition for the replacement of sapling and mature *Solanum aviculare* var. *aviculare* plants at least one metre tall. I suggest this is included as a third clause to REM8.

173. In paragraph 138 of this report, Mr Lambie suggests that the 0.25-hectare replacement of the 0.12-hectare loss of raupō reedland must be provided by way of condition, and that it would be appropriate to include this in Table REM9. I note that specific reference to the loss and offset of raupō reedland is already included in Table REM12 (Performance Targets). The quantum of wetland habitat removal (3.5 hectares) listed in Table REM9 includes the loss of raupō reedland; however, the restoration offset (4.65 hectares) has erroneously omitted the amount required to offset the raupō reedland. Table REM12 has been updated by changing '4.65 ha of wetland restoration' to '4.9 ha of wetland restoration'.
174. I am happy to include reference to mitigation planting in REM12, as suggested by Mr Lambie in paragraph 141 of his report.
175. I am supportive of including the requirement for eco-sourcing plants in REM7, REM8, and REM9, as suggested by Mr Lambie in paragraph 140 of his report.
176. Mr Lambie suggests that REM17 should allow for a reduction in the recalculated area as a result of avoiding the relevant habitats through design.³³ I do not consider a change to the condition is required given that any reduction in habitat loss implies that avoidance has been achieved.
177. Mr Lambie's suggests that Ecology Offset Site Layout Plans should be subject to certification (REM14).³⁴ I do not think certification is necessary: the Site Layout Plans will show how Waka Kotahi will implement the offset measures. The offsetting monitoring and reporting condition (REM19) ensures that the Regional Councils will have direct oversight of the progress made by Waka Kotahi in successfully implementing the offset scheme, by reference to the performance targets in REM12.

³³ Paragraphs 93 and 143 of the Section 87F report.

³⁴ Paragraph 142 of the Section 87F report.

178. I am supportive of including the requirement for eco-sourcing plants in REM7, REM8, and REM9 as suggested by Mr Lambie in paragraph 140 of his report.

179. With regard to the objectives of REM19, Mr Lambie claims that monitoring report dates in REM19(a) are potentially unclear given planting is to be completed in stages across multiple years. For clarity, I suggest amending the condition to refer to the planting areas that will be identified in the Ecology Management Plan as per below:

"a) Monitoring reports must be prepared and provided to the Regional Council for each planting area as identified in the Ecology Management Plan in the third, fifth, and fifteenth year from planting following the completion of the measures required by Condition REM6 and Condition REM11 as part of the Annual Report required by Condition RGA3."

180. Mr Lambie also expresses concern about the potential for ceasing further site maintenance (and success measurement) at Year 8, without objective evidence that net gain is attainable.³⁵ He goes on to say that "to prevent premature cessation of maintenance, REM 19 needs to make more explicit reference to each of the measures that may realistically start to indicate net gain by year 8 and a further term of assessment at year 25 (for forests)".

181. I am supportive of including the specific measures in REM19 that can serve as milestones for achieving net gain, although I suggest limiting the final endpoint to 15 years as 25 years is a relatively long time after the decision-making has taken place. Based on my experience with small and large-scale revegetation projects, including wetland restoration, I am confident that after 15 years the trajectory of the offset planting sites will be sufficiently demonstrated.

182. I suggest that the following targets are listed in REM19 together with their time to endpoint (as per the BOAMs):

- a) 90% canopy cover by Year 8 (terrestrial and wetland offset sites);
- b) Presence of 10 canopy plant species by Year 8 (terrestrial offset sites);
- c) Presence of 12 sub-canopy plant species by Year 15 (terrestrial offset sites);

³⁵ Paragraph 177 of the Section 87F report.

- d) 70% cover of indigenous understorey and ground tier species by Year 15 (terrestrial offset sites);
- e) 80% cover of raupō reedland cover following direct transfer by Year 8
- f) 80% canopy cover of raupō reedland following direct transfer by Year 8; and
- g) 80% canopy cover of indigenous-dominated fernland and rautahi sedgeland following direct transfer by Year 8.

183. With regard to condition RWB3, Mr Lambie requests that where plantings are required to mitigate the local effect on the natural character of wetlands or provide for improved ecological linkages, they should not be subject to approval of landowners. I defer to the Project's landscape architect, Mr Gavin Lister, to address this issue.

184. I am comfortable with Mr Lambie's recommendation that the performance standards in RWB3(a)(ii) and DLV1(b)³⁶ are revised to be consistent with the performance standards for terrestrial and wetland offsets as per REM12.

Matters relating to submissions

185. Beyond the matters I have discussed above, I address specific additional comments Mr Lambie makes on the Prouse and Forest & Bird submissions below.

186. With regard to the Prouse property (#479), Mr Lambie states that the absence of a buffer along the western forest edge does not align with the recommendations made in the technical ecological assessments, mainly in reference to mitigating edge effects on ornate skinks and indigenous land snails³⁷. I acknowledge the presence of ornate skinks (and possibly indigenous land snails) at the property; however, I do not consider a buffer is necessary for a remnant of exotic forest (ETF4) assessed as having 'moderate' ecological value. Furthermore, this habitat already supports abundant tradescantia in the ground tier, an exotic plant species that provides optimal habitat for indigenous skinks and snails in terms of microclimate requirements, food resources, and protection from predators.

³⁶ Paragraphs 146 and 147 of the Section 87F report.

³⁷ Paragraphs 165-167 of the Section 87F report.

187. With regard to the submission made by Forest & Bird, it is Mr Lambie's opinion that REM12 should address the improved ecological linkages sought through landscape and natural character planting³⁸. I consider that the performance standards in RWB3 and DVL1 are sufficient to ensure the success of the natural character and landscape plantings respectively. Although natural character and landscape plantings can form beneficial ecological linkages and buffers, it is my view that REM12 should only deal with the mitigation and offsetting of impacted vegetation.

Nicholas Paul Goldwater

4 July 2023

³⁸ Paragraph 175 of the Section 87F report.

APPENDIX A – REVISED TABLE J.2

Table J.2: Assessment of statutory significance for terrestrial and wetland vegetation and habitat types for the Ō2NL Project Area (updated row highlighted).

Vegetation/Habitat Type			Area within Project designations (in bold if within construction footprint)	Horizons One Plan (Horizons 2014)		GWRC Regional Policy Statement
Vegetation/Habitat Type	Equivalent Vegetation Type Listed in Table F.1 in Schedule F and Threat Classification Horizons One Plan	Equivalent Terrestrial Ecosystem Type Listed in Forest Ecosystems of the Wellington Region and Their Threat Classification (Greater Wellington Regional Council 2018)		Schedule F	Policy 13-5	Policy 23
ITF1 - Tawa forest	Hardwood/broadleaved species forest or treeland Threatened	NA	1.79 ha	Significant (Table F.2(a):(i)(a))	Significant (a)(i)(A)	NA
ITF2 - Tawa-kohekohe forest remnants	NA	MF6, Kohekohe, tawa forest Endangered	2.62 ha	NA	NA	Significant (a)(i), (b), (c)
ITF3 - Kohekohe-tītōki-karamū forest	Riparian margin At Risk	NA	0.03 ha	Significant (Table F.2(a):(v))	Significant (a)(iii)(B)	NA
ITF4 - Māhoe forest and scrub	Does not represent any of the forest definitions outlined in Schedule F Not Threatened	NA	0.27 ha 0.03 ha	Not significant	Not significant	NA
ITF5 - Puka-kōhūhū forest	NA	Does not represent any of the forest types outlined in Forest Ecosystems of the Wellington Region (GWRC 2018) Not Threatened	0.64 ha	NA	NA	Significant (d)(i)
ITF6 - Tarata-rewarewa forest	NA	Does not represent any of the forest types outlined in Forest Ecosystems of the Wellington Region (GWRC 2018) Not Threatened	0.4 ha 0.04 ha	NA	NA	Not significant
ITF7 - Tītōki forest	Indigenous forest or scrub containing <i>Powelliphanta</i> land snails At Risk	NA	0.20 ha	Significant (Table F.2(a):(iv))	Significant (a)(ii)(A)	NA
ITS1, ITS1d - Māhoe-karamū scrub	Does not represent any of the scrub definitions outlined in Schedule F Not Threatened	NA	ITS1 0.53 ha 0.18 ha ITS1d 1.47 ha 0.37 ha	Not significant	Not significant	NA
ITT01 - Kāmahi-kānuka treeland	Does not represent any of the treeland definitions outlined in Schedule F Not Threatened	NA	0.01 ha 0.004 ha	Not significant	Not significant	NA
ITT02 - Karaka-tawa treeland	Does not represent any of the treeland definitions outlined in Schedule F (due to abundance of karaka) Not Threatened	NA	0.16 ha	Not significant	Not significant	NA
ITT03, ITT03d - Planted indigenous treeland	Does not represent any of the treeland definitions outlined in Schedule F Not Threatened	0.01 ha (42) is in the Greater Wellington Region and does not represent any of the forest types outlined in Forest Ecosystems of the Wellington Region (GWRC 2018) Not Threatened	ITT03 0.03 ha 0.32 ha ITT03d 0.12 ha	Not significant	Not significant	Not significant
ITT04 - Tī kōuka treeland	Does not represent any of the treeland definitions outlined in Schedule F Not Threatened	NA	0.01 ha	Not significant	Not significant	NA
ITT05 - Tītōki treeland	Hardwood/broadleaved species forest or treeland. Threatened	NA	0.001 ha 0.003 ha	Not significant	Not significant	NA
ITT06 - Tītōki-hīnau-maire treeland	Hardwood/broadleaved species forest or treeland. Threatened	NA	0.03 ha	Not significant	Not significant	NA

Vegetation/Habitat Type			Area within Project designations (in bold if within construction footprint)	Horizons One Plan (Horizons 2014)		GWRC Regional Policy Statement
Vegetation/Habitat Type	Equivalent Vegetation Type Listed in Table F.1 in Schedule F and Threat Classification Horizons One Plan	Equivalent Terrestrial Ecosystem Type Listed in Forest Ecosystems of the Wellington Region and Their Threat Classification (Greater Wellington Regional Council 2018)		Schedule F	Policy 13-5	Policy 23
ITT07 - Tawa-tītoki treeland	Hardwood/broadleaved species forest or treeland. Threatened	NA	0.71 ha	Not significant	Significant (a)(i)(A)	NA
ITFn01 - Kiokio fernland	NA	Does not represent any of the terrestrial ecosystem types outlined in Forest Ecosystems of the Wellington Region (GWRC 2018) Not Threatened	0.03 ha	NA	NA	Not significant
MTF1 - Māhoe-barberry- <i>Muehlenbeckia australis</i> forest and scrub	Does not represent any of the forest and scrub definitions outlined in Schedule F Not Threatened	NA	0.09 ha	Not significant	Not significant	NA
MTF2 - Māhoe-sweet cherry scrub and forest	Does not represent any of the forest and scrub definitions outlined in Schedule F Not Threatened	NA	0.03 ha 0.14 ha	Not significant	Not significant	NA
MTF3 - False acacia-tītoki-cherry forest	Does not represent any of the forest definitions outlined in Schedule F Not Threatened	NA	0.35 ha	Not significant	Significant (a)(ii)(A)	NA
MTF4 - Crack willow-māhoe forest/scrub	Riparian margin At Risk	NA	0.08 ha	Significant (Table F.2(a):(v))	Significant (a)(iii)(B)	NA
MTF5 - Mixed indigenous-exotic planted forest	Does not represent any of the forest definitions outlined in Schedule F Not Threatened	Does not represent any of the terrestrial ecosystem types outlined in Forest Ecosystems of the Wellington Region (GWRC 2018) Not Threatened	0.52 ha 1.24 ha	Not significant	Not significant	Not significant
MTF6 - Karaka-māhoe-kawakawa forest and scrub	Indigenous forest or scrub containing <i>Powelliphanta</i> land snails At Risk	NA	0.07 ha	Significant (Table F.2(a):(iv))	Significant (a)(ii)(A)	NA
MTF6d - Karaka-māhoe-kawakawa forest and scrub (desktop only)	Does not represent any of the forest definitions outlined in Schedule F Not Threatened	NA	0.47 ha 0.20 ha	Not Significant	Not Significant	NA
MTF7 - Tītoki-karaka forest	Indigenous forest or scrub containing <i>Powelliphanta</i> land snails At Risk	NA	0.15 ha	Significant (Table F.2(a):(iv))	Significant (a)(ii)(A)	NA
MTF8 - Tītoki-false acacia-poataniwha-karaka forest	Does not represent any of the forest definitions outlined in Schedule F Not Threatened	NA	0.34 ha	Not significant	Significant (a)(ii)(A)	NA
MTS1 - Māhoe-karo scrub with emergent pine	NA	NA	0.37 ha	NA	NA	Significant (d)(i)
MTS2 - Barberry scrub with emergent tōtara	Does not represent any of the scrub definitions outlined in Schedule F Not Threatened	NA	0.07 ha	Not significant	Not significant	NA
MTS3 - Barberry-Blackberry- <i>Muehlenbeckia australis</i> -greater bindweed-(māhoe) scrub	Does not represent any of the scrub definitions outlined in Schedule F Not Threatened	NA	0.09 ha 0.001 ha	Not significant	Not significant	NA
MTS4 - Māhoe-mamaku-blackberry-barberry scrub	Does not represent any of the scrub definitions outlined in Schedule F Not Threatened	NA	0.06 ha	Not significant	Not significant	NA
ETF1 - Crack willow forest/scrub (riparian with Wainuia land snails)	Riparian margin At Risk	NA	0.40 ha 0.73 ha	Significant (Table F.2(a):(v))	Significant (a)(iii)(B)	NA
ETF2 - Eucalyptus forest	Does not represent any of the scrub definitions outlined in Schedule F Not Threatened	NA	0.30 ha 0.78 ha	Not significant	Not significant	NA

Vegetation/Habitat Type			Area within Project designations (in bold if within construction footprint)	Horizons One Plan (Horizons 2014)		GWRC Regional Policy Statement
Vegetation/Habitat Type	Equivalent Vegetation Type Listed in Table F.1 in Schedule F and Threat Classification Horizons One Plan	Equivalent Terrestrial Ecosystem Type Listed in Forest Ecosystems of the Wellington Region and Their Threat Classification (Greater Wellington Regional Council 2018)		Schedule F	Policy 13-5	Policy 23
ETF3 - Radiata pine forest	Does not represent any of the scrub definitions outlined in Schedule F Not Threatened	NA	0.21 ha 2.75 ha	Not significant	Not significant	NA
ETF3 - Radiata pine forest (riparian)	Riparian margin At Risk	NA	0.05 ha	Significant (Table F.2(a):(v))	Significant (a)(iii)(B)	NA
ETF4, ETF4d - Exotic treeland and forest	Does not represent any of the scrub definitions outlined in Schedule F Not Threatened	Does not represent any of the terrestrial ecosystem types outlined in Forest Ecosystems of the Wellington Region (GWRC 2018) Not Threatened	ETF4 5.90 ha 3.85 ha ETF4d 06.65 ha	Not significant	Not significant	Not significant
ETF5 - Sweet cherry forest	Does not represent any of the forest definitions outlined in Schedule F Not Threatened	NA	0.05 ha	Not significant	Significant (a)(ii)(A)	NA
ETF6 - Redwood forest	Does not represent any of the forest definitions outlined in Schedule F Not Threatened	NA	0.31 ha	Not significant	Significant (a)(ii)(A)	NA
ETF7 - False acacia-karaka forest	Does not represent any of the forest definitions outlined in Schedule F Not Threatened	NA	1.24 ha	Not significant	Significant (a)(ii)(A)	NA
ETF8 - Macrocarpa-radiata pine-false acacia forest	Does not represent any of the forest definitions outlined in Schedule F Not Threatened	NA	1.00 ha	Not significant	Significant (a)(ii)(A)	NA
ETG1 - Rank grassland	Does not represent any of the forest definitions outlined in Schedule F Not Threatened	NA	0.48 ha 0.40 ha	Not significant	Not significant	NA
ETS1 - Crack willow-brush wattle-tree lucerne scrub	Riparian margin At Risk	NA	0.17 ha	Significant (Table F.2(a):(v))	Significant (a)(iii)(B)	NA
ETS2 - Gorse scrub	Riparian margin At Risk	NA	0.01 ha 0.09 ha	Significant (Table F.2(a):(v))	Significant (a)(iii)(B)	NA
ETS3 - Gorse-pampas shrubland	Does not represent any of the forest definitions outlined in Schedule F Not Threatened	NA	0.26 ha	Not significant	Not significant	NA
ETV1 - Blackberry vineland	Does not represent any of the forest definitions outlined in Schedule F Not Threatened	Does not represent any of the terrestrial ecosystem types outlined in Forest Ecosystems of the Wellington Region (GWRC 2018) Not Threatened	0.93 ha 0.39 ha	Not significant	Not significant	Not significant
IWFn1 - Bracken-whēkī fernland on valley floor (Paruauku Swamp)	NA	NA	0.03 ha	NA	NA	Significant (a)(i), (b), (d)(i)
IWRe1 - Raupō reedland on valley floor	Swamp and marsh wetland Threatened	NA	0.12 ha	Significant (Table F.2(a):(viii))	Significant (a)(i)(A), (a)(ii)(A)	NA
IWSe1 - <i>Isolepis prolifer</i> a sedgeland on the valley floor	Swamp and marsh wetland Threatened	NA	0.02 ha 0.002 ha	Not significant	Significant (a)(i)(A)	NA
IWSe1-SPG, IWSe1d-SPG - <i>Isolepis prolifer</i> a sedgeland within a seepage wetland	Seepage and spring wetland Rare	NA	IWSe1-SPG 0.08 ha 0.10 ha IWSe1d-SPG 0.12 ha	The 0.18 ha and 0.10 ha areas of seepage and spring wetland is significant (Table F.2(a):(xi))	Significant (a)(i)(A), (a)(ii)(A), (a)(ii)(E)	NA
IWSe2 - <i>Isolepis prolifer</i> a-kiokio-spike sedge sedgeland on valley floor	Swamp and marsh wetland Threatened	NA	0.11 ha	Significant (Table F.2(a):(viii))	Significant (a)(i)(A)	NA

Vegetation/Habitat Type			Area within Project designations (in bold if within construction footprint)	Horizons One Plan (Horizons 2014)		GWRC Regional Policy Statement
Vegetation/Habitat Type	Equivalent Vegetation Type Listed in Table F.1 in Schedule F and Threat Classification Horizons One Plan	Equivalent Terrestrial Ecosystem Type Listed in Forest Ecosystems of the Wellington Region and Their Threat Classification (Greater Wellington Regional Council 2018)		Schedule F	Policy 13-5	Policy 23
IWSe3 - Rautahi sedgeland on valley floor (Paruauku Swamp)	NA	NA	0.07 ha 0.02 ha	NA	NA	Significant (a)(i), (b)
IWSe4 - <i>Isolepis prolifera</i> - <i>Juncus planifolius</i> sedgeland on valley floor (Paruauku Swamp)	NA	NA	0.001 ha	NA	NA	Significant (a)(i), (b), (d)(i)
IWSe5 - Kiokio-spike sedge-kāpūngāwhā sedgeland on valley floor (Paruauku Swamp)	NA	NA	0.04 ha 0.01 ha	NA	NA	Significant (a)(i), (b), (d)(i)
MWFn1 - Kiokio-spike sedge-Yorkshire fog fernland on valley floor (Paruauku Swamp)	NA	NA	0.07 ha 0.01 ha	NA	NA	Significant (a)(i), (d)(i)
MWSe1 - SPG, MWSe1-SPGd - <i>Isolepis prolifera</i> -soft rush sedgeland within a seepage wetland	NA	NA	MWSe1-SPG 0.04 ha 0.01 ha MWSe1-SPGd 0.02 ha	NA	NA	Significant (a)(i), (b)
MWSe2 - <i>Isolepis prolifera</i> -floating sweet grass sedgeland on valley floor	Swamp and marsh wetland Threatened	NA	0.01 ha 0.02 ha	Not significant	Significant (a)(i)(A)	NA
MWSe3 - <i>Isolepis prolifera</i> -Mercer grass sedgeland in oxbow wetland	Does not represent any of the wetland definitions outlined in Schedule F Not Threatened	NA	0.09 ha	Not significant	Not significant	NA
MWSe3 - <i>Isolepis prolifera</i> -Mercer grass sedgeland on valley floor	Does not represent any of the wetland definitions outlined in Schedule F Not Threatened	NA	0.01 ha	Not significant	Not significant	NA
MWSe4 - Pūrei-spike sedge-Yorkshire fog sedgeland on valley floor (Paruauku Swamp)	NA	NA	0.006 ha	NA	NA	Significant (a)(i), (b)
MWG1 - Yorkshire fog- <i>Isolepis prolifera</i> -spike sedge grassland on valley floor	Does not represent any of the wetland definitions outlined in Schedule F Not Threatened	NA	0.02 ha	Not significant	Not significant	NA
MWG1d - Mixed wetland species grassland on valley floor	Does not represent any of the wetland definitions outlined in Schedule F Not Threatened	NA	0.39 ha 0.37 ha	Not significant	Not significant	Significant (a)(i), (b)
MWG2 - Yorkshire fog-spike sedge grassland on valley floor (Paruauku Swamp)	NA	NA	0.19 ha 0.13 ha	NA	NA	Significant (a)(i), (b)
MWG3 - Yorkshire fog- <i>Isolepis prolifera</i> grassland on valley floor	Does not represent any of the wetland definitions outlined in Schedule F Not Threatened	NA	0.02 ha 0.11 ha	Not significant	Not significant	NA
MWV1 - Blackberry-spike sedge vineland on valley floor	Does not represent any of the wetland definitions outlined in Schedule F Not Threatened	NA	0.02 ha	Not significant	Not significant	NA
MWRs1 - Soft rush/Yorkshire fog-spike sedge rushland (Paruauku Swamp)	NA	NA	0.01 ha	NA	NA	Significant (a)(i), (b)
EWf1 - Crack willow forest on valley floor (Paruauku Swamp)	NA	NA	0.01 ha 0.02 ha	NA	NA	Significant (a)(i), (b), (d)(i)
EWG1 - Floating sweet grass grassland on valley floor	Does not represent any of the wetland habitat definitions outlined in Schedule F Not Threatened	NA	0.03 ha 0.03 ha	Not significant	Not significant	NA
EWG2 - Mercer grass grassland on valley floor	Does not represent any of the wetland habitat definitions outlined in Schedule F Not Threatened	NA	0.11 ha	Not significant	Not significant	NA

Vegetation/Habitat Type			Area within Project designations (in bold if within construction footprint)	Horizons One Plan (Horizons 2014)		GWRC Regional Policy Statement
Vegetation/Habitat Type	Equivalent Vegetation Type Listed in Table F.1 in Schedule F and Threat Classification Horizons One Plan	Equivalent Terrestrial Ecosystem Type Listed in Forest Ecosystems of the Wellington Region and Their Threat Classification (Greater Wellington Regional Council 2018)		Schedule F	Policy 13-5	Policy 23
EWG3 - Blue sweetgrass-creeping buttercup grassland on valley floor	Does not represent any of the wetland habitat definitions outlined in Schedule F Not Threatened	NA	0.01 ha	Not significant	Not significant	NA
EWG4 - Mercer grass-water pepper grassland on valley floor	NA	NA	0.05 ha	NA	NA	Significant (a)(i), (b)
EWG5 - Yorkshire fog-creeping buttercup grassland on valley floor	NA	NA	0.01 ha	NA	NA	Significant (a)(i), (b)
EWG6 - Yorkshire fog-creeping buttercup-Mercer grass grassland on valley floor	Does not represent any of the wetland habitat definitions outlined in Schedule F Not Threatened	NA	0.04 ha 0.03 ha	Not significant	Not significant	NA
EWG7 - Creeping bent grassland on valley floor	Does not represent any of the wetland habitat definitions outlined in Schedule F Not Threatened	NA	0.08 ha 0.02 ha	Not significant	Not significant	NA
EWG8 - Soft rush/Yorkshire fog-creeping buttercup grassland on valley floor	Does not represent any of the wetland habitat definitions outlined in Schedule F Not Threatened	NA	0.02 ha 0.008 ha	Not significant	Not significant	NA
EWG9 - Mercer grass-open water grassland on valley floor	Does not represent any of the wetland habitat definitions outlined in Schedule F Not Threatened	NA	0.002 ha 0.02 ha	Not significant	Not significant	NA
EWG1d - Exotic grassland in wetland on valley floor	Does not represent any of the wetland habitat definitions outlined in Schedule F Not Threatened	NA	0.09 ha 0.04 ha	Not significant	Not significant	NA
MWH1 - Water celery-kikuyu- <i>Isolepis prolifera</i> herbfield on valley floor	Does not represent any of the wetland habitat definitions outlined in Schedule F Not Threatened	NA	0.01 ha 0.002 ha	Not significant	Not significant	NA
EWH1 - Creeping buttercup herbfield on valley floor (Paruauku Swamp)	NA	NA	0.01 ha 0.06 ha	NA	NA	Significant (a)(i), (b)
EWH1d - Creeping buttercup herbfield on valley floor	Does not represent any of the wetland habitat definitions outlined in Schedule F Not Threatened	NA	0.05 ha 0.73 ha	Not significant	Not significant	NA
EWH2 - Creeping buttercup-water pepper herbfield on valley floor	Does not represent any of the wetland habitat definitions outlined in Schedule F Not Threatened	NA	0.05 ha 0.05 ha	Not significant	Not significant	NA
EWH3 - Water celery herbfield on valley floor (Paruauku Swamp)	NA	NA	0.35 ha 0.17 ha	Not significant	Not significant	Significant (a)(i), (b)
EWH4 - Herbfields dominated by water celery on valley floors	Does not represent any of the wetland habitat definitions outlined in Schedule F Not Threatened	NA	0.06 ha	Not significant	Not significant	NA
EWH5 - Water pepper herbfield on valley floor (Paruauku Swamp)	NA	NA	0.07 ha 0.003 ha	Not significant	Not significant	Significant (a)(i), (b)
EWH6 - Herbfield dominated by water pepper herbfield on valley floors	Does not represent any of the wetland habitat definitions outlined in Schedule F Not Threatened	NA	0.03 ha	Not significant	Not significant	Significant (a)(i), (b)
EWH7 - Water pepper-Mercer grass herbfield on valley floor	Does not represent any of the wetland habitat definitions outlined in Schedule F Not Threatened	NA	0.01 ha	Not significant	Not significant	NA

Vegetation/Habitat Type			Area within Project designations (in bold if within construction footprint)	Horizons One Plan (Horizons 2014)		GWRC Regional Policy Statement
Vegetation/Habitat Type	Equivalent Vegetation Type Listed in Table F.1 in Schedule F and Threat Classification Horizons One Plan	Equivalent Terrestrial Ecosystem Type Listed in Forest Ecosystems of the Wellington Region and Their Threat Classification (Greater Wellington Regional Council 2018)		Schedule F	Policy 13-5	Policy 23
EWH8 - Broadleaved fleabane/Yorkshire fog herbfield on valley floor (Paruauku Swamp)	NA	NA	0.004 ha 0.006 ha	NA	NA	Significant (a)(i), (b)
EWH9, EWH9d - Exotic dominant wetland on valley floor	Does not represent any of the wetland habitat definitions outlined in Schedule F Not Threatened	NA	EWH9 0.41 ha 0.03 ha EWH9d 0.32 ha	Not significant	Not significant	NA
EWH10, EWH10d - Soft rush/creeping buttercup-Yorkshire fog-Mercer grass herbfield on valley floor	Does not represent any of the wetland habitat definitions outlined in Schedule F Not Threatened	NA	EWH10 0.05 ha 0.01 ha EWH10d 0.01 ha 0.11 ha	Not significant	Not significant	Significant (a)(i), (b)
EWRs1, EWRs1d - Soft rush rushland on valley floor	Does not represent any of the wetland habitat definitions outlined in Schedule F Not Threatened	NA	EWRs1 0.05 ha 0.07 ha EWRs1d 0.004 ha 1.48 ha	Not significant	Not significant	NA
EWRs2 - Soft rush-creeping buttercup-Yorkshire fog rushland on valley floor (Paruauku Swamp)	NA	NA	0.007 ha	NA	NA	Significant (a)(i), (b)
EWRs3 - Soft rush-Yorkshire fog rushland (Paruauku Swamp)	NA	NA	0.03 ha 0.13 ha	NA	NA	Significant (a)(i), (b)
OW - Open water with New Zealand dabchick	Does not represent any of the habitat definitions outlined in Schedule F Not Threatened	NA	0.21 ha	NA	Significant (a)(ii)(A)	NA
OW - Open water	Does not represent any of the habitat definitions outlined in Schedule F Not Threatened	NA	0.12 ha 0.62 ha	Not significant	Not significant	Not significant
TG1 - Gravelfield	Does not represent any of the habitat definitions outlined in Schedule F Not Threatened	NA	0.37 ha 0.80 ha	Not significant	Significant (a)(i)(A), (a)(iii)(A), (a)(ii)(B)	NA
EHG - House, gardens and farm buildings	Does not represent any of the habitat definitions outlined in Schedule F Not Threatened	Does not represent any of the terrestrial ecosystem types outlined in Forest Ecosystems of the Wellington Region (GWRC 2018) Not Threatened	12.33 ha 10.39 ha	Not significant	Not significant	Not significant
ETP - Cropping pasture	Does not represent any of the habitat definitions outlined in Schedule F Not Threatened	Does not represent any of the terrestrial ecosystem types outlined in Forest Ecosystems of the Wellington Region (GWRC 2018) Not Threatened	312.79 ha	Not significant	Not significant	Not significant
RRR - River/road/rail	Does not represent any of the habitat definitions outlined in Schedule F Not Threatened	Does not represent any of the terrestrial ecosystem types outlined in Forest Ecosystems of the Wellington Region (GWRC 2018) Not Threatened	7.37 ha 4.52 ha	Not significant	Not significant	Not significant
QRY - Quarry	Does not represent any of the habitat definitions outlined in Schedule F Not Threatened	Does not represent any of the terrestrial ecosystem types outlined in Forest Ecosystems of the Wellington Region (GWRC 2018) Not Threatened	0.09 ha 0.78 ha	Not significant	Not significant	Not significant

