



16 August 2022

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Our Ref: HDC.00607

Dear Leigh

Initial Terrestrial Ecology Section 92 questions: Waihi North Mine Application by Oceana Gold NZ Ltd

1. INTRODUCTION

1.1. This document sets out the Section 92 questions of Mr Gerry Kessels and Dr Matt Baber on terrestrial ecology in relation to the Waihi North Project (WNP) as informed by the available documentation and a site visit undertaken on 28-29 July, 2022. The documents reviewed include:

- Waihi North Biodiversity Project Consultation Document The Ecology Company (2021)
- Waihi North Project Assessment of Terrestrial Ecological Values and Effects Bioresearches (June 2022)
- Waihi North Project - Terrestrial Ecology Values and Effects of the WUG Boffa Miskell (2022a)
- Terrestrial Ecology Mitigation, Restoration and Offset Plan for Waihi North project (Waihi Area) Bioresearches (2022b)
- Frogs Memorandum: OGNZL Wharekairauponga frogs: Potential adverse ecological effects RMA Ecology (2022)
- Bioresearches Frogs Memorandum: Vibration effects on amphibians (Leiopelmatid frogs) Bioresearches (2022b)
- Frogs Pest Animal Management Plan – Wharekairauponga Compensation Package Boffa Miskell (2022c)
- Estimating the Proportion of the Coromandel's Archey's Frog Population in the Area Affected by Vibrations from the Proposed Wharekairauponga Mine Lloyd (2022)
- Waihi North Project – Assessment of Environmental Effects - Lighting Assessment Pederson Read (2022)

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- Waihi North Project - Blasting and Vibration Assessment Heilig (2022)
- Waihi North Project - Landscape, Natural Character and Visual Effects Assessment Boffa Miskell (2022)
- Waihi North Project - Assessment of Noise Effects Marshall Day (2022)
- Terrestrial Ecology (TSF3, NRS, GOP) Waihi North Project - Assessment of Terrestrial Ecological Values and Effects Bioresarches (2022)
- Terrestrial Ecology Terrestrial Ecology Mitigation, Restoration and Offset Plan for Waihi North project (Waihi Area) Bioresarches (2022a)
- Terrestrial Ecology (WUG) Waihi North Project - Terrestrial Ecology Values and Effects of the WUG Boffa Miskell (2022b)
- Frogs Memorandum: OGNZL Wharekirauponga frogs: Potential adverse ecological effects RMA Ecology (2022)
- Frogs Memorandum: Vibration effects on amphibians (Leiopelmatid frogs) Bioresarches (2022b)
- Frogs Pest Animal Management Plan – Wharekirauponga Compensation Package Boffa Miskell (2022c)
- Frogs Estimating the Proportion of the Coromandel’s Archey’s Frog Population in the Area Affected by Vibrations from the Proposed Wharekirauponga Mine, Lloyd (2022)
- Ecology and Landscape Management Plan (ELMP) - Waihi North Project 2022, Oceana Gold (May 2022)
- Waihi North Project Resource Consent Application and Assessment of Environmental Effects, Oceana Gold (June 2022), including Part E (proposed consent conditions for the WNP)

1.2. The sites and proposed activities assessed and abbreviations used in this review are consistent with the applicant’s ecological reports as follows:

- A new underground mine at Wharekirauponga (WUG) located approximately 10 km north of Waihi, under land administered by the Department of Conservation (DOC) (Coromandel Forest Park).
- A Surface Facilities Area (SFA), rock stockpile on farmland (owned by OGNZL), and a portal at Willows Road where underground access to the orebody is initiated.
- A services trench from Willows Rd to the existing processing plant at Waihi (any impacts from this will be temporary and remediated through backfilling and revegetation);
- Gladstone Open Pit (GOP), a new open pit located to the south of the existing Waihi processing plant, with associated works to afford post-mining conversion to a tailings storage facility;
- Northern Rock Stack (NRS), a new rock stockpile area located north of the existing Tailings Storage Facilities and Processing Plant; and

- Tailings Storage Facility 3 (TSF3), a new tailings impoundment located to the east of the existing tailings facilities.

1.3. We set out S92 questions under the following sub-headings:

- General matters
- The desktop and field investigations
- The description and assessment of ecological values
- The significance assessment under the Regional Policy Statement and Hauraki District Plan
- The magnitude of effects assessment
- The overall level of effects assessment
- Effects management terminology
- Measures to avoid, remedy, or mitigate effects
- Measures to address residual effects that cannot be avoided, remedied, or mitigated
- Stated 'Net Gain' outcomes and alignment with biodiversity offsetting and compensation principles

1.4. The scope of this review is to identify matters that, in our opinion, warrant further clarification or consideration. This review does not directly assess the adequacy or appropriateness of the assessment of effects.

1.5. Further, in light of complexity we recommend a workshop with the applicant's ecologists to discuss this request, which would likely improve clarity and efficiency in terms of the applicant's S92 response.

1.6. We both have differing areas of expertise but have not differentiated these in this preliminary review, which combines our respective opinions.

1.7. In providing our questions we have given some context for some of those questions to assist the applicant with their response.

1.8. This is our initial broad review of the ecological effects associated with this application. We are likely to have more questions of clarification following the applicant's responses to these questions.

2. GENERAL MATTERS

2.1. This project has a much higher level of complexity than others we have reviewed, due to multiple sites, multiple activities with potential ecological effects assessed by multiple authors and multiple management measures across multiple locations.

2.2. To assist with the assessment of the application please provide a comprehensive executive summary (10 – 20 pages) including summary tables outlining vegetation/habitat and species values, effects assessments and residual effects management measures for the overall project. This summary should focus on the project-wide assessment of effects and project effects management package as a whole. In doing so, please also clearly distinguish between those residual effects management measures that are proposed to address effects on terrestrial ecology ('additional' measures) and those measures that are non-additional. That is, identify measures that provide benefits to ecology but are for the specific purpose of addressing other types



of adverse effects—for example native revegetation for addressing landscape-related effects or riparian revegetation to address effects on freshwater ecology — or measures required by regulations.

2.3. Section 4.1 of the Bioresearches (2022) ecological assessment report provides a comprehensive values assessment, including an overview of the biotic and ecological characteristics of the Waihi Ecological District, which focuses on “SNA 166”. The Coromandel Forest Park contains a multitude of inter-related significant indigenous vegetation communities and significant habitats of indigenous fauna, within which the WUG is situated. A qualitative description of the intrinsic values of ecosystems¹ of the CFP in relation to the WUG area would provide a more complete understanding of the ecological values of this locality. Please provide a description of the intrinsic values and life-supporting capacity of the ecosystems of the CFP in the locality of the WUG, particularly in relation to the Wharekirauponga Catchment, and in the context of the wider southern Coromandel Peninsula.

3. DESKTOP AND FIELD INVESTIGATIONS

3.1. In general terms we consider the focus and level of effort applied to desktop and field investigations to be commensurate with the type and scale of potential effects, with the following exceptions:

- i. The Boffa Miskell ecological assessment report (2022a - s4.1) states that: “Seasonal and weather constraints to animal activity (i.e. animals not able to be detected) prevented a comprehensive ecological survey (including bats (s4.7.2), native frogs, native lizards and native orchids in particular) of all of the potential vent raise sites from being undertaken for this assessment.” Please clarify the implications (in terms of robustness) of not undertaking these surveys as part of the ecological values and effects assessments, and determining the location of vent sites in the Wharekirauponga catchment or the infrastructure footprint at Willows Farm.
- ii. It appears two rounds of 5-minute bird counts have been carried out. This technique is most useful when repeated at regular time intervals to track local changes in populations (including seasonal ones). Repeating the surveys at quarterly intervals would provide a fuller picture of the use of the area by birds throughout the year. Please provide the details/reports of the bird surveys as cited in s5.6.1 (Boffa Miskell (2022a) as “(BML 2019b, 2022 (in preparation))”. Please provide the methodology and detailed findings of the bioacoustic surveys also mentioned in this section.
- iii. S 5.5.1 Boffa Miskell (2022a) - Please provide the reports and data referenced in this section in relation to bat surveys in the Wharekirauponga catchment as “BML 2018, 2019a, 2019b, 2021a”.
- iv. Bat survey effort and methodology described in the Bioresearches (2022) report is a mixture of previous dated surveys using older detection equipment and newer AR4 ABMs. The methodology sections, specifically s3.3.4. and s3.3.4.1, do not provide adequate descriptions of the data analysis methodology in terms of the newer AR4 ABMs nor have the weather performance standards been updated to latest best practice which are required to validate suitable survey nights using ABMs². Please update the methodology and provide valid survey nights (shown as ‘usable nights in Table 8) based on these newest best practice standards.
- v. S3.3.4.3 Bioresearches (2022) report states that handheld bat detectors were used to opportunistically survey for bats during other nocturnal surveys. Please provide details of these surveys in terms of times and survey effort.

¹ Which can be defined as: “intrinsic values, in relation to ecosystems, means those aspects of ecosystems and their constituent parts which have value in their own right, including— (a) their biological and genetic diversity; and (b) the essential characteristics that determine an ecosystem’s integrity, form, functioning, and resilience.” Part 1, RMA.

² Refer to section 4b (page 10): Protocols for minimising the risk of felling bat roosts (Bat Roost Protocols (BRP)) Version 2: October 2021 approved by the New Zealand Department of Conservation’s Bat Recovery Group



- vi. We note that no targeted terrestrial macroinvertebrate surveys were carried out as part of this assessment, either on Willows Road Farm, the services trench or within the Coromandel Forest Park (CFP). We acknowledge challenges with surveying invertebrates (particularly ground-dwelling invertebrates) within habitat that supports Archey's frog. That said we consider that at the very least, presence/absence manual searching is necessary to validate the assessment of values (see below) and help with understanding the potential benefits for invertebrates associated with the proposed pest management. We note that incidental low intensity manual invertebrate searches by ourselves during a site visit into the CFP on 29 July 2022 yielded ground weta, cave weta, an unknown species of Mecodema beetle and a paua slug within the vicinity of the vent sites (see Figure 1 below). Please provide further information on the composition of invertebrates within the CFP.
- vii. Lizard surveys do not appear to have been undertaken within the planted riparian margins within the Northern rock stack footprint. Please clarify why this is the case as our understanding is that these plantings are ecologically connected to SNA166 which is known to support moko skink and within which the presence of copper skink cannot be ruled out.



Figure 1: Paua slug detected on CFP site visit to proposed WUG dated 29 July, 2022

4. DESCRIPTION AND ASSESSMENT OF ECOLOGICAL VALUES

4.1. The use of the Ecological Impact Assessment Guidelines (EciAG) (Roper-Lindsay et al. 2018) is supported. However, the approaches taken to assessment of ecological values in the Boffa Miskell and Bioresearches terrestrial ecological effects assessment reports³ are, in part, inconsistent with the EciAG and/or unclear. Please clarify the following in particular:

- The Boffa Miskell (2022a) report separately assesses the vegetation values and fauna habitat values within the same vegetation, which is inconsistent with the EciAG, and makes the assessment challenging to interpret. To this end, please integrate the ecological values assessment for the vegetation/habitat types within the Project Area (project footprint and immediate surrounds).
- In the Boffa Miskell report the assessment of fauna values appears inconsistent with the EciAG because the assessment of values has been based on habitat suitability rather than the presence or potential presence of that species or species assemblage within the project area (also see comments below). For example, the potential presence of copper skink within the project area should result in

³ Entitled 'Waihi North Project - Terrestrial Ecology Values and Effects of the WUG by Boffa Miskell (June 2022) and Terrestrial Ecology (TSF3, NRS, GOP) Waihi North Project - Assessment of Terrestrial Ecological Values and Effects by Bioresearches (2022)



an ecological value assessment for copper skink as 'high'. The assessment of habitat suitability needs to be factored into the magnitude of effects assessment.

4.2. How much older will the existing vegetation/plantings be at the time of impact within the collective Waihi North Project area compared with when they were assessed, and has this been considered in the assessment?

4.3. In a number of instances, the rationale for assigning ecological value needs further clarification, particularly as we consider the ecological values have been assessed as lower than we would have expected for some values. In particular:

- Please clarify why the ecological value for long-tailed bats within the CFP and Willows Road Farm has been assessed as 'Very Low' in the Boffa Miskell report (Table 9). In our view this should be assessed as potentially 'Very High' under the EciAG because the species is nationally 'Threatened', bats are a highly mobile species, and the CFP and WRF provide potential habitat. The fact that bats may not be present at the time of impact or that the habitat might be of low value would be factored into the species-specific magnitude of effect assessment under the EciAG.
- Please clarify why the ecological value of the terrestrial bird community in the Wharekirauponga Catchment is not considered to be 'Very High' noting that the area has benefited from pest control so the diversity and relative abundance of bird species may be higher than for similar habitats that are not subject to pest control.
- Please clarify why the ecological value for lizards within the Willows Road Farm has been assessed as 'negligible' in the Boffa Miskell (2022a) report. In our view, under the EciAG lizard values this should be assessed as 'High' due to the likely presence of at least one 'At Risk' species, and given that the potential presence of other 'At Risk' species cannot be ruled out. As above, under EciAG, the likelihood of presence or abundance along with habitat suitability would be factored into the species-specific magnitude of effects assessment.
- Please clarify why the Wharekirauponga catchment provides only 'moderate' habitat for lizards despite the potential for the catchment to include the full complement of lizard species, and habitat being of very high value based on a description of characteristics (Table 8). Under the EciAG because the lizard fauna includes the potential presence of a nationally 'Threatened' species (i.e. the northern striped gecko), lizard values within the CFP project footprint area should be assessed as 'Very High' noting that other 'At Risk' lizards are confirmed or likely to be present.
- Please explain why vegetation/habitat values on the Willows Road 'Project site' are assessed as 'Low' (Table 4) or 'Negligible' (section 5.8) when the 'Project area' includes native forest fragments with mature native trees that likely support copper skink and possibly other At Risk species?
- Please provide further justification on the ecological values assessments against the four subcriteria for SNA 166, noting that based on our site visit we consider values to be higher than portrayed in the assessment of effects noting that in relative terms and in the context of the surrounding landscape this SNA is of relatively high value.
- In terms of representativeness the habitat should be assessed against native regenerating forest in which case the representative sub-criteria should be scored higher than 'low'. Alternatively if representativeness is assessed against WF11 then a representativeness score of 'low' may be appropriate but a rarity and distinctiveness score of 'low' would not be appropriate in the expectation that WF11 is uncommon or threatened in the surrounding landscape.



- The affected area of SNA 166 is potentially suitable for moko skink and its presence cannot be ruled out and while moko skink are classified as only 'At Risk' (relict) this habitat is potentially important to the persistence of the local population.

4.4. Please provide further justification on the ecological values assessments against the four subcriteria for native riparian plantings within the Waihi North Project area, noting that:

- Based on our site visit we observed that these plantings were not that dissimilar from natural early regenerative plantings and included kahikatea and matai and totara as well as other species (mostly ferns) that had self-colonised consequently representatives and diversity and pattern (we also note that we did not undertake comprehensive surveys so would likely have missed species).
- The habitat is potentially suitable for the nationally 'At Risk' copper skink and the presence of this species (and potentially others cannot be ruled out).
- The plantings provide important ecological context given that these plantings would be expected to provide ecological connectivity along riparian corridors as well as ecosystem sequencing between freshwater and terrestrial habitats.
- The assessment should be based on when habitats are expected to be impacted rather than when they were surveyed, in which case existing plantings will be older and have higher ecological value than assessed.

5. SIGNIFICANCE ASSESSMENT

- 5.1 Bioresearches (2022) terrestrial ecology assessment report provides an assessment against the WRPS criteria for determining significance of indigenous biodiversity (Part B, Chapter 11A, Table 11-1) in section 8, including detailed summary tables for each of the sites. Please clarify why criterion 3 has not been triggered for the NRS when the likelihood of copper skinks (and possibly other At Risk or Threatened lizard species, such as moko skink) being present is considered high (given the limited spatial and temporal extent of the lizard surveys at the NRS; the confirmed presence of these species in close proximity to the NRS; and the cryptic nature of these species making detection challenging, especially when survey effort is limited (referring to Figure 10 and s5.2.2.2 as supporting this information request)).
- 5.2 Boffa Miskell (2022a) provides a brief analysis of the WUP in relation to WRPS criteria for determining significance of indigenous biodiversity (s5.7). However, it is unclear as to which of criteria are triggered and the reasons why. Please provide a full and detailed analysis of the WUG site in relation to each of the eleven criteria in Table 11-1, similar to the analysis undertaken in the Bioresearches (2022) report.
- 5.3 Please confirm that no ecologically significant wetlands (criterion 6) or nationally uncommon vegetation or habitats (criterion 5) are affected by the WNP.
- 5.4 Please reassess the vegetation types found in the WUG which may be cleared for the vent shafts, in relation to Criterion 4 of Table 11-1 of the WRPS criteria for determining significance of indigenous biodiversity, whether in an Ecological District, or Ecological Region, or nationally. Please provide either quantitative or qualitative evidence to support the outcome of this assessment.



6. MAGNITUDE OF EFFECTS ASSESSMENT

- 6.1 The use of the Ecological Impact Assessment Guidelines (EciAG) (Roper-Lindsay et al. 2018) is supported. However, the approach taken to assessment of the magnitude of effects is difficult to interpret. In general terms, the suite of potential effects on terrestrial ecology associated with project activities has been identified and comprehensively addressed. However, please address the following:
- On a project-wide basis, it would be helpful to include a descriptive table/section on the collective direct and indirect effects on terrestrial habitats and associated nationally 'threatened' 'At Risk' or keystone species for each potentially affected vegetation/habitat type.
 - For each vegetation/habitat type and associated species that is potentially affected by the project, a more detailed magnitude of effect assessment is required that accords with the EciAG. In particular, an assessment of effects in respect of the quantum of habitat loss per se, the proportion of loss relative to the surrounding landscape (in general terms) and relative to the ecological district (in general terms).
 - As stated in Bioresearches (2022) (s6.3.1) for effects on SNA 166, 'locally, the effects of the TSF3 will be to remove around 31% of the treefern scrub and 21% of the rewarewa scrub'. In our view this would constitute a 'high' magnitude of effect as defined in the EciAG, i.e. 'a major loss or major alteration to key elements/features of the existing baseline conditions such that the post-development character, composition and/or attributes will be fundamentally changed'. Please provide further justification of the assessment that this proportional loss constitutes a 'moderate' magnitude of effect.
- 6.2 The project specific Myrtle rust and kauri dieback plan and a PCR-based disease surveillance programme are detailed in section 10 of the ELMP. We have no expertise in the efficacy of these protocols. Please clarify if a pathogen specialist has prepared and/or reviewed these measures..
- 6.3 S6.5.2 (Boffa Miskill 2022a) – Dr Lloyd's population estimation report has been used as evidence for reducing the potential magnitude of effects on Archey's frog⁴. To improve confidence in the frog population assessment, and to increase confidence that the population size estimate is not overstated, please reconsider and update the model with a more conservative assumption around the proportion of potential suitable indigenous habitat that is occupied by Archey's frog within its known geographical range. Specifically, can you please rerun the model allowing for a multitude of potential variables to habitat availability (e.g effects of animal pests where pest control is not undertaken regularly or at all; the effects of diseases). Our table below (Table 1) shows our calculations of various population estimates based on Lloyd's model and how they relate to the WUG vibration footprint (we have highlighted one scenario, showing a 5% occupancy rate for available habitat). Can you please comment on the table below and, in particular, comment on how adopting more conservative population estimates would affect the potential magnitude of effects on Archey's frog.

⁴ Lloyd, B. (2022). Estimating the proportion of the Coromandel's Archey's frog population in the area affected by vibrations from the proposed Wharekirauponga Mine. Report prepared for OceanaGold. 7 April 2022.



Table 1: Preliminary calculations of various population estimates based on Lloyd’s model and how they relate to the WUG vibration footprint

	Total population in millions		Proportion in ≥2 mm/s footprint		Proportion in ≥4 mm/s footprint	
	Estimate	SE	Estimate	SE	Estimate	SE
Lloyd report results	55	6	0.5%	0.1%	0.3%	0.1%
Site to site variability of 30%	55	12	0.5%	0.1%	0.3%	0.1%
With 20% vacancy rate	44	10	0.7%	0.2%	0.3%	0.1%
With 40% vacancy rate	33	7	0.9%	0.2%	0.5%	0.1%
With 60% vacancy rate	22	5	1.4%	0.4%	0.7%	0.2%
With 80% vacancy rate	11	2	2.7%	0.7%	1.4%	0.4%
With 95% vacancy rate	3	1	10.9%	2.8%	5.5%	1.4%

- 6.4 S6.5.4 (Boffa Miskell 2022a) –The assessment states that the magnitude of ecological effect of dewatering on vegetation and fauna (e.g. Archey’s frogs and their habitats) is Nil. While we accept that effects on the regolith (and hence vegetation) may be minimal, the report says further work is required to understand the groundwater system around surface water bodies, presumably including streams. The report states this risk will be avoided through management measures which will ensure that the activity does not cause any measurable dewatering of the soil regolith or surface water bodies which could have an adverse effect on vegetation or streams, and that proposed consent conditions do not allow for the mine to proceed if there is a risk of measurable changes to surface hydrology. We are unable to assess these management measures, and it is unclear how it can be guaranteed ahead of time that there will be no risk of hydrological changes. There is also no mention of what steps may be taken if unexpected changes occur once the mine is in operation. Please provide clarification on these matters supported by quantitative evidence, and detailed management and contingency approaches to address them and the corresponding implications/potential adverse effects on Archey’s frogs and their habitats.
- 6.5 S8.2 (Boffa Miskell 2022a) - Please clarify why a threshold of trees with a DBH greater than 50 cm will not be felled is a suitable threshold for ‘avoiding trees suitable for bats to roost in when ‘micro siting’ vent sites. The widely recognised best practice threshold for avoiding potential roost trees for bats is >15cm DBH⁵ and not 50 cm (and as identified in s5.5.2 of the same report). If trees less than 50cm DBH with bat roosting potential are to be removed in the WUG, please advise how the effects of the loss of these potential roosting trees on long-tailed bat habitat will be addressed.
- 6.6 In terms of the activities covered in the Bioresearches (2022) assessments, based on the quantum of habitat loss per se and the lizard survey information provided, we are of the view that project effects on copper skink within the Waihi Project Area is likely constitute a ‘moderate’ magnitude of effect. Please provide further detail on why the magnitude of effects on copper skink has not been assessed as ‘moderate’.

⁵ This diameter at breast height (DBH) threshold is based on dimensions of roosts used by south Hamilton long-tailed bats that were identified by Dekrout (2009, Unpublished PhD thesis, University of Auckland) - the smallest roosts were 15.5 cm DBH; but note that in South Canterbury Sedgely and O’Donnell (2004, New Zealand Journal of Ecology 28(1): 1-18) found that 25% of long-tailed bat roosts were smaller than 18.8 cm DBH.



7. OVERALL LEVEL OF EFFECTS ASSESSMENT

- 7.1 Please re-check the level of effect assessment in all relevant reports and correct instances where it doesn't accord with the ecological value and magnitude of effects assessment. For example, in Boffa Miskell (2022a) Table 13, despite the magnitude of effect of vegetation loss within CFP being assessed as 'Low', the level of effect prior to effects management is assessed as 'Very High'.

8. EFFECTS MANAGEMENT TERMINOLOGY

- 8.1 It would be helpful to understand how the terms 'mitigation', 'offsetting' and 'compensation' are defined as these terms appear to be used interchangeably across the reports. It is therefore difficult to determine how the effects management hierarchy has been applied. Most importantly, please clarify which measures are considered to reduce the severity of effect at the point of impact (mitigation) versus those measures that are positive effects that do not reduce the severity of effect.

9. MEASURES TO AVOID, REMEDY OR MITIGATE ADVERSE EFFECTS

- 9.1 Please clarify whether the proposed duration of weed control during rehabilitation of the vent shafts is two years or five years.

10. PROPOSED RESIDUAL EFFECTS MANAGEMENT

- 10.1 Please clarify the type and magnitude of project wide residual effects management that is proposed specifically to address residual effects on terrestrial ecological habitats and associated species that cannot be avoided, remedied or mitigated.
- 10.2 For each affected vegetation/habitat type and for each species, please clarify the type and quantum of residual effects management that is proposed specifically to address effects on that particular vegetation/habitat type and species.
- 10.3 We note the bat tree-felling protocols do not appear to be consistent with latest DOC protocols⁶ and similarly the competency levels for undertaking bat surveys, pre-felling checks and handling bats are also out of date in the ELMP. We note that proposed Condition 129 does refer to the latest protocols however. Please confirm or otherwise that a suitably qualified bat ecologist has written this aspect of the ELMP.
- 10.4 Please clarify if a suitably qualified herpetologist prepared the lizard management aspects of the ELMP.
- 10.5 Please clarify which measures are proposed specifically to address effects on landscape and/or freshwater wetland values (but are also expected to benefit terrestrial biodiversity values).
- 10.6 Please confirm what density of planting is proposed within the 16.5 ha offset area (Bioresearches 2022a s2.5) as well as the proposed duration of weed maintenance. We consider further detail is needed to understand the relative effort and expected gains from the proposed ecological offsetting noting that some areas proposed for native planting, particularly for riparian gully margins, are already dominated by indigenous vegetation
- 10.7 Please confirm that the quantum of pest management described in the Ecology Company report (2021) is still broadly what is proposed as the type and quantum of proposed pest management within the CFP appears to differ across the document. Specifically, *'The proposed Waihi North Biodiversity Project would*

⁶ Which are "Protocols for minimising the risk of felling bat roosts (Bat Roost Protocols (BRP)) Version 2: October 2021 approved by the New Zealand Department of Conservation's Bat Recovery Group"



involve control of stoats, possums, feral cats, goats and deer over approximately 18,870ha located on public conservation land immediately north of Waihi. Within the management area a more intensively controlled “core area” is proposed comprising approximately 1300ha which would include all of the Otahu Ecological Area (c. 655ha) and immediately surrounding areas. Within the core area the species listed above would be controlled as well as rats, hedgehogs, pigs and perhaps mice”.

- 10.8 As we understand DOC has recently conducted an aerial 1080 drop in the southern CFP; how is the potential for partial non-additionality factored into the proposed pest management offset?
- 10.9 Please clarify whether the duration of pest control proposed is 10 years or 20 years.
- 10.10 Please clarify expected benefits on Archey’s frog that are directly related to the additional pest control efforts and that are above and beyond existing levels of pest control within the Wharekirauponga / Otahu area (i.e. aerial 1080 applications approximately every four years). Please confirm whether it is proposed to quantify the differential increase associated with this extra pest control as part of the biodiversity outcome monitoring programme (yet to be developed).

11. STATED NET GAIN OUTCOMES AND ALIGNMENT WITH BIODIVERSITY OFFSETTING AND COMPENSATION PRINCIPLES

- 11.1 The project documentation states that effects are being managed in accordance with best practice for biodiversity offsetting in New Zealand, so that a net gain in biodiversity values is achieved. We commend this goal; however, we note that the term ‘offsetting’ by definition requires measuring both the losses to biodiversity caused by the project and the conservation gains achieved by the offset. Moreover, the term ‘no net loss’ (or ‘net gain’) is used when measurable conservation outcomes can reasonably be expected to result in no net loss (or net gain) of biodiversity. To this end, we view biodiversity models as necessary to address the need for loss and gains to be ‘measured’.
- 11.2 In terms of the stated Net Gain outcomes and the use of the BOAM to support this statement, please provide:
- The raw data that informed the impact models and the predicted gain attributes (information from the Auckland dataset) as well as the impact models (only the offset models seem to be provided).
 - Clarification of why Net Gain outcomes have been stated for the entire project but the BOAM has only been applied to effects associated with the loss of native habitat within SNA 166?
 - An assessment of the confidence you have in the model inputs and outputs and the degree to which the impact attribute values are:
 - representative of the entire approx. 8 ha of the SNA 166 that will be impacted
 - representative of the biodiversity values, components and attributes within SNA 166
 - An assessment of the confidence you have that the predicted gains in attributes are likely noting that these predicted attributes were derived from plots in the Auckland Region
 - An assessment of the confidence you in the model outcomes noting that:
 - There is no allowance for error (i.e. the model appears to assume that the data inputs are precise when the converse is likely to be true) and limited contingencies for uncertainty.



- The model predicts that an approximately 2:1 habitat restoration: loss ratio will result in Net Gain outcomes, which seems light.

- 11.3 Can further information please be provided on how potential delays with planting are factored into Net Gain assessments and accounting for time lag?
- 11.4 Please clarify the reason for not applying other types of biodiversity models that could be used to measure loss versus gain based on information derived from the effects assessment
- 11.5 Please clarify whether Net Gain objectives are proposed in respect of all values affected across the whole of mine project (i.e., the collective WUG and Waihi North Project Area, or in respect of the permitted baseline (e.g. excluding effects on non-SNA habitats).
- 11.6 We note that there are different models available for use that can help provide additional confidence and assurance that predicted/stated outcomes will be achieved. Please consider the use of alternative biodiversity models.

12. BIODIVERSITY OUTCOME MONITORING AND ADAPTIVE MANAGEMENT/CONTINGENCY (IF REQUIRED)

- 12.1 Has the potential for perverse outcomes associated with the buffer control programme been considered, e.g., increased rat numbers? If so, is specific pest or biodiversity outcome monitoring proposed to better understand potential effects (as research compensation)?
- 12.2 We understand that a preliminary draft biodiversity outcome monitoring and adaptive management/contingency plan will be provided as part of the applicant's section 92 response following a workshop with Council and DOC experts. We note that this is critical for providing certainty and assurance that stated Net Gain outcomes are achieved (which may or may not include adaptive management and contingency measures).

Yours faithfully



Gerry Kessels
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