BEFORE	the Independent Hearing Panel appointed by the Hamilton City Council
UNDER	the Resource Management Act 1991
And	
IN THE MATTER OF	Proposed Plan Change 5 – Peacocke Structure Plan
BY	Hamilton City Council

STATEMENT OF EVIDENCE OF ILSE CORKERY

On behalf of the

DIRECTOR-GENERAL OF CONSERVATION / TE TUMUAKI AHUREI

SUBMISSION 38 FS013

BIODIVERSITY OFFSETTING

Dated: 16 September 2022

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1. INTRODUCTION

1.1. My full name is Ilse Corkery.

1.2. My qualifications are a Bachelor of Science (1st Class honours) degree (2006) from the University of Cork, Ireland and a PhD (2012) in Ecology from Victoria University, Wellington.

1.3. I am employed by the Department of Conservation (the **Department**) as a Technical Advisor, Terrestrial Science Unit. I have worked for the Department since July 2018. Before that I was Senior Project Scientist on RaptorLife[1] in Ireland. From 2014-2015, I was employed as a researcher for University College Cork in Ireland to investigate the effects of plantation forests on native bird species. From 2012-2014, I was lecturer on the Biodiversity Management Degree at NorthTec, Whangarei and delivered courses including "New Zealand Conservation", "Conservation Management" and "Environmental Management".

1.4. My current position is a national role, with a focus on the North Island. I am responsible for providing advice relating to best practise effects management and biodiversity offsetting for resource consents, council plans and other statutory process. In addition, I am responsible for reviewing ecological assessments, conservation strategies and management and mitigation techniques for fauna species with regard to statutory and permitting processes and conservation programs.

1.5. I have previously provided expert evidence on compensation packages for the Waste Management New Zealand application for resource consents, Private Plan Change at Dome Valley and for provisions for biodiversity offsets in the Waikato District Plan. I am currently reviewing the proposed effects management in the Waihi North Mine Application by Oceana Gold NZ Ltd.

1.6. I am also a member of the New Zealand Ornithological Society and I have published ten scientific papers in peer reviewed literature.

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[1] A €3million LIFE+ project which ran for 4.5 year. The goal was to work with communities to connec and restore habitats for Hen harrier, Merlin, Atlantic salmon and Brook lamprey in Duhallow, Ireland.

1.7. I am presenting this evidence for the Director-General of Conservation / Te Tumuaki Ahurei (Director-General) in relation to effects management and offsetting/compensation matters arising out of proposed Plan Change 5 – Peacocke Structure Plan ('Plan Change 5').

1.8. I took part in online facilitated conferencing related to this Plan Change on 24 August 2022.

2. CODE OF CONDUCT

2.1. I confirm I have read the code of conduct for expert witnesses as contained in the Environment Court's Practice Note 2014. I have complied with the practice note when preparing my written statement of evidence and will do so when I give oral evidence before the Hearing Panel.

2.2. The data, information, facts and assumptions I have considered in forming my opinions are set out in my evidence to follow. The reasons for the opinions expressed are also set out in the evidence.

2.3. Unless I state otherwise, this evidence is within my sphere of expertise, and I have not omitted to consider material facts known to me that might alter or detract from the opinions that I express.

3. SCOPE

3.1. I have been asked to provide evidence in relation to provisions in Plan Change 5 relating to effects management, biodiversity offsetting and environmental compensation. I will also address the process used to assess the type and quantum of compensation required to address residual adverse effects, including use of the Biodiversity Compensation Model (BCM). My evidence will cover the following:

a) Effects Management Hierarchy

b) Biodiversity Offsetting

c) Limits to Offsetting

d) Environmental Compensation

e) Achieving Net Gain

f) Financial Contributions

g) Biodiversity loss-gain models

h) Giving effect to the Regional Policy Statement

i) Comment on the proposed effects management

3.2. The New Zealand government's *Guidance on Good Practice Biodiversity Offsetting in New Zealand* (the **Guidance**)[2], the Local Government's *Biodiversity offsetting under the Resource Management Act*,[3] the National Policy Statement for Freshwater Management 2020 (NPSFM) and the exposure draft of the National Policy Statement on Indigenous Biodiversity (NPSIB) are the four key documents I've used to help explain the concepts and current good practice around biodiversity offsetting.

3.3. In preparing this evidence, I have read and considered the following documents:

a) Proposed Plan Change 5 to the Operative Hamilton City District Plan (Peacocke Structure Plan);

b) Hamilton City Council, 2021, Plan Change 5 – Peacocke Structure Plan – Assessment of Environmental Effects

i. Appendix J – Peacocke Structure Plan (PSPA) – Long-tailed Bat Report

ii. Appendix K – PSPA – Preliminary Assessment of ecological Effects

iii. Appendix L – PSPA – Ecological Significance Assessment;

c) Hamilton City Council, 2021, Plan Change 5 – Peacocke Structure Plan - Section 32 Report: Notification Version;

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2 https://www.doc.govt.nz/about-us/our-policies-and-plans/guidance-on-biodiversity-offsetting/

3 https://www.lgnz.co.nz/assets/Uploads/7215efb76d/Biodiversity-offsetting-under-the-resource-management-act-full-document-....pdf

d) Submission and further submission of the Director-General of Conservation;

e) Section 42A Hearing Report (dated 2 September 2022);

f) Statements of evidence (dated 2 September 2022) prepared for the Hamilton City Council by:

   i. Dr Hannah Mueller (Ecology – Bats, Wetlands, Freshwater Biodiversity);
   ii. Dr Matthew James Baber (Ecology – Offsetting/Compensation); and
   iii. Mr Gerardus (Gerry) Henricus Anthonius Kessels (Ecology)
      - Attachment 1: Hamilton City Council, 2022, "Plan Change 5 Technical Ecology Report", prepared by Kessels, G., Dr Mueller, H., & Dr Baber, M., dated 31 August 2022;

g) Joint Witness Statements:

   i. Planning & Bats 24 August 2022;

h) Waikato Regional Policy Statement: Te Tauākī Kaupapahere Te-Rohe O Waikato 2016 (RPS);

i) Statements of evidence (dated 16 September 2022) prepared for the Director-General by:

   i. Ms Moira Pryde (Bat Ecology);
   ii. Dr Kerry Borkin (Bat Ecology and Effects of Development);
   iii. Ms Susan Mander (Lighting); and
   iv. Mr Jesse Gooding (Planning).

j) New Zealand Government's "*Guidance on Good Practice Biodiversity Offsetting in New Zealand*"[4];

[4] *Ministry for the Environment, Department of Conservation, Ministry for Primary Industries, Ministry of business, Innovation & Employment, Land Information New Zealand, New Zealand Government, 2014, "Guidance on Good Practice Biodiversity Offsetting in New Zealand*"

k) Local Government's "*Biodiversity Offsetting under the Resource Management Act – A guidance document*"[5];

l) National Policy Statement for Freshwater Management 2020 (NPSFM);

m) National Policy Statement for Indigenous Biodiversity: Exposure draft, June 2022;

n) Additional referenced material used in this evidence is attached in a consolidated list as Appendix 1 but is referenced throughout the document as appropriate.

4. EXECUTIVE SUMMARY

4.1. The effects management hierarchy which comprises the steps 'avoid', 'minimise', 'remedy', followed by 'offset' and 'compensate' requires each step to be completed as far as feasible before the next stage is attempted. This is to protect biodiversity from adverse effects that might result from development.

4.2. Predicting the magnitude and type of biodiversity losses as a result of development and the biodiversity gains that might result from offsets or compensation is not easy. Any tools that are used to aid in decision making need to be fit for purpose in order to transparently communicate these loss-gain calculations.

4.3. A mismatch in the level of certainty between the guaranteed losses from development activity in exchange for uncertain gains creates significant risk for the long-tailed bats and biodiversity in general within Peacocke Structure Plan Area (PSPA).

4.4. As it stands the provisions for biodiversity management proposed by Plan Change 5 do not adequately ensure that each of the first three steps in the effects management hierarchy are exhausted sequentially, do not adequately provide for losses to be offset and potentially do not provide for adequate compensation to address residual adverse effects.

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[5] Maseyk, F., Ussher, G., Kessels, G., Christensen, M., and Brown, M., 2018, "*Biodiversity Offsetting under the Resource Management Act: A guidance document",* Prepared for the Biodiversity Working Group on behalf of the BioManagers Group

5. EFFECTS MANAGEMENT HIERARCHY

5.1. Good practice effects management is needed to protect biodiversity from the impacts of development. Ideally it involves a robust and transparent process that results in no or very little adverse effects from development projects.

5.2. An overriding principle for good practice effects management is that of following the effects management hierarchy to ensure adverse effects are avoided before applying minimisation (akin to mitigation), remediation, biodiversity offsets or environmental compensation sequentially. The principle is an internationally accepted approach and is increasingly being incorporated into statutory planning instruments across New Zealand, including within Policy 11.2.2(b, c and d) 1 of the operative Waikato Regional Policy Statement (WRPS).

5.3. To assist with understanding what constitutes as avoidance, minimisation, remediation, an offset or compensation, I provide definitions of these terms, with reference to Maseyk et al. 2018[6], below:

a) Avoid – measures are taken to avoid creating biodiversity impacts, for example, re-routing a road to avoid high value bat habitat, or choosing not to put lights in a park.

b) Minimise – biodiversity impacts are minimsed, alleviated or moderated in terms of extent, intensity or duration, at the impact site. For example, ultilising smaller machinery to minimize the size of the track to be cleared through a forest or choosing lower lux lighting in areas frequented by bats.

c) Remedy – rehabilitates, recreates or restores temporarily affected ecological areas at the impact site. For example, replanting roads that are no longer required, or planting trees that screen the glare from lights.

[6] Maseyk, F., Ussher, G., Kessels, G., Christensen, M., Brown, M. 2018. Biodiversity Offsetting under the Resource Management Act: A guidance document. Prepared for the Biodiversity Working Group on behalf of the BioManagers Group.

d) Offset – measurable actions taken to address residual adverse effects on biodiversity that cannot be avoided, minimized or remedied. Seeks to recreate or replace the lost biodiversity and achieve no-net-loss (preferably net gain). Offsets are undertaken at a site different to the impact site.

e) Compensate - actions taken to recompence for residual adverse effects on biodiversity that cannot be avoided, minimized, remedied or offset. Seeks to increase biodiversity at another site.

5.4. The hierarchy consists of first avoiding, minimising and then remedying adverse effects sequentially before considering biodiversity offsetting and environmental compensation. Following this process, it is critical to ensure that adverse effects are reduced and made transparent so that residual adverse effects are as small as reasonably possible before any positive effects of biodiversity offsets or compensation are considered. This ensures that offsets or compensation are not inappropriately used to address adverse effects that could otherwise be managed earlier in the hierarchy.

6. AVOID, MINIMISE AND REMEDY

6.1. Avoid, minimise and remedy are aimed at reducing the level of adverse effects at site. Avoidance is the first and most important step, especially to prevent harm to biodiversity of greatest conservation concern. The methods to achieve avoidance include: (a) avoiding the site entirely; or (b) engineering solutions at the site, for example to avoid areas of high value biodiversity.

6.2. Avoidance is sometimes only considered at the site level, thus when no alternative site is available for development, avoidance is considered not possible. However, avoiding adverse effects can be achieved and should be considered at a range of spatial scales through careful project design after biodiversity values at the site have been identified and adequately understood. This is particularly relevant when project sites contain habitat of critically threatened species, such as the long-tailed bat, and

adverse effects can be many and varied across multiple scales, such as at roost site, across foraging habitats and transport route.

6.3. An example of an adverse effect on bats that needs careful application of the effects management hierarchy is loss and modification of habitat. The impacts of loss and modification of habitat needs to be clearly identified and understood. Efforts to avoid, minimise and remedy the adverse impacts of loss and modification of habitat at a site should be demonstrated to be sequentially exhausted before offsetting or compensation is considered.

7. BIODIVERSITY OFFSETTING

7.1. Biodiversity offsetting is aimed at achieving biodiversity gains and has been increasingly applied around the world[7]. Biodiversity offsetting works by managing the associated risks from residual biodiversity losses from development activities. The motivations for offsetting include the recognition that existing approaches to conservation in the context of ongoing economic development had failed to halt biodiversity decline, and there is an urgent need to shift development to a more sustainable model.

7.2. Offsetting is different from other conservation tools because biodiversity gains are quantified in relation to residual development-associated losses.

7.3. The following sets out a framework of principles for the use of biodiversity offsets. These principles are taken directly from the exposure draft NBSIB but are consistent with the Business and Biodiversity Offsets Programme (**BBOP**)[8], the NPSFM and the Local Government Guidance document. These principles represent a standard for biodiversity offsetting. I recommend that they be included in Plan Change 5 and can be used as a standard by which an offset is assessed against.

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[7] Josefsson, J., Widenfalk, L. A., Blicharska, M., Hedblom, M., Pärt, T., Ranius, T., & Öckinger, E. (2021). Compensating for lost nature values through biodiversity offsetting–Where is the evidence?. *Biological Conservation*, *257*, 109117.

[8] Business and Biodiversity Offsets Programme (BBOP). 2012. Standard on Biodiversity Offsets. BBOP, Washington, D.C.

a) *Adherence to **effects management hierarchy**: A biodiversity offset is a commitment to redress any more than minor residual adverse effects and should be contemplated only after steps to avoid, minimise, and remedy adverse effects are demonstrated to have been sequentially exhausted.*

b) *When biodiversity **offsetting is not appropriate**: Biodiversity offsets are not appropriate in situations where biodiversity values cannot be offset to achieve a net gain outcome, and if biodiversity values are adversely affected, they will be permanently lost. This principle reflects a standard of acceptability for demonstrating, and then achieving, a net gain in biodiversity values. Examples of where an offset would be inappropriate include where: (a) residual adverse effects cannot be offset because of the irreplaceability or vulnerability of the indigenous biodiversity affected: (b) effects on indigenous biodiversity are uncertain, unknown, or little understood, but potential effects are significantly adverse: (c) there are no technically feasible options by which to secure gains within acceptable timeframe.*

c) ***Net gain**: The biodiversity values to be lost through the activity to which the offset applies are counterbalanced and exceeded by the proposed offsetting activity, so that the result is a net gain when compared to that lost. Net gain is demonstrated by a like-for-like quantitative loss/gain calculation of the following and is achieved when the ecological values at the offset site exceed those being lost at the impact site across indigenous biodiversity: (a) types of indigenous biodiversity, including when indigenous species depend on introduced species for their persistence; and (b) amount; and (c) condition.*

d) ***Additionality**: A biodiversity offset achieves gains in indigenous biodiversity above and beyond gains that would have occurred in the absence of the offset, such as gains that are additional to any minimisation and remediation undertaken in relation to the adverse effects of the activity.*

e) ***Leakage****: Offset design and implementation avoids displacing activities that are harmful to indigenous biodiversity to other locations.*

f) ***Landscape context****: Biodiversity offset actions are undertaken where this will result in the best ecological outcome, preferably close to the impact site or within the same ecological district, and consider the landscape context of both the impact site and the offset site, taking into account interactions between species, habitats and ecosystems, spatial connections, and ecosystem function.*

g) ***Long-term outcomes****: Biodiversity offsets are managed to secure outcomes of the activity that last at least as long as the impacts, and preferably in perpetuity.*

h) ***Time lags****: The delay between loss of indigenous biodiversity at the impact site and gain or maturity of indigenous biodiversity at the offset site is minimised so that the calculated gains are achieved within the consent period.*

i) ***Science and mātauranga Māori****: The design and implementation of a biodiversity offset is a documented process informed by science and mātauranga Māori where available.*

j) ***Stakeholder participation****: Opportunity for the effective and early participation of stakeholders is demonstrated when planning for biodiversity offsets, including their evaluation, selection, design, implementation, and monitoring.*

k) ***Transparency****: The design and implementation of a biodiversity offset, and communication of its results to the public, is undertaken in a transparent and timely manner*.

8. LIMITS TO OFFSETTING

8.1. As stated in Principle (ii) above, there are situations where residual impacts cannot be fully addressed by a biodiversity offset because of the irreplaceability or vulnerability of the biodiversity affected.

8.2. In addition, the design of a biodiversity offset needs to be informed by adequate data to provide confidence that similar gains can be created to balance known losses. Without a data informed design process, it is not possible to demonstrate with a reasonable level of confidence that no net loss or a net gain can be achieved.

8.3. Where no net loss or a net gain cannot be confidently predicted or demonstrated, a biodiversity offset will not be an appropriate mechanism to address a project's adverse effects. In such cases, environmental compensation, when designed well and focused on biodiversity gains, can provide positive effects. However, due to the lack of a robust quantified loss and gain calculation, the risk of a biodiversity loss outcome is higher with compensation than with offsetting.

8.4. When limits to offsets are reached an applicant would then have a choice of:

a) Redesigning the project to avoid impacts on high-value biodiversity that cannot be offset (in order to still achieve a biodiversity offset); or

b) Proceeding with the development proposal and offering a package of measures to compensate for residual adverse effects that cannot be avoided, minimised or remedied (but would not be a biodiversity offset). In this case the consent authority in making a decision on the application would need to understand that there is a real risk of permanent biodiversity loss.

9. BIODIVERSITY COMPENSATION

9.1. Where offsetting is not possible, compensation is used as the last step in the effects management hierarchy. Environmental compensation is designed to compensate for losses but is not held to the same definition

or principles as biodiversity offsetting, and in particular the requirement to fully account for and balance losses and gains[9].

9.2. Thus, compensation attempts that fail or fall short will contribute to entrenching poor outcomes for biodiversity as losses that have already occurred, remain unaddressed.

9.3. The following sets out a framework of principles for the use of biodiversity compensation. These principles are taken directly from the exposure draft NBSIB but are consistent with the Business and Biodiversity Offsets Programme (BBOP)[10], the NPSFM and the Local Government Guidance document. These principles represent a standard for biodiversity compensation and must be complied with for an action to qualify as biodiversity compensation. I recommend that they be included in the Plan.

a) *Adherence to **effects management hierarchy**: Biodiversity compensation is a commitment to redress more than minor residual adverse impacts, and should be contemplated only after steps to avoid, minimise, remedy, and offset adverse effects are demonstrated to have been sequentially exhausted.*

b) *When biodiversity compensation is **not appropriate**: Biodiversity compensation is not appropriate where indigenous biodiversity values are not able to be compensated for, for example because: (a) the indigenous biodiversity affected is irreplaceable or vulnerable; or (b) effects on indigenous biodiversity are uncertain, unknown, or little understood, but potential effects are significantly adverse; or (c) there are no technically feasible options by which to secure proposed gains within acceptable timeframes.*

c) ***Scale** of biodiversity compensation: The values to be lost through the activity to which the biodiversity compensation applies are*

[9] Maseyk, F., Ussher, G., Kessels, G., Christensen, M., Brown, M. 2018. Biodiversity Offsetting under the Resource Management Act: A guidance document. Prepared for the Biodiversity Working Group on behalf of the BioManagers Group.

[10] Business and Biodiversity Offsets Programme (BBOP). 2012. Standard on Biodiversity Offsets. BBOP, Washington, D.C.

addressed by positive effects to indigenous biodiversity, (including when indigenous species depend on introduced species for their persistence), that outweigh the adverse effects on indigenous biodiversity.

d) ***Additionality**: Biodiversity compensation achieves gains in indigenous biodiversity that are above and beyond gains that would have occurred in the absence of the compensation, such as gains that are additional to any minimisation and remediation undertaken in relation to the adverse effects of the activity.*

e) ***Leakage**: The design and implementation avoid displacing activities or environmental factors that are harmful to indigenous biodiversity in other locations.*

f) ***Landscape context**: Biodiversity compensation actions are undertaken where this will result in the best ecological outcome, preferably close to the impact site or within the same ecological district. The actions consider the landscape context of both the impact site and the compensation site, taking into account interactions between species, habitats and ecosystems, spatial connections, and ecosystem function.*

g) ***Long-term outcomes**: Biodiversity compensation is managed to secure outcomes of the activity that last as least as long as the impacts, and preferably in perpetuity.*

h) ***Time lags**: The delay between loss of indigenous biodiversity at the impact site and gain or maturity of indigenous biodiversity at the compensation site is minimised.*

i) ***Trading up**: When trading up forms part of biodiversity compensation, the proposal demonstrates that the indigenous biodiversity values gained are demonstrably of higher indigenous biodiversity value than those lost. The proposal also shows the values lost are not to Threatened or At Risk species or to species considered vulnerable or irreplaceable.*

j) ***Financial contributions****: Financial contributions are only considered when there is no effective option available for delivering indigenous biodiversity gains on the ground. Any contributions related to the indigenous biodiversity impacts must be directly linked to an intended indigenous biodiversity gain or benefit.*

k) ***Science and mātauranga Māori****: The design and implementation of biodiversity compensation is a documented process informed by science and mātauranga Māori where available.*

l) ***Stakeholder participation****: Opportunity for the effective and early participation of stakeholders is demonstrated when planning for biodiversity compensation, including its evaluation, selection, design, implementation, and monitoring.*

m) ***Transparency****: The design and implementation of biodiversity compensation, and communication of its results to the public, is undertaken in a transparent and timely manner.*

10. ACHIEVING NET GAIN IN PRACTISE

10.1. Designing an offset proposal is complex and requires considered and detailed design to avoid perverse outcomes. Poorly designed offsets or compensation packages will not improve biodiversity but may give the impression they do due to their formality and structure.

10.2. Best practise dictates that the term net gain is only applied to offsets as it needs to demonstrate by a like-for-like quantitative loss/gain calculation.

10.3. A high level of knowledge and information is required to give decision makers confidence that a net-gain outcome can be achieved. This includes state and trend data for species and ecosystems, species and or ecosystem responses to management interventions, and a clear understanding of targets to ensure the persistence and viability of species and ecosystems at a landscape scale.

10.4. In the Council's Technical Ecology Report, a defined quantum of habitat restoration and pest control are proposed as sufficient for managing the residual effects from development in the PSPA. However, I don't believe there has been sufficient explanation or justification around this proposal. The restoration or creation of new habitat is not always effective and pest control can only partially make up for any loss of habitat.

10.5. For example, in the context of native forest birds in New Zealand, creating habitat and controlling invasive mammals provides benefits, but the nature, occurrence and magnitude of these benefits will be context-dependent[11]. Results from a 2016 study suggested that maintaining or increasing forest cover may be more important than pest control for maximising tūi abundance in landscapes with very low levels of forest cover and even intensive pest control may only benefit a small subset of species[9].

10.6. While invasive predators have large impacts on native species, and introduced predators including stoats, rats, cats and possums and wasps have all been implicated in the decline in bats[12], land-use change has the largest negative impact on biodiversity for terrestrial and freshwater ecosystems, mainly through habitat loss and degradation[13]. Around half of the total land area in New Zealand has been modified from its natural state for agriculture, production forestry and urban uses[14].

10.7. However, restoring or recreating habitat does not always result in the intended benefits, such as maintaining population viability and an increase in population size of the target species. Though created habitat can resemble the composition of existing habitat, certain ecological processes can be difficult to restore, possibly reducing the compatibility for the target species or community. Long-tailed bats have very specialist requirements in terms of breeding and day roost sites, home range and

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[11] Ruffell, J., & Didham, R. K. (2017). Conserving biodiversity in New Zealand's lowland landscapes: does forest cover or pest control have a greater effect on native birds?. *New Zealand Journal of Ecology*, *41*(1), 23-33.

[12] O'Donnell CFJ 2000a. Conservation status and causes of decline of the threatened New Zealand Long-tailed Bat *Chalinolobus tuberculatus* (Chiroptera: Vespertilionidae). Mammal Review 30: 89–106.

[13] Collen, B., Whitton, F., Dyer, E.E., Baillie, J.E., Cumberlidge, N., Darwall, W.R., Pollock, C., Richman, N.I., Soulsby, A.M. and Böhm, M., 2014. Global patterns of freshwater species diversity, threat and endemism. *Global ecology and Biogeography*, *23*(1), pp.40-51.

[14] Series, New Zealand's. Environmental Reporting. "Our land 2021."

foraging requirements making them vulnerable to land clearance[15], for example "the cavities they select are very specific and these can be quite rare, for example 1.3% of trees in the landscape even in native forest".

10.8. As the successful creation of offset habitat is not guaranteed, some broad recommendations have been developed to improve the likelihood of net gain outcomes[16];

a) A high offset ratio. More habitat needs to be created than is lost, especially when dealing with species with a risk of failure.

b) Proximity. Create new habitat as close to the impacted site as possible to maintain the original composition, increase the probability of colonisation and to incorporate localised habitat characteristics or ecological processes. This is particularly important with species that exhibit high levels of site fidelity such as the long-tailed bats[17]. In cases where offsets or compensation cannot be delivered onsite, to be effective management needs to be implemented within the home range of the affected long-tailed bat population.

c) Delay development to allow succession of habitat. This is crucial to avoid losses.

10.9. An example of a successful offset for a threatened species can be seen in Australia. A population of the green and golden bell frog (*Litoria aurea*) was impacted by urban development through the removal of nine ponds. A large number of ponds which resulted in a 19-fold increase in pond area were constructed to offset the losses. However, despite large increases in available habitat there was not an equivalent increase in population size, with an approximately 1.2 to 3.5-fold in increase in the original population size post offset[16]. This highlights that large efforts may be needed to achieve net gain of the relevant biodiversity values.

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[15] Statement of Evidence of Moira Pryde dated 16 September 2022, at paragraph 6.6.

[16] Pickett, E. J., Stockwell, M. P., Bower, D. S., Garnham, J. I., Pollard, C. J., Clulow, J., & Mahony, M. J. (2013). Achieving no net loss in habitat offset of a threatened frog required high offset ratio and intensive monitoring. *Biological Conservation*, *157*, 156-162.

[17] Statement of Evidence of Moira Pryde dated 16 September 2022, at paragraph 6.10.

10.10. We don't have any examples of successful completed offsets in New Zealand yet as many consented projects involving offsets have not yet begun, others have not been running long enough to be at endpoints yet, and in general compliance monitoring and reporting have not been of a standard to measure success or lack thereof. However, there are numerous examples of offsets designed and in their early stages of implementation.

10.11. In general, management interventions such as habitat restoration or pest control aimed at detecting and achieving net gain can only be successful where the offset ratio is large, monitoring is long term, robust and precise and funding is available to substantially increase the amount of habitat managed if monitoring indicates that this is necessary.

11. FINANCIAL CONTRIBUTIONS

11.1. As stated in Principle (x) above, financial contributions should only be considered when there is no effective option available for delivering indigenous biodiversity gains on the ground.

11.2. The council is proposing to facilitate financial contributions. I agree as stated in the Technical Report (page 45) that there needs to be an integrated approach to offsetting and compensation in order to avoid "death by a thousand cuts". The potential of a central fund is a more holistic and landscape wide approach to managing effects and the ability to consolidate efforts to deliver biodiversity gains, but as it stands it also entails serious risks for biodiversity. It is currently unclear who and how the fund will be managed and delegating responsibility for managing residual effects to a third party will have challenges. The effects management hierarchy should still be followed in accordance with the principles as outlined above.

12. BIODIVERSITY LOSS-GAIN MODELS

12.1. A key challenge for both offsetting and compensation is determining both the type and quantum of offset or compensation required to appropriately

address the effects of a development. An overview of the governance of offsetting around the world found that there is a large diversification of offsetting mechanisms, that has developed within different local, institutional, as well as sectoral contexts[18]. Irrespective of the method or tool used, metrics are needed to establish the type and quantity of biodiversity to be offset, and the choice of metrics that are used to assess biodiversity is crucial[19].

12.2. In New Zealand, there has been widespread use of the Stream Ecological Valuation (SEV) since its initial publication in 2006 as a method for quantifying the values of streams[20]. A biodiversity offset accounting model was developed that uses a disaggregated area by condition currency[21]. This model was designed with the aim of improving estimation of ecological equivalency and transparency in communicating loss-gain calculations. This model has been used in a number of projects around New Zealand to evaluate biodiversity offset proposals for terrestrial biodiversity.

12.3. A new Biodiversity Compensation Model (BCM)[22] has been recently developed and proposed for use in the PSPA. This model is novel in its reliance on qualitative rather than quantitative data to predict the biodiversity outcomes of projects. For example, rather than using detailed measurements to describe a habitat or vegetation characteristics, a BCM requires an expert to provide a habitat with a value score (ranging from 0 to 5) and uses this to calculate biodiversity outcomes.

12.4. The BCM solely uses qualitative data (more descriptive than numerical) as estimates for habitat quality. However, in my opinion, in order to be

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18 Droste, N., Olsson, J.A., Hanson, H., Knaggård, Å., Lima, G., Lundmark, L., Thoni, T. and Zelli, F., 2022. A global overview of biodiversity offsetting governance. *Journal of Environmental Management*, *316*, p.115231.

19 Gamarra, M. J. C., Lassoie, J. P., & Milder, J. (2018). Accounting for no net loss: A critical assessment of biodiversity offsetting metrics and methods. *Journal of environmental management*, *220*, 36-43.

20 Storey, R 2010. *Applicability of the Stream Ecological Valuation (SEV) to intermittent streams*, National Institute of Water and Atmospheric Research Client Report Ham2011-025 for Hawke's Bay Regional Council, Hamilton. 14 p.

21 Maseyk, F. J. F., Barea, L. P., Stephens, R. T. T., Possingham, H. P., Dutson, G., & Maron, M. (2016). A disaggregated biodiversity offset accounting model to improve estimation of ecological equivalency and no net loss. *Biological Conservation*, *204*, 322-332.

22 Baber M., Christensen M., Quinn, J., Markham, J., Kessels G., Ussher G. & Signal Ross R. 2021. The use of modelling for terrestrial biodiversity offsets and compensation: a suggested way forward. Resource Management Journal.

useful, estimates of input and output values need to be based on good evidence as well as justified expert opinion and this has not been demonstrated in this case. Structured methods of collecting this data such as an expert elicitation process, help to mitigate biases in expert judgement and improve the accuracy and transparency of the resulting estimates[23]. These methods are now routine within the ecological discipline, are recommended for use in the Biodiversity Accounting Model, but have not been employed for the BCM proposed in this case.

12.5. The stated intent behind the BCM is to improve and or generate robustness around compensation proposals[24]. However, in my opinion the model does not achieve this aim. The utility of mathematical models is predicated on researchers' ability to answer two key questions. First, whether the mathematical structure of a model is sufficiently realistic, and second, how that model should be parameterized to best represent reality[25]. In my expert opinion, this model is neither realistic enough structurally nor are the value estimates sufficiently stringent or transparently logical.

12.6. Ostensibly the BCM is based on mathematics set out in an accepted model type – the Biodiversity Accounting Model -- which bolsters the credibility of the framework. However, in contrast to that model, the BCM aggregates biodiversity values into attributes (one all-encompassing habitat value). Disaggregation of these values provides for their individual assessment which is extremely important to prevent any concealed losses and is a key feature of the Biodiversity Accounting model[26].

12.7. In my opinion there are several issues in both the BCM itself and in its application to this case (such as erroneous model inputs, and the overall

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[23] Hemming, V., Burgman, M. A., Hanea, A. M., McBride, M. F., & Wintle, B. C. (2018). A practical guide to structured expert elicitation using the IDEA protocol. *Methods in Ecology and Evolution*, *9*(1), 169-180.

[24] Baber M., Christensen M., Quinn, J., Markham, J., Kessels G., Ussher G. & Signal Ross R. 2021. The use of modelling for terrestrial biodiversity offsets and compensation: a suggested way forward. Resource Management Journal.

[25] Stouffer, D. B. (2019). All ecological models are wrong, but some are useful. *Journal of Animal Ecology*, *88*(2), 192-195.

[26] Maseyk, F. J. F., Barea, L. P., Stephens, R. T. T., Possingham, H. P., Dutson, G., & Maron, M. (2016). A disaggregated biodiversity offset accounting model to improve estimation of ecological equivalency and no net loss. *Biological Conservation*, *204*, 322-332

structure of the model) that result in flawed ecological accounting that cannot be trusted to predict the direction of outcomes even coarsely.

12.8. The BCM outputs lack transparency and are difficult for other ecologists or decision makers to interpret. The BCMs generate a unitless percentage gain as an output that has only relative meaning. As the applicant intends to compensate for loss in bat habitats, a real-world value (e.g. number of new bats or roost sites) is required for decision makers to assess the sufficiency of the compensation action.

12.9. In this case the proposal is for developers to compensate for difficult-to-offset losses through predator control and habitat restoration that is designed to benefit Critically Threatened Long-tailed bats as well as several bird and lizard species. The proposed provisions from the S42A report would enable a BCM to justify this out-of-kind exchange (only bats or their habitat are included in the model, benefits are assumed for other taxa). In my opinion, the models cannot predict benefits for other species as the relative biodiversity attributes are not included in the model and the currency used is overly simplistic.

12.10. The model itself is not provided so no detailed analysis is possible. The BCM predicts 20% Net Gains for bats. The applicant concludes that this purported gain would adequately compensate for losses in biodiversity values. However, this is likely to be misleading for several reasons. The BCM provides no error estimates. Sensitivity analysis is likely to show that calculated net gains are highly sensitive to minor fluctuations in inputs. Any gains lose their weight if predictions include large errors, for example if predicted Net Gains are 20 ± 50% then losses are just as likely.

12.11. There are many assumptions made in ecological modelling and these need to be made transparent. The ability to confidently rely on a model in any particular application hinges on the validity of the underlying assumptions. Modellers use assumptions to decide what to include and exclude in a model, and the omitted parts are assumed to have a negligible influence on the results. Being explicit about assumptions—and the belief in them—is therefore essential to both the portrayal of

uncertainty and the reliability of model results for decision-makers. Evidence from cognitive science suggests people are overly swayed by what they are presented, even if they know there is missing information[27]. Therefore, decision-makers may treat numerical estimates as if they were essentially true unless uncertainties are presented alongside such predictions.

12.12. Robust models can be powerful tools that can facilitate transparent decision making. However, the use of models, such as the BCM included in Plan Change 5, can result in more confidence placed in predictions than is justified and therefore it is critical that the development of any new model be held to a high standard.

12.13. In addition, I am of the opinion that models that facilitate compensation over attempting offsetting in the first instance, when limits to offsets are not reached, go against best practise effects management.

12.14. In my opinion, it is possible and even likely that poorly designed biodiversity models such as the BCM will facilitate biodiversity loss in the PSPA.

13. GIVING EFFECT TO REGIONAL POLICY STATEMENT

13.1. The Waikato Regional Policy Statement (RPS) policy 11.1 to maintain or enhance indigenous biodiversity puts a particular focus on

> a. working towards achieving no net loss of indigenous biodiversity at a regional scale;…
> …j. the consideration and application of biodiversity offsets

13.2. In the case of significant biodiversity, the RPS policy 11.2, provides guidance for biodiversity offsetting which is generally consistent with the BBOP standard and National guidance. Of note, the RPS policy 11.2 puts the emphasis on **avoid** in the case of Threatened species.

[27] Kahneman, D. (2011). *Thinking, fast and slow*. Macmillan.

13.3. *f.* recognise *that remediation, mitigation and offsetting may not be appropriate where the indigenous biodiversity is rare, at risk, threatened or irreplaceable;* …

13.4. The explanation to Policy 11.2.2 states that if any minor residual effects remain after avoidance, remediation and mitigation steps have been adhered to, they **must** be offset.

The Method seeks avoidance of adverse effects as the most effective means of protecting areas of significant indigenous vegetation and significant habitat of indigenous fauna. It recognises that some loss of or damage to those areas may be unavoidable and in those cases remediation and mitigation is required. Where adverse effects remain after avoidance, remediation and mitigation then more than minor adverse effects are required to be offset.

13.5. The use of compensation as a fifth step in the mitigation hierarchy is not mentioned. As compensation is inherently riskier for biodiversity this step is even more unlikely than offsetting to be appropriate for use with a Critically Threatened species.

13.6. In addition, the RPS states that where biodiversity offsets are used, it must be reasonably demonstrated that No Net Loss will be achieved. This has not been demonstrated for PSPA.

When applying Method 11.2.2, the expectation is that proposals should reasonably demonstrate that no net loss has been achieved using methodology that is appropriate and commensurate to the scale and intensity of the adverse effects.

14. COMMENTS ON PROPOSED EFFECTS MANAGEMENT

Avoid, minimise, remedy

14.1. It is necessary that the steps to avoid, minimise and remedy adverse impacts are shown to be sequentially exhausted. I agree with the assessment that the loss of 3.09 ha of high value bat habitat cannot be

adequately or appropriately addressed and thus should be avoided page 21 Technical Ecology Report[28].

14.2. The adverse effects will include increases in urbanisation, lighting, noise, predators such as cats, traffic, and roading network density. Loss of trees (and other vegetation) may result in a smaller bat population, with smaller home ranges, fewer roosts, and lower levels of functional connectivity through the area[29]. In my opinion best practise effects management demands that each of these effects is assessed and that endeavours are increased to avoid, minimise and remedy are applied to each sequentially across all spatial scales within PSPA.

14.3. The proposed provision 1.2.2.27 Bat Management Plan (D) could be more effective by stating that Bat Management Plans need to follow best practise effects management hierarchy, i.e., sequentially exhaust all steps before moving to the next.

14.4. The same comment applies to proposed provision 1.3.3 Restricted Discretionary, Discretionary and Non-Complying Assessment Criteria. The need to address all steps as much as feasible before descending the hierarchy can be made more explicit.

Biodiversity offsetting

14.5. Offsetting of bat habitat was deemed not possible, and a suite of compensation measures are proposed instead.

14.6. As stated in the Technical Report (page 29) *"While offsetting was considered in the first instance, offsetting was ruled out on the grounds that neither the biodiversity values within the PSPA, nor the nature of residual effects on those values or the proposed residual effects* management *measures, lend themselves to quantitative accounting for losses and gains with the necessary degree of confidence to constitute an offset. …In our view no residual effects could possibly be offset under the NPS-IB definition"*

[28] Kessels GHA 2022 Statement of Evidence of Gerardus Henricus Anthonius Kessels (Ecology) in the matter of Proposed Plan Change 5 to the Operative Hamilton City District Plan

[29] Statement of Evidence of Kerry Borkin dated 16 September 2022, at paragraph 5.3

14.7. In my view, these statements and the subsequent move towards compensation runs counter to The Waikato Regional Policy Statement.

14.8. Neither the biodiversity values within the PSPA nor the nature of the residual effects are unique to this instance and there are examples within New Zealand where offsets have been developed for at least some of the associated values and residual effects seen at PSPA[30]. See Maseyk et al 2015[31] for examples of how the Biodiversity Accounting Models can be used with different biodiversity types.

14.9. Long tailed bats are potentially one of the more challenging species, both in terms of data collection and implementing proven management interventions. However, Dr Borkin[32] details how monitoring of bats, as long as a sufficient sample size is acquired, can yield sufficient data to able to detect changes in population numbers, i.e., losses and gains could be quantified.

14.10. In addition, offsetting is not solely limited to quantitative data (although it is preferred as the associated errors are lower). There is the ability to use qualitative data, for example when data is absent or insufficient in models such as the Biodiversity Accounting Model.

14.11. In many cases it is necessary to use a combination of offsetting and compensation. For example, offset models can be developed for a proportion of the species or habitats affected by development or only a subset of the residual effects on a species can be offset and the rest compensated for.

14.12. In the Technical report (page 29) the authors state that the most notable difference between compensation and offsetting relates to the scale of the compensation. I disagree, the most notable difference between the two is in the level of confidence around the persistence of biodiversity values. When achievable offsetting is skipped over in favour of "easier

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[30] Brown M., Clarkson B. D., Barton B. J., & Joshi C. (2013). Ecological compensation: an evaluation of regulatory compliance in New Zealand. Impact Assessment & Project Appraisal, 31(1), 34 – 44; Mt Messenger Alliance. 2017. Assessment of Ecological Effects-Ecological Mitigation and Offset.

[31] Maseyk, F., Maron, M., Seaton, R., & Dutson, G. (2015). A Biodiversity Offsets Accounting Model for New Zealand: User Manual. *The Catalyst Group: Hamilton, New Zealand*, 67.

[32] Statement of Evidence of Kerry Borkin dated 16 September 2022, at section 22

to deliver" compensation we can no longer be certain that biodiversity values, such as the population of bats will be self-sustaining in the area.

14.13. Recognising the 'limits to offsetting' (see Section 7) is crucial but this should not translate into defaulting to compensation. Similar principles apply to compensation and rather than accepting losses, the first three steps of the effects management hierarchy may need to be re-visited.

14.14. In summary, if there are real limits to offsetting, i.e., a lack of available data and unproven methodologies to create gains in bat populations then I don't consider compensation an appropriate substitute as it constitutes an unacceptable level of risk for a Critically Threatened species. Providing a high level of confidence that a net gain outcome is achievable is particularly important when dealing with biodiversity values of conservation concern or significance[33]. Guaranteed losses for long-tailed bats are unlikely to be adequately addressed through uncertain compensation outcomes.

Decision support tool/quantum and type of management

14.15. In my opinion, the Biodiversity Compensation Models (BCMs) are not fit for purpose and should not be provided for by Plan Change 5 to provide guidance on the quantum and type of compensation required. The outputs of the models indicating a net gain and how they are reported are misleading, they undervalue existing biodiversity and overvalue management interventions.

14.16. The BCM as a tool has not undergone a scientific peer review process or been published in the scientific literature. It has been put forward as a tool in multiple resource consent applications to-date but it has not been endorsed by the ecological community. In a recent application for resource consent (Te Kuha mine) the court did not accept it as part of evidence.

[33] Maseyk, F., Ussher, G., Kessels, G., Christensen, M., Brown, M. 2018. Biodiversity Offsetting under the Resource Management Act: A guidance document. Prepared for the Biodiversity Working Group on behalf of the BioManagers Group.

14.17. The word “transparent” in conjunction with the BCM is used throughout the Technical report and in the evidence of Dr Baber and Mr Kessels several times. In my opinion, this tool is not at all transparent, it is not clear how conclusions are derived, what assumptions have been made along the way, or how close (or not) to accurate the predictions are. Overall, it serves to give a semblance of certainty that is just not present.

14.18. The report says that to achieve NNL/NG outcomes with a reasonable degree of certainty ~205 ha of revegetation and ~120 ha pest control is required. In my opinion this model is incapable of making such accurate or even ballpark predictions. The structure and the value scores that drive the BCM lead to inaccurate predictions.

14.19. Inputs and outputs of the BCM are subjective, use highly simplified evaluations of habitat type and are highly sensitive to input error. For example, more than 462ha of habitat is given a score of 0.25 (0 = habitat is unsuitable) despite evidence that bats regularly use this area. Losses are therefore likely to be grossly underestimated. The best habitat (3.09ha) being lost to development is assigned a score of 3 although bat ecologists say it is both a hotspot and provides critical resources (the BCM definition of habitat values should give this a score of 4 - <5). In terms of compensation, the model assumes that habitat creation will achieve a value of 3 within 25 years. This is a big assumption given that the guidance to increase bat habitat outside of plantation forests recommend that “plantings will include a mix of species that are fast-growing (e.g. cabbage tree, kānuka, houhere), to provide habitat in the short-term (e.g. 10-100 years), and species that are slower growing (e.g. tōtara, rimu, kahikatea), that will provide roosts in the longer term (e.g. 80-800 years plus)” [34]. Pest control compensation over 120ha of land is predicted to increase habitat value from 3.5 to 3.75 but there is no discussion of whether this is biologically meaningful for bats (both are relatively high value habitat in the definition of BCM value scores)

[34] Pawson SM, Brockerhoff EG, Meenken ED, Didham RK. 2008. Non-native plantation forests as alternative habitat for native forest beetles in a heavily modified landscape. Biodiversity and Conservation 17: 1127-1148

14.20. These qualitative inputs and outputs have not been subject to peer review, are not transparently supported by science, do not have any confidence intervals assigned and as such the potential magnitude of error and the direction of future state i.e., loss versus gain cannot be trusted.

14.21. In addition, it is my view that Net Gain terminology should not be used in a compensation approach, as losses and potential gains have not been appropriately quantified. Net gain is defined in the NPS-IB exposure draft as:

a) The biodiversity values to be lost through the activity to which the offset applies are counterbalanced and exceeded by the proposed offsetting activity, so that the result is a net gain when compared to that lost. Net gain is demonstrated by a like-for-like quantitative loss/gain calculation of the following, and is achieved when the ecological values at the offset site exceed those being lost at the impact site across indigenous biodiversity:

   i. types of indigenous biodiversity, including when indigenous species depend on introduced species for their persistence; and
   ii. amount; and
   iii. condition.

14.22. Currently the proposed provisions (1.2.2.27 Bat Management Plan) mention net biodiversity gain in relation to both offsets and compensation. In my opinion, this is inconsistent with current best practise.

14.23. The proposed provisions that provide for a financial contribution (1.2.2.27 Bat Management Plan) state that the purpose is to "**offset** such effects". The recommendation is that the BCM is used by developers to calculate the amount of funding required in each instance. This tool has not been developed for offsets and in my opinion

it is not fit for the purpose of calculating the amount and type of biodiversity management required within PSPA.

Proposed Compensation

14.24. In my opinion, not all residual effects associated with future development if the proposed Plan Change 5 is approved have been identified or provision for their appropriate management provided for.

14.25. And in my view those residual effects that have been identified (namely habitat loss) will not be appropriately addressed by the proposed Plan Change 5 through the recommended habitat restoration and enhancement as the assessment (BCM) that underpins this determination is flawed.

14.26. The compensation package proposed includes 62 ha predator control within PSPA and 66ha habitat restoration within PSPA as well as 190ha habitat restoration or 700ha of pest control of unidentified areas outside the PSPA. However, there are high levels of uncertainty regarding the quantum of management intervention needed to be effective, the degree to which either management intervention would be effective and whether enough area is available to implement both. No outcome measures for bats are proposed in response to either habitat creation or pest control.

14.27. I agree with Dr Mueller (evidence page 9) that in terms of habitat restoration, early planting of new bat foraging and commuting vegetation needs to be done well ahead of development affecting the bat habitat.

14.28. It is expected that bats will respond to the control of predatory mammals to low levels (<5%). However, there remains a high level of uncertainty in regard to the magnitude of benefit (increase and sustained population numbers) that will occur due to this predator control. According to both Dr Borkin[35] and Ms Pryde[36], bats are sensitive to low

[35] Statement of Evidence of Kerry Borkin dated 16 September 2022, at paragraph 17.9
[36] Statement of Evidence of Moira Pryde dated 16 September 2022, at paragraph 6.32

levels of rats and require large areas of predator control (up to 3350 ha) to be effective.

14.29. Post development, the amount of habitat remaining within PSPA for bats is 112 ha. The average home range of all the bats studied was 704 ha ref. If bats are to persist and be self-sustaining, they will need to adapt to meet all their needs within the PSPA with only 16% of the habitat or there needs to be sufficient connections with the wider landscape. This is difficult, for example, removing just a 5 m section of trees from the centre of a corridor (or known flight path) significantly reduced the functional connectivity within the immediate landscape[37].

14.30. Adding to the uncertainty around success of proposed management interventions is the unknowns regarding area targeted. The amount of land needed to offset or compensate for residual effects is not available within the PSPA which means that achieving positive environmental outcomes has to occur outside PSPA and is dependent on inter-agency collaboration.

14.31. If a larger area, outside the PSPA area, is used to compensate for development activities that cannot be managed within the PSP area, in my opinion, this should benefit bats currently resident within the PSPA. This is far from certain[38].This in effect may sacrifice the bats currently in PSPA but potentially improve bat habitat outside.

14.32. Similar to the assessment in the Technical Report (page 31) I assessed the proposed compensation package against the "Principles of Compensation" from the exposure draft of the NPS-IB. These are the standards against which effective compensation should be measured. In my assessment, none of the 11 principles are satisfactorily met, see Table 1.

[37] Carlier, J., Moran, J., Aughney, T., & Roche, N. (2019). Effects of greenway development on functional connectivity for bats. *Global Ecology and Conservation*, *18*, e00613.

[38] Statement of Evidence of Kerry Borkin dated 16 September 2022, at paragraph 23.3

Table 1: Assessment of the PC5 proposed residual effects management measures against biodiversity conservation principles (NPS-IB)

Principle	Explanation (NPS-IB exposure draft)	Assessment
Adherence to the effects management hierarchy	Biodiversity compensation is a commitment to redress more than minor residual adverse impacts, and should be contemplated only after steps to avoid, minimise, remedy, and offset adverse effects are demonstrated to have been sequentially exhausted	NO An offset was not demonstrated as not possible
When biodiversity compensation is not appropriate	Biodiversity compensation is not appropriate where indigenous biodiversity values are not able to be compensated for, for example because: (a) the indigenous biodiversity affected is irreplaceable or vulnerable; or (b) effects on indigenous biodiversity are uncertain, unknown, or little understood, but potential effects are significantly adverse; or (c) there are no technically feasible options by which to secure proposed gains within acceptable timeframes	NO Dealing with Critically Threatened species Substantial uncertainty around effects and management interventions
Scale of biodiversity compensation	The values to be lost through the activity to which the biodiversity compensation applies are addressed by positive effects to indigenous biodiversity,	NO The full scale of adverse effects have not been identified. The scale of compensation required has not been appropriately calculated
Additionality	Biodiversity compensation achieves gains in indigenous biodiversity that are above and beyond gains that would have occurred in the absence of the compensation, such as gains that are additional to any minimisation and remediation undertaken in relation to the adverse effects of the activity.	UNCLEAR Potential overlaps with Southern Links unknown Compensation is proposed outside PSPA – how this overlaps or potentially complements current biodiversity restoration work is unclear
Leakage	The design and implementation avoid displacing activities or environmental factors that are harmful to indigenous biodiversity in other locations.	NO Effects on pipits loss of habitat have not been quantified or addressed through management
Landscape context	Biodiversity compensation actions are undertaken where this will result in the best ecological outcome, preferably close to the impact site or within the same ecological district. The actions consider the landscape context of both the impact site and the compensation site, taking into account interactions	PARTIALLY Proposed restoration and habitat enhancement is at a landscape scale however connectivity issues have not been resolved

Principle	Explanation (NPS-IB exposure draft)	Assessment
	between species, habitats and ecosystems, spatial connections, and ecosystem function	
Long-term outcomes	Biodiversity compensation is managed to secure outcomes of the activity that last as least as long as the impacts, and preferably in perpetuity	UNCLEAR The habitat restoration and enhancement activities are proposed in perpetuity where this is possible but uncertainty remains around implementation
Time lag	The delay between loss of indigenous biodiversity at the impact site and gain or maturity of indigenous biodiversity at the compensation site is minimised	Partially Not sufficiently addressed
Trading up	When trading up forms part of biodiversity compensation, the proposal demonstrates that the indigenous biodiversity values gained are demonstrably of higher indigenous biodiversity value than those lost. The proposal also shows the values lost are not to Threatened or At Risk species or to species considered vulnerable or irreplaceable.	UNCLEAR Higher quality habitat is potentially created. However, other biodiversity values have not been adequately captured and accounted for so potential losses are concealed
Financial contributions	Financial contributions are only considered when there is no effective option available for delivering indigenous biodiversity gains on the ground. Any contributions related to the indigenous biodiversity impacts must be directly linked to an intended indigenous biodiversity gain or benefit	PARTIALLY As proposed in the plan, financial contributions will precede detailed management design. They may be appropriate ….
Science and mātauranga Māori	The design and implementation of a biodiversity offset should be a documented process informed by science, including an appropriate consideration of mātauranga Māori:	NO A novel untested tool (BCM) is used to determine quantum and type of compensation which has not had input or endorsement from the wider scientific community Inputs from expert(s) in mātauranga Māori have not been included
Stakeholder participation	The effective participation of stakeholders should be ensured in decision making about biodiversity offsets, including their evaluation, selection, design, implementation, and	UNCLEAR

Principle	Explanation (NPS-IB exposure draft)	Assessment
	monitoring. Stakeholders are best engaged early in the process.	
Transparency	The design and implementation of biodiversity compensation, and communication of its results to the public, is undertaken in a transparent and timely manner.	NO The presentation of the BCM makes it very difficult for users and decision makers to appraise the performance of the tool and understand the predictions

Effects management as a whole

14.33. I agree with Dr Mueller that Plan Change 5 should adhere to best practise effects management and offsetting methodologies[39] as this is the safest way to protect current and future biodiversity. However, I am of the opinion that best practise has not been followed in this case.

14.34. Demonstrating that options at each stage have been exhausted before moving on to the next stage has not been shown satisfactorily.

14.35. I agree with Dr Mueller that monitoring is crucial to effectively assess the impacts of development on long-tailed bats. In addition, there needs to be contingencies in place to be able to respond to results from monitoring.

14.36. In general, I support the whole-project or landscape approach to managing residual effects but in my view, as presented, the proposal is unlikely to be able to provide for more than compensation outcomes. It cannot provide net gain biodiversity offsets, as simple measures cannot adequately or appropriately account for complex, threatened, rare, uncommon, or less well understood attributes of biodiversity.

15. CONCLUSIONS

15.1. The best way to protect threatened species is to protect the places in which they live. The S42A report and associated documents focus the

[39] Mueller H. 2022. Statement of Evidence of Dr Hannah Mueller (Ecology – Bats, wetlands, freshwater biodiversity) in the matter of Proposed Plan Change 5 to the Operative Hamilton City District Plan page 9

majority of their ‘protection’ of bats and effects’ management within areas that are substantially smaller than bats home ranges. Incomplete protection is unlikely to halt decline in population numbers.

15.2. In my opinion the Plan needs to be more explicit in demanding that the effects management hierarchy is followed, in particular that avoidance, minimisation and remediation are demonstrated to be sequentially exhausted before residual effects can be addressed through either offsets or compensation.

15.3. I support the intention of the Plan to provide for biodiversity offsetting in its policies. In my preceding paragraphs I have outlined some of the key elements of biodiversity offsetting and why they are critical to achieving the goal of net loss of biodiversity.

15.4. It is also crucial that Plan Change 5 acknowledges that there are limits to biodiversity offsets. There are situations where residual effects cannot be adequately catered for by offsets and in such cases, adverse effects lead to net loss and this needs to be considered by decision makers.

15.5. I believe that including the principles of biodiversity offsetting (section 6) and environmental compensation (section 7) will lead to a better understanding and implementation of the mitigation hierarchy and ultimately better outcomes for biodiversity.

15.6. Currently the provisions allow for all considerable residual effects to be addressed through compensation, in the form of financial contributions. Details of the extent of these contributions, the ability of these to deliver meaningful outcomes for bats and the extent to which these outcomes actually compensate for losses is still unclear.

15.7. In my opinion the proposal for financial contributions to be managed by an external body is problematic as it devolves responsibility for managing the residual effects to a third party that cannot be encumbered by consent conditions. It is not clear who and how the fund will be managed.

15.8. In my opinion, if a financial fund is set up, it needs to be designed and implemented cautiously so that risks to biodiversity are explicitly acknowledged and addressed, and it should not claim to deliver more than it can.

15.9. Another fundamental issue with the proposed compensation approach within the proposed Plan Change 5 is that there is not enough available land within the PSPA to either offset or compensate for the residual effects from development.

15.10. I strongly recommend that the use of BCM's or any new modelling tool that has not undergone a peer review process, is not included in the Plan Change 5.

15.11. As it stands, the proposed compensation package lacks adequate certainty around the biodiversity gains to be achieved. Thus, there is no reassurance that biodiversity gains will be commensurate with losses, and it is unclear as to whether the long-tailed bat will maintain a self-sustaining population in Hamilton post PSPA development.

Ilse Corkery
Dated 16 September 2022

Appendix 1: Consolidated List of References in Dr Corkery's Evidence

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