

**IN THE ENVIRONMENT COURT
WELLINGTON REGISTRY**

**I TE KŌTI TAIAO O AOTEAROA
TE WHANGANUI-A-TARA ROHE**

ENV-2024-WLG-001

UNDER the Resource Management Act 1991

IN THE MATTER the direct referral of applications for resource consents by
under section 87G of the Act for the Mt Munro Wind Farm

BY **MERIDIAN ENERGY LIMITED**
Applicant

STATEMENT OF EVIDENCE OF ADAM FORBES

**ON BEHALF OF MANAWATŪ-WHANGANUI REGIONAL COUNCIL, GREATER
WELLINGTON REGIONAL COUNCIL, TARARUA DISTRICT COUNCIL, AND
MASTERTON DISTRICT COUNCIL**

FRESHWATER ECOLOGY


Dated: 23 August 2024




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STATEMENT OF EVIDENCE OF ADAM FORBES

A. INTRODUCTION

- [1] My name is Adam Forbes. I am the Director and Principal Ecologist at Forbes Ecology Limited. I have been in that position since 2012.
- [2] I prepared a report on the application required by s 87F of the Resource Management Act 1991 (**RMA**) on behalf of Manawatū-Whanganui Regional Council (**Horizons**) and Wellington Regional Council (**WRC**) Tararua District Council (**TDC**), and Masterton District Council (**MDC**) (the **Consent Authorities**) dated 15 March 2024 (**s 87F Report**).
- [3] In my s 87F Report, I reviewed the application from Meridian Energy Limited (the **Applicant** or **Meridian**) for resource consent applications lodged with the Regional Councils for the Mt Munro Wind Farm (**Mt Munro Project** or **Project**) in relation to freshwater ecology. The s 87F Report provided recommendations to improve or further clarify aspects of the resource consent applications, including with regard to conditions, should the Court be minded to grant resource consents.
- [4] I confirm I have the qualifications and experience set out paragraphs 5-9 of my s 87F Report.
- [5] On 6 August 2024, I participated in expert conferencing on freshwater ecology, resulting in a joint witness statement dated 6 August 2024 (the **Freshwater Ecology and Wetlands JWS**). I confirm the contents of the Freshwater Ecology and Wetlands JWS.
- [6] Additionally, I met with Meridian's freshwater ecologist Dr Vaughan Keesing, along with the planning experts for the Regional Councils (Lauren Edwards and Alisha Vivian), and Meridian (Tom Anderson) on 14 August 2024 to further discuss conditions following expert conferencing.

B. CODE OF CONDUCT

- [7] I repeat the confirmation provided in my s 87F Report that I have read and agree to comply with the Code of Conduct for Expert Witnesses contained in

the Environment Court Practice Note 2023. This evidence has been prepared in accordance with that Code. Statements expressed in this evidence are within my areas of expertise, except where I state I am relying on the opinion or evidence of other witnesses.

C. SCOPE OF EVIDENCE

[8] My statement will cover the following:

- (a) The extent to which issues identified in my s 87F Report have been resolved through mediation, Meridian evidence, and expert conferencing; and
- (b) Conditions.

[9] In addition to the material that was reviewed for my s 87F Report, I have reviewed the following:

- (a) Statement of Evidence of Dr Vaughan Keesing (Freshwater and Wetland Ecology) dated 24 May 2024, on behalf of Meridian;
- (b) The proposed changes to conditions filed with Mr Tom Anderson's evidence (the **Meridian conditions**);
- (c) Evidence of Janet McIlraith (s 274 party) dated 10 July 2024;
- (d) Evidence of Robin Olliver (s 274 party) dated 10 July 2024;
- (e) Evidence of Hastwell/Mt Munro Protection Society Inc. (s 274 party) dated 10 July 2024;
- (f) Evidence (Social Impact Report) of John Maxwell (s 274 party) dated 10 July 2024; and
- (g) The draft proposed conditions attached to the evidence of Damien McGahan on behalf of the Consent Authorities (the **August Proposed Conditions**).

D. OUTSTANDING ISSUES

- [10] My s 87F Report identified a number of concerns with the methodology undertaken by Meridian for the ecological assessment. As a result, there was uncertainty over the accuracy of the statutory significance assessment and freshwater values assessment. I was therefore unable to determine the freshwater ecology values across the site, the magnitude of effect and the adequacy of the assessed proposed offset/compensation proposal.¹
- [11] At the time I also had input into proposed conditions prepared by the Regional Councils and made specific recommendations with regard to a freshwater ecology management plan, a threatened species discovery protocol, a comprehensive offset management plan and the avoidance of adverse effects to freshwater ecology during construction of the proposed bridge crossing of the Mākāhahi tributary.² I also supported more robust instream monitoring, as requested by submitters on the Project.³
- [12] Following mediation, expert conferencing and review of the Meridian evidence I have identified the following matters that remain at issue following preparation of my s 87F Report:
- (a) Stream classification method and mapping.
 - (b) Characterisation of fish communities and freshwater mussel populations.
 - (c) Accuracy of values assessments.
 - (d) Accuracy of magnitude of effect assessment for culverting proposal in Mangaroa catchment.
 - (e) Application of the mitigation hierarchy and implications for culvert design and for the proposed offset.

¹ See the summary at Section D of s 87F Report – Dr Adam Forbes (Freshwater Ecology), 15 March 2024.

² Section 87F Report – Dr Adam Forbes (Freshwater Ecology), 15 March 2024, at [96].

³ Section 87F Report – Dr Adam Forbes (Freshwater Ecology), 15 March 2024, at [95].

(f) The design and validity of the proposed freshwater offset.

(g) Receiving environment monitoring.

[13] I address these issues in turn below, except the issues raised with regard to the conditions generally, which I address at section E below.

[14] I note that outcomes reached, and agreements made in freshwater conferencing have helped to progress my areas of concern. In particular, agreement was reached over the following matters, that:

(a) Meridian would provide stream simulation culverts (rather than their initial proposal to provide barrel culverts) in the Mangaroa and upper Mākākāhi tributaries.⁴

(b) ECRs need recalculating based on the above change.⁵

(c) eDNA sampling should be undertaken at all monitoring stations to help resolve my concerns over the adequacy of the values assessment and the implications for effects and effects management.⁶

(d) Further work is required to address the uncertainty I (and submitters) have raised over the Applicant's stream classifications.⁷

(e) The effects lengths used for offsetting must include all instream effects relating to stream simulation culverts.⁸

(f) Offsetting should take into account eDNA results once they are received.⁹

⁴ Freshwater Ecology and Wetlands JWS, at page 3, item 1.

⁵ At page 3, item 1.

⁶ At page 3, item 1.

⁷ At page 4, item 2.

⁸ At page 4, item 6.

⁹ At page 5, item 6.

- (g) Best practice protocols are available to manage effects of instream works (e.g., fish salvage ahead of instream works or methods of minimising sediment release to flowing water).¹⁰
- (h) Offsetting principles must be followed.¹¹

[15] However, as described above, and below, I consider there to be outstanding issues, albeit in some cases, there is further information to come following the additional work identified through expert conferencing. Some information has been recently provided by Meridian.¹² Once all information has been received, and I have had adequate time to review it, I can revisit my position. I expect the information that has been agreed to be provided will reduce uncertainty over ecological values, stream classifications, and the adequacy of the positive effects package and its ability to achieve a net gain position for freshwater biodiversity.

Stream classification method and mapping

- [16] I remain concerned about the method used to map stream classifications. I have previously outlined my concerns in my s 87F Report, where I noted that four submitters also claim inaccuracies in the Applicant's stream classification work.¹³ In my opinion, the survey should have followed a formal method and aspects of what was done raise fundamental concerns. For instance, the freshwater assessment describes that for a stream not to be ephemeral, it had to have flowing water.¹⁴ However, as the name suggests, intermittent flows are a defining characteristic of intermittent streams. This detail alone indicates that, inevitably, some intermittent reaches (i.e., which had no flowing water at the time of survey but would at other times) have been classed as ephemeral.
- [17] I consider the practical implication of this uncertainty for the Project relates to the extent of intermittently flowing versus ephemeral receiving

¹⁰ At page 5, item 6.

¹¹ At page 5, item 8.

¹² Memo – Dr Kessing (BlueGreen Ecology Limited), 19 August 2024.

¹³ Section 87F Report – Dr Adam Forbes (Freshwater Ecology), 15 March 2024, at [31]-[32].

¹⁴ Mt Munro Wind Farm Application, Appendix C - Ecological Assessment at page 41.

environments in relation to site activities. In particular, due to inaccurate stream classification, discharges (e.g., sediment laden, either planned or unforeseen) to ephemeral reaches which are actually intermittently flowing (and therefore hold a higher sensitivity than assessed) would not be accounted for in the effects assessment or effects management regime.

- [18] During expert conferencing it was agreed that Meridian should undertake further work to resolve my areas of concern.¹⁵ The work to be undertaken is firstly to overlay the existing stream classification with the mapped wetland layer to identify whether wetlands occupy all areas of concern. If this is the case, then my concern would be addressed as the areas concerned would be covered under the RMA and consenting framework for wetlands. However, where this process shows that ephemeral/intermittent systems are not wetlands, then it was agreed that a condition should require Meridian to reassess the classification of those reaches following the Auckland Unitary Plan Practice and Guidance Note¹⁶ for stream classification. This fieldwork would be required prior to finalising the design for the Project.

Characterisation of fish communities and freshwater mussel populations

- [19] I have previously raised concern over the adequacy of the freshwater fish surveys carried out by the Applicant in order to characterise the freshwater fish communities of waterways assessed at Mt Munro.¹⁷ My concern is based on the amount of survey effort (survey reach length) for the freshwater fish survey and also that no attempt has been made to survey for freshwater mussels, which hold the national threat classification Threatened – Nationally Vulnerable. Both of these aspects of data collection have implications for the assessment of diversity and rarity meaning the ecological values of the waterways would easily be undervalued if fish or mussel data were assessed incorrectly low.

¹⁵ Freshwater Ecology and Wetlands JWS, at page 4, item 2.

¹⁶ This is the method which experts agreed should be used:
<https://www.aucklanddesignmanual.co.nz/media/n3fdmw1x/rc-3317-stream-classification.pdf>

¹⁷ Section 87F Report – Dr Adam Forbes (Freshwater Ecology), 15 March 2024 from [28].

- [20] Dr Keesing asserts that standard methods have been employed in the two effects assessment with two sets of data collection involving industry best-practice methods and efforts.¹⁸ He goes on to claim there to be no deficiency in the data collection or in the data either spatially or temporally.¹⁹ Dr Keesing was of the same opinion during conferencing.²⁰
- [21] I note however that the science underpinning industry best-practice methods for freshwater fish surveys (Bruno et al., 2010²¹) has clearly established that a survey reach of 150 m length is required to adequately assess reach-scale fish community diversity in wadeable New Zealand streams. The Applicant limited their survey reaches to 50 m.

Figure 3 of 4
 Fig. 3 Species richness index curve (species accumulation standardised to a common value of between 0 and 1 for every 15 m sampled, 1 = 100% of the richness detected for the total distance sampled). Data points up to 150 m (dashed line) are means derived from $n=73$ sites across New Zealand. Numbers to the right of the dashed line represent the number of sites where more than 150 m was sampled. Likelihood of detecting previously undetected species becomes lower with increasing stream distance sampled. Error bars are expressed as (± 1 SD around the mean).

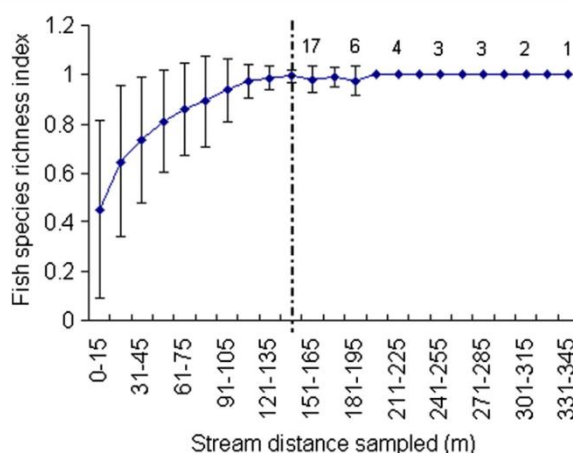


Figure 1. Fish species richness by stream distance sampled reproduced from Bruno et al., 2010. The figure shows that the applicant's data from 50 m survey reach lengths has considerable uncertainty associated with it and on average would explain < 80% (and one SD below the mean being c. 50% diversity explained) of the reach-scale fish community diversity.

- [22] These published data show that on average the Applicant's choice of survey reach length will have underestimated diversity and will have high levels of variability associated with them which undermines perceived certainty and

¹⁸ Statement of Evidence – Dr Vaughan Keesing (Freshwater and Wetland Ecology), 24 May 2024, at [235], [256].

¹⁹ At [256].

²⁰ Freshwater Ecology and Wetlands JWS, at page 3, item 1.

²¹ David, B. O., Hamer, M. P., Collier, K. J., Lake, M. D., Surrey, G. M., McArthur, K., ... & Dale, M. (2010). A standardised sampling protocol for robust assessment of reach-scale fish community diversity in wadeable New Zealand streams. *New Zealand Journal of Marine and Freshwater Research*, 44(3), 177-187.

any decisions based on the data collected. While Dr Keesing is confident the data collected for his assessment represent reach-scale diversity, the data (Bruno et al., 2010; Fig. 1) underpinning the New Zealand Freshwater Fish survey methods (Joy et al., 2013)²² strongly indicate a sampling length of 50 m is inadequate.

- [23] Regarding longfin eel (At Risk – Declining),²³ Dr Keesing continues to disregard the threat classification, on the basis that the species is abundant, and therefore not taking it into account in his assessment of stream values.²⁴ Under the New Zealand Threat Classification System (NZTCS 2022)²⁵ the conservation statuses of taxa are classified based on their population state, trend and size. To be classed as At Risk – Declining, species would have populations which are abundant but in decline. The declining aspect of the class is an aspect Dr Keesing has not acknowledged nor would I consider him able to assess the population trend without considerable expert input.
- [24] As I have previously explained in my s 87F Report, the National Policy Statement for Indigenous Biodiversity 2023 confirms that it is not valid to disregard the threat classification of nationally threatened species based on regional threat status and also longfin eel is classed as regionally threatened (At Risk-Declining) in the Wellington region.²⁶ Further, I remain of the view that the decision to discount the threat classification of longfin eel reduces (along with other methods of undervaluing described in my evidence) the assessed value of the waterways assessed.
- [25] Regarding freshwater mussels, there is no evidence of an attempt to survey for this specie. This is despite there being low-cost and rapid assessment methods such as eDNA sampling which would provide a good indication of the presence of freshwater mussels in affected waterways. Surveys using

²² See https://webstatic.niwa.co.nz/static/web/New_Zealand_Freshwater_Fish_Sampling_Protocols.pdf

²³ The definition of this threat classification is: *At Risk - Declining: population declining but still abundant*.

²⁴ Freshwater Ecology and Wetlands JWS, at page 3, item 1.

²⁵ See <https://www.doc.govt.nz/globalassets/documents/science-and-technical/new-zealand-threat-classification-system-manual-2022-part-1-assessments.pdf>

²⁶ Section 87F Report – Dr Adam Forbes (Freshwater Ecology), 15 March 2024 at [34-42].

eDNA would also have the co-benefit of complementing existing freshwater fish survey data for difficult-to-detect species such as lamprey (Threatened – Nationally Vulnerable).²⁷ This would help to address my concerns over the adequacy of the Applicant's freshwater values assessment.

- [26] During conferencing experts agreed that an eDNA sample should be collected from each of the project's existing freshwater monitoring locations and that the data from these eDNA samples will be made available prior to the hearing.²⁸ I request to review those data once they are available so that I can provide further comment regarding what the results mean for the applicant's freshwater assessment and proposed effects management.

Relevance of Policy 23 in the Wellington Regional Council Regional Policy Statement.

- [27] In my s 87F Report, I raised concerns as to the lack of identification of statutory significance of the Kopuaranga stream for the purposes of Policy 23 of the WRC Regional Policy Statement.²⁹ This was an area of disagreement during expert conferencing.³⁰ Since expert conferencing, I understand from WRC's planner, Ms Alisha Vivian that Policy 23 was wrongly identified as relevant to the Mt Munro proposal, as Schedule F1 of the WRC Natural Resources Plan does not identify the Kopuaranga stream as meeting the criteria for significant indigenous ecosystems.³¹ As such, I no longer have the concerns raised in my s 87F Report in this regard.

Accuracy of magnitude of effect assessment for the culverting proposal in Mangaroa catchment.

- [28] I maintain my disagreement with Dr Keesing regarding his assessment of magnitude of effect associated with the culverting proposal in the Mangaroa tributary.³² I have outlined my reasons for this disagreement in my s 87F

²⁷ The definition of this threat classification is: *Threatened - Nationally Vulnerable: facing a risk of extinction in the medium term.*

²⁸ Freshwater Ecology and Wetlands JWS, at page 3, item 1.

²⁹ Section 87F Report – Dr Adam Forbes (Freshwater Ecology), 15 March 2024, at [35-36].

³⁰ Freshwater Ecology and Wetlands JWS, at page 4, item 3.

³¹ Statement of Evidence – Alisha Vivian (Planning), 23 August 2024, from [26].

³² Freshwater Ecology and Wetlands JWS, at page 3, item 1.

Report, which relates to the scale at which the Applicant's assessment of magnitude of effect was conducted.³³ The Applicant assessed at the whole of catchment scale, rather than at the tributary scale, and I consider the latter more closely represents the zone of influence as per EIANZ 2018 best practice.³⁴ As I explained in my s 87F Report, and reiterated during freshwater conferencing, assessing magnitude of effect at wider scales than necessary has the effect of diminishing the magnitude of effect at the point of impact. The consequence of downgrading the magnitude of effect is an artificial reduction in the overall assessed level of effect. This is obviously of concern especially in situations where the ecological value has also been underestimated³⁵ which, as I have explained, I consider to be the case with regard to the Applicant's freshwater assessment.

Application of the mitigation hierarchy and implications for culvert design and for the proposed offset.

- [29] I note that freshwater offsetting Principle 1 (contained in Appendix 6 of the National Policy Statement-Freshwater Management 2020 (**NPS-FM**)) states (emphasis added in bold):

Adherence to effects management hierarchy: An aquatic offset is a commitment to redress 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.**

- [30] In other words, this means that a biodiversity offset should not be contemplated unless all steps in the mitigation hierarchy have been exhausted. This position is also stated in the NPS-FM:³⁶

An application should not be granted unless:

³³ Section 87F Report – Dr Adam Forbes (Freshwater Ecology), 15 March 2024 at [53-55].

³⁴ See <https://www.eianz.org/document/item/4447>

³⁵ Following EIANZ (2018) ecological impact assessment methods, the overall level of effect is determined from the outcome of the combination of assessed ecological value and magnitude of effect.

³⁶ NPS-FM, at cl 3.24(3) – Rivers.

- (i) The applicant has demonstrated how each step of the effects management hierarchy will be applied to any loss of extent or values of the river (including cumulative effects and loss of potential value), particularly (without limitation) in relation to the values of ecosystem health, indigenous biodiversity, hydrological functioning, Māori freshwater values, and amenity; and
- (ii) If aquatic offsetting or compensation is applied, the applicant has complied with principles 1 to 6 in Appendix 6 and 7 and has had regard to the remaining principles...

[31] As I have previously identified, the Applicant has a significant opportunity to further mitigate the adverse effects on the extent, values, ecosystem health, indigenous biodiversity and hydrological functioning of the Mangaroa tributary by installing stream simulation culverts rather than barrel culverts (see example in Figure 2 below).³⁷ I am of the opinion that unless this significant opportunity to mitigate adverse effects is taken, the NPS-FM framework for effects management does not offer biodiversity offsetting as an option to the Applicant.



Figure 3-2: An example of a stream simulation culvert design.

Figure 2. Stream simulation culverts in the Mangaroa tributary (rather than barrel culverts) would (1) show full application of the mitigation step in the mitigation hierarchy, (2) lower the magnitude of effects on the stream, (3) mitigate the loss of

³⁷ See s 87F Report – Dr Adam Forbes (Freshwater Ecology), 15 March 2024 from [74].

stream extent, health, and hydrological diversity (which are clear NPS-FM directives), (4) and help to secure fish passage.

- [32] Dr Keesing, in his evidence, paraphrases guidance from the National Environmental Standards for Freshwater 2020 and New Zealand Fish Passage Guidelines, when he states:³⁸

The principles of good ecological culvert installation are: ...

(c) use a bottomless arch where possible

- [33] A bottomless arch is analogous with a stream simulation culvert.
- [34] I understand from expert conferencing that Meridian have agreed to use stream simulation culverts for culverting proposals in the Mangaroa and upper Mākākahi tributaries and Dr Keesing and I agreed that stream simulation culverts were necessary in these locations.³⁹
- [35] Should Meridian not adopt stream simulation culverts then, I am of the opinion that they will not have exhausted the mitigation step of the effects management hierarchy and, offsetting residual adverse effects would not be an option open to them.

The design and validity of the proposed freshwater offset.

- [36] Dr Keesing has provided SEV based-ECR calculations for stream loss and habitat loss aspects of the Mangaroa tributary culverting proposal.⁴⁰ The following comments are made notwithstanding my position described above regarding the need to exhaust the mitigation step of the effects management hierarchy before proceeding to offsetting.
- [37] Dr Keesing describes that he has not collected SEV data from the site in order to calculate SEV scores and calculate the corresponding ECRs.⁴¹ I note that calculation of ECRs requires the exclusion of freshwater macroinvertebrate and fish data meaning that in the Freshwater Ecology and Wetlands JWS

³⁸ Statement of Evidence – Dr Vaughan Keesing (Freshwater and Wetland Ecology), 24 May 2024 at [134].

³⁹ Freshwater Ecology and Wetlands JWS, at page 3, item 1.

⁴⁰ Statement of Evidence – Dr Vaughan Keesing (Freshwater and Wetland Ecology), 24 May 2024 from [140].

⁴¹ At [146].

where Dr Keesing refers to site data, it cannot be these freshwater biotic data being referred to as those data do not form part of the calculation.⁴² It must be as per his evidence that no explicit site data forms part of the SEV/ECR calculations. Dr Keesing explains that he has undertaken lots of SEVs in the past and therefore does not need to collect data from the site, instead using scores which presumably simply represent his opinion. As no actual data from any site has been referenced it is not possible to understand what the SEV (and resulting ECR) scores represent and how applicable they are to the Mangaroa and upper Mākākahi tributaries where culverts are proposed and to the restoration reach in the upper Mangaroa tributary.

[38] The approach taken of not collecting specific site data from the Mangaroa tributary and instead basing SEV scores and ECRs in an undefined and subjective manner is I consider unacceptable for a resource consent application. Further, it is inconsistent with the following biodiversity offsetting principles (emphasis added in bold):⁴³

- (a) Equivalency – *“Assessing ecological equivalence **requires the biodiversity at both the impact and the offset site to be described and measured to quantify losses and gains**”.*
- (b) No net loss and preferably a net gain – *“This is demonstrated by a like-for-like quantitative loss/gain calculation, and is achieved when the **extent of values gained at the offset site** (measured by type, amount and condition) **are equivalent to or exceed those being lost at the impact site.**”* I note that the Applicant has not measured the extent of values lost or gained at either the impact or offset sites, respectively.
- (c) Transparency – *“The design and implementation of a biodiversity offset, and communication of its results to the public, should be undertaken in a transparent and timely manner.”* Gathering and applying site specific data is a matter of transparency of biodiversity

⁴² Freshwater Ecology and Wetlands JWS, at page 5, items 8-9.

⁴³ https://d1pepq1a2249p5.cloudfront.net/media/documents/Biodiversity-offsetting-under-the-resource-management-act-full-document-..._YbGa2tM.pdf at page 5.

offset design. I still do not know what the proposed SEV or ECR values represent.

[39] Also of relevance is this statement from best practice offsetting guidelines:⁴⁴

Biodiversity at a site that is not included in no-net-loss calculations may or may not be represented in trades, and may or may not be replaced at the offsite site to the same degree, and in fact may be permanently lost. A full picture should be presented to decision-makers and to avoid misrepresenting likely outcomes to stakeholders (NZ Govt, 2018, p. 23).

[40] Given the biodiversity offsetting principles are not met, the proposed offset is technically environmental compensation. Environmental compensation is the least preferable method of effects management as it has the highest level of uncertainty given that a clear balancing of loss and gain is not available.

[41] In his evidence, Dr Keesing continues with his justification of not collecting site-specific data and states rural streams typically fall around SEV 0.4.⁴⁵ However, I have personally been involved with SEV scores in 'unrestored' rural waterways as high as 0.6 (see Cameron 2010;⁴⁶ Forbes 2011).⁴⁷

[42] I have reviewed the ECR calculations now provided by Dr Keesing in his evidence⁴⁸ and make the following observations.

[43] It is important to note that the method for calculating ECRs specifies (emphasis added):⁴⁹

⁴⁴ Ibid at page 23.

⁴⁵ Statement of Evidence – Dr Vaughan Keesing (Freshwater and Wetland Ecology), 24 May 2024, at [245].

⁴⁶ See <https://www.hbrc.govt.nz/assets/Document-Library/Projects/TANK/TANK-Key-Reports/Upper-Karamu-Stream-Ecological-Valuation-2010.pdf>

⁴⁷ See <https://www.hbrc.govt.nz/assets/Document-Library/Projects/TANK/TANK-Key-Reports/Ruahapia-and-Raupare-Stream-Ecological-Valuations-2011.pdf>

⁴⁸ Statement of Evidence – Dr Vaughan Keesing (Freshwater and Wetland Ecology), 24 May 2024, at [150], [152].

⁴⁹ Storey et al., 2011. See <https://knowledgeauckland.org.nz/media/1397/tr2011-009-stream-ecological-valuation.pdf> at p. 55.

The method described here is considered the best of the various options that were explored. We used the SEV method to derive environmental compensation ratios based on the functions that will be lost at the impact site and the potential improvements to be gained at an environmental compensation site. This provides a scientific basis for determining an environmental compensation ratio scaled to the streams where the development and environmental compensation is intended. The rationale for the formula selected is that it compares the loss of functions at the impact site relative to the functions gained at an environmental compensation site. **However, the functions lost at the impact site include not only those that are actually degraded as a consequence of the development, but also the potential for improvement in these functions that is forgone by development of the site. Failure to take this component into account is likely to result in a steady decline of stream values on a regional scale.**

- [44] In the ECR formula (see Figure 3 below) the potential SEV value for the site to be impacted is represented by the acronym/code: SEVi-P (this stands for SEV score of the impact reach as a 'best case' potential value). Note for clarity that in Dr Keesing's evidence SEVi-P is written simply as SEVP.⁵⁰
- [45] In the Applicant's ECR calculation, the SEVi-P would be similar to the restoration potential outcome score (SEVm-P) which is given by the Applicant as 0.65. However, Dr Keesing's evidence show the ECR applying the current value (i.e., 0.45; which is clearly not the potential improvement value) as SEVi-P⁵¹ which significantly reduced the ECR and therefore the requirement for restoration. I raised this issue with Dr Keesing during conferencing and he disagreed that the SEVi-P should be a potential score and instead maintained that applying the lower value current reach score was appropriate.⁵² His justification for this is not clear to me. I note this to be a significant deviation from what the authors of the SEV method intended

⁵⁰ Statement of Evidence – Dr Vaughan Keesing (Freshwater and Wetland Ecology), 24 May 2024, at paragraphs [150] and [152].

⁵¹ Statement of Evidence – Dr Vaughan Keesing (Freshwater and Wetland Ecology), 24 May 2024, at paragraphs [150] and [152].

⁵² Freshwater Ecology and Wetlands JWS, at page 5, items 8-9.

their method to be used in calculating environmental compensation for loss in stream function.

[46] To explore the implication for the proposed ECR of deflating the SEVi-P to the current (not potential) value, I recalculated the Applicant's ECR with the values given in Dr Keesing's evidence but substituted the existing SEVi-P = 0.45 with the Applicant's restoration potential value for the waterway of 0.65. I made no other changes to the Applicant's ECR formulas.

[47] These corrections described above have implications for the ERCs proposed as summarised below (the Applicant's proposed ERCs/figures are included for reference in brackets):

(a) Revised stream loss: ECR = 4.9 (not 3.4); and

(b) Revised culverting: ECR = 3.4 (not 1.9).

[48] In combination, the revisions explained above would require 1204 m of stream restoration; not 739 m as proposed by the Applicant. This is a 63% longer restoration reach than what the Applicant has proposed. In my opinion, the Applicant has not justified anything less than what the formal method would prescribe.

Steps in the calculation of the environmental compensation ratio

Step 1: Establish the 'current' SEV values for the site that will be impacted and for the proposed environmental compensation site. (Note; do not include biotic functions (IFI and FFI) in this calculation because of the difficulty of predicting these outcomes).

Step 2: Determine the 'potential' SEV values for both the impact and environmental compensation sites by recalculating the variables using 'predicted' function scores assuming 'best-practice' remediation works have been carried out at both sites. Predictions are the best scores possible if the sites were to be restored as far as practical from present with current best-practice. (Note; do not include potential scores for biotic functions (IFI and FFI) in these calculations because of the difficulty of predicting these outcomes)

Step 3: Determine the SEV value at the impact site (SEVi-I) again using predicted function scores but now assuming that the proposed development works (e.g., piping, filling) have been carried out. (Note; do not include potential scores for biotic functions (IFI and FFI) because of the difficulty of predicting these outcomes).

Step 4: Follow the formula for calculating an environmental compensation ratio below. This value will be the amount you have to multiply the area of the stream you are impacting by to determine how much area of stream needs to be restored.

$$ECR = [(SEVi-P - SEVi-I)/(SEVm-P - SEVm-C)] \times 1.5$$

Figure 3. Steps involved in calculating an ECR using the SEV data. The formula for ERC calculation is given at the bottom of the figure. Reproduced from Storey et al., 2011.

Receiving environment monitoring

[49] During conferencing, I confirmed the following aspects of my position in regard to monitoring:

- (a) That routine (e.g., quarterly) monitoring of instream parameters is required as having these semi-continuous data help to understand and describe the effects resulting from the Project rather than from the remainder of a given catchment.⁵³
- (b) I note that post construction monitoring would cease after 12 months unless agreed earlier with WRC. I consider this to be a reasonable duration and approach.
- (c) One Plan instream thresholds relating to the protection of trout should apply to the Project's monitoring regime and that this should be measured within the project site at each of the existing instream monitoring stations (i.e., not in the lower main stems as referred to in paragraph 178 of Dr Keesing's evidence).⁵⁴ I consider that measuring the One Plan thresholds relevant to trout spawning (e.g., deposited sediment cover and pH) within the Project area is more likely to establish a cause-and-effect relationship between the Project, and the potentially affected streams. This is one important avenue for protecting trout spawning values where they occur in downstream reaches of the catchments concerned. Further, I consider that attempting to measure those parameters offsite would confound this cause-and-effect relationship as influences other than the Project would be influencing the result.

[50] In relation to (c) specifically, I note in terms of giving effect to One Plan Policy 5-4, a condition (EC15) is recommended which requires measuring deposited

⁵³ Freshwater Ecology and Wetlands JWS, at page 4, item 5.

⁵⁴ At page 5, item 5.

sediment onsite and this is a vital part of the approach for protecting the downstream trout spawning values.

E. SECTION 274 PARTY EVIDENCE

[51] I have reviewed the s 274 party evidence. The evidence does not raise any relevant issues that I have not already considered as part of my s 87F Report.

F. CONDITIONS

[52] During expert conferencing I agreed (along with the other experts) to the changes as described in the Freshwater Ecology and Wetlands JWS in relation to the following draft conditions:⁵⁵

- (a) EC4(c)(ii);
- (b) EC12(b);
- (c) EC12(h);
- (d) EC13; and
- (e) EC14.

[53] A point of disagreement (as recorded in the Freshwater Ecology and Wetlands JWS)⁵⁶ between Dr Keesing and I, is the need for routine monitoring. I am of the opinion it is required, and is a requirement I note is captured in the recommended condition EC17(c).

[54] I have reviewed the August Proposed Conditions. I am satisfied that the changes identified in the Freshwater and Wetland JWS have been carried over into the condition set. Further, the recommendations I have made, along with the outcomes of discussions between myself and Dr Keesing following expert conferencing, have been reflected in the conditions.

⁵⁵ EC12 renumbered to EC14, EC13 renumbered to EC15, and EC14 renumbered to EC16 in August Proposed Conditions.

⁵⁶ Freshwater Ecology and Wetlands JWS, at page 4, item 5.

G. CONCLUSION

[55] While the Freshwater Ecology and Wetlands JWS records progress towards resolving some of the issues I have identified in my reporting on the Project, there remain issues relating to the ecological values assessment and addressing residual adverse effects. This means that I am unable to reach a definitive view on the level of effect, and the acceptability of the proposed offsetting/compensation approach. However, as noted, further work is being undertaken by the Applicant. I await the additional data in full before commenting further on the acceptability of the freshwater assessment.

23 August 2024

Adam Forbes