Before the Fast-track Panel

Under: Fast-track Approvals Act 2024

In the matter of: FTAA-2603-1178 – Alternative to the Brynderwyn Hills – Brynderwyn Hills section

Statement of advice: Dr. Richard Storey

Freshwater offsetting

Independent consultant

20 October 2026

Department of Conservation
Te Papa Atawhai

Te Kāwanatanga o Aotearoa
New Zealand Government

Introduction

1. My full name is Richard Goodwin Storey.

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2. I have been requested to provide expert advice to the Director-General of Conservation (DOC/the Department) for the purposes of his comments on the Alternative to the Brynderwyn Hills Project Fast-track application.

Qualification and Experience

3. I am an Environmental Consultant employed by Wildland Consultants Limited. I have a Bachelor of Science in Botany and Ecology from the University of Auckland (1991), a Master of Science with Distinction in Zoology from University of Auckland (1995) and Doctor of Philosophy in Zoology from University of Toronto (2001). I have 15 years' experience as a scientist in the Freshwater Ecology group of NIWA (the National Institute of Water and Atmospheric Research), three years' experience as a scientific researcher at the Aquatic Ecology Centre of Kathmandu University, and two and a half years' experience as a senior/associate principal ecologist at Wildland Consultants.

4. I have a good understanding of the freshwater ecology of the Northland region. Work that is especially relevant to this application includes:

    i. I am the lead author of the current version of the Stream Ecological Valuation (SEV; Storey et al. 2011), the most widely used and recognised tool for freshwater offsetting in New Zealand. I have used the SEV to prepare numerous Ecological Impact Assessments (EcIAs) and have reviewed a number of EcIAs for consenting authorities.

    ii. I have advised the Expert Panel on freshwater matters for six fast-track applications, including one application by NZTA (State Highway 1 Cambridge to Piarere Long-term Improvements).

iii. I co-authored the most recent River Ecology State and Trends report for Auckland Council. This State of the Environment report summarises the state and trends of over 60 streams and rivers in the Auckland region.

Code of conduct

5. Whilst it is acknowledged this is not an Environment Court Proceeding, I confirm that I have read the Code of Conduct for expert witnesses contained in the Environment Court Practice Note 2023. I have complied with the Code of Conduct in the preparation of this advice. Unless I state otherwise, this advice is within my area of expertise, and I have not omitted to consider material facts known to me that might alter or detract from the opinions I express.

Scope of advice and expert opinion

6. My expert advice relates to freshwater ecology in relation to offsetting, and inparticular to the following:

   i. Adequacy of the Applicant's assessment of freshwater ecology in relation to offsetting, including identification of any values that have not been assessed or have been insufficiently characterised and that affect freshwater offsetting.

   ii. Adequacy of the Applicant's assessment of effects on stream ecosystems with specific reference to any effects that are incomplete, understated, or not addressed, particularly in regard to offsetting.

   iii. Adequacy of the Applicant's proposed effects management measures, particularly in regard to offsetting.

   iv. Alternative mitigation or management approaches, where appropriate, including clarification of my recommended or preferred measures including where these differ from those proposed by the Applicant.

   v. Comments on conditions that relate to freshwater offsetting.

7. The adequacy of the Applicant's assessment of freshwater values, effects and effects management not specifically related to offsetting are not addressed here as they are addressed in evidence by McEwan (2026).

Material Considered

8. In preparing this advice I have reviewed the following documents as part of the substantive application and further material provided during the suspension period:

   i. Volume B Appendix D07 Assessment of Effects on Freshwater Ecology (Keesing 2026), referred to hereafter as the Freshwater Assessment.

   ii. Volume B Appendix D12 Assessment of Effects on Groundwater (Revision A, 2 April 2026)

   iii. Volume B Appendix E Resource Consent Conditions (13 July 2026)

   iv. NZTA's A2BH – Ecological Effects Mitigation Table (28 August 2026)

   v. NZTA's Proposed Amendments to Mitigation Package Since Lodgement (9 October 2026)

   vi. Aquatic Survey Information Maps, dated and provided on 7 October 2026.

9. I visited the site on 26 June 2026 with other specialists engaged by the Department of Conservation.

Summary of freshwater offsetting approach

10. The Freshwater Assessment states that the Project will affect the ecology of 5.7 kilometres of perennial streams and 5 kilometres of intermittent streams located in four river catchments: Ahuroa, Waihoihoi, Wairau, and Pukekaroro. The Freshwater Assessment lists various potential effects of the Project on streams and wetlands. The main potential effects relevant to freshwater offsetting include:

    a) Habitat degradation due to culverting of stream reaches.

    b) Habitat degradation due to stream realignments (on natural ground).

c) Loss of streams beneath “spoil” from road construction.

d) Reduction in flow due to earthworks (“cut faces”) and stormwater diversions lowering groundwater levels.

11. The Freshwater Assessment does not consider that any management of effects is required. This conclusion is based on the author’s opinion that the streams have low ecological value, and the magnitude of effects is “negligible” or “low”.

12. The Freshwater Assessment assesses the magnitude of effects on streams based on the proportion of the total stream length in the catchment that is affected by the Project. Due to the high total stream length, the magnitude of effects is determined as “negligible” for all streams except one where it is determined as “low”.

13. The Freshwater Assessment recommends some good practice design principles for culverts and stream realignments, but only as voluntary measures and “where practicable”.

14. The Freshwater Assessment also recommends monitoring of stream realignments that occur on top of spoil (infilled stream valleys), potentially leading to offsetting if monitoring shows that these realignments have not created viable stream habitat. However, it proposes that appropriate offsetting will be determined after the results of monitoring are known. It recommends using the Stream Ecological Valuation (SEV) and Environmental Compensation Ratio (ECR) to determine the amount of offsetting required, but with two modifications to the method that reduce the amount of offsetting required.

15. The consent conditions proposed by NZTA propose some offsetting, but only for total loss of stream habitat in five selected streams. No offsetting would be required for loss of stream habitat in intermittent streams, or perennial streams apart from the five streams identified in the maps attached to the conditions. Perennial streams excluded from offsetting include all first-order streams and many second-order streams in the designation. Also excluded are any streams that will be culverted or realigned. Offsetting is only required where stream habitat is totally lost (such that no aquatic life is supported), not where ecological values or functions are degraded.

Key issues with proposed freshwater approach

16. In regard to freshwater offsetting, the key issues stem from underestimating the ecological values of streams and underestimating the magnitude of effects. These underestimates have resulted in most effects not being managed and most residual effects not being offset. In regard to the cases where effects management or offsetting has been offered, there are issues with the ways that these have been applied. These issues are addressed below.

Underestimate of ecological values

Application of the EIANZ levels

17. The Freshwater Assessment describes two of the sampled streams (Piroa Tributary West and Waihoihoi Mainstream) as being "high" ecological value, six as being "moderate", three as being "low" and one (Mayflower North Tributary) as being "negligible" ecological value. Most of these assessments appear to be reasonable based on site photographs, descriptions and scores of various stream metrics in the Freshwater Assessment and observations of some sites during the site visit (but see the next point). However, Mayflower North Tributary should be assigned at least "low" value as it is a habitat for indigenous species, and likely should be "moderate" value if it harbours a rare species as indicated in Table 11 of the Freshwater Assessment. Also, Waipu North Tributary should be assigned "moderate", rather than "low", value, based on the physical habitat quality (riparian tree cover, stony stream bed, variety of flow types including riffles and pools) observed during the site visit. McEwan (2026) provides more detailed evidence regarding ecological values.

18. Further, it is noted that due to inadequate field sampling methods, there is a significant probability that additional fish species are present in the affected streams that were not detected. Also, the threat status of īnanga (*Galaxias maculatus*) was erroneously quoted as "At Risk – Declining" whereas its actual status is "Threatened – Nationally Vulnerable" (Dunn et al. 2025). Third, the applicant has chosen not to include fauna values in calculating SEV scores for the sites. Correcting these errors and including fauna values in SEV scores may raise the ecological value of some streams further.

Underestimates of some SEV values

19. Some of the SEV values provided by the Freshwater Assessment for the impact sites are almost certainly too low. For example, the SEV values for Mayflower North Tributary and Robertson's Tributary are 0.26 and 0.33 respectively. These values are (respectively) lower than, and marginally higher than, the value provided for culverts, which is 0.3. It would be very surprising if the ecological functioning of these streams were poorer than, or nearly as poor as, the inside of a culvert. For additional context, the SEV values of Auckland Council's State of the Environment monitoring sites in low-intensity rural land-use ranged between 0.47 and 0.89 (average 0.67), while those in high-intensity rural land-use ranged between 0.37 and 0.82 (average 0.55) for the period 2021-2024. The function scores and calculations used to determine the SEV values of the streams within the designation should be presented.

20. Second, the Freshwater Assessment argues that the SEV values of the streams in forestry land-use (Pine/Piroa North and Pine/Piroa Mid) should be recalculated immediately prior to infilling, on the expectation that they will show effects of sedimentation effects from forest harvesting at that point in time. It should be noted that although forest harvesting often causes sediment deposition in streams, this is a temporary effect from which the streams can recover. The Freshwater Assessment gives no justification why the most degraded phase in the forest harvest cycle should be selected as the baseline condition for these streams.

Underestimate of magnitude of effects

21. The Freshwater Assessment describes the magnitude of effects on streams as being "negligible" (or, for one stream, "low"), based on the proportion of the total stream length in the catchment that is affected by culverting, stream infilling and realignments. The following points should be noted in relation to this assessment.

22. First, magnitude of effect has been determined solely based on the proportion of the total stream length in the catchment that is affected by the Project. The type of effect on each stream reach was not considered. It is highly unusual and scientifically unjustified to assess the magnitude of effects without considering the actual effects of the activity on resident biota and ecological processes.

23. Second, assessing effects by "zooming out" to the catchment scale makes the effects appear smaller than they really are. Assessing effects at the catchment scale is an unconventional interpretation of the EIANZ Guidelines (Roper-Lindsay et al. 2018), and an EIANZ Explanatory Note, published in August 2026 (EIANZ 2026) specifically states that it is inconsistent with correct application of the Guidelines. Referring to assessing stream impacts at a catchment scale, the Explanatory Note concludes "EIANZ's concern with such an example is that the amplification of scale for assessing magnitude means that the guidance is misrepresented and importantly the extent of effect is minimised." The catchments used by the Freshwater Assessment as the frame of reference are very large, including streams up to 7.5 kilometres from the Designation. The Designation itself occupies only *c.*7 percent of the catchment area in the Ahuroa and Waihoihoi catchments. By using such large catchments, extending far beyond the Designation, the Freshwater Assessment has understated the magnitude of effect of the Project on streams. This is the sort of outcome that prompted the EIANZ to publish their Explanatory Note.

24. Third, the categories for converting proportion of stream length affected into categories of magnitude of effect ("very high", 'high", "moderate", "low", and "negligible"), presented in Section 2.3.5 of the Freshwater Assessment are the opinion of the author and not based on scientific agreement or any other publication.

25. The result of the unconventional approach used in the Freshwater Assessment is a significant underestimate of the level of effects on streams in the application documents. An accurate estimate would require individually assessing each stream based on its ecological value and the type of impact. If this were done, it is expected that the level of effect would range between "moderate" and "high".

26. Regardless of questions about scale and the proportion of streams affected, it should remain clear that the Project results in adverse effects on approximately 11 kilometres of river (including perennial and intermittent streams). This represents a significant loss of stream extent and value.

Incorrect calculation of length of stream loss

27. The Freshwater Assessment presents the lengths of stream loss in Table 15. According to the accompanying text, "Length of stream loss: (final column) should be the difference between "Length of stream affected" (first column) and the sum of the next three columns. Using this formula, it appears there are errors in the calculations for several streams, including Piroa Main Stem, Waihoihoi Mainstem, Waipu South Tributary, Mayflower Mainstem, Wairau North Tributary and Pukekaroro Tributary. There is also an error in summing the individual lengths of stream loss.

28. According to Table 15, the total length of stream loss is 554 metres if all realignments on spoil successfully create viable stream habitat, or 4,984 metres if none of the realignments on spoil are successful. Recalculating these totals from the values presented to in Table 15 gives a different result. However, the values themselves do not appear to correspond to the maps provided in the Freshwater Assessment Appendix C, particularly for Mayflower Main Stem, where the values in Table 15 show a net gain of 460 metres of stream length, and Waihoihoi Main Stem where the values in Table 15 show a net gain of 310 metres. These lengths are not credible when viewing the respective maps in Appendix C. Therefore, Table 15 appears to have multiple errors which make it difficult to use.

29. Notwithstanding the comments in the previous two points, all stream infilling should be regarded as total stream loss (whether under earthworks or under spoil/borrow), for the reasons given below (in "Underestimate of risk of failure for realignments on spoil"), and all culverting should be regarded as loss or degradation of stream function. Realignments on spoil or natural ground should be regarded as offsets for stream infilling (not remediation), and follow the established process for calculating offsetting length using the SEV and ECR, as described in Storey et al. (2011) and outlined in the section "Inappropriate use of SEV and ECR for determining offsetting of stream loss" below. Therefore, net stream loss should not be calculated as "Length of stream affected" minus realignment or culvert length as in Table 15.

Replacing perennial stream length with intermittent or ephemeral streams inside culverts

30. Table 15 provides no distinction between intermittent and perennial stream lengths. This means that in some cases, for example Pukekaroro (Figure 1), the stream length lost is largely perennial while the culvert length "gained" is largely intermittent or ephemeral. In the Wairau South Tributary (Figure 2), a wetland is replaced by a culvert that will likely carry ephemeral or intermittent stream flow, given the nature of the tributaries. Therefore, while the final column in Table 15 implies minimal loss of stream length by simply subtracting culvert length "gained" from stream length lost, it obscures the fact that some perennial streams have been replaced by culverts containing intermittent and ephemeral streams. These examples provide another reason why it is not appropriate to calculate net stream length lost by this simple subtraction. Since ephemeral streams have not been included in stream loss calculations then culverts carrying ephemeral streams should also not be included. Where perennial stream length lost is replaced by a culvert carrying an intermittent stream, the reduction in ecological function should be fully accounted for, using the SEV or equivalent.



Figure 1. A screen capture of part of Map 32, Appendix C in the Freshwater Assessment. The perennial stream is shown in dark blue, the intermittent stream in light blue and the ephemeral streams in brown. The realigned stream is assumed to be the dashed white line and the culverts are assumed to be the green lines.

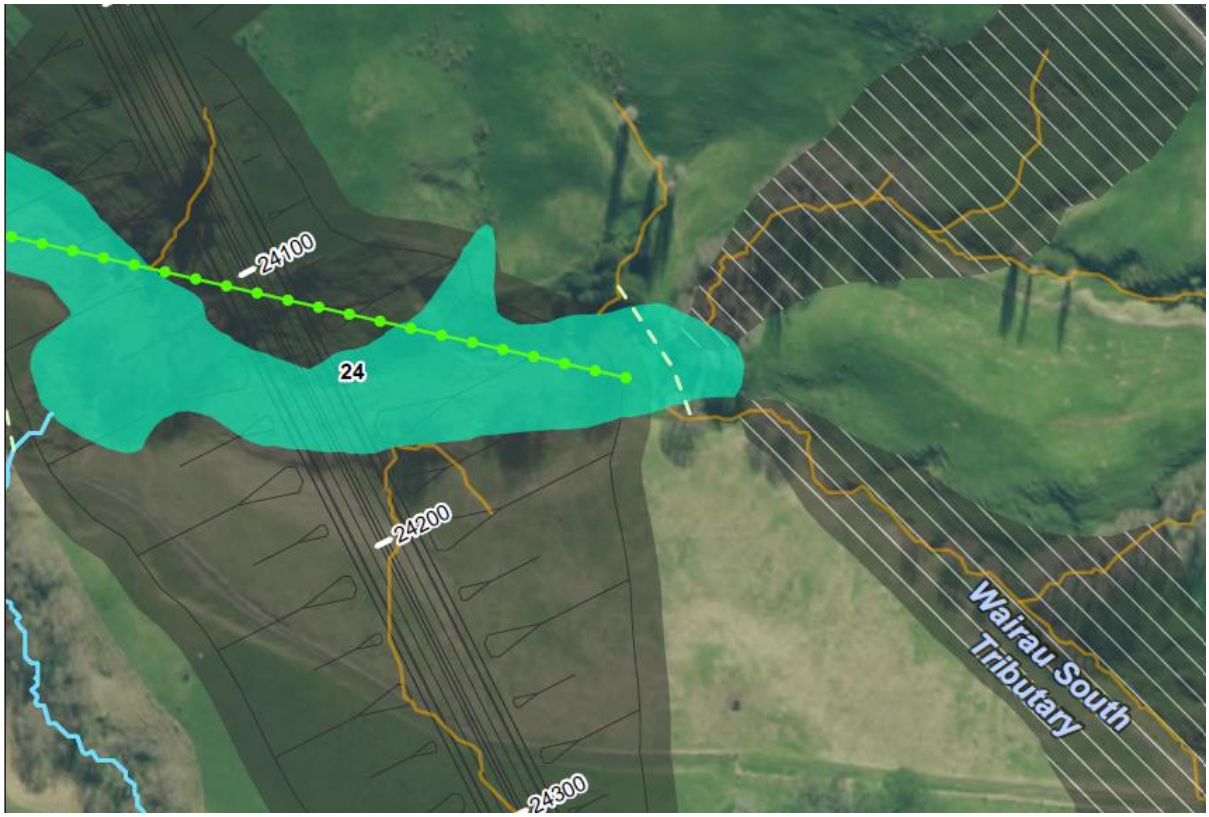

Figure 2. A screen capture of part of Map 29, Appendix C in the Freshwater Assessment, showing a wetland (green shaded area) replaced by a culvert (bright green line) that will likely carry ephemeral or intermittent flow.

Underestimate of loss of ecological function in culverts

31. Culverting a stream reach results in a loss or decline in various ecological functions. To some extent the Freshwater Assessment acknowledges this in Table 16, which shows lower SEV scores after culverting. However, the Freshwater Assessment underestimates the decline in ecological function in several ways. First, as noted above, SEV values have been underestimated for Mayflower North Tributary and Robertson's Tributary. Second, it assumes that all culverts are carrying perennial streams, which is not the case, as shown by the maps in Appendix C of the Freshwater Assessment).

32. The SEV value for perennial streams in culverts is usually 0.2-0.3, therefore the value of 0.3 in Table 16 assumes the best possible performance of the installed culverts. The Freshwater Assessment notes that if the culverts are not designed, or do not perform, according to the Assessment's recommended best practice, then the final SEV values of the culverts will be lower. If this occurred, then the residual level of effect on the streams would be higher, but the Freshwater Assessment provides no analysis of this, nor recommends any actions if this were to occur.

Underestimate of risk of failure for realignments on spoil

33. The Freshwater Assessment notes that realignments on spoil are not guaranteed to become viable stream habitat. In reality, they are very unlikely to function as viable streams because they are elevated above the groundwater level, and the spoil, which consists of relatively unconsolidated sediments (compared to the natural ground) and includes a "drainage" layer (Figure 3), will create an underground flow path for water that previously fed the stream. Therefore, groundwater inflow to the affected streams is expected to decrease or cease completely. Figure 3 below (copied from Appendix D12 Assessment of Effects on Groundwater) illustrates why this is the case:

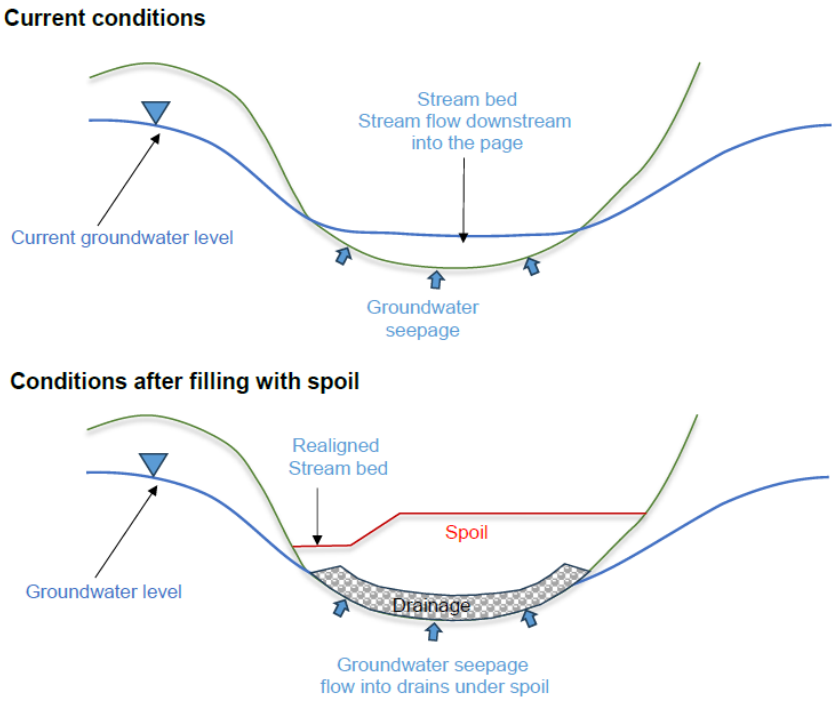

Figure 11: Schematic diagram effects of filling on stream baseflow from groundwater seepage

Figure 3. Schematic diagram showing the effects of infilling on stream baseflow from groundwater seepage (copied from Figure 11 in Appendix D12 Assessment of Effects on Groundwater).

34. The Freshwater Assessment acknowledges this and concedes that "the realigned streams at spoil sites may be mostly reliant on upstream surface flow". However, it does not acknowledge that all, or nearly all, of these streams have no headwaters, therefore receive no flow from upstream. Therefore, these realigned streams have no reliable source of water apart from direct rainfall. Locating them on the edge of the spoil, as suggested by the Freshwater Assessment, will not solve this problem. Due to the high chance that realignments on spoil will fail to achieve viable stream habitat, the effect of infilling these stream valleys should be considered as a total loss of stream habitat and should be avoided where possible, or offset.

<u>Underestimate of effects of groundwater drawdown</u>

35. The Freshwater Assessment notes that due to large "cuts" in the land surface, groundwater levels will be lowered, resulting in 15-30% (moderate), 30-80% (high) or >80% (very high) reductions in stream flow. However, it concludes that "because of the nature of the existing streams and wetlands in those drawn down zones, the effect is most likely to be subtle macroinvertebrate assemblage changes. I consider that effect will be less than minor and likely very difficult to

measure." Accordingly, the Freshwater Assessment offers no management to avoid, minimise, remediate or offset the effects of groundwater drawdown.

36. The Freshwater Assessment under-represents the results presented in Appendix D12 Assessment of Effects on Groundwater. According to Table 3 of that report, 11.0 kilometres of stream will experience "Very high" (80-100 percent) depletion of baseflow, 11.6 kilometres will experience "High" (30-80 percent) depletion, and 14.1 kilometres will experience "Moderate" (15-30 percent) depletion.

37. According to published literature, decreases in stream flow usually cause decreased stream habitat area, increased sedimentation, and changes in temperature regime and water chemistry (Dewson et al. 2007). Ecological effects on stream fauna often begin at approximately 20 percent reduction in flow (Richter et al. 2012). Further, in intermittent streams, flow reduction that leads to a lengthening of the no-flow period can cause a decrease in the abundance and diversity of sensitive macroinvertebrates (Storey 2016).

38. Based on the cited literature, the effects of groundwater drawdown will be measurable in at least 36.7 kilometres of stream, and will be very obvious in the 11.0 kilometres that have 0-20 percent of their flow remaining. It is difficult to interpret these effects as "less than minor" as stated in the Freshwater Assessment. If these effects cannot be avoided, minimised or remediated, they should be offset.

Issues with effects management

39. As a result of underestimating both the ecological value and the magnitude of effect of streams affects by the Project, the Freshwater Assessment assesses the level of effect as "very low" for each stream, and therefore asserts that no effects management is required. However, it does propose some good practice design principles for culverts and stream realignments, as voluntary measures and "where practicable". It also proposes offsetting for stream realignments on spoil if these are proven to have failed. And NZTA's proposed consent conditions offer limited offsetting for certain effects on a subset of streams. Issues with the proposed effects management are discussed below.

40. The NPS-FM requires that any residual adverse effects on streams that are more than minor must be offset. Reassessing the effects of culverting, stream realignments (on natural ground and on spoil) and groundwater drawdown as between "moderate" and "high" means that all of these residual effects require offsetting.

Offsetting conditions unlikely to apply to most effects on streams

41. Despite the recommendation in the Freshwater Assessment that no effects management is required for effects on streams, consent condition RC33 proposed by NZTA (13 July 2026) includes a requirement to offset loss of perennial stream length. However, according to the accompanying maps in Appendix B, only adverse effects on five streams within the designation qualify for this offsetting. The maps in Appendix B show only two of the first-order streams shown in Figure 5 of the Freshwater Assessment, and only some of the second-order streams in the designation. Other first and second-order streams are missing and are therefore excluded from offsetting requirements. Further, intermittent streams and streams that are culverted or realigned are explicitly excluded from this condition. Streams that undergo loss of ecological value or function but not complete loss (such that they are too shallow or narrow to support aquatic life) are also excluded by condition RC34. It is acknowledged that the Applicant is now proposing to offset loss (and loss of value) of all perennial and intermittent streams that are not realigned or culverted, so if this proposal is incorporated into the conditions, it may resolve the concerns described in this point and the following point.

42. The length of impacted stream may qualify for offsetting under RC33 is not clear in the Freshwater Assessment or elsewhere. Table 15 in the Freshwater Assessment indicates that a net 554 metres of stream will be lost after culverting and realignment lengths are subtracted (but see "Incorrect calculation of length of stream loss" above), however, the author also notes that 46% of impacted streams are first-order and 26% are second-order. As described above, most of these streams are not included in Appendix B. Using these figures, a rough estimate suggests that RC33 will require offsetting for approximately 150 metres of stream impacts - out of a total of nearly 11 kilometres of streams that the Freshwater Assessment describes as affected by the Project. Similarly, Table 12 of

the Freshwater Assessment indicates that only 22% of the total length of stream effects is on qualifying streams, and most of this length will be associated with culverts and realignments, to which RC33 does not apply. Therefore, the length of stream that qualifies for offsetting under RC33 is likely to be very low.

43. RC33 explicitly excludes streams that are realigned or culverted. For the reasons described above, losses of stream extent due to burying under spoil, and losses of stream ecological function due to culverting and flow reduction from groundwater drawdown are expected to result in more than minor effects. Those effects that cannot be avoided, minimised or remediated must be offset to comply with Section 3.24 of the NPS-FM.

Inappropriate use of SEV and ECR for determining offsetting of stream loss

44. Consent condition RC33 specifies that stream offsetting should use the Stream Ecological Valuation (SEV; Storey et al. 2011) and Environmental Compensation Ratio (ECR), but with two modifications to the ECR formula in Storey et al. (2011). The modifications are: 1) use the current value rather than the potential value of the impact site; and 2) remove the factor of 1.5 in the ECR formula. Both the potential value of the impact site and the 1.5 factor are used as standard practice by developers using the SEV to determine offsetting. The reasons for using them have been peer-reviewed, and are described below.

45. The reason for using potential value is to recognise that a stream could be restored in future, but the possibility of restoration is lost when a stream is infilled or culverted. The Freshwater Assessment states that the affected streams are "without obvious improvements in their near future". However, Northland Regional Council has several programmes to support landowners to protect streams through riparian fencing and planting. The site photos in the Freshwater Assessment show that three sites have already been fenced and one has riparian planting, indicating that landowners in this area are conscious of the need to protect streams from the effects of farming. Further, during the site visit, a large area of wetland restoration (wetland Q08/066), consisting of hundreds of planted wetland plants, was observed within the designation. And a recent newspaper article https://www.1news.co.nz/2026/07/03/women-devastated-wetland-forest-may-be-felled-for-highway/ showed that in the northern part of the designation a

landowning family has “dedicated a lot of effort and money – around $120,000 – over the past five years planting the banks of the Ahuroa River”. Therefore, there is ample evidence that landowners in the designation area are interested in improving stream condition on their land, and it is appropriate to use the potential value, rather than the current value, of impact sites in ECR calculations.

46. The reasons that the ECR includes a factor of 1.5 for calculating offsetting are: 1) to recognise the time delay between the ecological effects of development and the benefits of offsetting and 2) the risk of not achieving the anticipated benefits of offsetting. Published evidence from 14 sites across Auckland (Price et al. 2024) indicates that offsetting rarely achieves the expected benefits, therefore the risk of failure is significant and should be accounted for.

47. For these reasons, the ECR formula should be used as presented in Storey et al. (2011), including retaining the potential value of impact sites and the 1.5 multiplier.

48. In regard to offsetting for stream culverting, the length of offsets should be determined based on agreed final SEV values for culverted perennial and intermittent streams. To avoid a permanent stream being replaced by a culverted intermittent stream, offsetting calculations should be done per site, not as an aggregate amount.

<u>The need to treat all stream realignments as offsets</u>

49. There is a risk that realignments on natural ground will result in poor ecological functioning. This risk is much lower than for realignments on spoil, but is still significant. The risk can be demonstrated by recent projects (for example, Transmission Gully in Wellington Region) and other documented cases (Flatley et al. 2018) where stream realignments have resulted in poor ecological outcomes and ongoing issues that affect downstream reaches.

50. Therefore, in all instances where streams are infilled and replaced with realigned channels (not only those on spoil), stream infilling should be regarded as total loss of the infilled stream reach and the realignment should be regarded as an offset, rather than a remediation, of the loss. The offsetting approach should follow the established process using the SEV and ECR, as outlined in the section

"Inappropriate use of SEV and ECR for determining offsetting of stream loss" above. Consent conditions for offsetting should require offsets to be calculated per site, rather than in aggregate, and include monitoring, performance measures and performance targets to ensure that anticipated ecological benefits are achieved.

Inadequacy of the approach to managing the effects of realignments on spoil

51. The Freshwater Assessment recommends first monitoring each of the streams on spoil to see if each becomes a viable stream habitat, then offsetting each stream separately if monitoring indicates that the realignment has failed. This is not adequate for four reasons: 1) the low probability that the realigned channels will function as natural streams; 2) the delay between the impact and management of that impact; 3) this approach requires the Consenting Authority to ensure that the Applicant complies with a complex process of monitoring, calculating offsetting, and implementing the offsetting that will extend over a period of years; and 4) the risk that the Consenting Authority and the Applicant will disagree about the amount of offsetting required. Instead, offsetting requirements for stream infilling should be established at the consenting stage, along with performance standards to ensure that anticipated ecological benefits are achieved.

52. The Freshwater Assessment recommends that where offsetting is required for failures of realigned streams, the amount of offsetting should be determined using the Stream Ecological Valuation (SEV; Storey et al. 2011) and Environmental Compensation Ratio (ECR). However, it recommends the same two modifications to the ECR formula as in consent condition RC33. Therefore, the same two concerns apply as described in the section "Inappropriate use of SEV and ECR for determining offsetting of stream loss" above.

53. Regardless of the recommendations in the Freshwater Assessment, the consent conditions proposed by the Applicant (13 July 2026) expressly exclude offsetting of stream realignments. For the reasons described above, stream realignments on spoil have a very high risk of failing to provide viable stream habitat. Because of this very high risk, consent conditions should require offsetting for stream realignments on spoil as if they will fail.

Additional comments on proposed consent conditions

54. The proposed consent conditions do not provide any performance measures or any requirement for monitoring in regard to stream offsets or realignments. In regard to culverting, RC38 provides performance measures but no requirement for monitoring to determine whether these have been achieved. Performance measures and monitoring are required in addition to the design requirements in RC35 and RC36 to ensure that the purposes of the design requirements have been achieved.

55. Associated with performance measures and monitoring, conditions should specify actions to occur if performance measures are not achieved.

56. The proposed conditions do not include any requirements regarding the location of offset sites. The principles of offsetting, as stated in the NPS-FM Appendix 6, say "An aquatic offset action is undertaken where this will result in the best ecological outcome, preferably close to the impact site or within the same ecological district." According to this principle, it is preferred that offset sites are within the designation, but if this is not possible, then within 10 kilometres from the impact sites is recommended.

57. In resource consent condition RC35, requiring maintenance for the lesser of the two conditions (five years or until 80% canopy cover is achieved) is not sufficient. Achieving 80% canopy cover is a minimum requirement, and maintenance must continue until it is achieved.

Comments on NZTA's A2BH – Ecological Effects Mitigation Table (28 August 2026) and Proposed Amendments to Mitigation Package Since Lodgement (9 October 2026))

58. The amended mitigation package (9 October 2026) provides two points in regard to stream offsetting. The first states "Offsetting the loss of value for both perennial and intermittent streams that are not realigned or culverted in accordance with the design requirements of the conditions". This appears to broaden the inclusion criteria for streams eligible for offsetting, however, this statement is unclear as to the new criteria for inclusion. As I have stated above, all perennial and intermittent streams, and all residual effects that reduce stream extent or ecological value (including culverting and filling/realigning) require offsetting.

59. The second point states “Where perennial and intermittent streams within the highest value area (Zone 2) are impacted by spoil, offsetting to be undertaken at a higher ratio (to incentivise avoidance during detailed design)”. The proposal to increase the offsetting ratio at sites of high ecological value is welcomed. However, the ecological value of affected streams should be assessed site by site rather than broadly by zone, noting that Zone 2 includes some streams degraded by silt from forestry as well as high value streams. Further, decisions on which sites to avoid should be made with consideration to all ecological values (not only stream values), placing greatest weight on values that are difficult or impossible to offset (for example, the presence of indigenous frogs).

Conclusions / Recommendation

60. The offsetting approach described in the Freshwater Assessment and required in the consent conditions proposed by NZTA (13 July 2026), along with what is described in the NZTA’s more recent documents - A2BH – Ecological Effects Mitigation Table (28 August 2026) and Proposed Amendments to Mitigation Package Since Lodgement (9 October 2026) - for adverse effects on streams is inadequate. Most of the adverse effects on streams have been excluded from offsetting requirements because they are:

    a. On intermittent streams (though the Proposed Amendments to Mitigation Package since Lodgement (9 October) proposes including some intermittent streams but the details of the offset are not yet known).
    b. On perennial streams outside of the five streams identified in Appendix B of the consent conditions (though the Proposed Amendments to Mitigation Package since Lodgement (9 October) proposes including some perennial streams but the details of the offset are not yet known).
    c. Associated with culverting, infilling/realignments or groundwater drawdown.
    d. Degradation in stream ecological value or function, rather than total loss of stream habitat.

61. It is recommended that offsetting should be applied to:

    a. adverse effects on all intermittent and perennial streams

b. all adverse effects, including those that degrade ecological values or functions

c. culverted stream reaches, due to the degradation or loss of ecological function associated with culverting.

d. streams realigned on spoil, due to the high chance that these realigned streams will fail to provide viable stream habitat.

e. streams realigned on natural ground, due to the risk that ecological functioning in the realigned streams will be poorer than in the original streams.

f. streams experiencing flow reduction due to groundwater drawdown.

62. Offsetting for streams infilled by spoil should take into account the high probability that realignments on spoil will not create viable stream habitat.

63. The modifications to the Environmental Compensation Ratio (ECR) recommended by the Freshwater Assessment and incorporated in the proposed consent condition RC33 that reduce the amount of offsetting are unjustified, and the standard formula presented in Storey et al. (2011) should be used instead.

64. The SEV scores for some streams are lower than is credible given their catchment context. The function scores and calculations for determining the SEV values of impacted stream reaches should be presented so that an appropriate value for each stream can be agreed on.

65. Separate SEV scores for culverted perennial streams and culverted intermittent streams should be determined, with all function scores and calculations presented as for the natural streams.

66. Totalling all stream length to be buried under earthworks or fill, and all stream length to be culverted or realigned (as in Table 15), obscures important details that likely reduce the amount of offsetting below what is appropriate. Instead, stream reaches to be culverted should be presented one by one, with pre- and post-culverting lengths and SEV scores and a label indicating whether they are perennial or intermittent. The same should be done for streams to be realigned. This format provides the information required to determine appropriate offsetting. Care should be taken to avoid repeating the multiple errors in Table 15.

67. Effects of groundwater drawdown on stream ecology should be offset. The length of stream affected in each groundwater drawdown zone should be determined and the loss in stream habitat area should be determined using appropriate modelling tools. The loss in ecological function should be estimated using the SEV or similar.

68. Resource consent conditions should include a condition to ensure that performance measures are set for all culverted, realigned and offset sites, and that these are monitored and achieve the SEV score that has been used in ECR calculations.

69. Conditions should include a limit on how far offset sites can be from the impact sites.

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