

Appendix 11: s53(2)(a) Fast-track Approvals Act 2024 (FTAA) Technical Advice

Date	12/10/2026
To	Consents – Fast-track
Expert Name and Job Title	Olivier Ausseil, Principal Scientist and Director, Traverse Environmental
Project advice provided for	Carter Group Limited - Ōhoka Residential Subdivision
Documents referred to	Aquatic Ecology response to Environment Canterbury comments dated 10 September 2026 (Appendix 19(c), Stantec) Waterways and Wetlands changes Plan (Appendix 47(Updated)) Aquatic Ecology Assessment –Appendix 19(a), dated 25 August 2025 (InStream Consulting) Stormwater Management Report (Appendix 31 (updated), PDP) Aquatic Ecology Addendum – Appendix 19(b), dated 18 June 2026 (Stantec) Proposed Regional Council conditions – Appendix 44
Qualifications	I hold a PhD of Environmental Biosciences, Chemistry and Health from the University of Provence, France. I also hold a Master of Science Degree of Agronomical Engineering from the National Higher Agronomical School of Montpellier, France, and a DEA (equivalent Masters Degree) in Freshwater Environmental Sciences from the University of Montpellier II, France. I am a Principal Scientist and Director of Traverse Environmental Limited (previously Aquanet Consulting Ltd). I have over 20 years' experience in New Zealand as a freshwater scientist working in local government and as a private consultant working for regional councils and local authorities, central government and government agencies, iwi / hāpū, catchment and community groups and the private sector.
Code of Conduct	I confirm 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 technical report has been prepared in accordance with that Code. In particular, unless I state otherwise, the opinions I express are within my area of expertise, and I have not omitted to consider material facts that might alter or detract from the opinions that I express.

Introduction / Executive Summary

1. I previously provided detailed advice (dated 5 July 2026) on substantive application documents relevant to my area of expertise. I refer to my July review in this advice, particularly where my comments and conclusions have not materially changed.

2. A number of issues I raised in my July review have been suitably addressed and I am in agreement with the applicant's assessment on the following matters:
 - a. Greater clarity has been provided regarding the proposed stormwater catchment, treatment areas and discharge points;
 - b. I understand the stormwater management areas will provide runoff attenuation and will substantially mitigate the effects of the subdivision on flow peakiness in the receiving streams;
 - c. I generally agree with the further information that was provided regarding the nature of waterways within the proposed site (specifically, whether they are natural or artificial watercourses);
 - d. I generally agree that the proposed stormwater treatment follows good practice and the stormwater discharge quality is likely to be as described in the application. This does not, however, negate the risk of potential adverse effects as covered below;
 - e. I agree with the comments made by Ms Drummond regarding the inclusion of deposited sediment monitoring and actionable trigger levels in a monitoring /management plan, although I note no draft monitoring or management plans have been provided.
3. There are, however, a number of outstanding issues, specifically:
 - a. I remain of the opinion that the discharges of stormwater as proposed are likely to cause conspicuous changes in water clarity and / or colour, at least at times, and may result in sediment deposition and potential consequential ecological effects. This risk is primarily driven by the high sensitivity of the receiving streams and their small size relative to the stormwater catchments;
 - b. It seems likely the stormwater discharges will cause exceedance of the LWRP limit for zinc and exceed the ANZ guidelines for 95% species protection, at least at times. Additional information would be required to understand if the frequency of exceedances is sufficient to be of concern;
 - c. The assessment of stormwater discharge dilution and potential effects presented in the water quality assessment is useful but does not, in my opinion, represent an environmentally conservative assessment. It is likely there will be significantly less (than assumed in the assessment) dilution available under summer low flow conditions, leading to potentially worse effects on visual clarity and metal concentrations than concluded in the assessment;
 - d. Due to its small size, its flow almost entirely from springs, and the size of the catchments it will receive stormwater discharges from, I am of the opinion the spring channel is expected to be at most risk of adverse effects from the stormwater discharges. It may be useful considering not discharging to this stream, if practically feasible;
 - e. Although useful further information and details have been provided, I remain unconvinced the net loss of stream extent has been adequately offset or

compensated. This is primarily due to the fact that the measures counted as offset for stream loss and applied to “retained” streams on site would have been required as mitigation measures for the effects of realignment, urban land use development and stormwater discharges on the said “retained” streams;

- f. It is my understanding the Applicant has not provided any updates to the set of proposed consent conditions provided as part of the substantive application. The comments I provided in my July review remain substantially unchanged.
4. The Expert Panel (Panel) asked¹ “*whether all affected waterways, springs and natural inland wetlands have been correctly identified and effects quantified accurately; whether avoidance of loss and modification has been adequately considered*”. In my opinion, whilst the affected waterways have been identified, not all effects have been accurately quantified, and the net loss of stream extent has not been adequately offset or compensated.

Discussions with the applicant

5. I have been involved in one meeting with the Applicant on 12 August 2026. The meeting was relatively brief (less than 1 hour), and its usefulness was curtailed by the fact the Applicant’s experts had not received my July 2026 review. My understanding at the conclusion of the meeting was that further discussions would occur once the Applicant’s experts had reviewed my advice. I did not receive any further communications from the Applicant.

Outstanding areas of contention and significance

6. The main remaining areas of contention are:
- a. the stormwater discharges and their potential effects. These are summarised in paragraphs 7 to 17 below, and details are provided in paragraphs 15-25 of my July review;
 - b. the offset or compensation associated with net loss of stream extent. This is covered in paragraphs 18 to 26 below.
 - c. Consent conditions. This was covered in paragraphs 47 to 51 of my July review. These remain relevant given no response or update to proposed consent conditions were provided by the Applicant.

¹ Minute 1, Appendix 4, Question 5 (Waterways, wetlands and ecology)

Potential effects of stormwater discharges on receiving water quality and ecology

Sediment

7. In paragraphs 15 to 25 of my July review, I reviewed the potential water quality and ecological effects associated with sediment in the proposed discharges of stormwater into the receiving streams and concluded these were likely to cause conspicuous changes in water clarity or colour (in reference to RMA S107(1)(d)) and to result in increased fine sediment deposition on stream bed habitat, with potential flow-on ecological effects (in reference to RMA S107(1)(g)). The small size, nature and high sensitivity of the proposed receiving streams is a key driver of the risk of effects on water quality and stream ecology². These conclusions remain unchanged after reviewing the additional information provided.
8. These potential effects on the receiving environment had not been assessed or acknowledged in either the water quality or the ecological assessment reports provided as part of the Substantive Application; instead, the assessment provided appeared to be limited to a comparison of the predicted discharge quality with the LWRP permitted activity standard of 50 mg/L (as TSS concentration in the discharge). No commentary was provided relating to potential effects on visual clarity, including in relation to S107(1)(d) or the LWRP Schedule 5 receiving water standard of no more than 35% change in visual clarity applicable to streams classified as “Spring-fed-plains”.
9. For clarity, I do not contest that the proposed stormwater management follows good practice and that, based on the information provided, the stormwater discharges are likely to meet the LWRP limit of 50 mg/L TSS in the discharge; however, this does not in itself negate the risk of adverse effects, for the simple reason that the risk of adverse effects of a discharge into a stream is driven by the combined characteristics of the discharge and those of the receiving environment.
10. In Section 1.1 of her September memo, Ms Drummond indicates I had “*interpreted that that the provided assessment enables TSS to reach levels of 50 mg/l*”. This is incorrect, and I can confirm my assessment was based on the quality of discharges described in the application (typically 7-12.6 mg/L in the discharge), as stated in paragraph 23 of my July review. That said, I did raise the concern that the value of 50 mg/L had been used as a discharge limit and a receiving environment trigger in the proposed consent conditions which, in my view, did not reflect the quality of the discharges as proposed³.

² Paragraph 22 of my July review

³ Paragraph 51 (bullet points 1 and 5) of my July 2026 advice.

11. An assessment of potential effects of stormwater discharges on water quality was provided for the Ōhoka Stream Tributary only⁴. The assessment assumed a baseflow in the stream of 59.5 L/s⁵ and that the stream would receive stormwater from a catchment of 42.8 ha. I concluded this scenario had the potential to increase TSS concentrations in the stream from negligible concentrations to 3.5–10 mg/L. Using a generalised equation linking TSS concentration change with visual clarity change⁶, a TSS concentration increase from 1.5 mg/L (half the detection limit) to 3.5–10 mg/L would cause visual clarity reductions in the order of⁷ 47 to 76%, well in excess of the LWRP limit of no more than 35%, and likely constitute a conspicuous change in water clarity.
12. It is also relevant to note that the scenario used in the water quality assessment is not environmentally conservative or representative of all streams on site, because:
- a. Baseflow in the Ōhoka Stream Tributary can be 4 to 5 times lower than assumed (e.g. as measured in February 2025), i.e. significantly less dilution than assumed in the water quality assessment will be available at times (and therefore the potential effects on in-stream TSS concentrations will be greater than predicted); and
 - b. The Spring Channel will have a baseflow of c. 11 L/s⁸ but will receive stormwater discharge from a proportionally greater area compared with the scenario used for the Ōhoka Stream tributary.
13. In my opinion, of the streams proposed to receive stormwater discharges from the site, the Spring Channel (formed by joining the northern and southern spring channels) is likely to be the most sensitive to the potential effects of the proposed stormwater discharges. This is due to its flow being likely to be very stable (being nearly entirely

⁴ Water Quality Memorandum (presented as Appendix C to the stormwater Management Report), Section 7.

⁵ In my July review (paragraph 17), I raised the concern that the basis for the assumed 59.5 L/s had not been explained and that it represented a much higher baseflow than would be expected under summer baseflow conditions. This does not appear to have been addressed in the August/September documents I have reviewed.

⁶ Hicks, D.M., Haddadchi, A., Whitehead, A. & Shankar, U. (2019), *Sediment load reductions to meet suspended and deposited sediment thresholds*, NIWA Client Report 2019100CH, prepared for Ministry for the Environment.

⁷ An important caveat to using this equation is that it is a generalised (based on national-average coefficient) equation linking changes in median TSS concentration and changes in visual clarity, rather than an event-scale TSS to clarity conversion. It is nonetheless useful to provide an indication of the potential magnitude of change in visual clarity

⁸ Assuming a combined flow of the northern and southern spring channels

derived from springs, with very limited surface catchment) and its future surface catchment being essentially the stormwater catchment. Stable flow conditions are likely to limit the “flushing” of fine sediment, and encourage the deposition and accumulation of sediment. It would be prudent to require some monitoring of sediment quality after a few years of operation of the stormwater discharges.

Metals

14. Based on the information provided, I am of the opinion the stormwater discharges are likely to cause exceedances of the LWRP limit for zinc, although the frequency of these exceedances would need to be clarified in order to assess the risk of toxic effects to aquatic life in each proposed receiving environment, following the ANZG⁹. However, in my opinion, the information available does not support a conclusion that the risk is low. This is covered in paragraphs 18 and 19 of my July review.
15. Additionally, I note that:
- a. The Spring Channel is, again, likely to be the most sensitive receiving environment due to its small size relative to the stormwater catchment and the risk of particulate metal deposition and accumulation in stream bed sediment;
 - b. The ANZG’s Default Guideline Values (DGV) for zinc was recently updated¹⁰. The 95% species protection DGV for New Zealand freshwaters is now 4.1 µg/L (0.0041 mg/L), which is about half of the LWRP limit for zinc.
 - c. The DGV for copper was also updated, to 0.73 µg/L (0.00073 mg/L), which is again about half of the LWRP limit; however, having reviewed the expected discharge quality in Table 5 of the Water Quality Assessment, I am comfortable the risk of toxic effects from copper is likely to remain low.

Significance of this matter

16. The significance of the matter relates to likely exceedances of S107(1)(d) and the potential for significant adverse effects on aquatic life due to sediment deposition and zinc toxicity.
17. However, whether the above effects occur in practice, how often and to what extent will depend to a large extent on the actual quality of the stormwater discharges to each of

⁹ Australian and New Zealand Guidelines for Fresh and Marine Water Quality.
<https://www.waterquality.gov.au/anz-guidelines>

¹⁰ Published in 2026, although the technical basis and draft DGVs have been available for some time

the proposed receiving environments. Monitoring of the discharges and the receiving environments is advisable. I have commented on these aspects in my July review (paragraphs 47 onwards). It may also be wise to consider whether stormwater discharges to the central spring channel are able to be avoided.

Stream Mitigation vs. Offset

18. The second main area of contention relates to the mitigation of the potential effects of the proposal, offset of the net loss of stream extent, and the package of proposed actions.
19. In her response, Ms Drummond provides a useful summary of watercourse classification and watercourse value and extent. I generally agree with the information provided, although I do not consider it addresses the potential “double counting” of mitigation or offset actions I raised in my July review¹¹. Essentially, the concern I raised is that actions that are required to avoid, minimise or remedy the effects of the proposal on a given stream might also have been (but should not have been) counted as an offset for the loss of another stream’s extent.
20. The NPS-FM offset principles¹² require additionality—the gain from an offset must be additional to measures already required to minimise or remedy the effects of the development. They also generally require that the ecological value lost and the ecological gain achieved by restoration are quantified, so potential losses and gains can be compared on a transparent basis. Time lags between the loss and gain of extent or values and the gain must also be considered and minimised.
21. The proposed total loss of stream length is 2,144 m, which represents approximately 25% of the 8744 m of streams present on site. The 2,144 m net loss is comprised of¹³:
 - a. 560 m net loss within streams that are proposed to be retained on site (albeit with some realignment and loss of extent). These “retained” streams are the Ōhoka Stream Tributary, the South Ōhoka Branch, and three spring/seep channels; and
 - b. 1,584 m net loss of several “natural modified watercourses”.

¹¹ Paras 43-45 of my July review

¹² National Policy Statement for Freshwater Management 2020 Amended December 2025, Appendix 6.

¹³ Table 2, p 7 of Ms Drummond’s 10th September 2026 response

22. The situation considered here is relatively complex because the package of actions proposed to offset the loss of the natural modified watercourses is applied to the “retained” streams; however, the said “retained” streams are already subject to direct potential impacts that would require mitigation or offset in their own right.
23. Considering the “retained” streams independently, they will be subject to direct net loss of extent, realignment, and potential impacts from the proposed development (including the change to urban land use¹⁴ and stormwater discharges). One would expect that measures would need to be applied to these streams to mitigate or offset these losses and potential impacts from discharges. These measures would typically include riparian buffers, wetlands and habitat improvement, as proposed in the application. These should be clearly identified and should not then also be counted as separate improvements to offset the net loss of 1,584 m of natural modified watercourses. However, I have not seen in the application a clear description of the measures that are proposed to offset or mitigate the potential residual effects of the proposed development on the “retained” streams.
24. Considering each waterbody:
- a. The proposal is to join the two central spring-fed streams (Northern and Southern Spring channels), leading to a loss of some 450 m out of 1,435 m. Whilst the proposed measures (mostly riparian buffers) will result in habitat improvement on the remaining length of stream, this stream will also likely experience significant effects associated with the stormwater discharges, and lose about one-third of its on-site length. In my opinion, there will be a material overall habitat loss on this stream, despite the proposed measures.
 - b. The South Ōhoka Channel will receive stormwater discharge and be subject to some realignment and about 100 m stream length loss. The proposed measures (mostly riparian buffers) will result in some habitat improvement, although most of these measures would be expected to be put in place to respond to the impacts of the proposed development on this stream. Overall, I consider the effects on this stream will be neutral or slightly positive.
 - c. The Ōhoka Stream Tributary will not be subject to any realignment or extent loss, but will receive four successive stormwater discharges, with associated risk of effects on visual clarity and sediment deposition. It is noted this stream

¹⁴ As covered in paragraphs 7 and 31 of my July review, the change from high-intensity pastoral to urban land use does not, in my opinion, represent a “potential improvement”. Instead, it changes the risk profile (different contaminants, pathways and effect types) and has the potential to lead to worsening ecological outcomes.

supports good habitat quality and trout spawning¹⁵, making it particularly sensitive to sediment deposition. Stream and riparian habitat are proposed to be significantly enhanced under the proposal. Overall, I consider the effects of the proposal on this stream to be moderately positive.

d. It is my understanding¹⁶ the “Groundwater seep channel” will not receive any stormwater discharge or be subject to stream extent loss or realignment but will benefit from the proposed habitat improvement. Overall, I consider the effects of the proposal on this stream to be significantly positive.

e. I expect the overall effects of the proposal on the “retained” stream values will be moderately positive; however, that is without accounting for the net permanent loss of 1,584 m of “natural modified watercourses”.

25. Having reviewed the information provided in detail, I would generally be comfortable that the proposed package of actions would adequately offset and compensate for the loss of the 1,584 m of natural modified watercourses, *if* the “retained” streams were not subject to direct effects from the proposal. That is not, however, the case.

26. I also note the time lags between losses and gains do not appear to have been taken into consideration. As mentioned in paragraph 20 above, NPS-FM principles also require that time lags are considered and minimised. In the situation at hand, this is important because some effects (e.g. backfilling or re-aligning a stream) are immediate and permanent, but some offset measures will take time to become fully effective, especially when they rely on vegetation reaching a certain size or maturity. I remain unclear on when exactly the various backfilling or re-aligning of each stream is proposed to occur vs. when the proposed offset or mitigation actions will be implemented and when they will become fully effective.

27. Overall, I remain unconvinced the net loss of stream extent has been adequately offset or compensated given the effects the “retained” stream extent will be subject to. This conclusion is of course dependent on how the effects of stormwater discharges and land use development on the retained streams are considered within the NPS-FM aquatic offsetting framework .

¹⁵ Appendix 19(a) – Aquatic ecology assessment, page 10.

¹⁶ Appendix 47 (Updated), Watercourse changes overview plan.

Fast Track Approvals Act 2024 (FTAA) Technical Advice

Ōhoka Residential Development – Water Ecology

Date	05/05/2026
To	Joanne Mitten, Principal Consents Planner, Environment Canterbury, cc Samuel Prystupa, Consents Planner, Environment Canterbury
From	Olivier Ausseil, Principal Scientist and Director, Traverse Environmental
Project advice provided for	Carter Group Limited - Ōhoka Residential Subdivision
Documents referred to	Aquatic Ecology Assessment –Appendix 19(a), dated 25 August 2025 (InStream Consulting) Aquatic Ecology Addendum – Appendix 19(b), dated 18 June 2026 (Stantec) Water Quality Assessment presented as Appendix C to the Stormwater Management report (Appendix 31), dated June 2025 (PDP) Hydrology Assessment – Appendix 20, dated June 2026 (PDP) Proposed Regional Council conditions – Appendix 44
Qualifications	I hold a PhD of Environmental Biosciences, Chemistry and Health from the University of Provence, France. I also hold a Master of Science Degree of Agronomical Engineering from the National Higher Agronomical School of Montpellier, France, and a DEA (equivalent Masters Degree) in Freshwater Environmental Sciences from the University of Montpellier II, France. I am a Principal Scientist and Director of Traverse Environmental Limited (previously Aquanet Consulting Ltd). I have over 20 years' experience in New Zealand as a freshwater scientist working in local government and as a private consultant working for regional councils and local authorities, central government and government agencies, iwi / hāpū, catchment and community groups and the private sector.
Code of Conduct	I confirm 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 technical report has been prepared in accordance with that Code. In particular, unless I state otherwise, the opinions I express are within my area of expertise, and I have not omitted to consider material facts that might alter or detract from the opinions that I express.

Overview and summary

1. I have reviewed the following documents

- Aquatic Ecology Assessment –Appendix 19(a), dated 25 August 2025 (InStream Consulting)
- Aquatic Ecology Addendum – Appendix 19(b), dated 18 June 2026 (Stantec)
- Water Quality Assessment presented as Appendix C to the Stormwater Management report Appendix 31, dated June 2025 (PDP)
- Proposed regional council conditions – Appendix 44

2. My review focuses on the Aquatic Ecology Assessment report, the aquatic ecology addendum memo and the Water Quality Assessment memo; however, I have also read (but do not provide a detailed review of) the following documents that that were directly pertinent to my review:
 - The Hydrology Assessment (Appendix 20), as the effects of the proposed development on surface water hydrology is one driver of potential effects on aquatic habitat and ecology.
 - The Stormwater Management report (Appendix 31), as it sets out the basis for the Water Quality Assessment memo.
3. The scope of my review includes the potential effects of the development on water quality and ecological values of surface streams within, and downstream of, the site. It does not include effects on cultural values, natural wetlands, groundwater or surface hydrology.
4. I previously provided comments and identified gaps and / or concerns on the April 2026 versions of the aquatic ecology, water quality assessments. The June 2026 water quality assessment was amended and now addresses some of my comments; however the aquatic ecology assessment does not appear to have been amended and the concerns I raised in my April 2026 review remain unchanged. For clarity, and unless otherwise specified, all references to the water quality or aquatic ecology assessments are to the final (June 2026) versions of the documents.
5. The Water Quality Assessment (Appendix C to Appendix 31):
 - The water quality assessment was amended compared with the version I reviewed in April 2026, to include a modelling-based assessment of stormwater discharge to the Ōhoka Stream Tributary. This assessment is presented as representative of proposed stormwater discharges in the catchment.
 - describes the post-development stormwater catchment characteristics (Table 1), the contaminants and concentrations expected in stormwater (Table 2), and the expected discharge quality from the proposed treatment systems (Table 5);
 - presents background (existing) water quality in streams within the site and an assessment of future water quality and compliance with LWRP limits based on mixing assumptions.
 - In my opinion, the assessment provided presents several significant gaps that preclude a thorough assessment of effects on the stormwater discharges. Most of these gaps were identified in my April 2026 review, but were no addressed in the final application documents. These include:
 - Whilst stormwater catchments are identified in the application, the streams they discharge to, or the location of discharge points, are not identified. This precludes any assessment of effects on some of the smaller, more sensitive spring-fed streams;

- the risk of the proposed stormwater discharges causing significant adverse effects on visual clarity or colour or sediment deposition on each of the main receiving environments have not been assessed from a technical point of view.
- Effects on other key water quality parameters known to be affected by urban stormwater discharges, such as temperature, pH and dissolved oxygen, have not been assessed.
- With regards to the substantive conclusions on effects on water quality of the receiving environment(s), I am of the opinion that, on the basis of information available:
 - The LWRP guidelines for zinc are likely to be exceeded during rainfall events. The frequency and duration of these are likely to be greater during summer rainfall events. The information available does not allow to conclude the risk of toxic effects on aquatic life is low.
 - The streams receiving the proposed stormwater discharges are spring-fed and highly sensitive to sediment discharges due to their high background water clarity and low background sediment. The stormwater discharges are likely to cause conspicuous changes in water clarity and colour and increases in sediment deposition.

6. The Aquatic Ecology Assessment (Appendix 19(a)):

- is dated August 2025, and was thus not modified compared with the version I reviewed in April 2026.
- provides maps and describes the surface water bodies present within the site, including their existing water quality and aquatic ecology,
- identifies the activities that have a potential impact on water quality and / or aquatic ecology within, and downgradient of, the site
- describes the proposed future extent, alignment and some habitat characteristics of streams on site, including stream re-alignment and stream extent losses;
- provides an assessment against the NPS-FM effects management hierarchy
- Concludes that, overall, there will be a net improvement in aquatic ecological values, and the loss of stream length can be effectively offset.

7. Whilst I agree with some of the assessment presented, I have significant reservations and / or disagree with some of the conclusions reached, in particular:

- The change from high-intensity pastoral to urban land use does not, in my opinion, represent a “potential improvement” as contended in the application. Instead, it changes the risk profile (different contaminants, pathways and effect types), and has the potential to lead to worsening ecological outcomes.
- The potential effects of stormwater discharges on water clarity and sediment deposition on the ecology / aquatic life of the receiving, highly sensitive, streams

have not been assessed on a technical basis. Instead, the assessment was limited to a planning argument (a discharge quality of 50 mg/L being met).

- In my opinion, there is a material risk of the proposed stormwater discharges (both during construction and operation) causing conspicuous changes in water clarity and / or colour and sediment deposition, with consequential detrimental effects on aquatic life, including macroinvertebrate communities and trout spawning. The risk of effect is particularly high in the smaller, spring-fed streams (if these are to receive stormwater discharges, which remains unclear). This conclusion is applicable to both the construction and operation phases of the proposed development.
- The potential ecological effects of the effects of the proposed stormwater discharges on well-established potential effects of urban stormwater discharges such as stream flow peakiness, or changes in water temperature, pH or dissolved oxygen have not been assessed.
- The proposal will result in a nett loss of stream extent, as well as diversions and re-direction of streams. The proposed implementation of the NPS-FM effects management strategy for streams appears to double-count some actions, and should be clarified or modified. Whilst the proposed mitigation package represents good practice to mitigate, to the extent practicable, some of the direct effects of land use change and stormwater discharges, it does not, in my opinion, provide much, if any, offsetting or compensation for the proposed loss of stream extent. I am not able to support the conclusion drawn in the application that there will be an overall net improvement in aquatic ecological values.

8. The Aquatic Ecology Addendum (Appendix 19b):

Describes changes to the proposal

- Provides an updated assessment of future stormwater quality discharges (post-treatment).
- The rest of the memo refers to wetlands, which are largely outside the scope of my review.

9. Proposed Regional Council Conditions (Appendix 44).

My review focused on the proposed conditions associated with the discharges of stormwater during construction and operations phases, and stream works (including stream diversions).

My main comments are:

- The consent conditions require the development of several management and monitoring plans (e.g. Streamworks Management Plan, Ecological Management Plan). In my opinion, draft management and monitoring plans should be provided and clauses requiring the plans to be independently reviewed and approved by the regional council should be added in the conditions

- Stormwater-related conditions set a discharge quality limit of 50 mg/L for TSS concentration in the discharge. Whilst this is consistent with the LWRP, it is significantly more than the proposed discharge quality described in the application (3-13 mg/L) and assumed in the assessment of effects.
- Given the risks associated with sediment discharges identified in my review, I recommend that more extensive (than proposed) monitoring of the receiving streams' water quality and ecology be undertaken.
- I do not agree the use of a trigger value 50 mg/L TSS in the receiving environment is appropriate. A trigger value based on a degree of change caused by the discharges would seem more appropriate.

Overall Review of reports

Hydrology Assessment

10. I have not reviewed the hydrology report in detail and generally rely on the review comments provided by CRC experts.
11. The Hydrology report provides the results of flow gaugings undertaken on five of the streams present on site (Table 1 in the Hydrology report). This is relevant information for the assessment of effects on water quality and ecology.
12. The Hydrology report identifies that the proposed development will result in an increase in impervious surfaces within the site, with potential impacts on local groundwater recharge, and consequential potential effects on stream baseflows; however, it does not acknowledge that an increase in impervious surfaces also typically result in changes in hydrological patterns in response to rainfall, in particular it increase the “peakiness” of flow patterns (higher but shorter-duration peak flows, etc.). This is a well-known effect associated with urban / peri-urban development in stream catchments.
13. Qualitatively, an increase in flow peakiness can have detrimental effects on in-stream fauna of spring-fed streams, which are generally characterised by stable base flow conditions. These potential effects have not been identified or quantified in any of the reports I have reviewed, which represents a material gap in the assessment provided. This gap was identified in my April 2026 review, but not addressed in the final application documents.

Water Quality Assessment (Appendix C to the Stormwater Management report)

Agreement with the Applicant

14. I generally agree and / or have no concern about the identification and description made in the water quality memo of:
 - stormwater catchments,
 - stormwater treatment devices,
 - stormwater contaminants and their concentrations before and after treatment, and
 - expected background stream water quality.

Outstanding areas of contention

15. The Stormwater Management report identifies and presents maps of proposed development areas and pre- and post-development stormwater catchments. Table 5 of the stormwater management report indicates what post-development stormwater catchments form part of pre-development stormwater catchments. Maps are provided in Appendix B. However, I have not been able to find a map that shows the discharge point(s) of each stormwater catchment into the receiving environment(s). Further, most post-development stormwater catchments are located between two of the five main streams identified on site. There are only four pre-development stormwater catchments, and the surface catchments of several streams (e.g. southern and northern spring channels) are not identified. As a result, it is unclear what stormwater discharges (if any) several streams are proposed to receive. In my opinion, clearly identifying discharge points into streams and associated catchments is fundamental to any effects assessment. This gap was identified in my April 2026 review and has not been addressed.
16. An assessment of the potential effects of stormwater discharges on water quality of the Ōhoka Stream Tributary was provided, based on discharges from 42.8 ha of the proposed development that drain to that stream (see section 7 of the water quality assessment memo). The assessment was based on an assumed base flow of 59.5 l/s and a design storm of 25 mm depth and 5 mm/h average intensity. The mixing assessment (see figure 1 of the water quality memo) indicates that the stormwater flows from the subdivision are likely to peak at above 250 L/s and be equivalent to, or greater than, that of the stream for a period of 3 to 4 hours.
17. I note the assumed baseflow appears to have been calculated as the average of the February and November gaugings obtained at that site. The reasoning supporting for this methodology was not provided, but the assumed base flow is approximately 4 to 5 times the stream flow rate measured in February 2025, which means the scenario used in the assessment does not represent a worst-case scenario from a dilution point of view. If we assume the design storm occurs under summer baseflow conditions (c. 15 L/s in the Ōhoka Stream Tributary, as shown in Table 1 of the Hydrology assessment), then the stormwater discharge flow from the proposed subdivision would be expected to be significantly greater (4 to 10 times or more depending on the stream's response time) than that of the stream for several hours.

18. The water quality assessment (section 7.3) concludes that the LWRP limits for zinc are likely to be exceeded for a period of c. 4 hours under the storm scenario tested; however it also concludes that under a “typical” rainfall event, the discharge would be expected to meet the LWRP limits. Whilst I agree with the first conclusion (related to the likely exceedance under the scenario tested), I don’t think the opinion that the LWRP limit is likely to be met under “typical” rainfall event is supported by the available data. In fact, it seems likely that rainfall events much smaller (and therefore, more frequent) than assumed in the scenario occurring during summer (when stream base flow is 20-25% of the base flow assumed in the modelling) will result in exceedances of the LWRP limit, with potential toxic effects on aquatic life.
19. The ANZG provides guidance on comparing monitoring data to guideline values. The default guideline value (DGV) for a toxicant is regarded as being exceeded if the 95th percentile of the monitoring data exceeds the DGV¹. A finer level of analysis would be required to determine the likely frequency of exceedances caused by the stormwater discharges and more fully assess the risk of toxic effects to aquatic life, but the information available does not allow to conclude this risk is low.
20. The assessment of the potential effects of stormwater-driven sediment discharges to the streams appears to be limited to the conclusion that the discharges of stormwater are likely to meet the LWRP limit of 50 mg/L TSS in the discharge. No assessment of the potential effects of the discharges on water clarity / colour and / or sediment deposition in the receiving environments is provided. In my opinion, this constitutes a significant gap in the assessment of effects provided in the application, which I identified in my April 2026 review.
21. For clarity I do not disagree that, based on the information provided, the stormwater discharges are likely to meet the LWRP limit of 50 mg/L TSS in the discharge. However, strictly from a technical point of view, a discharge can meet the TSS limit of 50 mg/L and still cause significant adverse effects on visual water clarity, colour and / or sediment deposition (with potential flow-on effects on stream ecology) in the receiving environment(s). Whether these effects occur and their level of significance entirely depends on the nature and sensitivity of the receiving environment (e.g. background water clarity and stream bed substrate), as well as the volume, timing and quality of the discharge.

¹ <https://www.waterquality.gov.au/anz-guidelines/guideline-values/default/water-quality-toxicants#determining-if-a-toxicant-dgv-has-been-exceeded> . Accessed 2 July 2026.

22. Spring-fed streams such as those present on site are generally considered particularly sensitive to the effects of sediment discharges because (1) they generally have high to very high water clarity because their base flow is dominated by groundwater and (2) they experience very stable flow conditions and limited peak flows (compared with a rainfall / runoff dominated stream) that may assist with “flushing” deposited sediment. Background water quality sampling has confirmed that the streams within the site currently present high water clarity, as indicated by all TSS results (except one) being below the detection limit (water quality memo, Table 6). This confirms the high sensitivity of these streams to discharges of suspended sediments. Ecological surveys have indicated the streams within the site, in particular the Ōhoka Stream Tributary and South Ōhoka Branch, were characterised by coarse substrate and support trout spawning, which indicates a high sensitivity to the deposition of fine sediment.
23. A simple assessment of the potential risks associated with sediment discharges can be conducted for the Ōhoka Stream Tributary based on the dilution information provided in the application. Most of the stormwater will be treated by detention basins and wetlands or swales and rain gardens, and are thus expected to have TSS concentrations in the order of 7-12.6 mg/L (Table 5, water quality assessment). The stream under base flow conditions is expected to have negligible TSS concentration (Table 6, water quality assessment). The hydrograph presented in figure 1 of the water quality assessment indicates the flow of stormwater discharge will be equivalent to, or greater than, that of the stream for a period of 3 to 4 hours (i.e. a dilution ratio of c. 2). As indicated above, I am of the opinion this is not an environmentally conservative scenario, and significantly lower dilution will be available under summer baseflow conditions (potentially dilution ratios as low as 1.1). This means that during the initial phases of stormwater discharges in summer, the stormwater discharge is likely to represent the majority of the flow in the stream and cause the TSS concentrations in the stream to increase from negligible upstream of the discharge point to 3.5 mg/L (assuming best treatment and dilution) to over 10 mg/L (assuming worst treatment and dilution). If this was to occur, the discharge would cause a conspicuous change in water clarity and colour of the receiving environment (thus breaching RMA S107(1)(d)) and increase fine sediment deposition on the stream bed.
24. No mixing assessments were provided for stormwater discharges to the Ōhoka Stream South Branch, or the smaller streams (Northern Spring Channel, Southern Spring Channel and Groundwater Seep Channel). Baseflows in the three smaller streams are in the order of a 2-10 L/s (Table 1, hydrology assessment report), which makes them potentially more sensitive to stormwater discharges from urban catchments; however, what stormwater catchments may discharge to these streams has not been identified in the application. It is thus not possible to say whether the Ōhoka Stream Tributary example presented in the application is “representative” of expected discharges from the site, and the risk of effects from metals and sediment in stormwater discharges on these streams cannot be assessed on the basis of information available.

25. Other potential effects of stormwater discharges: It is well documented that stormwater discharges from urban catchment into small urban streams can also have significant detrimental effects on in-stream water temperature (especially peak temperature) and other key parameters such pH and dissolved oxygen, with consequential adverse effects on aquatic life. Whilst some of the proposed stormwater treatment devices and stream habitat mitigation measures might somewhat mitigate these concerns, an assessment of the potential effects of the discharge on in-stream water temperature, pH and dissolved oxygen, and consequential effects on aquatic life should be provided.

Overall Review of the report: Aquatic Ecology (report and memo)

Agreement with the Applicant

26. Generally speaking, and with the exceptions noted below (para 33 to 38) the Aquatic Ecology report describes the proposed activities and identifies the main associated potential effects on water quality and ecology in a logical and comprehensive way. The level of background information and site investigations is generally consistent with the nature and scale of activities.

27. Streams present on site are adequately mapped (e.g. figure 1 of the aquatic ecology report). Eleven waterways are identified on site. Five are clearly identified as natural streams, and 6 are identified as “drains” on the map; however it is unclear from the report whether all these are or should be considered “rivers” under the RMA definition. I suggest this point should be discussed further or clarified in the report².

28. Data collected during aquatic ecology surveys provide a robust description of the existing stream habitat, and aquatic life currently present on site. The stable banks and substrate and trout spawning values of streams present on site are notable.

29. Section 5 discusses the potential effects resulting from the proposed activities, including:

- Change in land use from dairy farming to urban
- Effects on groundwater and spring flows
- Effects stormwater discharges after land development (“Operational phase”)
- Effects of stormwater discharges during construction
- Dewatering during construction
- Waterways realignment and removals
- Instream works

² I note that the three unnamed drains proposed to be filled in are considered to be natural watercourses (aquatic ecology report, p21). It is however unclear whether the same conclusion applies to the other three waterways shown as “drains”.

30. I generally agree with the nature of potential effects listed above and discuss them in turn below.
31. Land use change: Section 5.1 notes that the change in land use has the potential to result in an improvement in the ecological condition of streams within the site. It is well recognised nationally and internationally that urban land use is a key driver of poor stream ecological health, due to multiple activities and stressors, and urban streams typically present the most degraded water quality and ecology of all stream types in New Zealand (e.g. Gadd et al. 2020). The term “urban stream syndrome” was coined specifically to describe the effects of urban land use on streams (e.g. Walsh et al. 2005). Transitioning from a rural (even intensive) to urban land use is expected to change the risk profile to streams, including the types of activities, associated contaminants and types of effects (as discussed in my review), but I do not agree this is likely to represent an overall positive in itself for stream ecological health.
32. Effects on groundwater and stream flows. The hydrology report concludes that effects on spring and stream flows are likely to be relatively minor, although I note reservations associated with this conclusion identified by Jen Dodson for CRC. I also note that the assessment conducted primarily relates to base flows, and, in my opinion, the effects of the proposed activities on peak stream flows should also be assessed. This is covered in paragraph 11 of my review.
33. The assessment of effects of stormwater discharges during the operational phase on water quality is discussed in paragraphs 13 to 24 of my review.
34. Stormwater discharges during construction: I generally agree with the principles of erosion and sediment control and management described in Section 5.1.1 of the aquatic ecology report. I am however concerned by the apparent full reliance on the LWRP 50 mg/L TSS discharge concentration limit to manage potential effects on the receiving environment. As discussed in paragraphs 20 to 22 of my review, spring-fed streams within the site should be considered highly sensitive to sediment discharges and a discharge with a TSS concentration of 50 mg/L has the potential to cause significant adverse effects on water clarity and/ or colour and sediment deposition, with consequential effects on aquatic biota, including trout spawning. These effects may occur during both the construction and the operation phases of the proposed development. But have not been identified or assessed in the application.
35. Waterway realignment and removals. The development as proposed will result in significant loss of stream length, and realignment of some remaining streams. These are well described in the report. Mitigation and offset actions are discussed further in paragraphs 43 to 45 of my review.

36. Instream works. I generally agree with the description of potential effects and management strategies for instream works. I note however that the consent conditions require the preparation of management plans (ecological and streamworks management plan), and these will need to be carefully reviewed when available.
37. Section 6.1 describes the assessment of effects of watercourses against the provisions of the NPS-FM policy 3.24. Whilst the policy has generally been applied correctly, I am generally concerned that the separation between actions proposed to “avoid”, “minimise or remedy” and “offset” is not clear. This is further addressed in paragraphs 36 to 38 of my review.

Outstanding areas of contention

38. The nature of the six “drains” described in pages 12-13 of the aquatic ecology report is not clear: should these be considered modified natural watercourses, i.e. do they fall under the RMA definition of a “river”, or should they be considered artificial watercourses?
39. As discussed previously, the locations of the proposed stormwater discharges should be confirmed, and their effects should be considered for each receiving environment. An assessment of the potential effects on in-stream ecology of each receiving stream should be conducted.
40. This should include specific consideration of the potential effects on stream ecology associated with suspended and deposited sediment. In my opinion, the potential effects of the stormwater discharges causing significant effects on visual clarity and / or colour or sediment deposition, or their potential flow-on effects on aquatic life have not been acknowledged or assessed from a technical viewpoint. Based on the information provided, I consider there is a significant risk of the stormwater discharges causing conspicuous changes in water clarity or and / or significant adverse effects on aquatic life (and thus breaching S107(1)(g)), especially in the smaller spring-fed streams present on site (if these are to receive stormwater discharges, which remains unclear).
41. Spring-fed streams are characterised by very stable flow conditions, and their habitat, channel morphology and aquatic life are adapted to these conditions. Stormwater discharges from urban areas have the potential to increase the “flashiness” of the flow patterns in response to rainfall, due to the increase in impervious surfaces. The hydrological assessment should assess the potential effects of the stormwater discharges on peak stream flows in response to rainfall, and the aquatic ecology report should consider the potential ecological effects of these changes (if any).

42. The assessment of potential effects on stream ecology should also consider other well-documented types of effects from urban stormwater discharges, such as effects on water temperature, pH and dissolved oxygen. The information available does not allow me to draw any conclusions with regards to these effects.
43. Mitigation actions and effects management hierarchy: Due to the nature of the proposal, all the actions proposed to be taken to avoid, minimise, remedy or offset the effects of the proposal are proposed to apply to the same six main waterways (as per Table 4 of the aquatic ecology report), and the separation between actions that are proposed to directly “avoid” or “minimise” effects on these waterways vs. those that should be considered offsetting actions for the loss of the three waterways vs. those that should be considered as offset for the effects of stormwater contaminants vs. those that would have occurred anyway as part of the proposal is not clear. For example, considering the actions listed as “offset” actions in Section 6.1.4:
- Setback distances and riparian planting are proposed to “avoid” adverse effects of land use at each waterway to be retained (Section 6.1.1); however setbacks and native riparian margins are also mentioned under “offset” (Section 6.1.4). The same action should not be counted as a direct measure to avoid effects in a given waterway and as a measure to offset the loss of another waterway;
 - It is unclear how the removal of 17 existing culverts should be considered an “offset” measure for the loss of stream extent. Similarly, it is unclear whether the cessation of groundwater takes within the site would have occurred anyway since urban land use is not typically irrigated or if it should be considered as a genuine offset measure.
 - It is unclear whether the proposed in-stream enhancement measures are intended to mitigate the effects stream re-alignment or offset the effects of stream extent loss.
 - The creation of high-quality stream reaches where realignment is required should, in my opinion, be considered a direct mitigation of the effects of re-alignment on the said stream, and cannot be considered an offset measure for the loss of another waterway.
 - I also note that none of the “offset” actions appear to have been quantified against the length of stream loss, making it difficult to gauge if the quantum of any proposed offset actions is consistent with the quantum of residual effects from the proposal (including stream loss).

44. The package of proposed actions needs to be clarified to show clearly where actions are intended to fall under each effect management hierarchy category. Potential benefits of offset actions should also be quantified against the quantum of residual effects from the proposal. I also note that any additional assessment of effects following recommendations in this memo (e.g. effects of stormwater discharges on water clarity deposited sediment and temperature) should be considered in the effects management hierarchy.
45. Overall, I am of the opinion that the package of proposed actions is consistent with what one would expect to see to avoid or minimise the combined effects of the land use change, the discharges of stormwater to sensitive environments and the stream re-alignment, but I cannot see how it also provides offset and / or compensation for stream extent loss. At this point, I cannot agree with the conclusion reached in Section 6.1, that overall there will be a net improvement in aquatic ecological values and the loss of stream length can be effectively offset.
46. These concerns were raised in my April 2026 review but were not addressed in the final application.

Proposed consent conditions (Appendix 44)

47. My review focused on the proposed conditions associated with the discharges of stormwater during construction and operations phases, and stream works (including stream diversions).
48. Works in Waterways (s13 land use): The consent conditions require the development of several management and monitoring plans (e.g. Streamworks Management Plan, Ecological Management Plan – see condition 18). Whilst this is a standard approach in greenfield development situations, it does make it difficult to comment on the adequacy of the proposed conditions, or their consistency with the information provided in the application.
- 49.
50. In my opinion, draft management and monitoring plans should be provided and clauses requiring the plans to be independently reviewed and approved by the regional council should be added in the conditions. From a stream ecology point of view, the design details of the “new” re-aligned sections of stream channel are critical to ensure adequate stream habitat quality and should be carefully reviewed.
51. Stormwater Discharge into Surface Water – Operational (s15 discharge permit):
- Condition 30 sets a discharge quality limit of 50 mg/L for TSS concentration in the discharge. Whilst this is consistent with the LWRP, it is significantly more than the

proposed discharge quality described in the application (3-13 mg/L) and assumed in the assessment of effects. Should a discharge concentration limit of 50 mg/L be sought, it seems logical the assessment of effects should also be undertaken on the same assumed discharge concentration.

- Condition 35 requires that water quality monitoring be undertaken 4 times during the first two years following the commencement of the consent, and then once during two additional years. Given the scale of the proposed development, it seems highly unlikely the site will be fully developed in 2 years, meaning that the main body of monitoring data will not reflect the fully developed site.
- Given the risks associated with stormwater discharges identified in my review, I recommend that more extensive monitoring of the receiving streams' water quality be undertaken. Monitoring should be undertaken regularly (2-3 times per year including at least once in summer) until full development of the site and two years thereafter. Regular monitoring (once per year) should continue for the duration of the consent, although it may be useful to add a clause to facilitate reducing monitoring if no adverse effects are identified. Monitoring should include sites located upstream and downstream of main discharge points in addition to the sites proposed.
- Condition 36 lists the water quality parameters that should be monitored. In my opinion, other typical parameters should be added such as temperature, pH and dissolved oxygen (which must be measured in the field), as well as turbidity (as it is better adapted to situations where TSS concentrations are very low), ammoniacal nitrogen and nitrate-nitrogen.
- Condition 37 set "contaminant trigger limits". I do not agree that 50 mg/L is a suitable trigger for receiving environment water quality (the LWRP sets this concentration as a limit in the discharge, not the receiving environment), especially for streams with very low background TSS concentrations, such as those present on site. A trigger based on a degree of increase in TSS concentration (or turbidity) between upstream and downstream of the discharge(s) should instead be considered (for example, the discharge causing an increase in turbidity or TSS concentration exceeding 50%, which is a relatively permissive trigger corresponding to a conspicuous change in water clarity)
- Given the potential effects on water clarity, sediment deposition, metals and other key water quality parameters identified in my review, I consider that ecological monitoring upstream and downstream of stormwater discharges is warranted. Monitoring should include benthic macroinvertebrates communities, deposited sediment and rapid habitat assessment, and should be conducted annually from the start of the consent and for a period of time (3-5 years) following full development. Depending on the results, it may then be appropriate to continue annual monitoring or reduce the frequency to "surveillance" levels, i.e. every 3-5 years.
- It may be useful to require the preparation (and review) of a Stormwater Monitoring Plan once the details of the development are finalised, to collate all the

information regarding monitoring sites, monitoring parameters and variables, monitoring frequency, methods and protocols etc.

References

Gadd, J., Snelder, T., Fraser, C., & Whitehead, A. (2020). Current state of water quality indicators in urban streams in New Zealand. *New Zealand Journal of Marine and Freshwater Research*, 54(3), 354–371

Walsh et al. (2005). The urban stream syndrome: current knowledge and the search for a cure <https://doi.org/10.1899/04-028.1>