
To: NZSki
Cc: Mitchell Daysh
From: e3scientific Ltd
Date: 27/08/2026
Subject: Doolans Expansion Tracks, Stream Crossings and Stormwater: Response to key issues and information gaps identified in ORC review.

The Tracks, Stream Crossings and Stormwater Freshwater Ecological and Hydrological Impact Assessment (Tracks and Stormwater) (e3Scientific, 2026b) forms part of the NZSki Remarkables Upgrade and Doolans Expansion fast track application. The application includes the construction of new tracks, stream crossings, works within wetlands and stormwater discharge.

The key issues raised by each review, along with a response, are listed below.

1. Torlesse Environmental Ltd review (11 June 2026)

Q1. Concrete - Report cites a risk of concrete entering the stream and has factored this in when considering unmitigated effects.

NZSki and Stantec have updated initial design specifications to confirm no concrete discharge to flowing water will now be required (via emails dated 1/7/2026). Based on this, the discharge effects within the report have been re-assessed to be Low. See Section 5.1 and 5.9 in the report for the updated assessment.

Q2. Stream bed area used - Stream bed area calculations are not helpful

The use of streambed area as a measure of the area potentially affected is a standard assessment approach. However, to support the reviewers understanding of the environment, the report has been updated as requested to describe the stream crossing lengths that are 8 m for each of the 12 crossings and a combined total length of 96 m within the Doolan's Basin. There will also be disturbance within the Rastus Burn

at two existing crossings each 8 m in length, resulting in a total stream length potentially disturbed of 16 m of stream length in the Rastus Burn catchment.

Q3. *Predicted instream zinc concentrations in Section 5.6 raises red flags. I recommend that the authors revisit their stormwater assessment methodology, including consideration of:*

- *More representative metal load estimates for the proposed roof materials;*
- *The degree of contaminant attenuation provided by the proposed discharge pathway; and*

Q4. *Predicted 95th percentile zinc concentrations within the receiving environment.*

Following a meeting on 4 August 2026, further comment was received on 6 August 2026:

- *Effects of the stormwater discharge: The current assessment still predicts an exceedance of the ANZG 99% species protection guideline for zinc, which suggests the potential for significant adverse effects. I suggest the authors revisit the mass-balance assessment and determine whether an exceedance is likely based on the annual 95th percentile concentration, rather than the approach currently adopted.*

Section 5.6 of the Tracks & Crossings Report (e3Scientific, 2026b) has been updated with more site-specific data based on the expected Colorsteel® roofing and baseline conditions. Based on this information, the expected concentrations of zinc and copper will be less than the 99th percentile acute DGVs which were derived for stormwater discharges (Gadd, Hickey, & Snelder, 2024). It is considered that the acute stormwater guidelines (Gadd, Hickey, & Snelder, 2024) are appropriate guidelines to use to generate site-specific guideline values in accordance with ANZG advice on refining toxicant values for transient exposures (<https://www.waterquality.gov.au/anz-guidelines/guideline-values/default/water-quality-toxicants/local-conditions#transient-exposures>). ANZG refers to the methodology of Warne et al (2025) to derive short-term guideline values, which in turn specifically refers to the Gadd, Hickey, & Snelder, (2024) Acute copper and zinc water quality guideline values for Aotearoa as an example of deriving short term guideline values based on toxicity data.

Therefore, we consider it very unlikely that toxicity guidelines will be breached.

Q5. *Could vehicle movements associated with the proposal generate metal loads capable of reaching surface water?*

Management of runoff from roads is discussed in Section 5.5. of the report, with the key points being as follows:

- sheet flow will primarily drain to the downside of the track corridor to be filtered and retained in roadside tussocks.
- Armoured trackside swales have been designed to have check dams and other sediment protection devices to minimise the potential for sediment input to waterways.
- Regular (i.e. weekly when accessible November to May) assessment and maintenance is required for the permanent erosion and sediment control devices such as sediment sumps with sediment removal occurring at 20% capacity.

In conjunction with these mitigations of stormwater discharge to land, the proposed roads within the Doolans Basin will not be open to the public and will have very low traffic movement from NZSki staff. The risk of metal loads from vehicle movements impacting streams is therefore very low.

1.1 *Torlesse – Water Quality and freshwater ecology post expert panel feedback meeting (6 August 2026)*

3. *Stormwater monitoring: As discussed, the proposed stormwater monitoring programme is unlikely to be particularly informative, as it is focused on periods when effects are expected to be lowest. That said, I appreciate Mr Hamer's point that the proposed monitoring is intended to provide an early indication of any immediately apparent issues. If ongoing monitoring is considered necessary (to be informed by the updated mass-balance assessment), a more appropriate approach would be to undertake monitoring throughout the consent term. My initial view is that this could comprise two wet weather water quality samples and one sediment sample every five years, with any exceedance triggering a more comprehensive monitoring programme and an appropriate management response*

Agree, if mass balance calculations or initial sampling surveys do not demonstrate an immediate risk, then 5 yearly deposited fine sediment monitoring (if present) for the duration of the consent would be appropriate.

4. *Stormwater management approach: Based on the effects assessment, it appears there may be an opportunity to dispose of at least some of the site's stormwater via*

soakage. If there remains a risk of exceeding the ANZG guideline values, implementing soakage from the outset may be a relatively straightforward way of avoiding those effects

There is no risk of exceeding ANZG guideline values for short term discharges. This has been addressed further in the updated response to Q3 & Q4.

5. It would be useful for e3 to provide a **cumulative effects assessment** for the Doolans that considers the combined effects of the stormwater discharges, wastewater discharges, and water take, together with the extent to which those activities may collectively diminish the natural character of the system

Section 5.8 of the Tracks and Stormwater (e3scientific, 2026b) covers the cumulative effects of the activities within Doolans Basin, which includes stormwater discharges and streambed modification. The Doolans Creek watertake is a separate activity, that occurs for a short duration during the snowmaking season and as such does not create an ecologically cumulative effect from the activities discussed in the Tracks and Crossings report. The wastewater discharge is within a different catchment (Rastus Burn) and therefore also does not represent a cumulative ecological effect within this catchment. The Part A Substantive planning report provides an overall assessment of effects which allows for a project cumulative effects assessment.

2. Morphem Review (17 June 2026)

Q6. A) The maintenance of hydrological function and connectivity of all wetlands and streams is reported to be undertaken. How will this be done and demonstrated? Without a robust and sensitive monitoring, it will remain undetermined if there have been any adverse effects on the hydrology and function of the wetlands. Some of the wetland crossings (and associated trenching) are considered to have a high risk to the maintenance of wetland function and hydrology.

Following a meeting on 4 August 2026 further comment was received on 12 August 2026:

B) Response does not address the question. It is considered that a detailed monitoring plan will need to be presented to demonstrate how, over time and during the trenching works, the function and connectivity of impacted wetlands, seeps and hydrology is being maintained.

- A) All wetland and stream crossings have been discussed within the Tracks and Crossings report (e3Scientific, 2026b) in Sections 3.3.4 and 3.3.5. The types of crossings selected have been designed to maintain hydrological function and connectivity.
- B) The design of the wetland and stream crossings and associated trenching, along with the construction methodology are the primary methods of ensuring wetland hydrology is maintained. The maintenance of wetland hydrology occurs by allowing water to pass from one side of the track and trenching works to the other side such that water continues on its original flowpath.

Where the services trench passes through a wetland and where the trench is on a gradient and could divert wetland seepage water away from the natural flow path, a concrete collar (bulkhead) is recommended on the trench up and downgradient of the wetland crossing. The concrete collar will ensure seepage water from the wetland does not flow along the trench away from the downslope wetland but instead water may fill the constrained trench and then continue to seep through to the downgradient wetland area over the top of the trench.

Each stream or wetland crossing is designed to allow water to move along the same flow path (above and/or below the ground surface), by using appropriate permeability materials. Figure 8 of the report provides a diagram demonstrating how an engineered permeable crossing allows the movement of water. The diagram demonstrates how this would work where the trench is laid within rock. Should the trench intersect deeper soils and not be laid within rock, the placement of the services pipes will not block the entire flow path due to the pipe dimensions, which can be seen to be relatively small relative to the trench.

Q7. All wetland and stream crossing designs will be reviewed by a Hydrologist and Ecologist and approved prior to any works commencing and be inspected once complete to ensure the design is implemented correctly and is functioning as anticipated. Would approval be by the applicant ecologist or council appointed? What particular criteria for approval would be applied and how would a situation be managed where approval was not forthcoming?

Following a meeting on 4 August 2026 further comment was received on 12 August 2026:

- *Relates to the above – Require some clarity and as to how the proposed will work, what the controls are explicitly. Is this the applicant ecologist and hydrologist opinion or will there be associated evidential data?*
- *Consider providing thresholds and standards that can be tested in a plan to be certified by Council with reporting? The monitoring is also inconsistent with the management plans and suggest this is addressed.*

The applicant's ecologist and hydrologists will be best able to be responsive to review the crossings and have the most familiarity with the site. The designs will be modified until the effects are as stated within the effects assessment i.e. vegetation loss no more than 2 m from the track, and no loss of hydrological functioning.

Further information detailing how the controls will work has been provided in the above response. The monitoring of the wetlands will provide evidence that the controls will be effective. In the meeting, it was agreed that wetland quadrats would be monitored. If the wetland vegetation remains unchanged relative to appropriate control sites, and the wetland extents are maintained, the controls can be considered to be effective.

Management plans are to be updated to reflect the monitoring recommended here.

Q8. Prior to construction, the boundaries of wetlands within 10 m of the planned track should be marked out. Who will mark the wetland boundaries, noting that the majority of the wetlands have only been delineated using remote tools. It is recommended that this includes a requirement to delineate wetlands by a suitably experienced ecologist and provide buffers/setbacks to the wetland edges

All of the wetlands to be crossed by tracks have been delineated using field methodologies as discussed in Section 2.3.2 of the TEcIA (e3Scientific, 2026c) – the assumption that they were delineated using remote tools was incorrect. Given that not all ecologists are trained in wetland delineation, we will specify that the boundaries will be mapped by a scientist experienced in wetland delineation.

Q9. If there is significant water revealed within any cuts that are not already designated for crossings, work should be paused to assess the need for further mitigations. What is considered to be significant water? Who will make this decision and what will it be based on? How will the adverse effects be addressed? These uncertainties mean that this control is unlikely to be implementable.

The recommendation has been updated as follows:

- If there is significant water (**resulting in pooling or runoff**) revealed within any cuts that are not already designated for crossings, work should be paused to assess the need for further mitigations to maintain hydrological connectivity in these locations, e.g. such as Permeable Track. **This assessment should be completed by a suitably qualified scientist skilled in wetland assessment.**

Water would be considered significant if it results in pooling or runoff. This requirement will be included within the CEMP so that the contractor is aware of this requirement. As the recommendation states, the adverse effects would be mitigated by ensuring hydrological connectivity is maintained.

Q10. The recommendation of static photographs of wetlands is noted, however, these do not provide an objective measure of wetland loss or loss of function. It is considered that photographs must be supported by regular assessments of appropriate wetland attributes to derive clear objective metrics of wetland extent, value and function. These should be continued for at least two seasons post works. Adaptive management actions must be provided should any changes be noted.

Photographs can be used determine any loss of attributes ie. Loss of wetland vegetation or wetted area. It is unclear why the reviewer considers that this would not be objective, as it would provide a clear reference point to enable comparisons to be made. The recommendation has been updated to clarify the duration and need for adaptive management.

As per discussion in meeting on 4 August 2026, it was agreed that the photos would be supported with additional attributes to provide an evidential basis for any conclusions. The precise thresholds for further action can be agreed upon in conditions and management plan review as per Q7.

Q11. Appropriate sediment control is implemented on the downgradient side of Permeable Access tracks to reduce discharges into wetlands. It is unclear what this is anticipated to be, and if these are these relate to crossings or instream structures. If instream, consent being sought for these? If so, what is the design?

This statement pertains to permeable access tracks in wetlands as described in the Stormwater concept report (Stantec, 2026b) and Figure 8 of this report and is not related to instream structures.

Q12. The locations of the crossings, in many instances, are indicated to be where the ecologists have identified as being lower risk. How are these locations to be translated into the detailed design and verified?

These locations have all been surveyed. The road alignments have been determined by surveyors with respect to the ecological mapping, slope etc. See response to Q18.

Q13. Uncertainty of the hydrology at sites such as culvert B and I are expressed and this should be resolved in the assessment stage so that effects can be understood and managed. It is inappropriate to push assessment and effects management to the detailed design stage. Can the hydrology and therefore the potential adverse effects of culverts B and I be provided.

The uncertainty is not with respect to the need for culverts at these locations, rather that wetlands are often present on the approach or exit from Culvert Crossings across waterways, as stated in Table 2 in Section 3.3.5.3. Where the seepage path is downgradient, running parallel to the stream, a Permeable Access Track should be considered in detailed design; these are assessed in **Error! Reference source not found.**Table 3. Where the direction of the seepage path is uncertain, we have included recommendations (Section 3.4) to assess wetland flow paths during detailed design to determine if a Permeable Access Track is required. These will not change the area of impact or wetland loss – this is just addressing the possibility that there may be flow that cannot be assessed until ground has been broken and is complimentary to the response to Q8.

All areas of tracks and crossings through wetlands have been accounted for as wetland loss within the terrestrial ecology EclA.

Q14. The value of eDNA is not in finding fish, these alpine streams are critical for invertebrates and the development of foodscapes for aquatic life lower in the catchment. The focus therefore should be on the water quality and invertebrate habitats.

The value of eDNA is to outline both fish and invertebrate species presence and values in particular for rarity matters. However, stream macroinvertebrates metrics are a more useful tool for understanding water quality and stream invertebrate habitats. The results of eDNA and macroinvertebrate sampling and associated ecological values are discussed in full in the report. However, the use of eDNA to confirm the absence of fish within the projects zone of influence and confirm the absence of the threatened 'Nevis galaxias' which is known from the next sub-catchment (upper Nevis River), is important

to the assessment of effects to ascertain if this species was present at the site, which it was not.

The water take weir report (e3Scientific, 2026d) outlined the rationale for an assessment of low effect on macroinvertebrate density based on *Deleatidium* habitat preferences following (Stoffels, et al., 2026). Table 10 of the e3Scientific (2026b) tracking report outlines the finding that good overall habitat is present and high stream invertebrate habitat abundance and diversity is present. The intent of the impact assessment is to ensure the potential for sediment inputs to the streams is minimised. However, as no fish populations are known to be present until 6 km downstream of these small alpine tributaries, local stream conditions (e.g. 5 km downstream) will be much more important to the Doolans Creek fish foodscapes than these small alpine streams. For these reasons, e3Scientific find that eDNA is useful in determining the absence of fish from these streams and the relevant ecological value. E3s assert that the influence of these alpine streams on the foodscape for fish some 6 km lower in the catchment is negligible, and that local instream macroinvertebrate habitat is of good quality.

Q15. There is no assessment point on the main stem of Doolans Creek, downstream of the ski field. Is there any reason this is omitted as it would potentially capture the effects on the catchment when comparing with the DC 1 sample site?

A monitoring site is proposed for bed sediment cover downstream of the Doolans Creek Weir and deposited sediment if present will have the zinc and copper content characterised (See Section 6.1 and 6.2; e3Scientific, 2026d). However, a macroinvertebrate monitoring site downstream of the activity is not required in my opinion. The reasons for this are;

- Any zinc or copper concentrations would be further diluted in the mainstem of Doolans Creek (Doolans Creek Right Branch).
- Macroinvertebrate surveys are only proposed near the stormwater outlet to Trib A near the Gondola building where potential impacts would be most likely (Table 16 and Section 6.2; e3Scientific, 2026b). If effects are evident actions will be undertaken (See Section 5.6.4) to improve the stormwater system ensuring effects are not present further downstream at the suggested site.

In conclusion, a site is proposed downstream of the activity near the Doolans Creek Weir to monitor the level of streambed sediment and the relevant contaminant levels within that sediment. e3Scientific do not consider it necessary to sample the macroinvertebrate community downstream of the proposed activity as the macroinvertebrates are very unlikely to demonstrate any adverse effects from zinc contaminants (See point 15 below) or deposited sediment at levels that will be managed to remain below known ecological thresholds.

Q16. The contribution of pollutants (zinc and copper) should be considered on a load basis as well as concentrations – the flow event size will have a dilution effect on concentration. Request for load of contaminants be provided and to include all towers and other infrastructure, not just roofs.

An updated assessment has been provided in Section 5.6 of the Tracks & Crossings report (e3Scientific, 2026b) which considers the effect of gondola towers. Given the low mobility of zinc and copper in soils, discharges to land are likely to have a negligible effect on waterways. Given the low concentrations expected in stormwater runoff due to the direct discharge to land, and the proposed monitoring of stormwater discharge, no further assessment is considered required.

Q17. Regarding zinc and copper contaminants, can the applicant provide sensitivities of the macroinvertebrates (many are more sensitive than fish) and the cumulative effects of the pollutants downstream.

The most abundant macroinvertebrates collected from the instream samples was *Deleatidium* (Appendix B; e3Scientific, 2026b). This is a common genus of mayfly found throughout New Zealand. As such it has been used as a test organism for toxicity testing within a New Zealand context.

Deleatidium are insensitive to zinc (Hickey & Vickers, 1992) but more sensitive to copper toxicant stressors. Gadd et al., (2024) reported copper (206 µg/L) and zinc (505 µg/L) sensitivities for *Deleatidium* based on the studies of Hickey & Vickers (1992) and normalised for water conditions of pH 7.5, hardness 30 mg/L and dissolved organic carbon (DOC) 0.5 mg/L. Noting that there can be increased combined sensitivities as discussed in Hickey & Golding, (2002).

Table 1: *Deleatidium* spp sensitivities as reported in Gadd et al., (2024).

Metal	Taxa name	EC50 values (µg/L) Hickey & Vickers (1992)	Normalised EC50\$ (µg/L) Gadd et al. (2024)
Copper	<i>Deleatidium</i> spp.	86	206
Zinc	<i>Deleatidium</i> spp.	570	505

Note 1: EC50 is the concentration at which 50% of organisms become immobile.

Note 2: EC50\$ values normalised to index condition: pH 7.5, hardness 30 mg/L and dissolved organic carbon (DOC) 0.5 mg/L.

The predicted zinc concentration (3 µg/L) as outlined in Question 3 (above) is well below that expected to directly affect *Deleatidium* mayflies. The predicted copper concentration of 0.01 µg/L as described in Table 15, Section 5.6 of the report is also well below the concentration expected to directly affect *Deleatidium* mayflies.

Cumulative effects on the benthic macroinvertebrate community downstream are considered very unlikely as sediment will be managed through appropriate weir construction processes, the tracking is to be designed, constructed and maintained to avoid sediment inputs to watercourses. The water take will have a very localised and short-term flow reduction largely during winter and spring maximum flows.

Q17. Annual summer macroinvertebrate surveys should also be undertaken upstream and downstream of the stormwater input to identify any measurable ecological response for the first two years. Is this recommendation for all stormwater input areas, including roads and infrastructure, or just the sites with gutters? What thresholds are appropriate for this monitoring and what actions would be implemented?

The macroinvertebrate sampling is just recommended for this one location, the stormwater outlet from the Gondola Base to Trib A. The track related stormwater locations will all have structures in place or are designed to divert stormwater away from streams. All other building roof rainwater will be directed to ground and soakage fields. The Gondola Base is the only location where a pipe is proposed to direct roof stormwater to a nearby stream.

In terms of what thresholds are appropriate for this monitoring. Text has been added to Report Section 5.6.4 that recommends using the macroinvertebrate metrics %EPT abundance, %EPT taxa richness and %mayfly abundance as the monitoring metrics as these have been demonstrated to be more sensitive to identifying metal effects than standard MCI and QMCI macroinvertebrate metrics (Hickey & Golding, 2002). The thresholds proposed for these macroinvertebrate metrics is an average decrease of no more than 10% between upstream and downstream sites. This should be based on 5 replicate Surber samples from each of the one upstream and one downstream sites. This will allow for some natural variability between samples and sites while ensuring there is no ecologically meaningful impact from the activity.

In terms of what actions are to occur if the proposed metric thresholds are exceeded. If the three proposed metrics (%EPT abundance, %EPT taxa richness and %mayfly abundance) are reduced by greater than 10% downstream of the Gondola Base, then stormwater input management actions are proposed. These actions include diverting

first flushes to ground soakage or installing universal pollutant treatment (UPT) (Table 16; e3Scientific, 2026b).

Q18. Avoidance -

is not discussed in the Freshwater EclA. It is uncertain as to how this has been implemented. It is the easiest and simplest effects management measure. It should also include no-go alternatives.

- *It remains unclear as to the need for more than 2 km steep track, associated earthworks, stream and wetland crossings to the water pump and location. Alternatives and avoidance are not provided or discussed.*
- *The proposed requirement to lay buried services to the proposed pump station and weir could be reviewed against using existing reservoirs on the Rastus Burn area and for this to be pumped over the ridgeline to the Doolans, utilising already earth-worked and impacted areas. (this access way has a high proportion of the crossings)*

Q19. Avoiding adverse effects of stream and wetland crossing (e.g. bridges or directional drilling) has not been presented or assessed.

Alternative water take options were discussed in the Water Take AEE (e3scientific Ltd, 2026).

The access track to the water take was carefully considered and optioneered before arriving at the submitted design. More direct, steeper routes were considered, which would have resulted in less areas of disturbance and potentially less stream crossings. However, those routes would have been very difficult to construct and operationally hard/impossible to utilise. Vehicular access to the intake is required for maintenance and inspections so the access grade needed to allow for this rather than a steeper direct route. Co-locating the combined trench and access track means less disturbance than 2 differing routes. The final proposed route best balances constructability, operational usability and avoided or minimised disturbance of high value ecological areas.

The types of crossing options used were discussed in the Stantec report. Thrust boring/directional drilling in conjunction with bridges capable of supporting construction machinery was explored during internal preliminary multidisciplinary discussions. However, this was not considered a feasible option given the geology of the site and the weight the bridges would need to be engineered to support.

Q18, Q20 and Q22. Further comment is raised in Q18, Q20 and Q21 of the reviewers tracking table 12/8/2026 with regard to avoidance, offset and compensation being applied sequentially.

These aspects have been assessed sequentially as intended within the EIANZ and NPSFM guidance. Avoidance is covered more fully in the Part A Substantive planning report; and is also covered in the Tracks and Stormwater report (e3scientific, 2026b) within Sections 3.3.1.2, 3.3.1.3, 3.3.4.1, 3.3.4.3, 3.3.5.1, 3.4, 3.5, 5.1, 6.9 and 6.3. Mitigation and minimisation are discussed in Sections 2.2, 3.4, 5.1, 5.2, 5.3, 5.5, 5.7, 5.9 and 6. Due to the high ecological values across Doolans Basin little restoration opportunities are available other than replacing tussocks as work areas are competed.

In accordance with the effects management hierarchy, where offsetting of more than minor residual adverse effects is not possible, compensation should be implemented. NZSki is proposing the establishment of a biodiversity project which will provide a compensatory package for the Project - the details of which are outside the scope of this report.

Q20. Mitigation, remedy and restoration -

- *Mitigation is the most common form of effects management provided, however, it is in terms of recommendations and reliance on controls in other reports.*
- *Mitigation requirements are occasionally linked to monitoring, however, in most cases no thresholds or remedial actions are provided.*
- *Remedial efforts to maintain hydrology of wetlands still result in the loss of extent and value.*

Due to the very high ecological value of the surrounding habitats, there are no opportunities for remedial actions or restoration. Mitigation actions have been proposed within the report and are to be included in a Construction Environmental Management Plan (CEMP). Monitoring thresholds of 10% are recommended for deposited fine sediment (See Section 5.5; Section 5.9; Table 16), zinc and copper in Section 5.6 (noting this has been updated to 99% species protection rather than the originally stated 95% species protection). Instream macroinvertebrates as measured by EPT% abundance, EPT% Richness and EPT Richness is recommended and are the monitoring metrics with a 10% change from upstream to downstream recommended as the threshold for management actions to be implemented.

Q21. Offset and compensation -

There is recognition that offset or compensation may be required, however, there is no detail or ecological accounting provided and that will allow an

assessment of net gain. The effects management hierarchy needs to be sequentially applied and there is no information that net gain or ecological equivalence can be demonstrated.
NZSki is proposing the establishment of a biodiversity project which will provide a compensatory package for the Project overall. Compensation calculation is outside the scope of e3Scientifics involvement in this project.
Q22. <i>The loss of stream and wetland extent and value is considered significant prior to offset and compensation.</i>
Wetland loss is discussed in (e3Scientific, 2026c).
Q22. Further comment is raised in Q22 of the reviewers tracking table 12 August 2026 with regard to: The loss of intermittent stream at the tarn must be addressed as well as the loss of the tarn and wetland extents. The assessment of the level of effects and the transparent management of the residual adverse effects through the effects management hierarchy retains reviewer uncertainty. There is a mismatch in scale of assessments and impacts.
Wetland loss is discussed in the terrestrial ecological impact assessment (e3Scientific, 2026c).
The loss of 55 m of intermittent alpine stream habitat has been assessed as having a Low level of effect based on the 3% of the 1.7km of Doolan Basin intermittent stream being lost equating to Low magnitude. The intermittent stream was dry at the time of the first site visit and therefore no freshwater surveys could be undertaken, however it has been assessed to have High ecological value based on the values found within the permanently flowing streams throughout Doolans Basin. Further text has been added to Section 4.3 and 5.4 of the Tracks and Stormwater report (e3scientific, 2026b) to support clarity on this aspect. The overall Low level of effect does not require further management actions. Table 13 in the FEclA-Tarns, Weir and Watertake report (e3scientific, 2026d) and Table 16 in the Tracks and Stormwater report outline the process to determine the residual level of effect.
Q23. <i>No effects management has been provided to address loss of extent or value and the proposal will result in a net loss of stream length and wetland extent in a protected area.</i>
Wetland loss is discussed in e3Scientific (2026c).

The modification of 40 m of stream habitat due to the installation of 5 culverts has been assigned a low level of effect based on the small reach effected in relation to the 8.2 km of stream length within the basin. As the overall Project site has very high naturalness values, it is considered of greater ecological benefit to not disturb areas further by riparian planting or increasing stream lengths, which are common mitigating or remediation actions for these activities. Therefore, no further management actions other than that already included in the CEMP have been proposed.

Q24. The effects management is proposed to be in the CEMP and ESCP. These reports have not been reviewed to determine if the management levels are appropriate, adequate or have suitable monitoring or thresholds for action.

Conditions have been offered to manage effects as discussed in the response to Q19 and Q20.

Q25. Cumulative effects of pollutants into the stream network is not assessed

See final paragraph in Q 16.

2.2 Morphem - Response Tracking Table

The following freshwater ecology questions and assessment of notes/close-out were provided by Morphem on 12 August 2026. Comments were also provided on the updated reports.

c. I remain uncertain on the tarn hydrology values as there is apparent conflicting information provided. There is no stage–area–volume curve, no bathymetry, only two water level records, no seepage measurement, no piezometry, contributing catchment (to the 210m intermittent stream), inflow volumes and no rainfall or evaporation values for the site to help understand the possible groundwater connection. In the Water Take Ecological Assessment, it indicates that the Tarn is not groundwater connected like the other tarns (section 3.4.1). The Freshwater Ecological and Hydrological Impact Assessment states that the tarn was considered likely to have lost water to shallow groundwater along with evaporation (referencing the water take report, which does not state this). Elsewhere there is comment that there are no downslope wetlands so no seepage and that the swales are expected to enable rapid soakage. Based on the above and observations that the tarn can be at 25% of its volume one year after another, it appears that groundwater loss is likely?

- i. Can the applicant please provide a water balance for the tarn 3 hydrology to establish if there is groundwater connectivity.
- ii. If there is groundwater loss, how will the effects of this be managed/addressed? I note here that the impact is seepage and not the redirection of flows around the proposed reservoir and the liner will halt any seepage.
- iii. If the tarn is losing water to groundwater, is it possible that it could seep 250m to the wetlands – or simply contribute to downslope streams where the topography is not conducive to wetland seep development? Evidence is required to support the reasoning for this.

The tarn is conceptualised in section 3.4.1 of the Water Take report (e3scientific Ltd, 2026) to gain water from precipitation and intermittent stream inflows. The nature of the stream being intermittent indicates that it is not connected to the groundwater table as it does not maintain baseflows. Similarly, the large fluctuations in water levels within the tarn indicate that the tarn does not gain water from groundwater, rather it is likely to lose water to groundwater and evaporation.

The diversion swales will provide opportunity for water that would have accumulated and been lost from the tarn to be accumulated and seep from the swales, in very close proximity to the original location of seepage from the tarn.

If there is connection with downslope wetlands, this will still be supported by the losses from the swales which will remain within the tarn catchment. Regardless, due to the distance to the wetlands, this assessment is outside of the requirements of the NES-FM.

d. Tarn diversion swales are engineered diversions to protect the proposed reservoir and prevent stormwater and snowmelt entering the reservoir, to avoid sedimentation. These do not therefore constitute as mitigation or offset for the reclaimed 55 m intermittent stream. The tarn functioned as storage and captured snowmelt and released it slowly through summer (seepage?). The swales discharging directly to soakage fields convert potentially attenuated, year-round release into flashy, snowmelt-timed point discharges. Even if annual volumes matched, the summer baseflow contribution is lost.

- i. The loss of the tarn inflow and impacts of the engineered swales and discharges need to be considered.

- ii. Given the evidence provided, the swales are not considered to as replacements for the 55m intermittent stream lost. Additional evidence basis and assessments would be required for the swales to be considered offset.

- i. The swales will divert the snowmelt around the tarn; however, the discharge will still be within the tarn catchment. The release of water from snowmelt will still be mediated by the function of snowmelt itself and will therefore not be a flashy response. Seepage of water through the ground will still be mediated by the hydraulic conductivity of the lithology upstream of the tarn, beneath the tarn and swales and therefore will not flow inherently faster through the ground due to the diversion of water. Schist bedrock may have conductivity around $10^{-7} - 10^{-8}$ m/s. Travel times for a distance of 250 m within these systems are in the order of months and years, rather than a flashy response.
- ii. Agree, the replacement of 55 m of intermittent stream with 288 m of engineered rock armoured swale should not be considered offset in this instance. However, it may well provide similar intermittent stream habitat during the snow melt for a low diversity of alpine invertebrates present. The loss of 55 m of intermittent alpine stream habitat has been assessed as having a Low level of effect based on the 3% of the 1.7 km of Doolan Basin intermittent stream being lost. The Low level of effect therefore does not require further management actions. Table 16 in the Tracks and Stormwater report (e3scientific, 2026b) outlines the process to obtain the residual adverse effects.

g. In figure 8 showing the permeable crossing for wetlands, all services are shown to be located below the wetland (presumed to be labelled organic soil) in the underlying rock.

- i. Will this be the case for all wetland crossings?
- ii. If any services are laid within the wetland material, but across the hydrological flow, how will hydrology be maintained?

g. i. Yes, all services associated with wetland crossings will be located below the permeable crossing structure.

g ii. Hydrology will be maintained by using the design described by Stantec (Design Report) comprising of permeable substrates and included in Figure 8 of the Tracks and Stormwater report (e3scientific, 2026b).

h. The cumulative loss summary (section 5.9) does not include wetlands. Recommend this is included.

Wetlands are covered in the Terrestrial EclA report (e3scientific, 2026c).
<i>i. The effects management summary excludes wetlands (table 16). Recommend it is included.</i>
Wetlands are covered in the Terrestrial EclA report (e3scientific, 2026c).
<i>j. EIANZ has recently provided comment on how to apply the assessment guide with regard to scale of level and magnitude effects assessments. This application contains issues that the EIANZ commentary is seeking to address. Freshwater Ecological and Hydrological Impact Assessment states that values are assessed at the disturbance area, magnitude at the zone of influence plus wider context. For example, magnitude benchmarked as 0.5% of an 8.2 km network, 0.26% of the Rastus Burn, 0.2% of mapped wetland habitat, 3% of the intermittent network and then concluded at "district and regional scale". These should be processed at the same scale. I acknowledge the wider scale comments for context, but they do not feed into the effects assessment.</i>
The freshwater ecological values assessment and associated impact assessment have been assessed at the Doolans Basin scale. This was assessed by e3Scientific to most accurately reflect the zone of influence of the project. Text within the Tracks and Stormwater report Sections 5.8, 6 and Table 16 report has been altered to reflect the Doolans Basin scale that was used in this assessment for the freshwater attributes rather than ecological district scale (that was used within the Terrestrial wetland assessment (e3scientific, 2026c)).
<i>k. The terrestrial impacts relate to a percentage of impact to get magnitude of effect. If this is done for freshwater and wetlands, it appears level of effect may be increased?</i>
The e3Scientific assessment and the reviewer's assessment of the magnitude of effect level are still in disagreement. E3Scientific has assigned a moderate magnitude of effect to the loss of Tarn 3 based on the loss at the Doolan Basin scale. The EIANZ guidance is that the magnitude of effect should be assessed at the scale the ecological values are assessed at, for the freshwater aspects of this project (streams and tarns) this is assessed at the Doolans Basin scale. The proportions used to assign magnitude of effect within the terrestrial report are considered at the ecological

district scale, therefore due to the larger spatial scale lower proportions are used for their assessment (Table 12; e3Scientific, 2026c). Terrestrial guidance within the EIANZ guidelines differs from that for freshwater with Section 5.2 of the EIANZ Guidelines relating to terrestrial areas and 5.3 relating to freshwater habitats for example. Therefore, in this instance it is not appropriate to use the scale outlined in Table 12 of the terrestrial EcIA (e3Scientific, 2026c) as the percentage to magnitude scale for streams and tarns. In the EIANZ the magnitude is described as follows:

Low:

"Minor shift away from existing baseline conditions. Change arising from the loss/alteration will be discernible, but underlying character, composition and/or attributes of the existing baseline condition will be similar to pre-development circumstances or patterns; AND/OR Having a minor effect on the known population or range of the element/feature";

Moderate:

"Loss or alteration to one or more key elements/features of the existing baseline conditions, such that the post-development character, composition and/or attributes will be partially changed; AND/OR Loss of a moderate proportion of the known population or range of the element/feature"; and

High:

"Major loss or major alteration to key elements/features of the existing baseline conditions such that the post-development character, composition and/or attributes will be fundamentally changed; AND/OR Loss of a high proportion of the known population or range of the element/feature".

Although the Tracks and Stormwater report (e3scientific, 2026b) has not explicitly stated the percentage brackets, the loss of 13.5 or 16% is considered to represent a moderate proportion of the range of tarn habitat within Doolan Basin.

Tarn 4 is located within the Doolans Basin 1.6 km to the south of Tarn 3. This is within the zone of influence spatial scale used for the values assessment that the freshwater ecological impact assessment utilised. However, because this tarn sits upstream of proposed tracking activities the tarn was not surveyed further.

I. The EIANZ guidance states: *Project effects in the 'Very High adverse' category are unlikely to be acceptable on ecological grounds alone (even with compensation proposals). Activities having very high adverse effects should be avoided. It is not the ecologist's role to make determinations with regard to project viability. And also: Where very high adverse effects cannot be avoided, a net biodiversity gain would be appropriate. (see section 6.4.3, pages 83 to 85). This is not statutory requirement,*

but a requirement of the method the applicant has elected to use for ecological valuation. Recommend that the effects management addresses this and effort is provided for evidence of avoidance.

The EIANZ guidelines provide a measurable and standardised approach for assigning ecological values, magnitude and providing an overall level of effect. Whether a project is deemed acceptable or not is outside of our scope. Each impact has been discussed and rationalised within the freshwater ecology impact assessment section of the reports (e3scientific, 2026b; e3scientific, 2026d) and the overall level of effects are summarised as follows.

- The loss of Tarn 3 has been assigned as an overall '**High**' level of effect based on the discussed descriptors.
- In-water bed disturbance in the Doolans Basin and Rastus Burn has been assigned "**Low**" level of effects.
- The stream habitat modification due to tracks and crossings has been assigned "**Low**" level of effects.
- Temporary waterway dewatering and diversion has been assigned "**Low**" level of effect.
- Intermittent streambed loss through reservoir inflow diversion has been assigned "**Low**" level of effect.
- The stormwater run-off and sedimentation has been assigned a "**Low**" level of effect.
- The stormwater discharge has been assigned an overall level of "**Low**" level of effects.
- Didymo biosecurity has been assigned a moderate magnitude of effect and a "**High**" level of effect. Proposed management actions are recommended within the Tracks and Stormwater report (e3scientific, 2026b) and residual level of effect is "**Moderate**".
- Cumulative effects have been assigned a "**Low**" level of effects.

Where avoidance, mitigation, remediation options are available or of ecological benefit they have been recommended. Where strategies to reduce the residual effect of an activity are not available this has been stated and the level of effect has remained high. This is done to provide a clear and transparent process of assessment of the potential ecological impact of the project activities on the freshwater ecosystems.

We also note the EIANZ guidance states "*Options in the 'High and Moderate adverse' category represent a level of effect that requires careful assessment and analysis of the individual case. Such an effect could be managed through*

avoidance, design, or extensive offset or compensation actions. Wherever adverse effects cannot be avoided, no net loss of biodiversity values would be appropriate". It is our understanding that actions are being discussed to support biodiversity values where possible and NZSki is proposing the establishment of a biodiversity project which will provide a compensatory package for the Project - the details of which are outside the scope of this report.

References

- Charters, F. J., O'Sullivan, A. D., & Cochrane, T. A. (2022). Influences of zinc loads in urban catchment runoff: Roof type, land use type, climate and management strategies,. *Journal of Environmental Management*,, 322.
- Clapcott, J., Young, R. G., Harding, J. S., Matthaei, C. D., Quinn, J. M., & Death, R. G. (2011). *Sediment Assessment Methods: Protocols and guidelines for assessing the effects of deposited fine sediment on in-stream values*. Nelson: Prepared for the Ministry for the Environment, By Cawthron Institute.
- e3Scientific. (2026b). *Tracks, Stream Crossings and Stormwater Freshwater Ecological and Hydrological Impact Assessment*. Arrowtown: Prepared by e3Scientific for NZSki.
- e3Scientific. (2026c). *Remarkables Ski Area Upgrade and Doolans Expansion - Terrestrial Ecological Impact Assessment*. May 2026.
- e3Scientific. (2026d). *Doolans Basin Tarns, Weir and Watertake Freshwater Ecological Impact Assessment*. Arrowtown: Prepared by e3Scientific for NZSki Limited.
- e3scientific Ltd. (2026). *Doolans Creek Water Take Assessment of Effects*. Arrowtown: e3scientific Ltd.
- Gadd, J., Hickey, C., & Snelder, T. (2024). *Acute copper and zinc water quality guideline values for Aotearoa. Acute copper and zinc water quality guideline values for Aotearoa: User guide*. 8 November 2024. Ministry for the Environment,. Retrieved from <https://environment.govt.nz/publications/acute-copper-and-zinc-water-quality-guideline-values-for-aotearoa-user-guide>
- Hickey, C. W., & Golding, L. A. (2002). Response of macroinvertebrates to copper and zinc in a stream mesocosm. *Environmental Toxicology and Chemistry*, 21(9): 1854-1863.
- Hickey, C. W., & Vickers, M. L. (1992). Comparison of the sensitivity to heavy metals and pentachlorophenol of the mayflies *Deleatidium* spp. and the cladoceran *Daphnia magna*. *New Zealand Journal of Marine and Freshwater Research*, 26(1): 87-93.
- NEMS. (2022). *National Environmental Monitoring Standards. Macroinvertebrates. Collection and Processing of Macroinvertebrate Samples from Rivers and Streams V1.0.0*. Wellington: Ministry for the Environment.
- Stantec. (2026b). *Remarkables Ski Expansion Project Stormwater Concept Report*. Queenstown: Prepared by Stantec New Zealand Limited for NZSki Limited.
- Stoffels, R. J., White, R. S., Torok, G. T., Measures, R. J., Hogsden, K. L., Rose, A. F., . . . Smith, B. J. (2026). Potential Impacts of Low Flows on Fish Foodscapes and Production in a Braided River. *River Research and Applications*, 0:1-17.

