Boffa Miskell

Memorandum

Auckland
Level 3
82 Wyndham Street
Auckland 1010
PO Box 91250
Auckland 1142

+649 358 2526

Whangarei	15 Porowini Avenue, Morningside, Whangarei 0110	+649 358 2526
Hamilton	PO Box 1094, Hamilton 3240	+647 960 0006
Tauranga	PO Box 13373, Tauranga 3141	+647 571 5511
Wellington	PO Box 11340, Wellington 6142	+644 385 9315
Nelson	27 Vanguard Street, Nelson 7010	+643 548 8551
Christchurch	PO Box 110, Christchurch 8140	+643 366 8891
Queenstown	PO Box 1028, Queenstown 9348	+643 441 1670
Dunedin	49 Water Street, Dunedin 9016	+643 470 0460

Attention:	FTAA-2603-1185
Date:	18 August 2026
From:	Ian Boothroyd and Sarah Flynn
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Project No:	BM250767

Freshwater values

8.002 *Wetlands have been delineated using the wetland delineation protocols (Ministry for the Environment). Field assessment was undertaken in mid-summer and based on the number and location of the vegetation assessment plots, the rapid technique was primarily used and supported by evidence of plots in the wetlands. Some areas that were less accessible (eg. 270 m of the Mangapū Stream reach was deemed too steep to access) have wetland extents estimated or were identified using aerial imagery. The methods used may result in an under assessment of wetland extent, although this may depend on the season and year of the aerial imagery used for delineation.*

Nevertheless, at the scale provided, I consider the wetland extent and values assessed acceptable, although this uncertainty would need to be refined should any future management plans require more detailed assessments. Nine wetlands were delineated with a total of 0.44 ha mapped. Seven of these are considered to currently have high ecological values (fig 27 of EcIA).

The matter of wetland delineation methods and findings was discussed with Auckland Council's ecologist (25/06/26) and clarifications were provided in written responses. In particular, we explained that while desktop analysis was used as the first step in wetland delineation (in accordance with the NPS-FM Wetland delineation protocols), all prospective wetland locations were inspected during field surveys. Furthermore, we note that while the **Appendix B12.4.5b Ecological Assessment** states that wetland delineations were undertaken in December 2025 and January 2026 (when the bulk of vegetation assessments were undertaken), wetland delineation plots were in fact surveyed on 11 November (as shown in plot data provided to Auckland Council on 12/06/26).

Wetlands delineation assessments within the project footprint were all undertaken in strict accordance with the NPS-FM wetland delineation protocol. We consider the results to be an accurate assessment of wetland location and extent.

Wetland delineation methods in the **Appendix B12.4.5b Ecological Assessment** state that wetland extents in 270 m of the Mangapū Stream reach deemed too steep to access were estimated or identified using aerial imagery, however this is an error, as upon review, these waterbodies were subsequently categorised as streams due to their steepness and incised characteristics.

While we agree that outcomes of wetland delineation can vary seasonally and between years, the delineation protocol is inherently conservative (ie, features with ambiguous results are classified as

wetlands), and we do not consider that our approach would tend towards underestimation of wetland extent or require refinement in any future management plan process.

8.003 *MCI scores from 2010 to 2020 for two sites are presented, however, the value of 6 year old data is considered limited as both sites showed a decline in MCI from excellent (143) to the middle of the 'good' range (110) (Figure 30 in EcIA). The monitoring was undertaken for quarry sediment discharges.*

We do not agree that the data used is limited. In the memo in response to Council questions (memo to Council dated 12 June 2026), we responded that there are no written rules or practice guidelines on the age of useable data for ecological data. A general rule of thumb previously verbally agreed with Auckland Council (the then RIMU section) staff is that data greater than ten years old (unless it forms part of a long-term monitoring sequence) is likely to be questionable; data five years or less is generally acceptable; and data 5-10 years of age is acceptable unless there has been substantial changes to the feature (or in the case of streams – landuse and/or instream infrastructure). Whilst we accept that each situation needs to be considered on its own merits, in practice we have largely adhered to this agreed position in all cases.

The monitoring data was consent related and any termination would have been due to the consent requirements. Recent water quality and eDNA assessments of the downstream (of Mangapū tributary) is included in sections 7.3.1.4 and 7.4.4 of **Appendix B12.4.5b Ecological Assessment**. In the absence of any changes to the catchment upstream and in the immediate vicinity of the Mangapū Stream we consider that the data and the assessment is acceptable for informing an assessment of ecological effects and effects management.

8.004 *The headwater in the vicinity and to the west of Middleton Road were assessed with one SEV being located here. The streams are reported to be mostly confined to gullies running generally north to south through the SEA_T_5323. Most headwater watercourses were classified as ephemeral, with some intermittent reaches also identified, although this was based on Geomaps rather than field assessments. The applicant has assessed that the proposed works will not adversely affect the ecology, functionality, connectivity or fish passage of the Mangapū Tributary headwaters. I accept this assessment and have not assessed these headwaters further. I note that the land use approvals sought run in perpetuity while the associated water permits and streamworks consents are limited to 35 years, and recommend the Panel satisfy itself that the approvals granted do not authorise works that would in practice adversely affect the headwater streams before that later application is lodged.*

The Council have correctly identified that the works proposed for Stages 1 to 6 of the quarry expansion will not adversely affect the ecology, functionality, connectivity or fish passage of the Mangapū Tributary headwaters. At the present time under FTAA-2603-1185 approvals are not being sought for the removal or any works within or alongside the headwater watercourses of the Mangapū tributary.

8.007 *The applicant's BOAM calculates 96.7 ha of revegetation as the minimum required to offset the loss of 44.46 ha of indigenous vegetation. 85.62 ha offset is identified, leaving an acknowledged shortfall of 11.08 ha, proposed to be addressed by compensation. I accept compensation is available for that purpose. I note, however, that the shortfall is derived using the five structural attributes discussed in 3.4.3 below; a model incorporating the omitted attributes would be more likely to increase than reduce the offset requirement, and therefore the shortfall would be greater.*

The matter of BOAM model attributes was discussed with Auckland Council's ecologist (25/06/26) and clarifications were provided in written responses (memo to Council dated 12 June 2026).

The Department of Conservation's BOAM method was developed with the explicit intention of comparing existing condition at an impact site with potential condition at an offset site. Only attributes that occur at both the impact and offset sites can be used in a BOAM, and the model produces an attribute-by-attribute calculation of losses (due to impacts) and gains (due to interventions associated with the offset).

The BOAM user manual notes that *"The Accounting Model is a non-prescriptive, flexible 'empty shell'…. The structure of the Accounting Model allows for use of either indirect measures (proxies or surrogates based on structural features or functional indicators correlated with the state of biodiversity) or direct measures (counts or measures of individuals).*" The "currency" used is left to the discretion of the user, though the manual instructs that "*parameters and values are empirically informed wherever possible and the use of unverifiable parameters or values is avoided*".

For this project, the BOAM attributes selected were derived from empirical RECCE and PCQ plot data collected during field surveys. Structural attributes (stem density, basal area, canopy cover, canopy height and litter depth) were used as surrogates for biodiversity attributes because:

- In forest systems, vegetation structure influences the variety and availability of habitats, resources, and ecological niches for plants, animals, fungi, and microorganisms;
- Structural attributes are useful indicators of the developmental stage of a forest ecosystem (as illustrated in Figures 15 – 21 of the **Appendix B12.4.5b Ecological Assessment** (Section 5.1.2).
- The structural attributes selected can be applied with confidence to both the impact site and the offset site (post restoration).
- Structural attributes are more robust predictors of forest health and succession than direct biodiversity attributes (such as species counts or presence of a specific fauna population). For example, numbers of species present at an offset site is determined by the planting schedule, and including large numbers of species does not necessarily result in high biodiversity values; while the presence of indigenous fauna is the product of several factors (proximity of a source population, migration barriers, seasonality, etc), even when the restored habitat is favourable.
- Many of the factors that we routinely describe and evaluate in ecological assessments cannot be readily converted into the "area x condition" currency used in the BOAM calculator. The inherent assumptions of an area x condition currency are

  (1) that biodiversity values are cumulative with area (ie the biodiversity value of a large offset area of lower value is equivalent to a small impact area of higher value), and

  (2) this relationship is linear.

  While this is a reasonable assumption for some attributes, for others it is unreliable or untrue, and/ or data limitations mean that the values required to calculate losses and gains for species of interest are would be highly speculative and unverifiable. Our analysis uses BOAM specifically to assess the adequacy of the restoration area as a like-for-like exchange for the loss of forest and scrub extent within the footprint, using relevant proxies for forest development that reflect successional stage. Other management actions (pest control) are not included in the BOAM and are assessed as compensatory measures.

Auckland Council's ecologist does not specify which attributes he considers *"would be more likely to increase than reduce the offset requirement"*. We consider that the structural attributes we have used are suitable surrogates for species richness, fauna habitat and ecosystem functions, so the impact and offset ratios for these attributes would be similar, and adding these attributes would not alter the overall assessment.

8.008a *The planting at Meremere does not meet the offsetting principles of the AUP, Appendix 8 (3) regarding proximity to the impact and effects management undertaken at this site I consider to strictly be compensation.*

The AUP offsetting principle 8(3) referred to is as follows (emphasis added):

> *Offset actions should be undertaken close to the location of development,* ***where this will result in the best ecological outcome****.*

The highlighted text implies a comparison of benefits between prospective options where offset opportunities are present both near to and away from the impact site. However, the principle does not exclude the latter as an offset if a closer option is unavailable (or would produce a poorer ecological outcome).

We note that AUP-OP Appendix 8 presents a framework for the use of biodiversity offsets that is to be read in conjunction with the New Zealand government Guidance on Good Practice Biodiversity Offsetting in New Zealand, New Zealand Government et al, August 2014 (or any successor document). The guidance document explains the relevance of proximity as part of "landscape context" (not as a stand-alone principle), as follows:

> *The size and location of the offset site […] should take into account a much broader biodiversity context than focussing solely on demonstrating no net loss for individual components of biodiversity. This is because long-term viability of biodiversity at any given site critically depends on its interaction with other components of the wider landscape. Some of the reasons why this is important are:*
>
> ***Connectivity.*** *A species' feeding, mating, colonising or dispersal behaviour might require habitats to be connected. Restoration of an isolated site may not address a species' overall ecological requirements;*
>
> ***Proximity****. In general, nearby impact and offset sites are more likely to contain similar biodiversity features (e.g. in the same ecological district, catchment or other natural boundary.*
>
> ***Ecosystem function****. It may not be possible to achieve no net loss at an ecosystem level if individual components, which normally all occur within the same site, are offset at a number of different sites, or if the choice of site is too small;);*
>
> ***Local importance.*** *Conservation priorities can be locally or regionally specific. For example, a plant community may not be nationally rare but may be locally rare (e.g. because it only occurs at one site in the local area). This would make it important to replace locally; and*
>
> ***Future proofing.*** *The offset site should consider biodiversity aspirations and objectives for the area and future likely developments and emerging threats.*

For this project, a considerable effort was made to secure ecological enhancement opportunities close to the Project Site, and the proposed offset/ compensation package includes ecological enhancement in adjacent properties, within the Hunua Ranges *and* at the Meremere site. The proposed package has sought out prospective offset locations that adjoin, connect or enhance the condition of existing ecological features, and have the potential to improve the viability of local fauna populations through pest management and habitat expansion.

The Meremere offset site is in Hapuakohe Ecological District, which adjoins the southern boundary of Hunua Ecological District. The Meremere offset Site is located on the western foothills of the Hapuakohe Range, which comprises steep, dissected hill country formed from Greywacke bedrock overlain by volcanic ash-derived clay soils and a warm-humid climate, much like Hunua Ecological District.The forest composition of Hunua and Hapuakohe EDs is also similar, with representative forest types comprising podocarp-broadleaf forest with kauri-hard beech forest on upper slopes and ridges. Forest areas are likely to support similar fauna assemblages, and there is probably overlap in populations of species such as long-tailed bats, kaka, kereru, whose large home ranges could encompass forest areas in both EDs. Therefore, the Meremere site was assessed as having sufficiently similar ecological characteristics to the Project Site to be considered "like-for-like".

8.008b *The proposed planting is predominantly of early succession forest species at focus areas 1 and 2, with limited infill and valley bottom with later succession forest species. This does not appear to be in the same proportion to the vegetation types lost, with the applicant relying on natural successional development. For example, Meremere' s planting has no equivalent statement of the target ecosystem type, so the like-for-like case is asserted rather than demonstrated for Focus Area 2.*

Establishment of "pioneer" forest species and reliance on natural processes of forest succession is a widely accepted forest restoration method, as this approach is more likely to develop the structure, habitat and composition of natural forest than direct planting of a mature-phase forest assemblage. This is because forest ecosystems develop through a series of stages that build the conditions for the next stage, and "mature-phase" forest is characterised by attributes that take time to develop (canopy tiers, treefall gaps and light wells, accumulation of humus and litter, colonisation of substrates by herbs and bryophytes, etc), rather than by the presence of particular "mature phase" species alone. While some secondary forest and "mature phase" species (e.g., kauri, tōtara, rewarewa) establish early in a forest succession, most later-successional broadleaved species (and some podocarps) are bird dispersed, shade-tolerant "gap-phase regeneration" specialists and will recolonise from surrounding populations as the canopy of the pioneer phase matures and fragments. Allowing this process to proceed spontaneously will produce a forest composition that resembles naturally established forest.

The proposed restoration plan does not seek to replicate the forest types lost, as the communities identified essentially represent a series of successional stages of the same overall forest type (with some variation due to local topography) and are primarily a product of their disturbance history. They do not comprise distinct, stable communities determined by underlying physical conditions.

8.009 *The application acknowledges the presence of threatened vegetation species (most regionally, not nationally threatened), however, there is no measures provided to address these. There is no pre-clearance survey to relocate threatened plant specimens, no salvage, no spore or cutting collection and no inclusion of any threatened species in the offset planting schedules.*

We agree that the Ecological Management plan for Focus Areas 1 and 2 should be updated to include recovery and propagation of regionally at-risk and threatened flora if found within the Project Site. The proposed consent conditions require the finalisation EcMP to set out a process for adaptive management in response to unforeseen changes in the environment.

Augmented flows for dewatering effects

8.012 *I have some concern regarding the water quality of the augmentation flows as these are likely to be pumped from sumps in the base of the pit and could well carry contaminants from the works, have low dissolved oxygen being groundwater sourced. I have recommended monitoring the groundwater to address these issues.*

The quarry sump has simply intercepted the natural groundwater system (like a sink) and the water that would be pumped and used as augmentation flow in streams is the same water that would have discharged to the streams in any case. The comprehensive water quality monitoring, which has been ongoing since the quarry's operation, confirms that the quality of this groundwater is both well-understood and suitable for stream augmentation (B12.4.9 Groundwater Effects Assessment). As discussed in the groundwater report, the potential risk to water quality is from low dissolved oxygen or increasing water temperature. These parameters are already managed through the proposed consent monitoring and mitigation conditions (Conditions 225 to230), as per existing consent conditions for the site. That said, following on-going consultation with Council, we have amended conditions 225 and 228 to include the following additional thresholds:

- pH concentration below the discharge point must be within one whole unit of upstream value; and

- Turbidity levels must not exceed a 20% change between upstream and downstream monitoring points.

Stream diversion

8.013 *The applicant considered the diversion to replace a portion of the reclaimed stream and its tributaries. The applicant proposes that this diversion will maintain the ecological values of the impact stream and therefore it is only the length difference that is required to be addressed through effects management. I do not concur with this and consider that, whilst the intention may be to create a biodiverse channel, there is a very low likelihood that this will achieve the equivalent ecological values of the high quality stream that currently exists. The riparian filtration function and natural flow regime along its length will be absent as will the wide (>20 m) mature woody riparian vegetation of the current stream. The riparian vegetation is unlikely to thrive under the new alignment to the extent of the current stream. In addition, the narrow riparian margins (<5 m) of the diversion will be subjected to edge effects that will make maintenance of them an ongoing requirement. The resulting outcome is that there will likely be an unaccounted loss of ecological value on the diversion stream.*

I do not agree that there is a low likelihood of creating an ecologically functional channel.

The objectives of the **Appendix 12.8.7 Stream Realignment Management Plan** are:

> To realign and rehabilitate the Mangapū StreamTributary in a manner that restores natural stream processes and form, enhances ecological values, and protects and strengthens the natural character of the waterway and its margins, while supporting long-term freshwater health and resilience.This will be achieved by:
>
> - Realigning the Mangapū Stream Tributary to mimic natural channel morphology, hydrology and habitat diversity; and
> - Incorporating riparian planting and instream features to support aquatic biodiversity and natural character attributes.

The attributes for the channel formation set out in **Appendix 12.8.7 Stream Realignment Management Plan** reflect those of the existing stream. The channel will retain a natural flow regime (i.e., there are no curtailed or augmented flows, and flow will be subject to natural variation). The source environments for colonisation of the rehabilitated channel are retained upstream in the Mangapū tributary, as well as from tributary 2. Accordingly, there is a high likelihood that the fauna and flora will reflect that of the existing channel and thus achieve a high ecological value as assessed currently. The ecological values are not expected to be exactly the same in composition and abundance as the Mangapū tributary, but are expected to reflect the natural processes, aquatic biodiversity, food web structures, temporal changes, assimilation that occur in high ecological value watercourses.

Implementation of the plan, along with **Appendix 12.8.9 Landscape Rehabilitation Strategy and Management Plan** provides all the essential components to meet the desired outcome.

The establishment, schedule and maintenance for the riparian planting is set out in **Appendix 12.8.9 Landscape Rehabilitation Strategy and Management Plan.** The riparian margin of the rehabilitated channel will necessarily be of a narrower margin than the entire forest and is expected to vary in width along the length of the channel. The purpose of the riparian vegetation is not essentially for a filtration purpose (with no land-based contaminants of real concern at the rehabilitated location; nor indeed within the existing location) although this will occur. The primary purpose of the riparian planting for the rehabilitated channel is to provide near margin and canopy shade for the rehabilitated stream, and to contribute to the natural processes of the watercourse (as per the objective - being leaf fall, woody debris, terrestrial food source etc.).

The staged livening of the realigned tributary provides a means for testing the durability and acceptance of the habitat and other attributes; with the opportunity for adaptive amendments during that period.

The **Appendix 12.8.7 Stream Realignment Management Plan** also establishes performance targets and monitoring that provides for the realigned stream objectives. The performance attributes are well established nationally accepted methods that measure key meaningful ecological attributes (and not simply a suite of metrics for the sake of monitoring). These targets and requirements are now also reflected within proposed consent condition 67.

Accordingly, we consider that the Council view that there will be an unaccounted loss of ecological value is unfounded and that there is sufficient experience, a location that is conducive to colonisation, a well-outlined plan for natural stream processes to be enabled, a timeframe for adaptive actions if needed, and performance monitoring to ensure that the desired outcome is achieved.

The Council is incorrect in suggesting that *it is only the length difference that is required to be addressed through effects management.* Effects management has been applied to all identified effects of the Hunua Quarry expansion project. In reference to the realignment of the Mangapū tributary, the establishment of natural processes of a portion of Mangapū tributary in the realigned channel is a remedy of effects (as per the effects management hierarchy), and through the offset and compensation for the remaining residual effects on aquatic ecological values and stream extent, the effects management is satisfied (s13.2, page 151 of **Appendix B12.4.5b Ecological Assessment**). We have noted that a residual effect remains with the realignment of a portion of the aquatic values and extent of the existing Mangapū tributary (630 m that will not be part of the realigned channel), and this is addressed through effects management as summarised in s10.7.3, page 140 of **Appendix B12.4.5b Ecological Assessment**.

8.014a *The applicant has provided monitoring for the diversion and performance is currently measured against three metrics – RHA, sediment and MCI —set below the condition of the reach being reclaimed. Large woody debris, a critical structural component of these watercourses, is not provided for, and canopy planting is delayed. My recommendation to use the SEV (for which values for the impact stream are provided – 0.91 and 0.83) as an outcome target has not been accepted. Should consent be granted, monitoring using the SEV and with agreed values outcome as a condition (along with water quality) would enable adaptive management to be implemented through additional offset/compensation actions should the stream not reach targets of maintaining potential and value.*

The SEV used as part of an Ecological Compensation Ratio (ECR) is helpful in ascertaining a suitable quantum as an outcome for an offset or compensation, but it is not determinative. For the substantive application the SEV was used to inform the offset and compensation, but we do not rely on the SEV as the determinative tool to derive the outcome. In applying the Effects Management Hierarchy, the SEV was helpful in ascertaining how much of residual effects could be settled with an offset and what remaining compensation was sought. Accordingly, it is not a tool that is helpful in simply seeking the addition of more offset or compensation.

The SEV metric is not an effective monitoring tool as the levers of influence that can be applied through the SEV are very limited; essentially only through riparian planting, given that additional habitat attributes are planned as set out in the Appendix 12.8.7 Stream Realignment Management Plan. A better use of the SEV would be to apply it during the design phase of the channel when the respective components of the measured SEV and the levers available are established upfront, rather than monitoring of the livened channel realignment when change or adaptation is limited. We have proposed that this feature is included in the proposed conditions.

8.014b *The ecological performance target proposed for the realigned channel is MCI Band C (from the NPS:FM attribute tables). The reach to be replaced records MCI 115 (Band B) and QMCI 6.81 (Band A) at Site 3. The applicant justifies the lower target by reference to the range of MCI values across the catchment, including downstream reaches. I do not accept this. The relevant comparison is the reach being lost, not a catchment continuum. The applicant's position is that the realignment maintains the values of the impact stream; a target set one to two bands below the existing condition is inconsistent with that position and is, in my view, an indication that equivalence will not be achieved.*

The ecological performance target is set to reflect the variation in ecological metrics experienced in the relevant reaches of the Mangapū Stream, including the Mangapū tributary and the immediate downstream reaches; it does not reflect a whole catchment continuum. Nor is it sensible to simply accept the highest (or lowest score or number) when a range of data is evident and variation can be expected in all natural systems. The target outcome is thus based on the range of MCI values recorded from the upper catchment – being from 105 (s. 7.3.2.2 of **Appendix B12.4.5b Ecological Assessment**) to 125 (s.7.4.5) and therefore encompasses Band C of the NPS-FM NOF (Table 14)[1]. We note that these MCI scores are all in the 'Good' ranks of the MCI ('Excellent' = > MCI score of 120) for the purpose of reporting MCI scores[2]. It is worth noting that the threshold for the MCI for aquatic ecosystem health in the NOF 'bottom line' is raised by a score of 10 and thus increased the upper ranks of the MCI[3]. Note also the response to Comment **0.014a**.

The purpose of the performance targets for the realigned channel is to reflect the characteristics of the Mangapū Tributary and accepting that similar variance in the outcome is a likely and essential consideration. Notwithstanding the set performance targets, implementation of the proposed attributes as set out in **Appendix 12.8.7 Stream Realignment Management Plan** is likely to provide for ecosystem health in higher Bands of the NOF.

8.015 *In stream classification, there is inherently a transitional area where the ephemeral channel becomes intermittent. This transitional area moves within from season to season depending on antecedent environmental conditions. The timings of the assessments is mostly outside of the Auckland Council's timing window for stream classification. The impact is that extent of stream classified as intermittent that is to be reclaimed may be underestimated and therefore insufficient offset and compensation is provided to address the loss.*

We agree that the transitional areas of a stream classification of ephemeral, intermittent and permanent streams can vary. We note that the Auckland Council guidance on timing for assessment for stream classification is a guide and is not a rule or a best practice. Nevertheless, we have undertaken a further classification of Tributaries 3 and 4, and indeed the extent of stream to be reclaimed is substantially greater than our original estimate. Accordingly, we have revisited the schedule of works and offered revised offset and compensation to satisfy the effects management hierarchy. This is discussed further in response to **8.445** below.

8.016 *The planting at Meremere is alongside the existing quarry and is only in the headwaters of the watercourse. There is a modified channel of over 1,000 m with narrow, poor riparian cover and culverts beyond the property before the Whangamarino wetland is reached. The assertion that this is a critical stream connection that is being restored is ambitious.*

We emphasise that the critical stream connection as set out in the effects management is the improved connectivity to the upper catchment through the improvement of a severe perched culvert within the Meremere quarry. The connection to the Whangamarino Swamp is emphasised as a benefit of the improvement between upper and lower reaches and is therefore a consideration as a component of the effects management response.

8.008 *The use of the Meremere site as an offset is not supported due to its lack of proximity to the impact site, it is therefore more appropriate to consider it as a compensation site. The site is surrounded on three sides by pine plantations and is at least 300 m from the Whangamarino wetland. The watercourse that flows to the Whangamarino has culverts under a road and in private land and there is no evidence provided that these are not also fish passage barriers. The stream on the compensation site, for the most part, runs alongside the open quarry operation, has narrow sparsely vegetated riparian areas that are not subject to any improvement. The result is potentially a restoration wetland and stream that is somewhat*

[1] NPS-FM = National Policy Statement for Freshwater Management. NOF = National Objectives Framework.
[2] Stark, JD and Maxted, JR 2007. A biotic index for New Zealand's soft-bottomed streams. NZ journal of marine and freshwater research 41: 43-61.
[3] Freshwater Science and Technical Advisory Group Report to the Minister for the Environment, June 2019.

isolated (1 km) from the Whangamarino wetland, reducing potential outcomes and benefits below that considered by the applicant when considering this landscape scale.

The suitability of Meremere Quarry (Focus Area 2) as an offset site is addressed in the response to Comment **8.008a**.

The comment that the Whangamarino Swamp is isolated from waterbodies within the Meremere site is perplexing; the stream forms a direct connection with its downstream reaches, and the improvements to the upper reaches and removal of the fish barrier improves the extent that the upper catchment contributes to the habitat for fish. Further detail is added in our response to Comment **8.016**.

8.017 *Wetland offset is calculated through the use of the BOAM. A total of 0.22 ha wetland is likely to be lost with the expansion and another similar extent lost through drainage, being close to the pit wall. A total of 0.44 ha (the application provides different extents as the addition comes to 0.45 ha, however, this is not considered to be material) requires 2.4 ha offset restoration using the applicant's BOAM calculator. A total of 2.5 ha wetland extent is proposed for offset restoration across the three focus areas, however, as previously discussed, the restoration at Meremere would be more appropriately considered compensation.*

The suitability of Meremere Quarry (Focus Area 2) as an offset site is addressed in the response to Comment **8.008a**.

8.018 *The applicant has used the BOAM for terrestrial vegetation and wetland offset calculations. This is an industry standard tool to use for this, however, the manner in which the applicant has applied this creates uncertainty in the output. These are:*

- *For terrestrial vegetation, the offset sites are calculated as having 'zero' across the ecological attributes assessed, which is unlikely to be the case as even pasture grass would provide some value.*
- *No data is provided for offset focus areas 2 and 3.*
- *In both the terrestrial vegetation and wetland calculations, the applicant has used 5 attributes which more appropriately describe functions rather than biodiversity values. Some of these attributes are aggregated metrics. On request of the applicant, I provided a list of over 50 metrics that can be considered in a BOAM assessment for wetlands. The attributes provided to the applicant included, among others, hydrological integrity, hydric soil condition, canopy cover and browsing damage. Each is measurable, each is a component of the Clarkson WCI already relied on by the applicant, and each converts readily into the area × condition currency the BOAM requires. None of the applicant's attributes capture the water table depth or hydric soil structure on which the forest seepages were delineated. Further the low number of attributes used and their aggregated nature are not considered to address key ecological components of the wetland's values and may lead to hidden losses*
- *All the wetland offset areas, across the three locations, were assessed as having identical values which could be subject to restoration.*
- *Only two of the impacted broad vegetation type offsets are calculated using the BOAM. There is a separate BOAM for late successional forest (Tawa-taraire forest with mature kanuka/Kauri, podocarp, broadleaf forest) and another for Early successional vegetation. Seven distinct vegetation types are impacted.*
- *Four of the five wetland attributes score systematically higher on the offset sites than on the impact sites for reasons of ecosystem type rather than ecological condition. Planted farm-pond wetlands and alluvial terraces can score strongly on indigenous wetland plant dominance, hydrological connection, hydraulic function and open-wetland habitat value. Forest seepages*

score ambiguously or low on all four, not because they are degraded but because they are a different type of wetland.

An overview of the BOAM model approach, and the use of 'structural' attributes as surrogates for biodiversity values, is provided in response to Comment **8.007**. These matters, and the rationale for not replicating plot-sampling field surveys at offset sites to obtain data for BOAM attribute scores, was discussed with Auckland Council's ecologist (25/06/26) and clarifications were provided in written responses.

With respect to terrestrial vegetation, the selected attributes used for the BOAM model all pertain to forest ecosystems. The proposed offset action (replanting) commences with a non-forest ecosystem, where all assessed attributes are essentially absent. While it is true that all ecosystems (including pasture) have some ecological function, the purpose of the terrestrial BOAM is to assess losses and gains in an indigenous forest ecosystem; quantitative surveys using RECCE and PCQ sampling methods deployed for the Project Site would have produced zero (or near-zero) values and therefore would not result in a substantively different outcome.

Wetland attributes in offset areas were all scored equally as wetland condition of features proposed for restoration in all offset locations is broadly comparable, reflecting their similar history of pastoral use, variations on very degraded.

Comprehensive wetland delineations were not undertaken for Focus Areas. Small wetland features are prone to seasonal changes in extent. To ensure plants are suitable for the site characteristics, the location and dimensions of wetland features will need to be delineated, and a detailed restoration planting plan prepared, in the season prior to undertaking planting.

We note that pest & weed control and infill planting in all remnant forest and scrub within Focus Areas 1 & 2 is not factored into the BOAM and is instead assessed as compensation.

Auckland Council's ecologist notes that *"On request of the applicant, I provided a list of over 50 metrics that can be considered in a BOAM assessment for wetlands".* In fact, our request (documented in the summary table of information requests and responses) was for "*examples of previous evaluations he has encountered/ reviewed where additional attributes he is looking for have been used satisfactorily".* No such examples were supplied.

As noted in Council's response, the five attributes we used in the wetland BOAM are derived from the *"Clarkson WCI"* (Wetland Condition Index) but use only a subset that we assessed as relevant to the wetland features in question. In contrast, the Council ecologist's suggested attributes are a complete list of the Clarkson WCI indicator components, pressure indices and change indices. We note that the "pressure" and "change" indices are essentially a way to use the WCI indicators to identify management priorities and monitor change, so many of the suggested attributes are synonyms (e.g., hydrological integrity/ change in hydrology; number of exotic plants/ % in area of exotic plants/ dominance of native plants; etc). Hence, the statement that "*over 50 metrics were supplied"* is an exaggeration.

A number of the suggested attributes are not relevant to the small, mineral (non-peat) wetland features that occur within the Project Site (e.g., animal access/ damage, browse index, canopy dieback, harvesting regime, fire damage, von Post Index, production export, among others), and many are also not appropriate for conversion to an "area x condition" currency. The comment "*None of the applicant's attributes capture the water table depth or hydric soil structure"* is hard to follow, as these are physical characteristics that indicate a wetland is present, but are not indicators of biodiversity value or wetland function.

The terrestrial BOAM is calculated for early-successional and late-successional forest types rather than for all of the vegetation communities identified. This approach recognises that vegetation communities described represent different successional stages and are the result of disturbance history, as explained in the response to **8.008b.** We consider that combining the vegetation types into early and late-

successional forest types is a helpful categorisation of the dataset, and results in conservative valuations of forest areas (attribute scores used 95th percentile values of later successional stages in each group, though earlier successional stages are more abundant).

We disagree with the statement "*Four of the five wetland attributes score systematically higher on the offset sites than on the impact sites for reasons of ecosystem type rather than ecological condition".* The high value of forest wetland features is reflected in BOAM impact site scores, but these features can be offset because the impacted areas are very small (therefore area is exchanged for condition), and wetland enhancement can improve the biodiversity and functions in degraded wetlands within the offset sites.

8.020 *Suggested S67: The offset calculations, being the BOAM and SEV-ECR are updated with improved assessment attributes and receiving site values in BOAM and receiving site metrics for the SEV-ECR calculations to demonstrate no net loss and net gain. The "net gain in net present biodiversity value" conclusion is untestable without the model. This is the key component of the claim in the whole vegetation and stream offset and is not easily addressed by a condition.*

BOAM and SEV-ECR are decision support tools that offer structured and systematic way to estimate and compare losses in biodiversity and ecosystem functions arising from an impact, balanced against expected gains from ecological restoration and enhancement measures. At best, the "offset model" approach provides a transparent breakdown of what has been assessed, and how the size and type of offset has been derived.

Offset models are simple accounting tools, not ecological models. Inclusion of a large number of precisely measured attributes does not necessarily improve sensitivity/specificity:

- Attribute scores cannot incorporate statistical variability or trend data,
- Use of related attributes can result in over-estimating losses or gains in some characteristics;
- Many aspects of ecosystem value are not readily converted to model attributes and are not counted in models.

Hence, offset models should not be relied on as comprehensive or precise measures of all biodiversity values, or used to derive targets/ thresholds for consent conditions.

9.050 *The proposed offsetting approach relies on augmentation to prevent stream flows falling below Mean Annual Low Flow (MALF), on the basis that maintaining flows at or above MALF will prevent adverse ecological effects from dewatering. However, Dr McEwan considers that ecological effects associated with flow reduction are not necessarily confined to flows approaching MALF and may occur at higher flows where dewatering results in a substantial departure from the natural flow regime.*

Reduced flows can affect habitat availability, aquatic biota and stream processes, including water temperature and the capacity of flows to buffer water-quality effects. Consequently, if dewatering significantly reduces flows but they remain above MALF, adverse ecological effects could occur before the proposed augmentation trigger is reached. This is particularly relevant given the range of permanent and intermittent habitats within the predicted zone of influence.

9.051 *The dewatering management and monitoring framework should therefore provide for the identification and management of adverse ecological effects arising from dewatering across relevant levels of flow reduction, rather than relying solely on MALF as the threshold for intervention. Effects should be mitigated or otherwise managed as necessary.*

MALF is often used as the benchmark for establishing acceptable minimal flows (e.g., acceptable minimum flows expressed as a percentage (e.g., 75% or 85% of MALF). These determinations can be generic or based on specific instream fauna or habitat requirements. The effects of loss of surface flows

is set out in s8.6.2, page 97 of **Appendix B12.4.5b Ecological Assessment** and in **Appendix B12.4.5b Groundwater Effects Assessment**.

As set out in the response to DOC dated 8 July 2026, the proposed augmentation does not create low flow conditions; it simply prevents dewatering from making them worse. The objective is to prevent adverse effects from dewatering and maintaining flows at or above MALF achieves that objective. The proposed monitoring and adaptive management framework will detect and address any ecological effects.

The most important factor for stream health during low flow periods is ensuring that flows do not fall below the natural low flow baseline (MALF). Flows below MALF represent conditions that are outside the natural range of variability; and it is these conditions that are most likely to cause significant ecological stress. The proposed augmentation (if required) is designed to do exactly that by preventing flows from dropping below MALF. This ensures the stream does not experience artificially low flows caused by quarry dewatering.

The length of time a stream remains at MALF is not considered the primary concern. This does not represent a failure of the augmentation. The key point is that the stream is not being pushed below its natural baseline. Maintaining flows at or above MALF means the stream continues to function within its natural low flow envelope - even if that envelope is slightly extended especially considering the duration of MALF conditions is also influenced by natural climate variability (e.g., drought years).

Conditions 218 - 222 provide the framework for monitoring and augmentation of flows in the respective watercourses within the zone of influence. The condition replicates those in the existing Winstone resource consentsand as granted for the Drury Quarry Fast Track consent. We are unaware of any reports of significant adverse effects on aquatic ecosystems arising from the implementation of similar consent conditions.

Effects management

9.041 *The effects management approach outlined in the EcIA characterises the constructed channel as remediation for the effect of infilling the natural channel, whereas DOC's position regarding stream realignment is that the infilling of a stream reach represents a total loss that requires like-for-like offsetting. The application explicitly refers to the infilling as "unavoidable loss" but then proposes to remedy this loss by "moving the stream". This view seems less suitable than viewing the infilling as a loss to be offset - particularly given the uncertainties associated with habitat recreation in the constructed channel and the low suggested indicative performance targets for the new channel.*

To further explain the difference between these approaches: In basic functional terms, the proposed realignment in this case involves the infilling of 1770 m^2 of stream and replacing it with 693 m2 of stream (i.e. 1077 m^2 less). A mitigation-based approach to managing the effects of stream realignment would involve:

• Remedying the temporary loss of 693 m^2 of stream extent and value by 'moving the stream', and avoiding/minimising time lag associated with habitat development in the new channel. And,

• Offsetting or compensating for the permanent loss of the remaining 1077 m2 of stream value with ecological rehabilitation intended to represent like-for-like replacement or appropriate compensation measures. And,

• Compensating for the permanent loss of 1077 m^2 of stream extent with appropriate compensation measures (or emphasising avoidance where appropriate based on cumulative effects).

We do not agree with the mitigation-based approach as set out by DOC. We have applied the Effects Management Hierarchy as set out in 3.21 of the NPS-FM, and the principles of offset and compensation as in the respective Appendices 6 and 7 of the NPS-FM.

The DOC commentator is correct in that we consider that the staged livening provides for the staged establishment of natural processes and ecological values in the realigned channel whilst natural processes and ecological values continue in the existing channel. Over time the transition will see improvements in those natural processes in the rehabilitation channel as they are modified in the exiting channel (but not disappear). Monitoring of both channels during this exercise will provide for adaptation to provide for continuation of natural processes, noting that natural variations will continue to occur during this period.

9.043 *The EcIA proposes that the loss of 1077 m^2 of stream extent and value be remedied by constructing a new channel and attempting to recreate habitat values, with (it is not made clear but I assume) the remaining effect on value arising from time lag minimised by staged livening. The latter has merit as a concept provided that there is reasonable certainty that no net loss of stream value and extent would occur during the transition period. Certainty is not currently available, however, and there is risk that the new channel will not provide equivalent ecological value for quite some time – and possibly never based on the relatively low indicative performance targets suggested in Section 10.6.5. The progressive flow reduction in the impact reach may also temporarily reduce value there (as less habitat is available, and potential impacts result from reduced dilution potential and increased negative biotic interactions from overcrowding). The converging nature of these outcomes is one of the principles that supports the investigation of staged livening as a process, and comprehensive monitoring and reporting of the process could contribute to improving future management of the adverse effects of stream realignments.*

See response to Comment **9.041**.

Conservation values

9.001 *The mature secondary forest types present—including tawa–taraire forest, kauri–podocarp–broadleaf forest remnants, and mature kānuka forest—are high-value indigenous ecosystems that provide important habitat, ecological connectivity, and ecosystem functions within the wider Hunua landscape. These are mature forest communities that are not easily replaceable within the proposed duration of the Project.*

BOAM accounts for the loss of ecosystem features that require time to develop by exchanging “area for condition”, i.e., the area offered for offsetting is larger than the impacted area. See response to Comments **8.007** and **8.008b.**

9.002 *Several native plant species of regional conservation significance are present within the Project site. Vegetation surveys recorded the regionally endangered Black maire (Nestegis cunninghamii), Poataniwha (Melicope simplex), and Forster's sedge (Carex forsteri). The surveys also recorded Kauri (Agathis australis) and King fern (Ptisana salicina), both of which are classified as At Risk – Declining nationally.*

See response to Comment **8.009.**

9.004 *The Project includes a proposal to infill 1770 m^2 of the Mangapū tributary 2 and create a new 693 m^2 channel between the upstream and downstream reaches of Slippery Creek. The Mangapū tributary is of very high ecological value, and as such is also rare in the Slippery Creek catchment and the Manukau Ecological District.*

The ecological values of Mangapū tributary and effects management, including for the residual effects, for the realignment are provided in are set out in section 13.2 **Appendix B12.4.5b Ecological Assessment** respectively. The high ecological values of the Mangapū tributary are provided for in the effects management response.

9.005 *Generally, there remains uncertainty around the extent to which values associated with mature indigenous forest and forest seepage wetlands can be replaced, and the time required for replacement habitats to develop comparable ecological functions. It cannot be confirmed whether the offsetting and compensation areas will be able to meet the requirements of the National Policy Statement for Indigenous Biodiversity 2023 and the National Policy Statement for Freshwater Management 2020 (both amended December 2025) offsetting and compensation appendices, for ensuring that time lag is minimised.*

BOAM includes multipliers for lag time and uncertainty in the calculation of net present biodiversity value (i.e., the required offsent extent). See also responses to Comments **8.008a&b** and **8.007**.

9.007 *While the Department considers the proposed offset and compensation package to be an appropriate response to the residual loss of mature indigenous vegetation, their loss is still considered ecologically significant. Replacement habitats will require many decades to develop the structure, species composition and ecological functions characteristic of mature forest ecosystems. As a result, there is inherent uncertainty regarding the extent to which equivalent ecological outcomes can be achieved within ecologically meaningful timeframes.*

See response to Comment **9.005.**

9.008 *The removal of indigenous vegetation will occur well before many of the anticipated restoration outcomes are realised, and some characteristics of mature forest ecosystems may not be fully replicated for many decades, if at all. It is therefore necessary, that the offset and compensation planting occur prior to vegetation clearance and the resource consent conditions should reflect this requirement.*

See response to Comment **9.005.**

9.010 *Nevertheless, the permanent loss of forest seepage wetlands remains a significant aspect of the proposal. These wetlands contribute not only to wetland biodiversity values, but also to wider freshwater ecosystem functions through hydrological regulation, flow attenuation, and ecological connectivity between wetland, terrestrial and stream habitats. These systems are strongly influenced by site-specific hydrological processes and may not be fully replaceable through restoration elsewhere.*

The hydrological functions and ecological connectivity provided by forest seepage wetlands are factored into the BOAM attributes used to evaluate these features and assess the potential performance of offset features. The impacted forest seepage features are intact, but their small size does limit their physical function (e.g., in attenuating flows or acting as connective linkages). We do not know what the "*site-specific hydrological processes*" referred to are (other than to the extent that all ecosystems are to some degree a unique product of local site and history).

9.014 *As a result, the Department considers that moderate to high residual adverse effects on terrestrial vegetation and wetland values are likely to remain in the short to medium term and will need further conditions to ensure that similar ecological values can be potentially realised.*

See response to Comments **8.008a&b** and **8.007**.

9.021 *The Ecological Management Plan condition (condition 55-56) is largely supported. As discussed in paragraphs 3.4 – 3.5, longer-term ecological outcome performance standards would be beneficial to ensure that the ecosystem value of the mature indigenous forest can be achieved through offsetting and compensation.*

The use of restoration as an offset comes with the implicit assumption that well planned and executed ecological enhancement measures will produce ecologically beneficial outcomes.

Performance standards must relate to actions specified in the EMP. For example, canopy cover and survivorship of plants is a useful performance standard because if the standard is not met, the response (infill planting) is clear. In contrast, litter depth is a useful surrogate for habitat complexity but is not a helpful performance standard, because accumulation of litter is an indirect result of forest establishment

and development, and is not made to happen through direct restoration action. Hence, if forest litter does not accumulate as predicted, there is no clear remedy.

9.022 *The ecological assessment has already established a useful dataset through the vegetation plots and surveys completed for the project. Setting up plots in the restoration/enhancement areas and comparing them over time with suitable reference areas of mature forest nearby and the previously collected data, would provide a way of assessing whether the restoration areas are meaningfully progressing towards the type of forest and the values that are cleared.*

See response to Comment **9.021.**

9.023 *The Department recommends that the Applicant provide a condition that includes the requirement for mature forest values to be achieved within the life of the consent, and performance standards that must be achieved. The condition would help enforce the Ecological Management Plan as a long-term programme designed to achieve no net loss of indigenous biodiversity from the Project. The Department is willing to assist the Applicant with drafting such a condition/s.*

See response to Comments **8.008a&b, 8.007** and **9.005**. The life of the consent is not long enough to ensure "*mature forest values to be achieved within the life of the consent".*

9.024 *There is minor amendment recommended to ensure that the required offsetting and compensation planting occurs before vegetation is cleared. 56(h) timeframes for the implementation of Site Specific Planting Plans before Construction works occurs in the staged area.*

Agreed and incorporated into the consent condition.

9.032 & 9.033 *The Department considers that the Applicant's proposed bat conditions can be simplified by instead referring to the Department of Conservation Bat Roost Protocols. As vegetation clearance will be staged throughout the lifetime of the quarry being approximately 80 years, there is a possibility that bats return to the Hunua ranges. Referring to the Bat Roost Protocols allows the consent holder to implement the best method of minimising adverse effects on bats, particularly as methods are likely to adapt and change overtime.*

The proposed amendments are accepted (see Condition 152).

Freshwater values

9.039 *The Mangapū tributary reach proposed for realignment is of very high ecological value, and as such is also rare in the Slippery Creek catchment and the Manukau Ecological District. The EcIA mentions the cumulative loss of high quality stream reaches, but only to briefly note that it is a reason (among others) that an ECR greater than 1 is justified for offsetting/compensation. Given the above, I consider it important that the application include discussion regarding the cumulative impact of the loss of headwater extent and value (that are not being like-for-like replaced regarding extent) related to ongoing quarrying activities. Presumably at some point, cumulative losses will reach a level that requires avoidance, and it is appropriate that this is acknowledged and taken into account during planning and decision-making, rather than each loss being considered in an isolated context as an adverse effect for which compensation is an option.*

The realignment and offset of Mangapū tributary (in part) is unavoidable for Stages 1-6 of the quarry expansion, and the future loss of tributaries 3 and 4 along with the headwaters of Mangapū tributary in Stage 7 (which will be the subject of a separate consent application at the time circa year 43). The proposed effects management has been amended such that offset and/or compensation applies only for the loss of the Mangapū tributary during Stages 1 – 6 and a similar approach is expected to be established for the future loss of Tribs 3 and 4 and the headwaters before or at the time of applications for resource consents for Stage 7. These stream losses are expected and the effects management approach

will be undertaken. These changes are discussed in more detail in response to comment **8.445** below.Proposed consent conditions 157 and 158 provide for the cumulative impact of the losses of stream length.

9.040 *The EcIA appropriately discusses the potential effects of this on habitat availability, periphyton, fish, invertebrates, and buffering capacity in relation to water quality, temperature, and turbidity. The report describes the effects of dewatering as a 'significant adverse effect', which I agree with, although I would add that cumulative effects of flow reduction in the catchment could also warrant consideration if quarrying activities have caused this effect previously, and may cause further similar effects in future.*

See response to Comments **9.050-9.051.**

9.044-9.047 *I wasn't able to systematically assess the proposed offset and compensation measures because I found it too difficult to confidently establish what actions were being proposed to manage what effects. For example, section 9.10 describes offset and compensation locations and actions in some detail but also says that these details are not relevant to the Mangapū tributary realignment, which is covered in Section 11. Section 11 relates to CFFA, but Section 10 focusses on the realignment (so I assume that is just a typo). However, this section notes the need for offsetting related to Mangapū tributary loss, but refers back to section 9.10 for details. The offsetting/compensation proposal also incorporates measures related to effects of activities that are not part of the activities currently under consideration (the quarrying of tributaries 3 and 4).*

I understand that the permanent loss of 693 m^2 of stream extent and value is proposed to be offset and compensated for by the enhancement of 2860 m^2 of existing streams based on an ECR of 4.1310. The applicant describes three specific enhancement activities, and acknowledges that not all proposed activities are easily quantifiable:

• Planting riparian vegetation along stream margins.

• Re-establishing connectivity and linkages to and between reaches of existing watercourses.

• Removal of willow, blackberry and other woody weeds from reaches of streams and rehabilitation with native riparian vegetation.

I make the following comments in relation:

• Presumably the quantification process counts 'woody weed removal and replacement with native vegetation' and 'riparian planting' separately, so as not to risk double counting.

This is correct. The effects management provides for offset and compensation separately for loss of terrestrial vegetation and the provision of riparian planting for stream environments. This is clearly shown in figures 37 and 38 of **Appendix B12.4.5b Ecological Assessment**.

• Presumably the comment regarding less quantifiable enhancement activities[11] does not mean that 'benefits for threatened species' or 'enhancements to spawning sites' are being counted separately, because they are outcomes that will occur as a result of the more quantifiable activities (riparian and barrier rehabilitation), so counting them as providing additional benefit could risk double counting.

This is correct. Less quantifiable enhancement activities are not counted separately but are integrated in the overall effects management, and especially as compensation.

• Presumably all proposed barrier remediation relates to culverts that the applicant does not have an existing statutory responsibility to fix, or are already likely to be remediated as part of Auckland Council's wider barrier remediation programme (crossover could risk additionality).

We understand that the proposed barrier remediation is for culverts that do not have an existing statutory responsibility to fix. Please also refer to Appendix 2 Planning response which also addresses Comment 9.046.

• Presumably barrier remediation activities will both 1) meaningfully increase the ability of more migratory native fish species (compared to the status quo) to access higher value upstream habitats, and 2) not increase the ability of introduced fishes to access more habitats. More detailed planning may be necessary to ensure that barrier remediation achieves its intended objective and does not cause secondary effects in relation to species' distributions.

The intention of the culvert enhancements and removal of barriers to native fish movements is intended to increase access to a greater upstream extent of watercourse that is currently denied. At the time of design of culvert improvements, consideration will be given to lessening the potential ability of introduced fishes to access more habitats. This is provided for in Condition 4, Part J of the proposed consent conditions which requires design to be inccordance with best practice and the NZ Fish Passage Guidelines.

9.048 *In addition, I consider it appropriate that the ECR calculations are revisited with a view to incorporating the significance of banded kōkopu, and the potential value of the impact site – with the latter based on the possibility that it may contain a higher diversity of native fishes in future as a result of downstream barrier remediation (which is a specific restoration opportunity identified by Auckland Council.*

The attributes used in the calculations of SEV scores and the ECR do not include threat status of aquatic biota. We have applied a high potential SEV score for the offset locations that reflects the high value of the streams to be lost. Revisiting the ECR values specifically for banded kōkopu would not vary the outcomes already achieved.

9.049 *As noted above, the EcIA mentions the cumulative loss of high-quality stream reaches, but only as brief note that it is one of the reasons that an ECR greater than 1 is justified. Presumably this would have happened anyway, so I am unsure if this effect (that the proposed activities are contributing to) has actually contributed to the ECR value. It would be good for the applicant to clarify whether they are proposing specific measures to manage this effect.*

The high quality of streams is reflected in the SEV ecological function score and is thus reflected in the ECR applied to the potential to be achieved at the offset improvement locations. Accordingly, we clarify that the effects on the high value streams is incorporated into the assessments and the effects management response. No further specific measures are proposed or required. See also response to Comment **9.039**.

9.050-9.051 *The applicant proposes to remedy the effects of dewatering by augmenting flows to ensure that levels do not drop below Mean Annual Low Flow (MALF) and considers that no residual effects on aquatic ecological values will remain. I disagree with this opinion, because ecological effects associated with flow reduction are not confined to flows approaching MALF and could occur at a range of flow reduction levels. For example, Richter et al. (2012)14 proposed a presumptive standard under which alteration of natural flows by 10–20% provides only a moderate level of ecological protection, and ecological risk increases further where alteration exceeds 20%. If dewatering significantly reduces base flows and adverse effects result, then these effects will presumably remain unaddressed until levels decline to MALF. I raised this concern during discussion with the applicant's ecologist on 9th July 2026. The applicant responded in a later memo15 with their opinion that providing augmentation to prevent stream flow dropping below MALF is the only adverse effect that needs to be managed. The applicant identifies that the relevant objective in this context is to "prevent adverse effects from dewatering" and I agree with this – but I do not agree with the following assertion that "maintaining flows at or aboveMALF achieves that objective". I consider that preventing adverse effects from dewatering will require the consideration of a range of other effects (which were identified earlier in the EcIA) of dewatering in relation to the ecological context of the zone of influence – including intermittent reaches, and in relation to other levels of flow reductions. Effects should be mitigated or otherwise managed as necessary.*

MALF is often used as the benchmark for establishing acceptable minimal flows (e.g., acceptable minimum flows expressed as a percentage (e.g., 75% or 85% of MALF). These determinations can be generic or based on specific instream fauna or habitat requirements. The effects of loss of surface flows is set out in s8.6.2, page 97 of **Appendix B12.4.5b Ecological Assessment** and in **Appendix B12.4.5b Groundwater Effects Assessment**.

As set out in the response to DOC dated 8 July 2026, the proposed augmentation does not create low flow conditions; it simply prevents dewatering from making them worse. The objective is to prevent adverse effects from dewatering and maintaining flows at or above MALF achieves that objective. The proposed monitoring and adaptive management framework will detect and address any ecological effects.

The most important factor for stream health during low flow periods is ensuring that flows do not fall below the natural low flow baseline (MALF). Flows below MALF represent conditions that are outside the natural range of variability; and it is these conditions that are most likely to cause significant ecological stress. The proposed augmentation (if required) is designed to do exactly that by preventing flows from dropping below MALF. This ensures the stream does not experience artificially low flows caused by quarry dewatering.

The length of time a stream remains at MALF is not considered the primary concern. This does not represent a failure of the augmentation. Of importance is that the stream is not being pushed below its natural baseline. Maintaining flows at or above MALF means the stream continues to function within its natural low flow envelope - even if that envelope is slightly extended especially considering the duration of MALF conditions is also influenced by natural climate variability (e.g., drought years).

Conditions 218-222 provides the framework for monitoring and augmentation of flows in the respective watercourses within the zone of influence. The condition replicates those in existing Winstone resource consents and the recently granted Drury Quarry Fast-track consent. We are unaware of any reports of significant adverse effects on aquatic ecosystems arising from the implementation of similar consent conditions that would justify or warrant a different approach here.

Pest management

9.028 *The PMP condition 62 should implement the Table 6 and Table 8 from the Boffa Miskell Pest Management Plan submitted in support of the application. The targets within the Applicant's tables 6 and 8, have been stated to achieve the overall objective of the ecological management plan, to achieve no net loss of biodiversity. To assist monitoring of the consent conditions, and to ensure the activities are meeting the no net loss objective, the tables should be included in the consent conditions.*

Accepted and agreed that the targets should be included in the resource consent conditions.

9.029 *The Department requests an amendment for the threshold for Feral Cats matches the response at section 10.1.1 of the PMP should be made, and there should be a specific link to the Auckland Council Regional Pest Management Plan, and its subsequent versions, to ensure that all applicable pest plants are included.*

Acceptable and agreed.

6.001 *I would like to ensure that the pest management program is maintained and expanded to include the control of browsing animals.*

12.009 *We would contend that any offset planting and associated pest control should be undertaken within the region proximate and adjacent to the quarry with the objective of offsetting the degradation of the Ponga Road ONL resulting from the loss of the once prominent Symonds Hill landscape feature and other historic land use activities including Papakura Council refuse dump.*

12.011 *Due to the poor management of the Refuse dump operated by Papakura District Council pest control is a challenge beyond the resources of adjacent land owners and the significant population of feral cats and rats impacting on native bird species. Whilst not Winstone responsibility, it is Auckland Council reasonability to mitigate the long-term effects of the refuse dump operation. A joint effort of pest management in the wider interest of future protection and enhancement by Council and Winstone should be considered.*

The PMP (**Appendix B12.8.5 Pest Management Plan**) refers to the staged implementation of pest management as the offset and compensation as per the effects management for the ecological effects of the proposed Hunua Quarry Expansion Project. The pest management is focused on the areas of existing and proposed planting and includes strategy to prevent reinvasion of pest into areas where pest management has occurred. A key area (Focus Area 1) is at and around the Hunua Quarry and will provide some local benefits by removing a potential source of pests to the surrounding landowners. As the commentator points out it is it is Auckland Council's responsibility to mitigate the long-term effects of the refuse dump operation. Any joint agreement between Auckland Council and Winstone Aggregates as suggested by the commentator would be outside of any final decision on the current FTAA application.

Control of browse animals is included in the pest management plan.

Stream offset and compensation

8.445 Stream loss is offset and compensated through riparian planting of 600 m in the quarry area, 400 m at the Meremere quarry and riparian planting along 2.58 km of the Mangatawhiri Stream within Hunua Regional Park. Total stream restoration/riparian planting length is 3,580 m. No SEV has been undertaken at the Meremere and Mangatawhiri locations, however, desktop estimates are provided from proxy sites to inform the SEV – Ecological Compensation Ratio (ECR) . An SEV was undertaken at the offset site for the Waipokapū tributary (482/484 Hunua Road), however, this is not used in the ECR calculations. The total area of stream of SEV value 0.39 (SEVi-P) required to be improved (excluding the diversion) to a score of 0.71 (SEVm-P) is calculated by the applicant to require an offset of 3,980 m², equating to approximately 4,500 m of stream length (2,602 m at 1.1 m mean width for the Mangapū Tributary residual, plus 1,898 m at 0.59 m for tributaries 3 and 4). The applicant states 3,938 m² is provided, along 3,580 m length of stream. Therefore, there is a shortfall of about 1,000 m of stream length. There is also a shortfall is 42 m2 in area, however, the offset length and area is calculated from proxies and therefore unverified.

The full 1,157 m of stream extent is permanently lost and is not offset. The applicant acknowledges that the creation of additional new stream length and channels is not a feasible option, a position I agree with. Extent lost isproposed to be addressed by compensation through fish passage reconnection to 2,500–4,000 m of currently inaccessible watercourse to climbers.

The streams lengths and areas stated here along with the stream offset and compensation lengths/areas are those reported in **Appendix B12.4.5b Ecological Assessment**. Whist the sum of the numbers is correct, and there is a shortfall in the availability of aquatic offset, it is incorrect to suggest that there is an overall shortfall as the offset and compensation provided together complete the effects management for any adverse effects. The suggestion of a shortfall misrepresents the implementation of the effects management hierarchy, and the approach of effects management in this FTAA application. We set out our approach to effects management and offset/compensation in section 9.10.1 of **Appendix B12.4.5a Ecological Assessment**: '*We have used the area calculations within the site of biodiversity loss (i.e., stream area loss as the residual effects of the proposed pit development) to inform the proposed offset/compensation but have not relied on the quantifications alone as the method as benefits for aquatic ecosystems can be derived from the management of other attributes that are not incorporated into the ECR/SEV methodology (e.g., improvements to fish passage, benefits for threatened species, enhancements to spawning sites)'.*

Furthermore, we consider that the proposed compensation meets the principles as set out in Appendix 7 of the NPS-FM. Most notably steps to avoid, minimise, remedy and offset have been applied sequentially and compensation is deemed to be acceptable. We draw attention to the landscape context (principle 7) which comments on preference for compensation to occur close to the impact site (see response to

Comment **8.008a**), and taking into account interactions between species, habitats and ecosystems, spatial and hydrological connections, and ecosystem function. The executive summary of **Appendix B12.4.5a Ecological Assessment** emphasises the compensation outcomes as follows:

'*Effects management is focused on an integrated offset and compensation outcome over three Focus Areas with similar attributes. Each of the Focus areas incorporates revegetation of a headwater catchment to improve water quality before it descends its catchment, as well as riparian planting to enhance aquatic values, removal of fish barriers to increase substantially the extent of upper watercourse available to migratory fish, revegetation of diverse indigenous forest and habitat for indigenous fauna, as well as substantive landscape-scale pest management. These focus areas have the potential to become biodiversity hubs in their own right within their respective landscapes*.'

Revised stream offset and compensation

Following further stream assessments in response to Council request for information on stream classification of Tribs 3 and 4, (Comment **8.015**) and in association with the revision of fish passage through the proposed culverts in Trib 3 in response to DOC comments, we have revised the offset and compensation accordingly, as set out in Table 1.

The revised offset and compensation is based on the following amendments:

- Implementation of fish passage for climbing fish through culvert for Trib 3. Offset/compensation for loss of 75 m of culvert length.
- Blockage of fish passage at culvert for Trib 4. Offset/compensation for loss of 40 m of culvert length plus 191 m of intermittent upstream length.
- Removal of remaining Stage 7 of Tribs 3 and 4 from the Tranche 1 offset and compensation. Tranche 1 covers only Stages 1-4 of the quarry expansion.

The proposed Tranche 1 of the effects management for aquatic ecological values no longer includes the complete Stage 7 loss of Tribs 3 and 4. The revised Tranche 1 includes only the loss culvert lengths for Tribs 3 and 4, plus the inaccessible (for fish) reach upstream of Trib 4 (151 m of intermittent stream).

It is important to note that the 151 m of upstream reach of Trib 4 will not be removed until Stage 7 (some 43 years hence and outside the range of these consents). Providing offset/compensation now for the loss is additional benefit to the effects management and provides 543 m^2 (921 m length) of stream some 40 plus years in advance of the loss.

***Table 1**: Summary of effects management for freshwater ecology and wetlands, Hunua Quarry Development.Table 37 of **Appendix B12.4.5b Ecological Assessment**.*

	Freshwater Ecology			
	Watercourse: Mangapū Tributary	**Watercourse: Mangapū Stream tributaries 3 and 4**	**Fauna: Fish and koura**	**Wetlands**
Ecological Values	Very high	High	Moderate	Low-moderate
Avoid	Unavoidable realignment of 1,770 m^2 (approximately 1200 m length) of intermittent and permanent stream.	Unavoidable loss of 266 m length of watercourses (191 m of Trib 4 – culvert with no fish passage; 75 m of Trib 3 – culvert with fish passage)		Unavoidable loss of 0.45 ha of wetland area.
Minimise	Minimise stream loss as much as is practicable. Maintain passage opportunity for climbing fish	Minimise stream loss as much as is practicable.	Minimise (avoid) fatality through salvage of fish from watercourse.	
Remedy	Stream realignment of approximately 571 m length. Flow augmentation to sustain flows as needed.	N/A	Relocate salvaged fish to stream realignment and/or Mangapū Stream for the protective benefit of the fish populations: living, migration and reproduction.	
Residual Effect	Unavoidable loss of 630 m length of watercourse extent and aquatic ecological values.	Unavoidable loss of 266 m length of watercourse and aquatic ecological values.	No residual effects.	Unavoidable loss of 0.44 wetland extent and aquatic ecological values.
Indicative Freshwater Offset	Values: [Enhance 2,862 m^2 (approx. 2,600 m length] Assumes 1.1 m stream width.	Values: [Enhance 565 m^2 (approx. 958 m length)] Assumes 0.59 m stream width.	N/A	Values: 2.4 ha
Freshwater Offset	610 m of ecological value enhancements at headwater Waipokapū Stream 400 m of ecological value enhancements at Meremere Quarry Stream			~ 0.15 ha wetland values improvement at Meremere

	Freshwater Ecology			
	Watercourse: Mangapū Tributary	**Watercourse: Mangapū Stream tributaries 3 and 4**	**Fauna: Fish and koura**	**Wetlands**
Ecological Values	Very high	High	Moderate	Low-moderate
	2,580 m removal of willow, blackberry and other woody weeds and enhancement of aquatic values to watercourse: Mangatawhiri Stream.			~ 0.5 ha wetland values improvement at Hunua
Freshwater Compensation	Extent of watercourse available following improvements to fish passage: 958 m of stream length compensation occurring some 43+ years ahead of loss. 610 m of stream accessible inland for migratory climbing fish at Waipokapū Stream headwater. At least 1,915 m of stream accessible inland for migratory climbing fish at Meremere Quarry Stream Aquatic Values: Removal of fish barriers to enable extent of penetration to headwater habitat by native fish Native vegetation (as per terrestrial offset) to create some 18.8 ha of headwater catchment benefit and improved water quality as it enters downstream at Waipokapū Stream. Native vegetation (as per terrestrial offset) to create some 30 ha of headwater catchment benefit and improved water quality as it enters downstream at Meremere Quarry Stream and ultimately to the RAMSAR-listed Whangamarino Swamp. Enhanced connection of Meremere Quarry Stream with the RAMSAR listed Whangamariono Wetland.			Re-establishing 0.5 ha of wetland through removal of farm ponds at Hunua
Outcome	Effects management hierarchy is satisfied.			

Response to s51 comments

Department of Conservation

Response to Hunua Quarry: S51 Complex Freshwater Fisheries technical advice dated 16 July 2026

Shortjaw kōkopu and other fish species

72.020 Regarding Tributaries 3 and 4: if robust and species-specific survey methods detect shortjaw kōkopu in these tributaries, DOC considers the preservation of populations and their habitats to be of high importance and would warrant changes relating to presently proposed culverts and future consideration of removing these tributaries.

72.021 Regarding Tributaries 3 and 4: If surveying does not detect shortjaw kōkopu, the tributaries are still valuable habitat in a context where such is rare.

72.027 DOC assesses that the provided documents do not address regional threat classifications and the applicant has applied superseded national threat classifications for fish.

72.028 The characterisation of fauna values in Tributaries 3 and 4 are less clear, and DOC is uncertain if the fish noted as present in Tributary 3 (and thus Tributary 4 by assumption) is based on eDNA or on extrapolation from nearby data. 'Figure 30 of review document 3' seems to indicate that eDNA site 1 is downstream of Tributary's 3 confluence (so presumably in part reflects eDNA originating from Tributary 3). 'Table 12 of review document 3' notes that eDNA sampling at eDNA site 1 detected mostly the same species as at eDNA sites 2 and 3 (i.e. multiple native species – 4 of which are nationally or regionally 'At Risk').

72.030 Fish surveying commissioned by Auckland Council in 2015 recorded shortjaw kōkopu in the Waihoihoi Stream (also in the Slippery Creek catchment) in forested habitat potentially quite similar to that in the Mangapū Tributaries (Fig. 3). Shortjaw kōkopu are classified as 'Threatened – Nationally Vulnerable', and in the Auckland region are classified as 'Threatened – Regionally Critical'9. This is the highest threat classification possible, and the regional notes that barriers to fish passage are considered a key pressure for this species.

72.031 Regardless of data source, DOC considers that the species likely to be affected by the activities in terms of fish passage are longfin eel, shortfin eel, banded kōkopu, and potentially shortjaw kōkopu.

72.034 DOC considers that a survey for shortjaw kōkopu must be concluded prior to initiating any works, rather than at salvage as proposed by the Applicant. This is because the outcome of the survey is required before robust decisions can be made regarding the proposal to block fish passage on Tributaries 3 and 4.

72.039 Shortjaw kōkopu: DOC clarify surveys at tributaries 3 and 4 are considered inadequate given the shortjaw kōkoput context. DOC do not support undertaking a survey for shortjaw at the time of salvage. The survey is required prior to decisions regarding the blockage of fish passage.

Fresh and recent surveys of fish, notably for shortjaw kōkopu, were carried out in Tribs 3 and 4; results are provide in Attachment 1 to this memo 'Response to Panel Minute 4'. Shortjaw kōkopu were not observed during nightspotting in Trib 4, or detected from eDNA samples from Trib 4, or from eDNA downstream of Trib 3 (eDNA site 1 is downstream of Tributary's 3 confluence and thus reflects eDNA originating from Tributary 3 (Figure 30, **Appendix B12.4.5a Ecological Assessment**).

The fish species relevant to Tribs 3 and 4, and the Mangapu tributary are longfin eel, shortfin eel and banded kōkopu. Shortjaw kōkopu have not been observed or detected in the Mangapu tributary. We note that shortjaw kōkopu have been recorded in other subcatchments of Slippery Creek.

Aquatic fish and fauna salvage

72.023 Aquatic fauna salvage and relocation will be undertaken in accordance with best practice. 'Review document 7' provides details and notes that additional site-specific planning will be prepared closer to the time. DOC considers it important that plans include a certification requirement and that they direct any salvage that may be carried out in Tributaries 3 and 4 to only work in the immediate vicinity of culvert installation sites, because aquatic fauna does not need to be salvaged from other parts of these tributaries in association with the activities presently under consideration.

Aquatic fish and fauna salvage and relocation will only occur in the immediate vicinity of culvert installation sites immediately before construction and installation of the culverts. It is expected that salvaged fish will be released downstream of the culvert site.

Fish passage

72.024 DOC considers that risks to freshwater values and habitat in relation to fish passage (including migration associated with spawning) is adequately managed in relation to Tributary 1 (diversion, new channel creation, prolonged instream works), although it is noted that risk assessments may need to be updated with the latest threat classifications (see memo section 5).

72.033 Regarding Tributaries 3 and 4, DOC is unable to assess the potential effects of providing fish passage due to the lack of detail regarding the current values of the habitat. In E5.1 of Part E the applicant notes in relation to Tributaries 3 and 4 there is a lack of suitable upsteram habitat. However,other parts of the reporting describe features that suggest that maintaining fish passage into these tributaries would be an advantage. The descriptions of the tributaries in the AEE indicate valuable headwater habitats in a highly modified catchment, (DOC is unable to be certain regarding extent) likely contain nationally and regionally 'At Risk' species and may – pending further survey work – also contain a species that is Nationally Vulnerable and Regionally Critical (shortjaw kōkopu).

Recent surveys for fish in Tribs 3 and 4 recorded no observations or eDNA detections of shortjaw kōkopu. The habitat and ecological values of Tribs 3 and 4 have been assessed as high value.

Recommended amendments to consent conditions

72.035 Recommend a range of amendments to Part J conditions

We agree that the AFSRP must include:

(a) a description of the aquatic fauna values to be addressed by the AFSRP;

(b) plans identifying the locations where salvage of fish and kōura will be undertaken, and in Tributary 3 restrict salvage to culvert installation sites only at Stage 2; and culvert installation sites and upstream reaches of Tributary 4 during Stage 2.

© procedures for pre-stream works site visits prior to any works commencing within any streams, with each site visit addressing at a minimum:

Monitoring and reporting

5. A SQEP shall inspect all culverts and the realignment of the Mangapū Tributary to monitor fish passage success. Success, and how to measure it should be pre-defined in a way that facilitates robust inference from monitoring data. Inspections shall be carried out one year, two years and four years following completion of construction. The Dispensation Holder shall provide inspection results to DOC annually by 30 June.

Agreed amendment to consent condition.

Attachment 1 to Appendix 3: Response to Panel Minute 4

Boffa Miskell

Memorandum

Auckland
Level 3
82 Wyndham Street
Auckland 1010
PO Box 91250
Auckland 1142

+649 358 2526

Whangarei	15 Porowini Avenue, Morningside, Whangarei 0110	+649 358 2526
Hamilton	PO Box 1094, Hamilton 3240	+647 960 0006
Tauranga	PO Box 13373, Tauranga 3141	+647 571 5511
Wellington	PO Box 11340, Wellington 6142	+644 385 9315
Nelson	27 Vanguard Street, Nelson 7010	+643 548 8551
Christchurch	PO Box 110, Christchurch 8140	+643 366 8891
Queenstown	PO Box 1028, Queenstown 9348	+643 441 1670
Dunedin	49 Water Street, Dunedin 9016	+643 470 0460

Attention:	FTAA-2603-1185 Expert Panel
Date:	18 August 2026
From:	Katrina McDermott and Ian Boothroyd
Message Ref:	FTAA-2603-1185 - Hunua Quarry – response to Panel Minute 4
Project No:	BM250767

Introduction

Boffa Miskell were engaged by Winstone Aggregates to respond to comment 5 of Panel Minute 4 in relation to Tributary 4 of the Mangapū Stream. Accordingly, we investigated Tributary 4 for evidence of the presence, or absence, of shortjaw kōkopu. We also include additional observations and assessments of Tributary 3.

In response further field investigations have been undertaken by Boffa Miskell freshwater ecologists. Surveys were undertaken of Tributary 4 on 28 July 2026 and Tributary 3 on 4 August 2026.

Tributary 4

Fish Surveys

Environmental DNA (eDNA)

On 28 July 2026 six replicate eDNA samples were collected from the lower reaches of Tributary 4 to detect for the presence of shortjaw kōkopu. The location was recorded on Fieldmaps and is shown in Figure 1. The results of the eDNA sampling revealed no detection of shortjaw kōkopu, but shortfin and longfin eels were both detected as present.

Fish Survey – Spotlighting

Nighttime spotlighting surveys were undertaken in Tributary 4 on 28 July 2026 by two freshwater ecologists to search for freshwater fish, including shortjaw kōkopu. Spotlighting methods followed those described in the New Zealand Freshwater Fish Sampling Protocols (Joy et al., 2013[1]). Spotlighting commenced 45 minutes after sunset, with clear conditions during the survey. No fish were observed during the survey. Abundant kōura were observed along the survey, with visual estimates of size of approximately <10mm to >60 mm.

Habitat observations

Habitat within the stream channel was predominantly fine sediment, with occasional gravels and cobbles. The lower reaches of the stream, near the confluence, contained some larger boulders and cobbles. The channel was predominantly comprised of pools and small runs or cascades over bedrock. The largest pool

[1]Joy, M.; David, B; Lake, M. 2013: New Zealand freshwater fish sampling protocols: part 1—wadeable rivers and streams. Massey University, Palmerston North.

was estimated to have a maximum depth of 0.3 m. A large slip was evident part way up the tributary, with the stream flowing underneath it. Photographs of the habitat within Tributary 4 are provided in Figure 2.

The largely soft sediment of Tributary 4 and minimal cobble habitat both upstream and downstream is not favoured shortjaw kōkopu habitat (adult fish are typically found in relatively small, bouldery, intact bush-covered streams[2]).

Presence of shortjaw kokopu

Spotlighting of Tributary 4, lack of detection in from eDNA sampling, and observations of mostly unfavourable habitat, strongly suggest that shortjaw kōkopu are not present in Tributary 4. This finding is consistent with the existing known information that shortjaw kōkopu have not been observed or detected (through eDNA sampling) in Mangapū Stream or its tributaries upstream of, and including, Tributary 3 (see below).

Figure 2*. Examples of the habitat within Tributary 4. Note koura in central photograph.*

<u>Tributary 3</u>

Further surveys were undertaken of Tributary 3 on 4 August 2026, in the same manner as those undertaken at Tributary 3 except night spotlighting was not undertaken at Tributary 3 due, noting that previous eDNA samples of Mangapū Stream have been undertaken at a sample location downstream of its confluence with Tributary 3.

Fish Surveys

Environmental DNA (eDNA)

On 4 August 2026 six replicate eDNA samples were collected from the lower reaches of Tributary 3 to detect for the presence of shortjaw kōkopu. The location was recorded on Fieldmaps. At the time of writing, the eDNA samples are at the laboratory for analysis, and the results are typically returned within two weeks. At the time of writing, we have not received these results.

Fish Survey – Habitat observations

Habitat within the Tributary 3 stream channel was predominantly fine sediment, with occasional gravels and cobbles and boulders. Higher up in the catchment bedrock become the dominant substrate in areas, with numerous waterfalls and cascades present. The lower reaches of the stream contained many run and small riffle habitats and higher proportions of cobbles and boulders. Overhanging banks were abundant. Further upstream in the catchment the channels became highly incised, with numerous pool, cascade sequences.

[2]https://niwa.co.nz/freshwater/kaitiaki-tools/mahinga-kai-what-species-interests-you/shortjaw-kokopu

Bank erosion was abundant, with many areas of fresh slips and high levels of fine deposited sediment noted within the channel. Photographs of the habitat within Tributary 3 are provided in Figure 3.

While undertaking the habitat assessment kōura were observed. No aquatic fish species were observed.

The largely soft sediment of Tributary 3 and minimal cobble habitat both upstream and downstream is not favoured shortjaw kōkopu habitat (adult fish are typically found in relatively small, bouldery, intact bush-covered streams[3]).

Presence of shortjaw kokopu

Subject to the findings from the eDNA sampling, the observations of mostly unfavourable habitat, strongly suggest that shortjaw kōkopu are not present in Tributary 3. This finding is consistent with the existing known information that shortjaw kōkopu have not been observed or detected in Mangapū Stream or its tributaries upstream of, and including, Tributary 3.

Figure 2*. Examples of the habitat within Tributary 3. (left) downstream habitat higher presences of cobbles and boulders. (middle) typical habitat in mid reaches, with abundant deposited fine sediment. (right) waterfall approx. 6 m high.*

Effects management

Fish salvage and relocation

Notwithstanding the unfavourable habitat and the absence of observations of fish in Tributaries 3 and 4 in the present surveys, the FTAA-2603-1185 application provides for the salvage and relocation of native fish, which will include Tributaries 3 and 4. Salvage will occur from the reaches of Tributaries 3 and 4 where culverts will be placed as part of Stage 2 of the expansion (construction of new haul road), as well as upstream of the culvert at Tributary 4 (upstream as a precautionary measure). Salvaged fish will be relocated to the lower reaches of each respective tributary.

The proposal has been amended to provide for fish passage in the Tributary 3 culvert. However, challenges within the Tributary 4 culvert relating to low flow and steep gradient result in a high-degree of uncertainty as to the ability to successfully provide for fish passage. Accordingly, the proposal maintains blocking of fish passage in the stage 2 culvert at Tributary 4..

There is no intention to undertake a fish salvage and relocation for the entirety of the lengths of Tributaries 3 and 4 at the time of installing the Stage 2 culverts.

[3]https://niwa.co.nz/freshwater/kaitiaki-tools/mahinga-kai-what-species-interests-you/shortjaw-kokopu

Salvage and relocation of native fish from the entirety of Tributaries 3 and 4 will be considered at the time of the quarry expansion into these areas, which is expected to occur during Stages 7 and 8 of the expansion some 43-73 years hence.

Offset/compensation

We also note that offset/compensation provides for the complete removal of culvert installation locations of Tributaries 3 and 4, and for the reaches upstream of the culvert location in Tributary 4 (151 m of intermittent stream) as part of Stage 2. This means that the offset/compensation for the loss of values and extent associated with the stage 2 culverts occurs immediately and should future works be approved, will contribute to some 43- 73 years of benefit in advance of the actual loss of the tributaries planned in Stage 7.