

To: Alex Semenoff

Date: 10 February 2023

Attention: Pamela Santos (Barkers)

Ref: 66172

Subject: Kings Quarry Stage 2 – Freshwater values

This memorandum provides a high-level assessment of the freshwater ecological values and characteristics within the proposed Stage 2 expansion area (Zone of Influence, ZOI) of Kings Quarry, Wainui, North Auckland. For this assessment, the ZOI includes the proposed pit expansion and overburden disposal, a smaller footprint to the northeast of the proposed pit. This assessment is solely informed by a desktop review of freshwater environments (overland flow paths, floodplains and biodiversity overlays), as indicated by Auckland Council Geomaps GIS viewer (mapped in Figure 1), as well as relevant information provided by terrestrial ecology investigations.

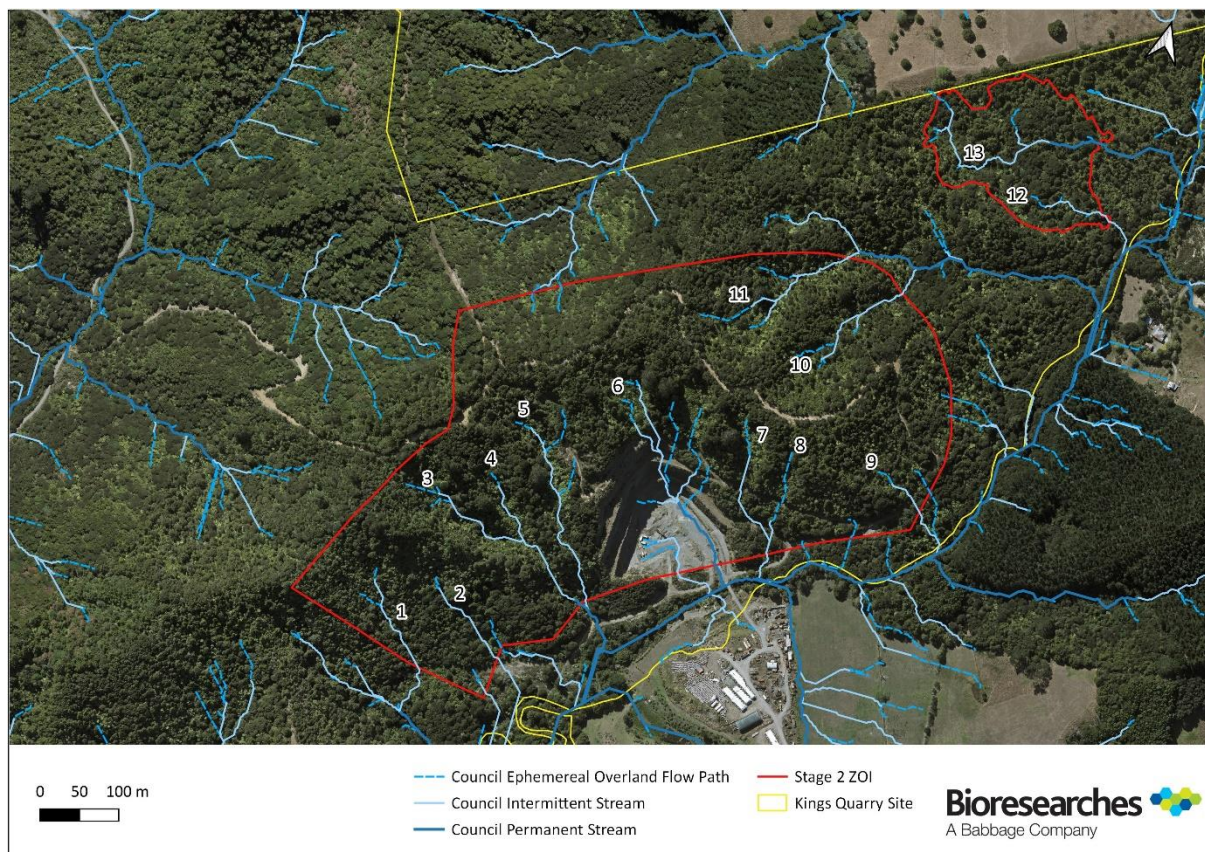


Figure 1. Kings Quarry site at Wainui, North Auckland, showing predicted overland flow paths present within the proposed expansion and overburden disposals.

Freshwater Ecology

Auckland Council Geomaps indicate several potential permanent and intermittent tributaries of the Waitoki Stream to be within the Kings Quarry ZOI. Eleven stream systems are predicted to be present within the expansion area, and two stream systems present within the overburden area. No ecosystems extents indicative of natural wetlands (palustrine or riverine ecosystems) were observed within the ZOI, and floodplain data does not indicate the ZOI to be saturated enough to support a

riverine wetland on the boundaries of the streams. No wetlands are expected to be present due to the high shade and steep topography of the ZOI.

The Stage 2 ZOI is covered entirely by indigenous forest, likely providing good filtration and year-round shade and organic matter inputs. It is expected the streams would consist of hard substrates and contain high hydraulic heterogeneity due to the topography of the ZOI. Records from the New Zealand Freshwater Fish Database indicate īnanga (*Galaxias maculatus*), longfin eel (*Anguilla dieffenbachii*) and common bully (*Gobiomorphus cotidianus*) have been recorded within the wider King's Quarry site. Fish surveys undertaken by Bioresearches further indicate redfin bully (*Gobiomorphus huttoni*), shortfin eel (*Anguilla australis*), smelt (*Retropinna retropinna*), banded kōkopu (*Galaxias fasciatus*) and torrentfish (*Cheimarrichthys fosteri*) have been recorded within the Waitoki Stream.

It is expected the streams within the ZOI would be, at minimum, of moderate ecological value based on ground-truthed stream values surrounding the quarry¹ and there is the potential for endangered aquatic fauna to be present within the area.

Assessment of Effects

The aquatic habitat within the ZOI that will be affected by the Stage 2 expansion and overburden area comprises of approximately 2,340 linear metres of intermittent stream and 177 linear metres of permanent stream. A total of 2,517 linear metres of stream will be impacted. The stream extents are conservatively estimated as overland flow paths and catchments within the ZOI may be absent.

The magnitude of effect of stream loss, without offset or compensation, is assessed as being 'Very High'. This is due to the complete loss of all stream habitat within the ZOI. The likelihood of this effect occurring will be definite and will have a direct impact on the stream habitat. The loss of stream will be permanent and irreversible. The proposed Stage 2 works will result in a 'High' level of effect.

Reclamation of streams presents the potential for the injury or mortality to freshwater fauna, which are anticipated to be within the streams. As such, the potential magnitude of effects on freshwater fauna without minimisation or mitigation is expected to be 'High'.

Mitigation

The potential for injury or mortality to indigenous freshwater fauna can be mitigated by implementing fish recovery management prior to the reclamation of streams. Intermittent streams provide less habitat for native fish in comparison to permanent streams and are temporary in nature ceasing to flow during the drier, summer periods. The implementation of a fish recovery plan and undertaking stream reclamation during summer months would minimise the potential effects on fish.

Following the implementation of appropriate fish management, the magnitude of effect on freshwater fauna is expected to be low, resulting in an overall 'Low' level of effects.

¹ Bioresearches (2021) Kings Quarry Ecological Assessment of Effects Report: 306 Pebble Brook Road, Wainui.

Offset

It is not possible to remediate or mitigate stream reclamation as there is a complete and permanent loss of aquatic habitat. While stream reclamation cannot be mitigated, it can be offset or compensated. The loss of 2,517 linear metres of stream in the Stage 2 expansion area is considered a significant residual adverse effect under the Auckland Unitary Plan – Operative in Part (AUP) and the National Policy Statement for Freshwater Management (NES-FM) and would require offset environmental compensation.

Under Section E3 Lakes, rivers, streams and wetlands of the AUP, E3.2. Objectives [rp] (3) states:

Significant residual adverse effects on lakes, rivers, streams or wetlands that cannot be avoided, remedied or mitigated are offset where this will promote the purpose of the Resource Management Act 1991.

The offset procedure requires the use of Stream Ecological Valuation (SEV) and Environmental Compensation Ration (ECR) to quantify the amount of offset stream bed area required to achieve ‘no-net-loss’ of stream bed area (Stream length and average width). The requirements for stream environmental compensation and mitigation and the procedure to follow is detailed below.

Stream Offset Procedure

The following procedure summarises the steps required to calculate the amount of offset compensation required for stream works using the SEV and ECR methodology^{2,3}.

1. Characterise the quality of the aquatic habitat that will be lost as a result of the proposed development - undertake Stream Ecological (SEV) assessments of the impacted stream if appropriate.
2. Identify a compensation/offset site. Ideally this would be onsite either upstream or downstream of the site, within the same catchment, and as close to ‘like for like’ in character as the section of stream being impacted (similar stream width, characteristics) as outlined in the AUP (OP) Section E3.3(4). Initially onsite options would be investigated and if these options were not accepted as ‘like for like’, did not have enough length for mitigation works or were not suitable due to land ownership, then other options would be investigated offsite.
3. Once a compensation site has been identified the habitat quality of the compensation stream would be characterised and an assessment undertaken.

² SEV is the favoured method by Auckland Council, but an ecological value may also be based on the “Guidance of Good Practice Biodiversity Offsetting in New Zealand” document, which is an accepted alternative to SEV for offsetting (E3.3(4) AUP(OP)). Both documents have equal precedence within the AUP (OP).

³ Storey, R. G., Neale, M. W., Rowe, D. K., Collier, K. J., Hatton, C., Joy, M. K., Maxted, J. R., Moore, S., Parkyn, S. M., Phillips, N. & Quinn, J. M. (2011). Stream Ecological Valuation (SEV): A Method for Assessing the Ecological Function of Auckland Streams. Auckland Council Technical Report 2011/009. 66p.

4. The information would then be used to calculate the Environmental Compensation Ratio (ECR), which determines the area of compensation stream required based on the restoration/enhancement works taking place.
5. The section of compensation stream to be restored/enhanced would be defined. Restoration typically consists of undertaking native riparian planting to a minimum of 10m each side of the stream channel.
6. A detailed restoration/riparian planting management plan would be developed. This plan would describe the areas and plant species to be planted, outline maintenance plans (e.g. weed management, pest management, plant replacement and fencing) and include any other restoration actions to be undertaken.
7. Legal agreement of the landowner to proceed would be obtained.
8. The restoration plan is then implemented.
9. Monitoring may be needed to confirm the riparian planting has been successful and that the ecological gains have been achieved.

The principles for aquatic offsetting within the NPS-FM⁴, are:

- a. Adherence to effects management hierarchy
- b. When aquatic offsetting is not appropriate
- c. Scale of aquatic compensation
- d. Additionally
- e. Leakage
- f. Long term outcomes
- g. Landscape context
- h. Time lags
- i. Trading up
- j. Financial contribution
- k. Science and mātauranga Māori
- l. Tangata whenua or Stakeholder participation
- m. Transparency

⁴ Ministry for the Environment (2022. National Policy Statement for Freshwater Management 2020, amended December 2022.

Recommendations for offset

Offsetting, restoration and enhancement recommendations:

- a. The site be located as close as possible to the subject site.
- b. Be 'like-for-like'.
- c. Achieve no net loss.
- d. Preferably achieve biodiversity gains.
- e. Offset ratios of 3:1 is adhered to, dependant on current and potential SEV values.
- f. Minimum of 10 m riparian planting undertaken within the offset site.
- g. Consideration of the use of biodiversity offsetting.
- h. The use of Storey et al. (2011), Appendix 8 (AUP Operative in Part) and the Ministry for the Environment et al. (2014) for guidance.

Provided that the above stream offset procedure and recommendations are adhered to, then the potential effects of the Stage 2 pit expansion on the freshwater ecological values would be appropriately compensated and offset.

Regards,



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