Appendix L Stormwater and industrial trade activities

Technical Memorandum

Subject:	ARL Transition Project – Stormwater, ITA and Sediment Assessment	**Reference No:**	1092369.7000
Author:	Rob Van de Munckhof	**Date:**	14 October 2025

1 Introduction

Tonkin & Taylor Ltd (T+T) has been engaged by WM New Zealand (WMNZ) to provide technical assessments to understand the effects from a proposal to reconsent Redvale Landfill, north of Auckland.

Redvale Landfill is currently scheduled to cease accepting waste in December 2028 and due to a delay in the authorisation and establishment of the replacement Auckland Regional Landfill (ARL) a transition plan is required. The proposal is to continue sending the current residual waste (around 600,000 tonnes per year) to Redvale Landfill, beyond the existing consent limit of December 2028. This would require new resource consents at Redvale Landfill.

To accommodate the on-going placement of waste at Redvale Landfill beyond 2028, the proposed works will involve the following:

- **Revised final surface profile of the existing landfill:** The current final design landfill ground profile varies but is less than 1V:3H across the footprint. That ground profile will be steepened up to a maximum grade of 1V:3H, to allow placement of additional waste within the existing landfill footprint. Bunds, varying in height between 2 and 6 m, will be constructed along the eastern and southern boundaries to accommodate the required additional waste volumes.
- **Class 2 extension:** The landfill is proposed to be extended to the south-west of the current landfill boundary, within the area currently occupied by the now decommissioned Managed Fill and Pond 6. The extension will comprise the excavation and lining of a new landfill cell, allowing the acceptance of waste that meets the Class 2 waste acceptance criteria, which will be constructed in a manner similar to the already constructed cells within the current landfill.
- **Relocation of ancillary activities:** the relocation of ancillary activities to allow for the placement of waste.
- **Sediment Retention Ponds:** The removal and filling in of Sediment Retention Pond 6 and the Office Pond while enlarging Pond 1 to capture and treat the stormwater from these catchments.

This technical memorandum provides an outline of the initial findings of the Water Quality and Stormwater Assessment and has been prepared for inclusion in an application for Ministerial referral of the project under the Fast-track Approvals Act 2024. Specifically, this technical memorandum responds to the requirements under section 3.4 of the Fast-track Approvals Referral Application Form. A full description of the draft proposal is included in the accompanying information attached to the application form for the referral.

2 Summary of findings

Contaminants and sediment within surface water runoff from stormwater, Industrial and Trade Activities (ITA) and earthworks may potentially have water quality and quantity effects on downstream receiving environments, being the Rangitopuni Stream.

The activities are managed through the implementation of stormwater treatment systems, erosion and sediment controls including the use of sediment retention ponds and operational controls through an existing Industrial or Trade Activity Environmental Management Plan.

We have undertaken an initial assessment of water quantity effects, including effects on stream stability and channel erosion, and **assessed any effects as negligible**, as there are **no** changes in the runoff from the site associated with the proposed extension.

This initial assessment of water quality effects has identified that there is **no evidence of any statistically significant changes in water quality** between the upstream and downstream sites within the Rangitopuni Stream associated with existing activities and no changes anticipated with the landfill extension. This is supported by water quality monitoring of the discharge showing generally **low** concentrations of contaminants with only the occasional exceedance of ammoniacal nitrogen, copper, manganese, zinc and conductivity.

Potential sediment effects associated with the operation of Stockpile 4 will be managed through the implementation of an Erosion and Sediment Control Management Plan, as well as utilising the existing Sediment Retention Pond.

3 Assessment methodology

The methodology to inform the assessment to date has been desktop-based, utilising long-term water quality monitoring data of both the discharges from the individual on-site treatment ponds and receiving environment monitoring data upstream and downstream of site discharges.

The following desktop-based tasks and assessments have been undertaken to inform the assessment:

- Review of historical water quality monitoring data undertaken in accordance with Condition 117 of Permit REG-641342 for the on-site treatment systems to understand the effectiveness of existing controls.
- Review of historical receiving environment water quality monitoring data in the Rangitopuni Stream undertaken in accordance with Condition 117 of Permit REG-641342 to identify any potential trends or changes in water quality that could be attributed to discharges from the site.
- Review of the Ecological Memo (specifically as this relates to freshwater) to understand the sensitivity of the receiving environment and potential evidence of changes in the ecological environments that could be attributed to discharges from the site.
- Stormwater calculations including stormwater runoff and sizing of the current stormwater systems to confirm the treatment systems are consistent with current good practice.
- Review of current operational controls related to managing activities with the potential for contaminant discharges from the site.

4 Site and project context

A general description of the site and surrounding locality is included in the accompanying information as part of the referral application. The following elements of the site and project are key to the Stormwater, ITA and Sediment assessment:

- The existing site surface water drainage system has been designed to achieve four principal objectives:
  - Stormwater run-off which has been in contact with refuse will be kept separate from stormwater from all other places and will be treated as leachate. This run-off is collected as part of the leachate collection system and is not discharged to the environment. Consequently, it is not included in the stormwater or ITA applications.
  - Stormwater run-off from the landfill footprint and ITA area will be controlled to avoid erosion and passed through treatment ponds to reduce sediment and contaminant discharges. This includes stormwater from the landfill footprint, including earthworks construction areas, as well as the workshop, generator centre, and water from the wheel wash.
  - Clean stormwater run-off from neighbouring land and land within the site including buffer zones which are outside the landfill or ITA Activity Area will be diverted in separate drainage systems direct to off-site receiving waters. This run-off is not included in the stormwater or ITA applications.
  - Stormwater from completed landfill areas (finished contours with final cover in place) will be controlled by permanent drainage systems and by practices such as grassing to minimise erosion. Run-off will be passed through the treatment ponds until closure.
- Water quality monitoring has been undertaken at four sites within the Rangitopuni Stream and tributaries as shown on Figure 4.1 below. Monitoring at the four sites commenced prior to the establishment of the landfill and therefore a comprehensive dataset is available to evaluate current water quality in the Rangitopuni Stream and identity changes in water quality.
  - The purpose of each monitoring site is as follows:
    - Site 1: Upstream site of Pond 4 discharge, located in tributary of Rangitopuni Stream.
    - Site 2: Upstream of Pond 1, 2 and 3 discharge points located in the Rangitopuni Stream.
    - Site 3: Downstream of all discharges from the landfill into the Rangitopuni Stream.
    - Site 4: Upstream of Pond 1 discharges, located in tributary of Rangitopuni Stream.

- Stockpile 4 will be utilised as a key source of material for the construction of the landfill extension and for final closure of the landfill. Stockpile 4 was developed to place material excavated during the construction of the landfill for re-use during future development and closure of the landfill. Runoff from Stockpile 4 will utilise the existing sediment retention pond constructed when Stockpile 4 was first established, with the addition of a new forebay at the base of the stockpile to increase the available storage capacity of the existing pond system.

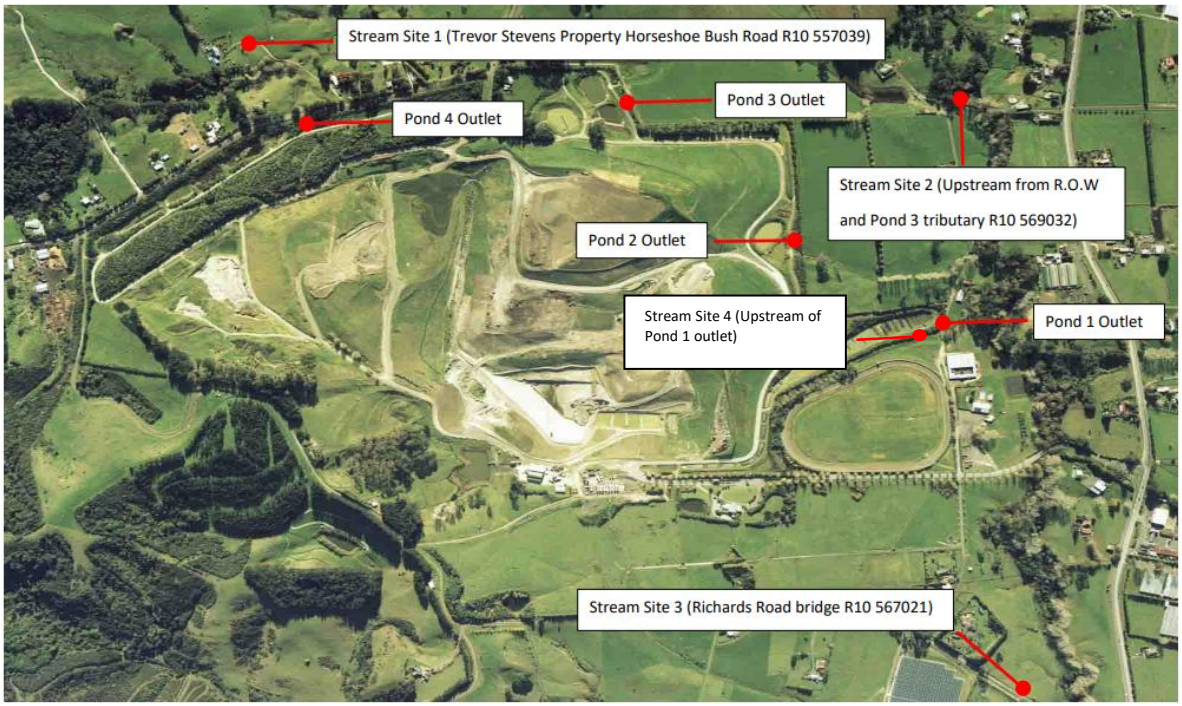

Figure 4.1: Water quality monitoring locations.

5 Assessment of potential effects

Based on the proposal, an assessment of potential effects has been undertaken and summarised below. The potential effects on the environment from the on-going discharge of stormwater, sediment and contaminants from an ITA (being the existing landfill) are as follows:

- Water quantity through potential increase in the peak flow rate and volume of stormwater discharged into the receiving environment.
- Stream stability and channel erosion through increased peak flows from impervious surfaces.
- Water quality through the discharge of contaminants (other than sediment) into the receiving environment.
- Water and stream quality through the discharge of sediment into the receiving environment.

5.1 Water quantity effects

Surface water from the landfill discharges into the Rangitopuni Stream. Surface water discharges have occurred from the site since the original lime quarry operation commenced and discharges from the landfill development have occurred since the landfill commenced in 1993. Therefore, current peak discharges from the site are part of the existing flow regime of the stream.

Although discharges from the site are part on the existing flow regime, the discharges were approved based on peak flow buffering from the site for specific rainfall events. This is achieved by controlling the peak velocities during specific rainfall events. The current peak flow limits in the existing consent were developed at the time the landfill was first permitted using rainfall and stream flow information at the time of the original application under the Water and Soil Conservation Act 1967.

Updated calculations using current rainfall rates and for the 2-year, 10-year and 100-year Average Recurrence Interval events have confirmed that the existing peak flow limits are still **lower** than the calculated pre-development peak flows.

5.2 Stream stability and channel erosion effects

As outlined in Section 5.1 above, current peak discharges from the site are part of the existing flow regime of the stream.

Stream stability and channel erosion effects occur where the runoff volumes and peak velocities from development are greater than pre-development and exceed the ability for a stream to manage the increased flows. Considering the site has been operational for 30 years, any evidence of on-going stream stability or erosion effects would be evident within the receiving environment by now if they were to occur. The Freshwater Ecology assessment indicates that the stream environment downstream of the discharge locations is similar to upstream, indicating limited evidence of any change in the character of the stream environment.

5.3 Water quality effects

Analysis of historic water quality data within the receiving environment has been utilised to understand potential water quality effects on the downstream environments. This has included reviewing monitoring data at the point of discharge and within the receiving environment.

The review of the water quality monitoring of the discharge from the stormwater treatment system has shown:

- Ammoniacal nitrogen concentrations from Ponds 1 and 4 do exceed the ANZECC 95% Species Protection Level (SPL) on occasion (37 out of 1900 monitoring results), although the mean and median are below the DGV, and the 95th percentile is below the 80% SPL with no allowance for mixing.
- The mean, median and 95 percentiles concentrations of metals are all below the relevant guidelines with the exception of the 95th percentile for dissolved copper.
- There have been only two occasions where conductivity has exceeded the trigger level 2 values with no exceedances since 2020.
- Total suspended solids concentrations have complied with the current consent of 50 g/m^3 over 95% of samples.

The monitoring results show that with no allowance for mixing, the discharges are generally compliant with the existing trigger levels and current receiving environment guideline values, with the occasional elevated result for ammoniacal nitrogen, copper and conductivity.

Monitoring within the receiving environment has been reviewed to understand whether the occasional higher discharge concentration is showing any evidence of effects.

The analysis indicates that at Site 1, upstream of the majority of the landfill discharges, water quality parameters are generally below the ANZECC DGV for 95% SPL with the exception of metals including zinc, manganese and copper which exceed the 80% SPL. Monitoring data for Site 2 and 3 show similar patterns, but with a slightly higher frequency of elevated dissolved copper concentrations at Site 2 and some exceedances of the 95 % SLP for Total ammoniacal nitrogen and dissolved cadmium and chromium at Site 2 and aluminium, lead, zinc and manganese at Site 3. The data shows some alignment in monitoring results between the discharge and the receiving environment with concentrations of copper, zinc and manganese elevated upstream of the discharge indicating contributions from other sources within the catchment (metals are a key contaminant associated with road runoff).

Non-parametric Kruskal Wallace test[1] results for chromium, copper and cadmium **do not indicate significant differences** between the sites. Further statistical analysis using the non-parametric post-

[1] The Non-parametric Kruskal Wallace test can be used to identify potential statistically significant differences between groups where the data is not normally distributed.

hoc Dunn test[2] to understand paired differences between individual paired sites show that the difference between Sites 2 and 3 for ammoniacal nitrogen, total zinc and manganese, **are not significant**. Overall, the monitoring data does not show any evidence of any statistically significant change in water quality downstream of the site discharges following discharges from the landfill.

5.4 Sediment effects

The two main sources of sediment discharged from the site are from the operational landfill which is managed through the existing stormwater treatment system and discharges from Stockpile 4. Total Suspended Sediment is monitored at each discharge point with monitoring results showing discharges typically well below the current consent limit with the ponds effective in managing sediment from landfilling activities.

The approach to managing sediment from earthworks is well understood and subject to the effective implementation of the proposed controls (below) then sediment discharge will be minimised.

Sediment discharges from Stockpile 4 will be managed through the implementation of an Erosion and Sediment Control Plan based on Auckland Council GD05 which will set out the methods that will be used to undertake erosion control to prevent sediment from being mobilised in the first place and sediment control to retain sediment generated on the site.

The key control methods include the provision of the sediment retention pond and controlling the active earthworks area to ensure this is minimised and below the capacity of the sediment retention pond. Subject to the effective implementation of the sediment controls during works, the effects of sediment are expected to be no more than minor.

[2] The post-hoc Dunn test is a non-parametric test for comparison of paired data.

6 Applicability

This report has been prepared for the exclusive use of our client WMNZ, with respect to the particular brief given to us, and it may not be relied upon in other contexts or for any other purpose, or by any person other than our client, without our prior written agreement.

We understand and agree that WMNZ will submit this report to the Environmental Protection Authority in support of a referral application under the Fast-track Approvals Act 2024 for the works described herein, and that the Environmental Protection Authority will rely on this report for the purpose of assessing that application.

Tonkin & Taylor Ltd

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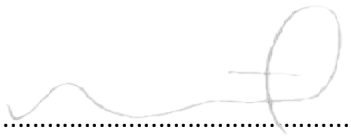

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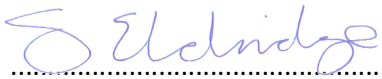

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