Risk management assessment s92 response

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91 A semi-quantitative risk assessment has been undertaken for a variety of scenarios within the submitted Risk Management Assessment Report (RMAR). However, the level of detail provided within the report is insufficient to allow a thorough peer review. Overall, the RMAR does not sufficiently assess the likelihood or severity of environmental risks. In this respect, a quantitative assessment of the ecological risks outlined in the RMAR should be provided and should include:

- *the cumulative impact of all discharges from the site as well as background concentrations outlined in the BMR (T & T, 2019b);*

This is outside the scope of the Risk Management Assessment Report and is assessed by Technical Reports G and P.

- *potential for bioaccumulation and secondary poisoning potential for ecological and human receptors;*

The Health Risk Assessment (Section 4.4) provides some assessment of these aspects. In summary the exposure pathway to enable continued exposure to these contaminants is incomplete or at most intermittent due to operational control and monitoring of this to verify effectiveness. The ecological and human pathway that has been assessed in the Human Health Risk Assessment as outlined in Section 4.6 is considered adequate to address this concern.

- *assessment of persistent, bioaccumulative and toxic compounds outlined within the Stockholm Convention, most recent updates to NZ Drinking water guidelines and the ANZG (2018) Fresh water and marine guidelines;*

There are currently 28 Persistent organic pollutants (POPs) listed by the Stockholm Convention as at May 19 that include pesticides, industrial chemicals and by-products.

Section 5 of the HHRA considers the contaminants of potential concern based on source concentrations, screening for toxicity considering the Drinking Water Standards NZ 2018, and the fate and transport characteristics relevant to the pathways being assessed.

PFAS is selected in the HHRA as a POP for consideration. This is considered appropriate as it is mobile relative to the other POPs in the groundwater and surface water pathways as a result of its low partition coefficients. Consideration is also given in the HHRA to POPs in soil (aldrin, dieldrin and DDT).

For all viable exposure pathways assessed the hazard index is orders of magnitude below the hazard threshold, this gives confidence that less mobile POPs would not present an unacceptable risk.

- *assessment of water quality within the site streams against the criteria outlined in NZ NPS FW (2011) national objectives framework and most recent updates;*

This document has been superseded by the National Policy Statement for Freshwater Management 2014 and the subsequent 2017 amendment of this document. The progressive implementation plan developed by Auckland Council has this being implemented in 2025 through a series of scheduled changes to the Auckland Unitary Plan.

With regard to the national objectives framework and the relevant compulsory values in Appendix 2, including nitrogen species, phosphorus and dissolved oxygen, baseline values have been defined in the Baseline Monitoring Report (BMR) (T & T, 2019b). Monitoring to assess these parameters to meet the framework objectives should all be included by way of consent conditions and trigger levels included in the landfill management plan.

- *assessment of the acute and chronic toxicity risks to ecological receptors against suitable ecological guideline criteria;*

The risk events for exposure of ecological receptors to contaminants from leachate include the following pathways to surface water (including via groundwater):-

Risk ID	**Event**	**Receptor**	**Reference/comment**
1.15	Water Quality criteria not met in the discharge from Pond 1, Pond 2 or Pond 3. Located in Valley 1	Surface Water	Technical Report P – Stormwater and Industrial
2.2	Unforeseen leachate production	Surface water via groundwater	Transient and covered by Technical Report E
2.5	Leachate collection pipework failure within landfill	Surface water via groundwater	Transient and covered by Technical Report E
2.6	Leachate disposal tanker accident	Surface Water	Draft ITA EMP attached as Appendix A of Technical Report P
2.7	Toe bund failure	Surface Water	Technical Report B- Geotechnical Interpretive
2.8	Lining system settlement and failure	Surface water via groundwater	Mitigation relies on robust design and verification. Assuming failure if this type would likely require works to mitigate any effect beyond the level proposed and assessed.
2.9 & 2.10	Liner materials failure	Surface Water	Technical Report N – Engineering Report
2.12	Lining system failure	Surface Water	Technical Report N – Engineering Report
2.13	Cover failure	Surface Water	Technical Report N – Engineering Report
2.15	Leachate surface breakouts	Surface Water	Technical Report N – Engineering Report
2.16	Landfill instability	Surface Water	Technical Report N – Engineering Report
2.20	Leachate enters stormwater from recirculation	Surface Water	Draft ITA EMP attached as Appendix A of Technical Report P
5.10	Oil or fuel spills	Surface water via groundwater	Draft ITA EMP attached as Appendix A of Technical Report P
5.18	Wastewater discharge from ancillary facilities such as the site office	Surface water via groundwater	Draft ITA EMP attached as Appendix A of Technical Report P

The pathways for any exposure via groundwater are considered in Section 8 of Technical Report E - Hydrogeology Assessment which considers six points of exposure in Valley 1 and 2 confluence (POE#1), the Hoteo River (POE#2 and 3), Farm bore (POE#4 and 5) and the Waiteraire Stream (POE#6). Effectively these risk events result in a potential effect on groundwater so, with the exception of scenario 2.8 discussed above, the Technical Report assesses the effects. The Hydrogeology Assessment assesses effects against ANZECC guidelines at the 95% level of protection for freshwater species and concludes that there is no unacceptable risk to freshwater ecology.

The pathways for direct exposure via surface water would essentially require discharge via the surface water ponds. The assessment of these effects is addressed in the following Technical Reports:-

- Section 5 of Technical Report G – Ecological
- Section 9 of Technical Report P – Stormwater and Industrial
- Technical Report T – Health Risk Assessment

The operational practices in conjunction with a tiered monitoring protocol are therefore fundamental to mitigating any acute and chronic toxicity risks, including the development of appropriate trigger levels for inclusion in the management plan and subject to approval of the Auckland Council.

- *assessment of acute and chronic physical stressors to ecological receptors against suitable ecological guideline criteria;*

Section 5 of Technical Report G – Ecological and Section 9 of Technical Report P – Stormwater and Industrial provide assessment of the physio chemical water quality effects.

- *assessment of potential impacts against the appropriate water quality classes as outlined in Schedule 3 of the RMA;*

The potential effects in terms of physical parameters including temperature, pH, dissolved oxygen, clarity, fish consumption and undesirable biological growth have been assessed in Technical Reports G, P and T.

- *where minor or greater risks exist to ecological receptors a description of the mitigation measures should be provided (including safeguards and contingency plans where relevant) to be undertaken to help prevent or reduce actual or potential effects; and*

Appendix A of the RMAR provides the mitigation for each risk event. The relevant Technical Report areas are cross referenced above. Contingency responses will be developed in the management plans and emergency responses like those provided in Technical Report P. Appendix A will address more extreme unscheduled events.

- *where the scale and significance of the activity's effects identified within the ecological risk assessment are such that monitoring is required, a description of how and by whom the effects will be monitored should be provided.*

The proposed monitoring in the draft consent conditions addresses these potential effects.

<u>Answers are provided as follows to questions that relate to the purpose of the report:</u>

- *The purpose of their report*

The Risk Management Assessment Report is a qualitative assessment as stated in Section 2.1 of the report. Its purpose is as a risk screening exercise to identify the higher risk items that should be assessed in more detail as part of the bond assessment. It also provides a basis for confirming that adequate mitigation is place where necessary to minimise any potential for adverse effects for the risk event identified.

- *References to the information and figures that they used within their assessment that would add context and reason*

The technical reports prepared as part of the application are the key supporting documents to this assessment. We have cross referenced the key sections considered in the report as shown above.

- *Methods used to inform the numbers used in the report*

Likelihood

The likelihood of a risk event is based on considering the sequence of occurrences required for an assessed risk event to occur. For example a failure of the stormwater system at the site requires a sequence of occurrences to result in the uncontrolled release of sediments. As an example risk events 1.1, 1.2 and 1.3 which consider stormwater treatment pond failure are assessed as follows:

1. This event could occur from an error or omission with the constructed pond from either a design or construction error that is not detected by the peer review or construction supervision and is not identified by the site operators. The pond embankment is compromised and there is then storm event approaching the design events that is released and that this is not mitigated. In a detailed quantitative risk analysis an event tree would be developed that considers the sequence of events that and the probability that each would occur is used to calculate the probability. In this qualitative assessment for the purposes of the RMAR, the likelihood is derived based on a more generic assessment. For example the events that rely on human error have a likelihood in the order of less than 1 in 100 and typically closer 1 in 1000. For a design that is peer reviewed or construction work that has a robust QA process there are two lines of defence and the probability is therefore likely to be less than 1 in 1000 ($p < 0.001$). It is worth noting that for the event to occur in this scenario also requires the condition to exist on site and not be observed by the site operators.
2. Alternatively the risk event is a stormwater event that is outside the parameters that the system is designed for, and the secondary measures in the design do not prevent the event occurring. This would be a 1% AEP storm event (so 1 in 100) with a failure in the secondary measures (1 in 100) with no operator intervention (human error = 1 in 100). This gives a combined probability of 1 in 1000000 ($p < 0.000001$)

The highest probability is adopted in the selection of the risk likelihood giving a classification of ***Rare*** ($p = 0.0001 - 0.001$) for this uncontrolled release risk event.

Consequence

The consequence of the event is assessed against the criteria outlined in Table 3 of the RMAR for environmental, human health, social and cultural and financial.

Taking the example above risk events 1.1, 1.2 and 1.3 which consider stormwater treatment pond failure have consequences that relate to environmental and financial aspects:-

1. The environmental effects from an untreated release of suspended sediment would be apparent outside the landfill and require restoration/remediation and would possibly

involve regulatory intervention. Mitigation measures could be implemented within days with full reinstatement in months – the effects are therefore potential more than transient depending on the magnitude of subsequent rainfall events but not permanent damage that would require ongoing remediation. On this basis the consequence is less than ***Catastrophic*** but potentially greater than ***Moderate*** and is therefore rated ***Major.***

2. The financial cost of reinstating the ponds would be in excess of $100K and potentially greater than $1M but less than $10M if remediation downstream was required. On this basis the consequence is more than ***Minor*** but less than ***Catastrophic*** and is therefore likely to be ***Major.***