

Tim Baker

Q1:	Are the proposed trigger levels and response actions appropriate? Please explain
	The Applicant proposes to use total ammoniacal nitrogen (TAN) as the key indicator of leachate in groundwater and apply trigger values to this parameter. I agree with this approach as TAN is observed across all monitoring sites, coincident with other leachate indicators, and is often at very high concentrations well in exceedance of the ANZG (2018) (which is proposed as a surface water trigger). Sites have been grouped based on the distribution of residuals from an ANOVA or Mann-Kendall trend test. This has been done to have shared trigger levels for sites with similar impact profiles. I note that site LS13 has not been included, and its absence is not explained. I recommend it is included (I note it has significant variability in results but should still have a trigger applied given its central location). Short-term leachate trigger levels for groundwater sites have been proposed at the 95% confidence interval of long-term data, in the routine monitoring wells outside the landfill footprint. Medium-term trigger levels are to be calculated by way of trend analysis. A statistically significant degrading trend (over either a five or a 10-year period) will trigger a response. This grouping approach seems reasonable however it would be useful to present the 95% tolerance levels for each site individually, in addition to the proposed grouping trigger. I would like to be comfortable that the grouping approach does not allow individual sites to increase before being triggered. I recommend that applicant is asked to provide this.
Q2:	Has the Applicant proposed appropriate adaptive management and remedial measures to enable adverse effects identified through monitoring to be addressed?
	Yes, I consider the proposed trigger responses to be appropriate. The initial response is a review against historical data, and the second level response is follow-up sampling and reporting. I support these proposed trigger responses.

Pete Wilson

Q1:	Are the proposed trigger levels and response actions appropriate? Please explain
	The Applicant proposes to use total ammoniacal nitrogen (TAN) as the key indicator of leachate in surface water and apply trigger values to this parameter. I agree with this approach as landfill leachate is one of the more likely sources of TAN. Trigger levels for TAN have been proposed by the Applicant based on the 95% confidence interval of the long-term monitoring data for two downstream receiving environment locations (FH39 and FH40). I agree with using the 95% confidence interval of long-term monitoring data to derive trigger values; however, I recommend that such compliance triggers are also applied to monitoring of the North and Weighbridge ponds, which the Applicant is directly responsible for, rather than just in the downstream receiving environment. I consider that applying the same 95% confidence interval of long-term monitoring to each of the pond's long-term data is an appropriate approach to confirm that the quality of discharges is not degrading over time.

	The Kaikorai Estuary receives pressures from a range of catchment activities, which would make it difficult to identify if exceedances of the proposed trigger may be a result of landfill leachate rather than other catchment activities. As such, I am mindful that using FH39 and FH40 as the only proposed trigger locations would create high uncertainty, and it would be difficult to link exceedances of the triggers to the leachate specifically - ultimately making the triggers unhelpful if there is no management response due to uncertainty of the source. I still recommend that monitoring in these locations is beneficial to understand the landfill's effects on the receiving environment. The proposed receiving environment triggers (3.3 and 2.2 mg/L) exceed the ANZG (2018) 80% level of species protection (1.7 mg/L), which is the lowest level of protection offered by the guidelines. I do not consider trigger values that exceed this to be appropriate as it allows potential adverse effects on aquatic fauna. In my opinion, the 90% level of species protection (1.2 mg/L) is the lowest level of protection that should be applied after reasonable mixing. I understand this is a complex issue as TAN concentrations have historically exceeded this. The Applicant states that "<i>Longer-term trends are not considered a reliable basis for triggering responses</i>". I disagree with this statement. In my opinion, long-term trends are highly relevant for assessing chronic effects and long-term change. If, for example, TAN concentrations had a significant increasing trend, I would consider this an appropriate indicator that there could be an issue, rather than solely waiting for a trigger to be exceeded. In my previous assessment, I noted that one of the few significant long-term trends was an increase in TAN concentrations by 3.1% per annum at FH39, which the Applicant proposed as a key indicator site. This may suggest that, in time, exceedance could occur more often. Overall, I recommend that in addition to the downstream receiving environment locations, trigger values are also derived for each of the North and Weighbridge Ponds, which the Applicant is seeking to discharge water from into the receiving environment. Changes to water quality in these ponds outside of historical ranges, if that were to happen, could be clearly linked to effects from the landfill. I also recommend that consideration is given to trigger values in the receiving environment that would avoid adverse effects on aquatic fauna.
Q2:	Has the Applicant proposed appropriate adaptive management and remedial measures to enable adverse effects identified through monitoring to be addressed?
	Yes, I consider the proposed management response to an exceedance of the trigger to be appropriate on the basis that similar triggers are also developed for each of the North and Weighbridge Ponds. That is, determining whether the concentration exceeds historical values and further sampling if so. An exceedance of the retested sample would trigger further investigation into the landfill and necessary remedial action.