

Before Hawkes Bay Regional Council and Hastings District Council

In the matter of the Resource Management Act 1991

And

In the matter of Applications by Hastings District Council and Napier City Council
(**Applicants**) for approvals relating to Area B at Ōmarunui Landfill
(**Landfill**)

Summary of evidence by Tony Reynolds (Hydrogeology)

Dated 28 October 2021

1. I prepared evidence dated 2 September 2021 regarding the hydrogeological and environmental setting of Area B and potential hydrogeological effects.

Minor Changes and Corrections to Evidence

2. Please note the minor corrections to figure referencing in my evidence as follows:-
 - (a) At paragraph 31 the reference to Figure 2 should be to **Figure 3**.
 - (b) At paragraph 40 the reference to Figure 3 and Figure 4 should be to **Figure 4** and **Figure 5**, respectively.
 - (c) At page 12 the reference at the end of the first caption stating "... shown on *Figure 4 below*" should be to "... shown on **Figure 5 below**".

Summary of Evidence

3. The key points of my evidence are summarised in the following paragraphs.
4. The site is underlain by an unconfined aquifer comprised of bedrock (sandstone/limestone) and is overlain by alluvium and colluvium in the base of the valley within Area B.

5. Groundwater has been measured and monitored within the underlying bedrock to be at around 19 to 26 mRL with higher levels to the east of the Area B boundary. Water levels measured within BC7A indicate a water level at around 37 mRL.
6. Groundwater flow beneath Area B generally flows from east to west. To the west of Area B, groundwater is indicated to flow to the southwest.
7. Recharge of the groundwater at the site is inferred to occur through rainfall infiltration through the bedrock. Recharge to the alluvial groundwater system beyond the site is by rainfall infiltration and losses from the Tutaekuri River.
8. Permeability (hydraulic conductivity) of the underlying bedrock has been measured to be in the range of 1×10^{-4} to 3×10^{-8} m/s. The calculated permeability is 0.27 m/day or 3.1×10^{-6} m/s for the unconfined bedrock aquifer.
9. With the exception of BC6 (August 2018) sample exceedances outside relevant trigger values (DWSNZ¹ and ANZG² for protection of 95% of species) were reported at all other sample locations (BC6, BC7A, BC9, BH10, BC10, and BC14) for one or more of pH, total hardness, nitrate, iron, copper, zinc, manganese, and arsenic.
10. Groundwater contours indicate that groundwater flow is from the vicinity of BC14 to the southwest towards BC9, towards the north-west and to the north towards BC10. This groundwater flow direction supports our assessment that the elevated parameters (e.g. TKN, TOC, chloride, sodium, EC) in the sample from BC10 may have been affected by off-site activities. While parameter concentrations measured at BC5, BC6, and BC9 indicate that these locations may be representative of some background groundwater quality the results from BC14 and BC10 must also be considered representative of groundwater of a different quality flowing from off-site.
11. Based on the assumed mixing model, should leachate leakage occur at the modelled rate, leachate concentrations are predicted to be less than the relevant guideline value after mixing with flowing groundwater beneath the landfill liner and below the relevant guideline value at the Upokohino Stream.

¹ Ministry of Health, 2008. Drinking-water Standards for New Zealand 2005 (Revised 2018).

² ANZECC & ARMCANZ, 2000. Australian and New Zealand Guidelines for Fresh and Marine Water Quality. Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand, Canberra, now ANZG 2018.

12. The Moteo Valley and the Tutaekuri flood plain have numerous groundwater wells and groundwater and surface water take consents.
13. Based on the description of the landfill operation and modelled leachate concentrations my assessment is that the predicted effect on nearby groundwater users of the groundwater take and diversion, and the modelled change in groundwater quality, is inconsequential. Accordingly the potential effect of the Proposal on the Breckenridge potable water supply (bore number 16779) is assessed as inconsequential.
14. Saline intrusion is not considered to occur as a result of any proposed works as any diversion of groundwater would occur above mean sea level. Therefore there are no effects at the site associated with saline intrusion.
15. Settlement beyond the site boundary has been considered as negligible as dewatering for the purposes of landfill construction will be short term and occurring within bedrock.

Consent Conditions

16. I refer to the proposed consent conditions provided as Appendix A of Ms Brabant's evidence dated 2 September 2021. The recommendations I made at paragraph 100 of my primary evidence have been incorporated into conditions 47 and 48 in Ms Brabant's evidence as follows:
 - (a) Condition 47 refers to development of trigger levels for those determinands relevant to potential landfill leachate effects. My recommendation is that the trigger levels be set at three standard deviations from the mean of the baseline samples for Group 1 and Group 2 determinands. I consider that my recommendation provides more certainty that a trigger level exceedence is not a false positive.
 - (b) As the existing groundwater quality exceeds relevant standard or guideline levels at some locations, I recommend that condition 48 set out in the s42A report be reworded as follows:-

"The consent holder shall review all sample results within two weeks of receipt of results and

- a) *Compare Group 1 and Group 2 determinands with trigger levels (as defined in condition 47) to the trigger levels established in condition 47*
- b) *Compare Group 3 determinands to relevant drinking water standards or water quality guidelines.*

The consent holder shall then undertake actions etc ...”

The actions a, b, c, and d remain unchanged.

Tony Reynolds
28 October 2021