

**BEFORE INDEPENDENT HEARING COMMISSIONERS
AT GREYMOOUTH**

**I MUA NGĀ KAIKŌMIHANA WAHAKAWĀ MOTUHAKE
KI MĀWHERA**

RC-2024-0122

UNDER

The Resource Management Act 1991

IN THE MATTER OF

Application for discharge permits and application for variation of consent conditions.

APPLICANT

TAYLORVILLE RESOURCE PARK LIMITED

SUMMARY OF EVIDENCE OF NATALIE LINDA O'ROURKE

Dated

4 September 2025

Presented by:
Corcoran French
74 Armagh Street, Christchurch Central 8013
PO Box 13001, Christchurch 8141

Telephone: (03) 379 4660
Email: geraldine@cflaw.co.nz
jonathon@cflaw.co.nz
Solicitors: Geraldine Biggs &
Jonathon Sylvester

SUMMARY OF EVIDENCE OF NATALIE LINDA O'ROURKE

- 1 I supported GDC with the technical review of hydrogeology aspects of the discharge permit application in relation to the potential effects on GDC's potable water supply at Coal Creek.
- 2 I prepared a statement of evidence in writing dated 28 August 2025 and my evidence is summarised in the following section.

Summary of Evidence

- 3 The Updated HA contains information gaps that affect the assessment of effects, as discussed below.
- 4 On the basis of the limited well construction and bore log information presented in the Updated HA, I cannot confirm the appropriateness of the existing groundwater monitoring wells for obtaining representative data with respect to:
 - a groundwater levels (and therefore flow directions);
 - b groundwater quality; and
 - c hydrogeological properties of the formations, such as hydraulic conductivity.
- 5 It is unclear if preferential flow paths exist within the Pleistocene Gravel. I note that the Pleistocene Gravel is not homogenous, and preferential flow paths within zones of higher hydraulic conductivity could theoretically occur. These flow paths (if present) could influence groundwater flow directions, discharge points and travel times for contaminant transport, and could alter the assessment of effects.
- 6 It is unclear if fracture flow systems are present in the Kaiata Formation which may increase infiltration from the soakage area and connection between potential receptors. The investigations undertaken to assess the properties of the Kaiata Formation are very limited, and some of the investigations (slug testing and packer testing) have produced confounding information, which warrants further investigation.
- 7 There are potential contaminants that have not been tested for in the proposed discharge or in groundwater and surface water, and these should be tested to establish if they are present prior to the discharge occurring.

- 8 As a consequence of the information gaps, the existing (baseline) groundwater and surface water quality conditions and the discharge water have not been adequately established.
- 9 I note the baseline condition of groundwater may show some level of pre-existing contamination due to other activities at the TRPL site. If so, the assessment of effects would need to consider potential changes to the fate and transport of pre-existing contamination (if present) as a result of the discharge.
- 10 The Hantush model scenarios indicate the potential for groundwater flow away from the proposed soakage area in all directions. Mounding may therefore induce groundwater flow south towards the GDC supply bores.
- 11 The Hantush modelling includes a range of assumptions that may not reflect the site conditions, such as:
- a The Kaiata Formation is impermeable (i.e. does not transmit water).
 - b Soil permeability testing of the unsaturated gravel in the proposed soakage area has not been undertaken, and a hydraulic conductivity value of 1.96 m/day has been selected for the modelling to allow for a discharge of 300 m³/day.
 - c Dissipation (depletion) of the mound, which cannot be accounted for in the model.
- 12 Overall, I consider the extent of mounding that might occur under the proposed operational constraints is unclear.
- 13 I consider that the contaminant fate and transport modelling presented in the Updated HA is of little utility, given:
- (a) The “worst case” contaminant concentrations in the proposed discharge are not adequately characterised, due to the omission of testing for some potential contaminants.
 - (b) The existing conditions of groundwater are not adequately characterised, due to the omission of testing for some potential contaminants and the uncertainty generated from the lack of clarity of which geological formations are being monitored by the monitoring wells.
 - (c) The information gaps in the understanding of the site-specific hydrogeology.
- 14 With respect to the contamination CSM, there is at least one potentially complete pathway for contaminants to reach the GDC water supply bores. This pathway is

groundwater discharging into the roadside drain to the south of the TRPL site then transport in surface water to the Grey River terrace and seepage into the Holocene gravel. The roadside drain on Taylorville Road crosses beneath the road near sampling location TRD2 (Figure 15 of the Updated HA) into an unnamed creek referred to as “Noname Creek 2”. “Noname Creek 2” is located east of the GDC water supply plant, and its proximity to GDC bores is shown on Figure 10 of the Updated HA.

- 15 Migration through the Kaiata Formation presents another potential pathway for contamination to reach GDC’s water supply bores.
- 16 Because of the information gaps, I conclude that the assessment presented in the Updated HA is insufficient to assess the potential effects on the GDC water supply.
- 17 I consider that additional site investigations are needed to address information gaps to enable a suitable assessment of the potential effects.

Expert Witness Caucus – 1 September 2025

- 18 On 28 August 2025, I was provided ENGEO’s draft Temporary Discharge Monitoring Plan, dated 26 August 2025 (**the DMP**).
- 19 On 1 September 2025 I met with Mr Berry, Mr Griffiths and Mr Steffens, and we produced our Joint Witness Statement (**JWS**).
- 20 The points of agreement are outlined in Paragraphs 8 to 12 of the JWS. I note that the comparatively shorter list of points of disagreement does not suggest that there were few points of disagreement, rather a reflection of the limited time available and that that the focus for the caucus was seeking points of agreement to address the Commissioners directions outlined in Minute 5.
- 21 In the caucus it was generally agreed that a pathway for contamination to GDC’s bores existed, that is, the pathway via discharge into the roadside drain and transport in “Noname Creek 2” (refer Paragraphs 9 and 10 of the JWS). The parties disagreed on the level of potential effects via this pathway (Paragraph 13 of the JWS).
- 22 The parties agreed that there are potential contaminants that have not been tested for (Paragraph 12 of the JWS).
- 23 The parties agreed that in theory that it could be feasible to manage the proposed discharge via consent condition for a discharge management and response plan. The plan would be informed by further investigations and subject to independent

review. However, the participants did not have sufficient time to consider the draft wording for consent condition(s) (refer Paragraph 11 of the JWS).

- 24 ENGEO supplied an outline of suggested consent conditions, which are attached to Attachment 1 of the JWS. The outline indicates the preparation of a Groundwater Discharge Monitoring and Response Plan (**GDMRP**). A GDMRP was not available for the caucus. My understanding is that the GDMRP will supersede the draft DMP.
- 25 In Paragraph 18 to 24 of the JWS initial comments on potential conditions were provided. I note these are comments and not proposed conditions, as reflected in Paragraph 17 of the JWS: *“Due to the limited time available we anticipate the content and the wording of these conditions to be discussed and refined”*.
- 26 Other documented points of disagreement included:
- a Fracture flow in the Kaiata Formation, where Mr Steffens and I considered insufficient investigation has been completed (refer Paragraph 14 of the JWS).
 - b The ability of the Pleistocene Gravel to accept the volume of discharge (refer Paragraph 16 of the JWS).

Site Visit – 2 September 2025

- 27 I visited the TRPL site, observed the roadside drains near TRD2, and visited the vicinity of the GDC bores on 2 September 2025, accompanied by a representative from ENGEO. I thank TRPL, ENGEO and GDC for enabling the site visit.
- 28 My visit to the site and surrounds does not alter my opinions formed, or conclusions outlined, in my evidence.

Oral Evidence – 3 September 2025

- 29 In oral evidence, Mr Berry noted that all models carry a level of uncertainty (Paragraph 10). I contend that the uncertainty raised by the information gaps in the hydrogeological assessment is not simply uncertainty related to a model structure and parameters. There is information that would have been straightforward to obtain to inform the assessment but was not, e.g. by testing of proposed discharge water for the potential contaminants, or installing new monitoring wells in the south of the site, between MB3 and MB4, to better assess the groundwater flow directions. Instead, the assessment relies on using modelling.
- 30 In oral evidence, Mr Berry provided estimated volumes of fracture flow as lines of evidence for there being no viable pathway via fractures in the Kaiata Formation (Paragraph 16.1 and 16.2). The presumption that either a 3 cm or 5 mm fracture

bears any relation to the site conditions, and volume that may be transmitted by the Kaiata Formation, is not supported in evidence.

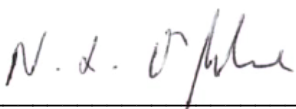
- 31 In the Commissioners' questions to Mr Berry, there was discussion regarding the base of the landfill cells and their interface with groundwater levels. I note that there may be local effects on groundwater flow directions from groundwater discharging into cells, leachate discharging from cells, and leachate pumping. With respect to this consideration, during my site visit I observed the proximity of the proposed Cell D to the proposed soakage area. Cell D is an open unlined gravel pit. I note that seepage into Cell D from the proposed discharge had not been considered with respect to the mounding effects.
- 32 In oral evidence and responses to the Commissioners' questions, Mr Berry noted that the Pleistocene Gravel is heterogenous (has varying properties) and anisotropic (has directional differences in properties). Mr Broughton also referred to differences in the gravel sub-units in his oral evidence. These considerations are important with respect to the potential for preferential pathways (which do not appear to have been considered in the hydrogeological assessment) and the idealisation of a homogenous unit in modelling scenarios.
- 33 In the Commissioners' questions to Mr Griffiths, there was discussion of the possible PFAS sources in construction and demolition (C&D) waste. To assist the Commissioners, I have attached a study¹ of PFAS leachability from various C&D wastes. In that study, C&D in unlined landfills is considered to pose a similar, if not greater, PFAS leaching risk than municipal solid waste landfills.

Conclusions

- 34 There is a generally agreed pathway to the GDC bores as outlined in the JWS and my evidence.
- 35 The understanding of groundwater flow patterns at the site, and the potential effects of mounding from the proposed discharge, are limited by the hydrogeological characterisation that has been undertaken.
- 36 The quality of the proposed discharge and the baseline conditions of groundwater and surface water have not been adequately established.

¹ Liu, Y, et al, 2024. *Per- and polyfluoroalkyl substances (PFAS) in construction and demolition waste debris (CDD): discerning sources and fate during waste management*. Journal of Hazardous Materials 472 (2024).

- 37 On the basis of the above, I consider the proposed activity could pose a risk to the GDC's water supply.
- 38 The yet to be formed draft conditions will include further investigations, which, in my opinion, could address information gaps I have outlined in my evidence.
- 39 I note that the results of further investigations could indicate that additional subsequent investigation is still needed to assess the potential effects of the discharge.
- 40 While I cannot comment on the consentability of the approach pondered in the JWS, I do note that an estimated timeframe was not included. To assist the Commissioners, I have provided my opinion here. Based on the suggested outline for conditions and initial comments in the JWS, I consider it could take up to three months following granting of the consent to complete the further investigation and interpretation, and independent reviews, before the discharge may be able to commence. This estimate does not account for the time before consent execution to prepare, review, and agree on the conditions.
- 41 I consider that the crafting of clear, workable consent conditions is likely to be difficult and take some time given the breadth of items to be included, which are not limited to the suggested outline provided by ENGEO or the initial considerations in the JWS.
- 42 I consider that the independent review process may result in disagreements over the interpretation of data collected, which could affect the assessment of risk. My reason for this consideration is based on the extent of differences already documented in evidence and iterations of review already undertaken by Mr Steffens and me.
- 43 I note that the timeframe would also be contingent on other factors, such as:
- a whether the detailed design of the soakage area changes the investigation approach,
 - b contingency for additional subsequent investigations, and/or
 - c further pre-treatment of the discharge water if new contaminants are identified.



Natalie Linda O'Rourke

Dated 4 September 2025