

To: Shay McDonald
From: Tim Baker
Company: Otago Regional Council
SLR Consulting New Zealand
cc:
Date: 5 April 2024
Project No. 875.V15838.00002

**RE: Green Island Resource Recovery Park Precinct Consent
Groundwater Quality and Quantity Review**

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1.0 Introduction

SLR Consulting NZ (SLR) has been engaged by Otago Regional Council (ORC) to conduct a technical review of the resource consent application (including subsequent attachments) submitted by Dunedin City Council (the applicant, DCC) for the development and operation of the Green Island Resource Recovery Park Precinct (RRPP) (referred to herein as the site).

As part of improvements to Dunedin's waste management and kerbside collection services, the applicant is proposing to develop a new RRPP facility at the existing Green Island Landfill which is coming to the end of its operational life.

SLR has prepared a number of technical memorandums in relation to the application. This technical memorandum relates to groundwater quality and quantity effects and management.

2.0 Scope of the Review

2.1 Key Documents Reviewed

The following key documents, which were submitted as part of the application, have been reviewed in the development of this technical memo:

- GHD Limited, 2024. Appendix 4: Green Island Resource Recovery Park Precinct - Groundwater Technical Assessment
- GHD Limited, 2024. Appendix 20: Resource Recovery Park Precinct – Draft ORC Conditions of Consent.

The following supporting documents have been cross-checked where they reference or related to groundwater aspects:

- GHD Limited, 2024. Appendix 2: Green Island Resource Recovery Park Precinct – Design and Operations Report
- GHD Limited, 2024. Appendix 3: Green Island Resource Recovery Park Precinct – Stormwater Management Plan and Assessment of Effects
- GHD Limited, 2024. Appendix 5C: Green Island Resource Recovery Park Precinct – Contaminated Land Management Plan

2.2 Pre-Application Review and Questions

Prior to this application being formally submitted, the SLR technical review team had the opportunity to carry out a pre-application review. This provided an opportunity to understand the application and provide some general questions on the application.

The Applicant responded to these initial questions and provided a summary spreadsheet (RRPP Technical Peer Review Spreadsheet) of where amendments to the application documents had been made. This process provided clarity on the proposed operation and the likely effects on groundwater and has greatly assisted this review.

3.0 Response

ORC posed the following questions which SLR respond to in turn:

- 1 Is the technical information provided in support of the application robust, including being clear about uncertainties and any assumptions? Yes, or no. If not, what are the flaws?**

Yes, the Groundwater Technical Assessment provides an adequate summary of the potential and likely effects of the proposed RRPP development on groundwater. It is generally based on technically defensible information and assumptions.

The background information (conceptual model and environment description) is a summary of information previously presented as part of the landfill closure application (Green Island Landfill Closure Groundwater Technical Assessment, GHD 2023).

- 2 Are there any other matters that appear relevant to you that have not been included? Or is additional information needed? Please specify what additional info you require and why. Please explain.**

There are no other matters for consideration.

- 3 If granted, are there any specific conditions that you recommend should be included in the consent?**

In relation to groundwater effects there are no specific conditions that are required in addition to the requirement to follow the process and methodologies for dewatering and leachate management as set out in the technical documents (covered by Schedule 1 – General Conditions).

- 4 Do the conceptual site models (RRPP design and operation, RRPP construction and dewatering) accurately reflect the groundwater system for the RRPP area?**

Yes, the conceptual model presented is adequate and represents the groundwater environment sufficiently for this application.

The conceptual model presented for the site, and clarified via the pre-application questions, can be summarised as follows:

- Rainfall landing on the site can infiltrate into areas not covered by hard standing/concrete pad/buildings, coming into contact with waste and generating landfill leachate within the underlying landfill.
- Leachate migrates downward and outward, and toward the edges of the landfill footprint, where (according to the Applicant's assessment) it is almost entirely intercepted by the leachate interception trench. Leachate is pumped from the trench at pump stations, which maintain the groundwater barrier.



- The leachate is pumped to the Green Island Wastewater Treatment Plant.
- Pumping from the leachate interception trench also draws in groundwater from outside of the trench perimeter. A PVC liner on the trench supposedly limits this, however chemistry of the abstracted water indicates a mixing of water types.
- Upward hydraulic gradients in the Lower Kaikorai Estuary formation (silts, sands clays) have been reported by GHD (2023) to restrict downward migration of landfill leachate into layers beneath the trench system.
- The underlying mudstone forms an aquitard which restricts deeper flow paths.

There are two main aspects to the proposed RRPP that have the potential to affect groundwater. These are:

- The potential for RRPP construction activities (specifically gravel raft foundations) to intercept groundwater (leachate) beneath the proposed footprint. This leachate is sitting within the landfill, and eventually discharges to the leachate interception trench.
- The potential for operational stormwater and leachate generated on the RRPP to enter groundwater (leachate) beneath the site or in the interception trench, from where it may affect offsite groundwater.

5 Do you agree with the description, assessment, and conclusions as to the effects of the RRPP construction activities on groundwater quality and quantity, and other groundwater users? Please explain.

Yes, I agree with the assessment of construction related effects.

The proposed design involves the installation of gravel raft building foundations to a (maximum) depth of 2.5 m below ground level. Based on groundwater monitoring from bores RRPP BH01 – BH04 it is likely that dewatering will be required to manage leachate ingress into the excavations.

The Applicant used SEEP/W to estimate inflow volumes and model scenarios to replicate the likely construction process. The modelling appears to use appropriate input values and assumptions and is therefore considered to be an adequate representation of the likely impacts.

The applicant proposes that leachate collected during dewatering of the excavation will be piped to one of the Pump Stations associated with the existing leachate collection system or recirculated and discharged to the landfill. It is noted that given the variability in the waste material, there are likely to be pockets of slightly higher inflows compared to other areas of the excavation. Estimated dewatering rates over a 30-day period range between 7.5 m³/day (low estimate) and 330 m³/day (high scenario).

Given that the leachate collected during dewatering will either be treated by the Wastewater Treatment System, or recirculated within the landfill, I agree with the Applicant that there will be no effect on groundwater quality or quantity beyond the landfill footprint.

6 Do you agree that the proposed leachate management system (capture and pipe leachate directly to pump stations and to WWTP) will ensure that there will be no adverse effects on groundwater quality or quantity resulting from RRPP (operational phase) leachate? Please explain.

Yes, I agree that it is unlikely to be no adverse effects on groundwater quality or quantity from the operational phase.



The proposed RRPP development will increase hard-standing and building area on the site, including moving the current green waste/organics processing area (~1ha) which is on uncapped landfill, onto hard-standing. Stormwater and leachate from these new areas of hard-standing and building, will be collected and discharged to one of several Pump Stations (PS) that currently pump leachate from the leachate interception trench to the WWTP.

Section 6.1.1.1 of the Stormwater AEE describes how leachate will be managed and outlines the stormwater flow calculations that have informed the efficacy of the proposed management system.

Runoff from the compost bunkers and maturation areas will be treated as leachate and discharged to PS6. To prevent the pumpstation being overloaded, three 30,000 L balance tanks will be installed to capture leachate generated during high flow event and prevent leachate backflowing from the PS into the perimeter drain (and therefore preventing the leachate entering groundwater beyond the footprint). This appears to be a robust and acceptable approach.

Stormwater run-off from the glass bunkers stockpile, and truck wash facility will be treated as leachate and discharged to PS5. The volumes estimated from this area of the site are well within the operating capacity of PS5.

The remainder of the site is managed as stormwater and directed to the Northern Leachate Pond (NLP). Discharges from the NLP are addressed in the Stormwater Quality assessment.

7 Do you agree that no groundwater monitoring is required for the RRPP other than monitoring that is proposed for the landfill (as described in Appendix A to the groundwater report)? Please explain.

I agree that no additional groundwater monitoring is required for the RRPP, other than the monitoring already proposed (but not yet agreed) for the Landfill consent.

4.0 Closure

The consent application and additional information provided to support the application are considered adequate to manage the risks to human health and the environment for the proposed development.

Should you have any questions, please do not hesitate to contact the undersigned.

Regards,

SLR Consulting New Zealand



Tim Baker,
Principal Consultant

Review: Gillian Holmes, Principal Consultant.

