

BEFORE A HEARINGS PANEL APPOINTED BY THE OTAGO REGIONAL COUNCIL

IN THE MATTER OF the Resource Management Act 1991 (“the Act” or “the RMA”)

AND

IN THE MATTER OF Application RM24.143 by Dunedin City Council to establish
and operate a resource recovery park

**STATEMENT OF EVIDENCE OF TIM BAKER ON BEHALF OF OTAGO REGIONAL
COUNCIL**

GROUNDWATER

23 October 2024

INTRODUCTION

1. My full name is Timothy Michael Baker
2. I am employed by SLR Consulting New Zealand Limited (SLR Consulting) as a Principal Consultant – Hydrogeology, based in Wellington.
3. I have read the Code of Conduct for Expert Witnesses in giving evidence to the Environment Court. I agree to comply with that code when giving evidence to the Hearing Panel in this matter. All my evidence is within my expertise, and I have considered and stated all material facts known to me which might alter or qualify the opinions I express.

QUALIFICATIONS

4. I hold a Bachelor of Science (BSc) in Geography and Environmental Science (2000) and a Master of Science Degree with Honours in Physical Geography (2004) from Victoria University of Wellington.
5. I have over 20 years' experience in the field of hydrogeology, water resources and discharges to land. I have been in consultancy for 15 years both in NZ and UK, and prior to that held the role of Groundwater Scientist at Greater Wellington Regional Council from 2003-2007.
6. I am a member of the Hydrological Society of New Zealand and am certified as RMA decision maker through the Making Good Decisions Programme (2023).
7. I have acted as an Expert Witness in groundwater and environmental discharge related consent hearings in New Zealand for the past ten years. I have provided expertise in the fields of hydrogeology, groundwater quality and environmental monitoring plan design to a range of local and central Government clients including the Department of Conservation and regional councils across New Zealand.

ENGAGEMENT AND SCOPE OF EVIDENCE

8. In November 2023 I was engaged by Otago Regional Council (ORC) to undertake a technical review of submitted application documents provided by Dunedin City Council (DCC).
9. I have not visited the site, however, I intend to prior to the hearing.

10. I have been asked by ORC to prepare evidence in relation to the construction and operational effects of the proposed Resource Recovery Park on groundwater.
11. In preparing this evidence I have reviewed the following documents:
 - (a) Waste Futures – Green Island – Resource Recovery Park Precinct Groundwater Technical Assessment Dunedin City Council 09 October 2023; which includes
 - (b) Appendix A: Waste Futures - Green Island Landfill Closure Groundwater Technical Assessment Dunedin City Council 09 March 2023

BACKGROUND

12. DCC propose to construct and operate a new Resource Recovery Park Precinct (RRPP) at the existing Green Island Landfill.
13. Several new buildings will be built as part of the RRPP. Excavation for the construction of concrete raft foundations buildings may require dewatering of groundwater (leachate) form within the landfill. Excavation up to 2.5 below ground level (m bgl) is likely. The depth of waste in the location of the RRPP is reported to be between six (6) to eight (8) metres deep.
14. Groundwater has been recorded ~2.1 m bgl, and therefore dewatering is likely to be minimal. The extent of drawdown from dewatering will be limited by the presence of the leachate drain, beyond which effects would be nil.
15. Dewatered water would be directed to the leachate drain pump stations, and then pumped to the wastewater treatment plant.
16. Leachate will also be generated on site as part of the RRPP activities. This leachate will be collected from hard standing areas directly to the leachate drain pump stations and treated by the local WWTP.
17. The operation of, and effects of the leachate drain on the surrounding environment are covered by the resource consent for the wider Green Island Landfill and not addressed in this consent.

APPLICATION AUDIT

18. In April 2024, I prepared a Technical Audit Memo to respond to questions posed by ORC regarding the application. A copy of this Memo is provided as Appendix A. My assessment has not changed since preparing this Memo.

SUBMISSIONS

19. Six submissions were received. None raised issues relating to groundwater.

PROPOSED CONSENT CONDITIONS

20. I have reviewed the proposed Conditions of Consent included in the ORC Officers Section 42A report and agree that no specific groundwater/dewatering related conditions are required. It is recognised that the proposed Construction Environmental Monitoring Plan will include details on the management of dewatering activities, which I consider adequate.

CONCLUSION

21. Overall, I consider that the technical information provided in relation to groundwater related matters is appropriate and supports the conclusion that effects on groundwater as a result of the proposed activities are negligible.



Tim Baker

23 October 2024

Appendices Appendix A: Green Island Resource Recovery Park Groundwater Review

Appendix A

Green Island Resource Recovery Park Groundwater Review

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.

