

Under the Resource Management Act 1991 (**RMA**)

In the matter of an application by **Dunedin City Council** for resource consents for the operation, closure and aftercare of the Green Island Landfill, Dunedin.

Statement of evidence of Anthony Dixon

4 March 2025

Applicant's solicitors:

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**anderson
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Qualifications and experience

- 1 My name is Anthony Dixon.
- 2 I am currently employed by GHD as a Technical Director and Business Group Leader for Waste Management in GHD's Sydney office.
- 3 I have over thirty-three years' experience in waste related projects in Australia and New Zealand. I have regulatory experience gained through a previous role as the Principal Technical Advisor – Waste Disposal at the New South Wales Environment Protection Authority where I led a team which advised on environmental performance, engineering and licensing of waste projects in New South Wales.
- 4 I have the following qualifications and relevant experience:
 - (a) Bachelor of Chemical Engineering with Honours from University of New South Wales, 1991;
 - (b) Master of Engineering Studies in Environmental Engineering from University of Sydney, 1992;
 - (c) Master of Engineering in Groundwater Management from University of Technology Sydney, 2003; and
 - (d) While working for the NSW EPA, for one project I reviewed the complaints made to the EPA about rural landfills in NSW. This identified a high proportion of complaints were due to fires and associated smoke. Since then, I have provided expert advice on several projects relating to landfill fires. This included:
 - (i) Expert advice on investigation of a fire at a waste storage and processing facility in Chester Hill for the NSW EPA;
 - (ii) Review of possible causes and advice on methods to extinguish and prevent fires in landfills for two confidential clients operating landfills in NSW;
 - (iii) Review of the possible operational and response factors that may have exacerbated the spread and extent of a landfill fire for a confidential client operating a landfill in the North Island of New Zealand;
 - (iv) Prepared a fire extinguishment and landfilling reactivation plan for a landfill fire at a 20,000 tpa landfill in rural NSW (Bald Hill Quarry Landfill).

- (v) Prepared a fire management plan for the proposed Smooth Hill landfill.

5 I have read the Code of Conduct for Expert Witnesses (Section 9) in the *Environment Court of New Zealand – Te Kōti Taiao o Aotearoa – Practice Note 2023*. This evidence has been prepared in accordance with it, and I agree to comply with it. I have not omitted to consider material facts known to me that might alter or detract from the opinions expressed.

Scope of evidence

- 6 I have been asked to prepare evidence in relation to the landfill fire risks associated with continued operation and closure of Green Island landfill. In particular I have been asked to address any outstanding issues arising from the independent review commissioned by Otago Regional Council (ORC) in November 2023.
- 7 This includes responses to ORC peer review comments provided in the *Section 42A Staff Recommending Report* dated 25 February 2025.

Executive summary

- 8 A Fire Management Plan (FMP) was prepared in March 2023 to support the Consent Application (Number RM23.185) that addressed how a surface or subsurface landfill fire could occur on the site and identified prevention, detection and mitigation measures.
- 9 The FMP was prepared as an appendix to the Design Report (GHD 2024). If resource consents are granted the Green Island Landfill Development and Management Plan (LDMP, Stantec 2023)) will be reviewed following the determination of the project and commitments in the FMP (and updates in this document) will be incorporated into the LDMP as are relevant. This will include consultation outcomes with Fire and Emergency New Zealand (FENZ).
- 10 A request for further information on 29 January 2024 under section 92(1) of the Resource Management Act 1991 was received in relation to the FMP. Overall it was concluded by the reviewer acting on behalf of the ORC that the fire mitigation, monitoring and management requirements detailed in the FMP were generally considered acceptable subject to some further clarifications.
- 11 An addendum to the FMP was prepared on 8 October 2024 in response to request for information that included a landfill fire risk assessment and

provided additional information to address the comments relating to fire risk.

- 12 Additional recommendations were also identified in the *Section 42A Staff Recommending Report*.
- 13 A meeting was held with Fire and Emergency New Zealand (FENZ) on 14 February 2025 to provide a tour of Green Island Landfill and discuss fire preparedness projects. Some preliminary actions have been identified and further discussion ongoing to confirm further FENZ's recommendations and enhance its effectiveness to contain and extinguish fires should they occur at the Green Is Landfill.

Sections as set out in scope of evidence above

Introduction

- 14 My evidence is based upon the information reviewed to inform the FMP and FMP Addendum which I prepared and recent feedback from FENZ. This information includes environmental monitoring data and other site reports relating to the landfill history and previous investigations. I have focussed my evidence on matters raised by Mr Elliot in the *Section 42A Staff Recommending Report*.

Overview of landfill fire risk assessment

- 15 The FMP Addendum addressed the following landfill fire risks:
 - (a) A surface fire over the landfilled waste
 - (b) A subsurface fire within the landfilled waste
 - (c) A surface fire extending to combustible material on site (with vegetation being the main fuel source)
 - (d) A surface fire entering the site from off-site (wind blown embers and via vegetation)
- 16 It was concluded that the residual risk rating for the above risk sources was low given the proposed risk treatment as detailed in the FMP.

Response to review comments

- 17 Mr James Elliot of SLR prepared a Statement of Evidence on behalf of Otago Regional Council dated 21 February 2025. The comments relevant to landfill fires are presented and addressed in Table 1, Appendix A.

- 18 The ORC prepared a *Section 42A Staff Recommending Report* dated 25 February 2025. The comments relevant to landfill fire management are presented and addressed in Table 2, Appendix A.
- 19 The comments predominantly relate to a requirement for a landfill fire risk assessment, battery fires and their management, review of the FMP, gas monitoring, infrared monitoring, chemical fires and odour monitoring for fires. I note these matters were addressed in the addendum to the FMP provided to the ORC in October 2024 but Mr Elliot does not appear to have had the benefit of been provided a copy.

Matters raised by FENZ

- 20 General feedback from FENZ during the site inspection meeting on 14 February 2025 indicated that they were generally satisfied with the proposed approach to fire management at the site. Further consultation with FENZ will be undertaken to confirm firefighting water supply capacity requirements, water cart specifications, implementation of fire awareness training, vegetation maintenance, monitoring and signage.
- 21 For example, FENZ suggested that the site's water cart not have a cannon installed on it to spray water, but instead Council should defer to it to respond to fire. I however recommend that the cannon is installed on the water cart as there can be ignition events which can be rapidly extinguished with earthworks plant and soils and having access to a water source to spray and cool the area is important to ensure that a surface ignition event is extinguished.
- 22 FENZ also suggested that a water cannon cannot project water 50 m or more and as this may not be possible due to wind conditions and not being able to have the flow forced by a pump, I recommend that the proposed consent condition be modified such that the cannon is procured to be able to at least project water as far as reasonably practical from the water cart.

Conclusion

- 23 I consider that the landfill fire management measures as identified in the FMP and FMP Addendum address site specific risks associate to potential fire incidents.
- 24 It is my opinion that the risk assessment I completed as part of the FMP Addendum sufficiently assesses the potential and associated risks of a fire occurring at the site and residual risks following the application of the proposed measures identified in the FMP.

- 25 The LDMP should be updated to include the fire mitigation measures identified in the FMP and supplemented by the FMP Addendum and response to review comments and address consultation outcomes with FENZ. These measures generally align with better practice management for landfills.

Anthony Dixon

4 March 2025

Appendix A

**Detailed response to review
comments**

Table 1 Response to ORC peer review comments

Key concerns	Response
<p>Inadequate details on the mitigation, monitoring, and management in relation to hazards associated with fires</p>	<p>A review of fire history and a Fire Risk Assessment has been conducted as part of the FMP Addendum. The following fire risks are identified:</p> <ul style="list-style-type: none"> - A surface fire over the landfilled waste. Risk rated as 9 (medium), mitigated by maintaining a small working face, trained staff, and inert materials. Residual risk: 6 (low). - A subsurface fire within the landfilled waste. Risk rated as 9 (medium), mitigated by monitoring the landfill gas collection system and implementing industry guidance. Residual risk: 6 (low) - A surface fire extending to combustible material on site or entering the site from off-site. Risk rated as 6 (moderate), mitigated by perimeter access track improvements and selection of low-flammability plant species. Residual risk: 4 (low).
<p>Batteries ignition risk</p>	<p>This has been noted and further addressed in the FMP Addendum.</p> <p>Measures for waste screening and monitoring are outlined in the FMP. Item 2 in Section 6.1.1 of the FMP specifies that, if safe to do so, a smouldering or burning battery should be removed to a covered waste area adjacent to the active landfill working area and extinguished there. This approach minimizes the duration that the battery remains in contact with flammable waste and further isolates it from potential landfill gas (LFG).</p> <p>Additionally, the DCC runs an active community education program on the risks of improper battery disposal. This includes a free battery drop-off service at the Green Island Rummage Store, along with various print and radio campaigns to raise awareness.</p>
<p>Inadequate details on the reviews, and potentially updates to the FMP</p>	<p>As noted in section 8.3 of the FMP, annual reviews of the plan will be undertaken to</p> <ul style="list-style-type: none"> – maintain its currency – ensure suitability to site specific hazards – provide general updates to firefighting technologies and procedures <p>In addition, a cause investigation protocol will be triggered following each fire incidence that may result in review and improvement of the fire prevention, detection and mitigation measures outlined in the FMP (refer section 7.3 of the FMP).</p> <p>The LDMP will also be subject to review and refinement following review by FENZ following its recent inspection of the Green Is Landfill.</p>
<p>Other types of firefighting methods</p>	<p>Where extinguishment by application of inert cover soils is not appropriate, for example due to chemical fire, staff will rely on direction from FENZ to manage these fires.</p> <p>FENZ are equipped with firefighting foams etc to manage different types of fires.</p>

Key concerns	Response
Odour monitoring	<p>Monitoring for odour to detect smoke is part of the fire detection measures listed in Table 5 of the FMP.</p> <p>Action item 4e of 'subsurface fire detected' of Appendix 4 of the FMP is updated as follows:</p> <p>e. Operations Supervisor and Landfill Supervisor will identify landfill vents (locations of smoke and odour emissions) and smother with stockpiled non-combustible cover soil to limit oxygen availability to the fire and limit odour.</p> <p>Furthermore, when there is a fire at the site, the frequency of landfill gas monitoring will be increased to daily for a period of two weeks following the fire to provide a check that the fire is not continuing in the waste mass.</p> <p>This is an additional item in the Action Plan to be included under both surface and subsurface fire detected scenarios. Further details are provided in Appendix B of the FMP Addendum.</p>

Table 2 Response to Staff Recommending Report review comments

Key concerns	Response
Prepare a Landfill Fire Risk Assessment which includes consideration of the potential for subsurface fires.	A risk assessment was undertaken as part of the FMP Addendum that included consideration of the potential for subsurface fires.
Update the FMP to include the management of battery-related fire, including provision for such a fire to be extinguished by dumping in a dedicated fire-safe area away from the waste mass and other infrastructure.	Further clarification on the removal and extinguishment of smouldering/burning batteries is provided in Table 5 of the FMP Addendum.
Compile and provide the results and monitoring records relating to the thermal monitoring of the active tip face (via the fixed mount thermal imaging camera) within the Annual Monitoring Report	I agree that the thermal imaging monitoring records should be included in the Annual Monitoring Report.
Include a monitoring requirement for the detection of odours that may be indicative of subsurface fires	Odour monitoring requirements are addressed in Table 1 above.

