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 Peter Stacey

4 March 2025

Applicant's solicitors:
Michael Garbett | Rebecca Kindiak
Anderson Lloyd
Level 12, Otago House, 477 Moray Place, Dunedin 9016
Private Bag 1959, Dunedin 9054
DX Box YX10107 Dunedin
p + 64 3 477 3973
michael.garbett@al.nz | rebecca.kindiak@al.nz

anderson lloyd.

Qualifications and experience

1 My name is Peter Warwick Stacey. I am the Managing Director at Air Quality Consulting NZ Limited. I have been in that position since December 2021.

2 I hold a Bachelor of Science from The University of Auckland and a Graduate Diploma in Business from Auckland University of Technology.

3 I am a Member of the Clean Air Society of Australia and New Zealand and a Certified Air Quality Professional.

4 I have more than 20 years of experience assessing air discharges from a wide range of activities. My work experience relevant to this application includes:

(a) Expert witness for Northland Waste for the proposed construction and operation of a new Refuse Transfer Station. This project involved an assessment of odour and dust associated with the facility's construction and operation (2019).

(b) Expert witness for Dunedin City Council, preparing and presenting evidence as part of an application for Smooth Hill Landfill. This project required a detailed assessment of odour and dust from the construction and operation of a new municipal waste landfill (2020-2022).

(c) I am responsible for undertaking the annual independent peer review of Redvale landfill's odour management practices and complaints (2017-2024).

(d) I have undertaken various odour assessments and investigations associated with the following landfills: Hampton Downs, Porirua, Bonny Glen and Greenmount.

(e) Expert witness for Enviro NZ, preparing and presenting evidence as part of an application to reconsent the Te Maunga Resource Recovery Park in Tauranga. This project required a detailed assessment of odour and dust from the operation of an existing refuse transfer station (2024).

(f) Expert witness for Wellington Water in relation to the renewal of the air discharge consent for the Porirua wastewater treatment plant (WWTP). As part of this project, I presented evidence before the hearing panel regarding the potential effects from odour discharges and measures to upgrade the plant to reduce the potential for odour nuisance.

(g) I have also prepared odour assessments for the following wastewater treatment plants: Whangarei, Te Puke, Kerikeri, Cambridge and Paeroa.

5 I am experienced using a range of atmospheric dispersion models, such as CALPUFF/CALMET, TAPM, AERMOD, GRAL, CALROADS, LandGEM and AUSPLUME) and have applied these skills to air quality assessments for a broad range of clients.

6 In addition to the above, since 2010 (14 years), I have been responsible for obtaining air discharge consents for a large number of different activities within New Zealand.

Project involvement

7 I was engaged by GHD in 2023 to oversee the development of an air quality assessment report[1] (hereafter referred to as *The Air Quality Assessment*) to support the application for the renewal of the landfill's air discharge consent, allowing continued filling operations until closure.

8 I was also involved in responding to s92 requests and reviewed the updated version of the air quality assessment (Revisions 02[2] and 03[3]), which incorporates additional information requested by Otago Regional Council's (**ORC**) peer reviewer, Ms Tracy Freeman.

9 I visited the Green Island landfill in 2022. This visit provided me with a better understanding of site operations, mitigation measures and the receiving environment. I intend to undertake another visit prior to the hearing to observe the recently constructed Organics Receivable Building (**ORB**) and assess changes to the landfill since my last visit.

Scope of evidence

10 I have been asked to prepare evidence in relation to the effects of the proposal on air quality, specifically odour, dust and combustion emissions. My evidence assesses these effects and responds to key issues raised in the peer review, submissions, and Council's recommendations.

11 I acknowledge the directive provided in the Commissioner's Minute dated 21 January 2025 that the scope of evidence should focus on areas of disagreement with the Council's expert peer reviewer and recommended

[1] GHD, Waste Futures – Green Island Closure – Air Quality Assessment (Rev01), dated 13 March 2023.
[2] GHD, Waste Futures – Green Island Closure – Air Quality Assessment (Rev02), dated 27 September 2023.
[3] GHD, Waste Futures – Green Island Closure – Air Quality Assessment (Rev03), dated 4 October 2024.

consent conditions. However, to provide context to my evidence and help address the comments of the peer reviewer and submitters, I have provided a short summary of the findings from my assessment.

12 The scope of my evidence is, therefore, as follows:

(a) Summary of the Air Quality Assessment

(b) Comments on Submissions

(c) Comments on the peer reviewer's technical audit and recommendations

(d) Comments on the Section 42A report

Executive summary

13 I undertook an air quality assessment to evaluate the potential effects of air discharges from the landfill, including odour, dust, landfill gas (**LFG**), and combustion emissions from the LFG engine and flare. The assessment was undertaken in accordance with Ministry for the Environment (**MfE**) good practice guidance.

14 My assessment included a review of complaint records, odour scouting results, an evaluation of site activities that may contribute to odour and FIDOL (Frequency, intensity, duration, offensiveness and location) analysis.

15 Key odour sources include compost turning, the tip face, excavation of old waste, sludge acceptance, highly odorous waste deliveries (offal, etc) and fugitive LFG emissions. I reviewed existing mitigation measures and recommended additional controls, such as updated waste acceptance procedures and improved landfill gas and leachate management.

16 I consider the following factors to be relevant to ensuring the site will operate in a manner that will reduce the potential for offensive and objectionable odours to be observed at off-site locations.

(a) Current and proposed odour mitigation measures

(b) Limited complaints

(c) Recent odour scouting results

(d) Reduction in waste volumes and diversion of organic waste streams to the RRPP

(e) Progressive expansion of final capping

(f) Completion of the landfill gas capture system

(g) Limited term of the consent (five years)

17 Based on my odour assessment and considering the above factors, excluding abnormal events, I consider that offsite odours will not be at a frequency, duration and intensity that results in offensive or objectionable effects. While I consider that some odour may still be noticed at times, it is likely to be infrequent and of a low intensity.

18 Combustion emissions from the flare and engine, including NO_2, CO, PM_{10}, $PM_{2.5}$, and SO_2, were assessed using AERMOD. Predicted pollutant concentrations comply with air quality standards at all receptor locations.

19 Dust emissions from landfill activities were evaluated using the FIDOL method and found unlikely to cause off-site adverse effects.

20 Overall, I consider that the effects from the operation of the landfill will be no more than minor.

Summary of the air quality assessment

21 I undertook an air quality assessment to evaluate the potential effects of air discharges from the landfill. These discharges primarily include odour, dust, LFG and combustion emissions from the LFG engine and flare.

22 I conducted this assessment in accordance with the guidance provided in the relevant MfE Good Practice Guides[4,5] as is considered best practice in New Zealand.

23 As recommended by these guides, I assessed odour and dust discharges qualitatively using the FIDOL assessment tool. Combustion gases were assessed quantitatively using the atmospheric dispersion model AERMOD.

24 Based on my assessment, odour was determined to be the primary air discharge, which could cause some form of adverse effect at off-site locations. To assess the potential for odour nuisance effects, I reviewed the odour complaint history and undertook a qualitative FIDOL assessment.

25 My odour assessment indicated that the nearest receptors, located to the southeast of the landfill, have the greatest potential to be affected by odour. Based on my review of complaint records, the main sources of odour

[4] Ministry for the Environment. (2016), Good Practice Guide for Assessing and Managing Odour.

[5] Ministry for the Environment. (2016), Good Practice Guide for Assessing Discharges to Air from Industry

complaints were identified as compost turning, activities at the tip face, the sludge pit, highly odorous waste deliveries (offal, etc), fugitive LFG emissions, and shutdowns of the flare and engine.

26 I reviewed the existing mitigation measures outlined in the Waste Management Landfill Operations Plan (**LOP**) and identified additional mitigation measures targeting the primary sources of odour emissions.

27 The additional measures included improved waste acceptance controls, landfill gas management, leachate management, and stricter controls on the disposal of highly odorous waste.

28 My assessment considered how the proposed mitigation measures would reduce odour emissions and nuisance effects. Based on these measures, I expect odour impacts to decrease in intensity, frequency, and duration from historic levels. While there is the potential for landfill odours to be observed at off-site locations from normal operations, these are expected to be at a frequency and intensity that is unlikely to result in nuisance effects.

29 Providing that the site adopts and appropriately implements the proposed odour mitigation measures presented in the air quality assessment, I considered that odour nuisance effects will be no more than minor.

30 The combustion of landfill gas in the flare and engine will result in emissions of nitrogen dioxide (**NO_2**), carbon monoxide (**CO**), fine particulate matter (**PM_{10}** and **$PM_{2.5}$**) and sulphur dioxide (**SO_2**). My modelling indicates that pollutant concentrations at receptor locations comply with the health-based air quality standards and guidelines at locations where people could be exposed.

31 I also assessed the potential for dust emissions from other landfill operations, such as the acceptance of dusty waste and vehicle movements on unpaved roads. Using the FIDOL assessment tool, I determined that operational dust emissions are unlikely to cause adverse effects beyond the site boundary.

Cumulative effects RRPP

32 Following the preparation of my assessment and response to s92 requests, I note that the Resource Recovery Park Precinct (**RRPP**) received resource consent in January 2025, authorising odour discharges from this facility. In support of the application, I reviewed the air quality assessment undertaken by Mr Curtis of Paddle Delamore Partners Limited, which included an evaluation of the potential cumulative odour effects from the landfill and the RRPP.

33 Mr Curtis concluded that he did not anticipate any increase in off-site odour intensity or offensiveness associated with the RRPP. This conclusion was based on the expectation that, as the landfill approaches closure, the completion of final capping will reduce fugitive landfill gas and odour emissions. The reduction in fugitive emissions is anticipated to lead to lower odour levels, thereby decreasing the potential for cumulative effects.

34 Mr Curtis acknowledged the potential for a slight increase in the frequency of odour during the overlapping period of landfill operations and RRPP activities. However, due to the distance between the potential odour sources and sensitive off-site locations, he considered that there would be no increase in odour intensity or offensiveness arising from cumulative effects.

35 Furthermore, the air quality assessment for the RRPP concluded that the duration of any potential cumulative effects would be limited to a few years. This being, the remaining time of landfill operations, less the time required to commission and construct the RRPP.

36 I agree with Mr Curtis' assessment regarding the potential cumulative effects from the landfill and the RRPP. In addition, when considering the further mitigation measures discussed in my evidence, which have recently been implemented to reduce odour emissions from the landfill, I consider that there is unlikely to be any significant cumulative odour effects on nearby sensitive receptors associated with the continued operation of the landfill until closure.

Comments on submissions

37 I have reviewed the submissions received by ORC in response to the consent application and noted one submission in support and three neutral submissions. Of these four submissions, only two identified odours as a potential issue.

38 The main issues raised in the submissions included:

(a) Odour

(b) Improved odour control

(c) No odour beyond the site boundary

Colin Venables

39 Colin Venables has requested that there be no odour beyond the site boundary in his submission. While I understand the sentiment of not wanting odour discharged beyond the boundary, for most activities that have the

potential to generate odour, it is not always possible to internalise odour within the site boundary, landfills being good examples.

40 I consider that it is reasonable for odour to be observed beyond the boundary, providing that it does not result in nuisance effects. This is why I support the consent condition recommended by MfE[6] that specifies that only "noxious", "offensive", and "objectionable" odours have some form of adverse effect. I recommend that the condition proposed by ORC is redrafted as follows to align with the MfE guidance.

> "There shall be no noxious, dangerous, offensive or objectionable odour to the extent that it causes an adverse effect at or beyond the boundary of the site.".

41 Colin Venables also requested an improvement in odour controls used at the landfill. I agree that there needs to be improvements in odour control given that the Site occasionally discharges odour that causes complaints. Consequently, as part of my Air Quality Assessment (set out in Section 6), I recommended a range of additional mitigation measures that I consider represent best practice for this type of landfill.

42 Based on the implementation of these mitigation measures, combined with existing measures, I consider that odours from the landfill will be reduced, and the potential for odour nuisance will be minimised to the lowest practicable level.

Colin Leslie Weatherall

43 Colin Weatherall did not cite any specific concerns in his submission regarding odour. Consequently, it is difficult to provide additional information that might alleviate his concerns. While I acknowledge that odour has been a concern for the local community, I trust that my responses to Colin Venables' submission and Tracy Freeman's technical review provide sufficient information to address his concerns.

Comments on Ms Freeman's technical review for ORC

44 I agree with most of Ms Freeman's comments on the air quality assessment that she provided in a technical memorandum (Jacobs, 30 October 2024[7]). In the interest of brevity and in accordance with the Commissioner's

[6] Ministry for the Environment. (2016). Good Practice Guide for Assessing and Managing Odour.

[7] Jacobs RM23.185 – Dunedin City Council – Technical Audit Responses – October 2024 Update; Air Discharges

direction, my evidence focuses only on the key areas where we disagree or where further clarification is needed. I discuss these areas below.

Receptor Locations

45 Ms Freeman requested two additional receptors located within the landfill designation (**Receptors 10 and 11 – refer to Appendix A, Figure 1**) be included in the atmospheric dispersion model of combustion gases. I note that these receptors were incorporated into the model, and results were provided separately as part of the s92 response. The concentration of air pollutants at these locations was found to be below the health-based assessment criteria.

46 As discussed further below, I have updated the modelling study to assess cumulative effects from the Green Island Wastewater Treatment Plant (**GIWWTP**) biogas boiler and have also included these additional receptors (R10 and R11) in the model.

Updates to meteorological and complaint data

47 Ms Freeman recommended that the FIDOL odour assessment should be updated based on analysis of more recent onsite meteorological data and complaint data. I have therefore provided this additional analysis below.

Meteorological Data

48 To satisfy Ms Freeman's concerns regarding the potential variability in prevailing winds and to understand if the limited period of monitoring data does not provide a good indication of wind patterns, I have reviewed additional data from the onsite weather station, covering the approximately three-year period from February 2022 (date of commissioning) to February 2025 and compared this data with the period presented in the Air Quality Assessment (11 months, February 2022 to January 2023). This data has been presented in **Appendix A, Figure 2** as windroses to visualise wind patterns.

49 Visual examination of the windroses shows that there are minimal differences in the frequency of wind direction and windspeeds when comparing the two datasets. This is further demonstrated based on the data presented in Table 1, which shows there to be negligible differences in the frequency of low-speed winds (<3 m/s) blowing towards sensitive receptors when comparing the two datasets.

Table 1: Frequency of low-speed winds (<3 m/s)

Receptor	Wind direction blowing to receptor	% of low-speed winds <3 m/s	
		3 February 2022 to 10 January 2023	3 February 2022 to 11 February 2025
R01	W	2%	2%
R02	SSW	2%	2%
R03	SSE	1%	1%
R04	E	2%	2%
R05	N	5%	5%
R06	NNW	3%	2%
R07	WNW	2%	2%
R08	SE	2%	1%
R09	SE	2%	1%

50 Overall, while analysing a longer period of data is always preferable, as it is more likely to capture general annual variability and climatic variations such as La Niña and El Niño, I consider that the data presented in the Air Quality Assessment adequately represents the frequency of winds measured in the three-year dataset and consequently the use of a longer period of data does not change the conclusions reached based on the FIDOL assessment.

Complaint Data

51 I have reviewed the additional odour complaint data up to the end of 2024 (2018 to 2024 – complete years) and have presented the number of complaints per year as a bar chart in **Figure 1**.

52 The data shows that over the period 1 January 2022 to 31 December 2024, there has been a downward trend in the number of complaints per year. Noting that there were 32 complaints in 2022, 20 in 2023 and 12 in 2024.

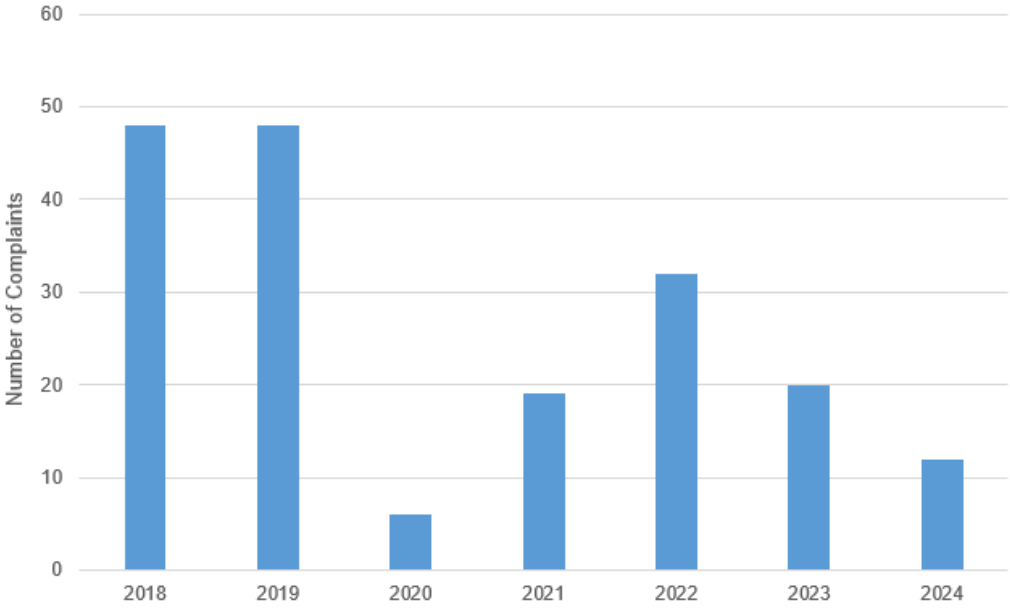
53 The high number of complaints during 2018 and 2019 was most likely associated with the management of WWTP sludges, which were found to be especially odourous.

54 The reason for the drop in complaints during 2020 and 2021 is unknown. However, DCC noted that significant improvements were made in landfill gas collection and destruction during this period. Interestingly, this decline in complaints contrasts with trends observed at other landfills during the COVID-19 pandemic, where complaints increased, most likely due to people spending more time at home.

55 While complaints are not always a reliable indicator of whether odour nuisance effects are being experienced for a range of reasons, the reduction

in complaints suggests additional odour control measures being implemented, such as almost universal liming of WWTP sludges and improved gas collection infrastructure, has reduced odour discharges from the Site.

Figure 1: Annual Odour Complaints



56 To better understand potential odour sources based on current operations, I have reviewed the findings from investigations undertaken by site staff during 2024. The following provides a summary of the likely cause of the complaints:

(a) Special works (4 complaints) – i.e. excavation of old waste to construct new gas infrastructure

(b) Receival of special waste (2 complaints) i.e. animal by-product waste

(c) Exposure of Sludge (1 complaint)

(d) ORB (2 complaints) – Unloading of especially odourous material with winds blowing towards receptors.

(i) GIWWTP (1 complaint)

(ii) Unknown (2 complaints)

57 Of the 12 complaints received during 2024, three were most likely attributed to other sources of odour (ORB and GIWWTP). The remaining nine complaints were most likely associated with the landfill.

58 Four odour complaints were attributed to “special works” being undertaken at the landfill. This may have been related to the excavation of buried gas laterals within the historical waste, as well as the excavation and re-working of historic waste in order to achieve the necessary compaction of waste.

59 I understand that where at all possible these types of works are planned in advance to be undertaken during favourable wind conditions, however this is not always possible. Odour suppression units are used to minimise the impact from this type of work.

60 Overall, the low number of odour complaints in 2024 suggests that improvements in odour control measures, such as liming of WWTP sludges, reducing the size of waste placement areas, enhancing gas system coverage, and increasing the uptime of landfill gas extraction and destruction equipment, have reduced odour nuisance complaints when compared to previous years.

61 However, more recently, I understand that three odour complaints were received by DCC between 27 and 28 January 2025. These complaints were investigated, and it was determined that they were related to special works that involved the cutting down of the tip face, which exposed old refuse, generating significant odour.

62 The latest odour complaints reinforce that, despite long periods without complaints, maintaining a high level of odour control is essential and that lapses in appropriate odour management can result in odour nuisance effects.

63 Based on the 2024/2025 complaints, I consider the areas of continued focus should be on the receival of special waste and non-routine works.

Independent Odour Scout Monitoring

64 In addition to reviewing complaint data, I have analysed independent odour scout monitoring arranged by DCC covering the period 8 March 2022 to 17 June 2024, when it was discontinued.

65 During this period, a total of 86 odour surveys were undertaken across 40 different days at various locations around the landfill. Each survey typically included odour observations at six locations around the landfill, with a comprehensive 10-minute survey at Allens Road.

66 During the study period, odours were detected on 21 occasions, with 15 instances linked to landfill odours. The other instances included odours such as “cut grass” and “smoke” from home heaters.

67 Landfill-related odours were described as ‘rubbish’ or ‘putrid, foul, decayed’ odour, with the most common odour character being ‘rubbish’ occurring 11 out of the 15 instances. Wind speeds during these surveys ranged from 0.3 m/s to 5.2 m/s, with lower wind speeds correlating to higher detections of ‘rubbish’ odour.

68 The intensity of landfill-related odours ranged from very weak to strong (1 to 4 on the intensity scale), with limited instances of odours having either a “moderate” or “strong” intensity. The hedonic tone of these odours varied, with most classified as mildly unpleasant to unpleasant (-1 to -3 on the hedonic tone scale).

69 Landfill odours were detected at several locations, including Clariton Ave, Allen Rd South, Wavy Knowes Drive, Blanc Ave, and Brighton Road. However, landfill-related odours were generally intermittent and not considered continuous or objectionable. The only exception to this was on two occasions, namely 17 March 2023, and 28 May 2023, where odours were detected that, if experienced on a continuous basis, would be considered objectionable in the opinion of the odour scout.

70 Overall, the findings from the independent odour surveys are consistent with my expectation of the odour that could be experienced at off-site locations, with off-site odours generally being of low frequency and intensity and at levels that would not be considered to cause nuisance effects, except if these odours were experienced for long durations of time.

Atmospheric Dispersion Model Setup

71 I acknowledge Ms Freeman’s concern regarding AERMOD’s limitations in complex terrain. However, given the buoyant well-dispersed nature of the discharges, the minimal topographic variation between the discharge sources and the nearest receptors, the large buffer distances, and the fact that predicted pollutant concentrations at receivers are well below guideline levels, the use of a model such as CALPUFF is unlikely to alter the overall findings of my assessment.

72 Ms Freeman has also identified various model settings and parameters that could influence the model’s predictions. I acknowledge that there are a range of different approaches to modelling emissions using AERMOD used by air quality consultants, that can influence the model’s outputs. However, I agree with the overall conclusions that Ms Freeman reaches that these differences in approach are not determinative to the overall outcome of the assessment, with Ms Freeman noting that the sensitivity of the model to these uncertainties *“is unlikely to result in predictions of ground-level cumulative concentrations exceeding either the WHO or NZAAQG/NESAQ assessment*

criteria, however, some control on the concentration of H_2S in the biogas burned in the engine and flare is appropriate."[8]

WWTP Biogas Combustion Emissions

73 In terms of Ms Freeman's concern regarding the cumulative impacts of SO_2 discharges from the LFG combustion equipment (engine and flare) and the operation of the GIWWTP boiler, I have remodelled emissions to determine the cumulative impact.

74 I have also taken this opportunity to update the model based on the parameters recommended by Ms Freeman. A summary of the changes to the modelling approach is summarised below.

(a) 24-hour average SO2 concentrations were reported as the maximum value.

(b) "US NAAQS special processing" was disabled.

(c) Updated the AERMET data file as follows: used onsite meteorological parameters (wind speed, wind direction, dry bulb temperature, relative humidity and pressure), supplemented with cloud cover data from Dunedin Airport.

(d) Wind observations collected at a height of 10 m and temperature, relative humidity at 2 m. The updated metrological file covered the period 4 February 2022 to 31 December 2024 (~35 months).

75 The GIWWTP utilises biogas produced from the digesters to generate heat for onsite processes. There are three potential pathways for this gas to be combusted, these include:

(a) Biogas conveyed to Boiler 1 (250-300kW) – the primary form of disposal.

(b) Biogas conveyed to LFG Engine (gas combined with gas flow from the landfill) – a secondary form of disposal - this occurs when heat is not required from the boiler.

(c) Biogas is flared using a separate candlestick flare if system pressure is above 225 mm H2O.

[8] Jacobs RM23.185 – Dunedin City Council – Technical Audit Responses – October 2024 Update; Air Discharges (Page 6, Paragraph 4)

76 In addition to the biogas boiler, there is a second boiler (**Boiler 2**) that is configured to run on diesel. This serves as a backup if there is insufficient biogas to operate the boiler – i.e. such as during process start-up. I note that both boilers (Boilers 1 and 2) can operate using diesel. However, only one boiler would ever operate at one time.

77 I anticipate that SO_2 emissions from this diesel boiler(s) will be much lower than from the biogas boiler due to the lower sulphur content of the fuel (10 ppm) when compared with biogas (~250 ppm). I have, therefore, not included the operation of the boiler(s) using diesel in the updated modelling assessment.

78 I reviewed the last six months of WWTP biogas flow and H_2S data and used the highest mass flow of H_2S to the boiler to calculate SO_2 emissions. This was based on the following: H_2S Concentration (440 mg/m³) x gas flow of 72 m³/hr = 0.03 kg/hr. I then assumed 100% oxidation of H_2S to SO_2 to calculate an SO_2 emission rate of 0.06 kg/hr.

79 I consider this emission rate to be relatively small, contributing only 5.5% of the total SO_2 emissions, when compared with the combined emission rate from the LFG flare and engine of 1.1 kg/hr.

80 Given that most of the time, biogas is either combusted in the boiler or LFG engine, I have not included discharges from the GIWWTP biogas flare in the modelling assessment. However, as part of configuring the model, I compared a release from the flare vs the boiler and found that off-site concentrations from the boiler were slightly higher than the flare (most likely due to the lower discharge temperature and lower efflux velocity). Consequently, assessing discharges from the biogas boiler represents the worst-case scenario.

81 The results from the updated modelling assessment are presented in Table 2 and show that off-site concentrations are below the relevant air quality assessment criteria. Maximum off-site 24-hour average concentrations of SO_2 are also below the more stringent 2021 WHO guideline of 40 µg/m³.

Table 2: ***Predicted ground-level concentrations of SO_2***

Receptor ID	Maximum 1-hour SO_2 concentration (µg/m^3)		99.9%ile 1-hour Average SO_2 concentration (µg/m^3)		Maximum 24-hour SO_2 concentration (µg/m^3)	
	Site contribution	Site contribution + background	Site contribution	Site contribution + background	Site contribution	Site contribution + background
Assessment Criteria	570		350		120	
Maximum offsite	60	80	45	65	22.0	30.0
R01	12	32	11	31	2.0	10.0
R02	12	32	11	31	1.5	9.5
R03	9	29	7	27	1.9	9.9
R04	20	40	16	36	1.7	9.7
R05	55	75	54	74	8.1	16.1
R06	15	35	14	34	5.1	13.1
R07	12	32	11	31	4.4	12.4
R08	15	35	11	31	2.0	10.0
R09	17	37	13	33	4.3	12.3
R10	64	84	42	62	7.5	15.5
R11	34	54	24	44	4.7	12.7

Odour Assessment

82 Ms Freeman agrees that the proposed mitigation measures will reduce odour in terms of intensity, frequency and duration". However, she does not agree with my statement that *"While odours may still be detectable on occasions at or near the site boundary, providing the proposed mitigation measures are rigorously implemented, the likelihood of off-site odours being considered offensive and objectionable is low. Consequently, odour discharges are unlikely to cause more than a minor effect."*

83 In Ms Freeman's technical assessment, she considers *"that whilst the proposed measures should result in a reduction in the frequency, duration and intensity of odours noticed by sensitive receivers, evidence has not been provided to demonstrate that off-site odour impacts will reduce to the extent that there is no offensive or objectionable odour effect due to landfill activities. Due to the nature of landfill activities at the site, it is unlikely that such evidence could be provided."*[9]

[9] Jacobs RM23.185 – Dunedin City Council – Technical Audit Responses – October 2024 Update; Air Discharges (Page 4, Paragraph 8)

84 I agree that the proposed measures will result in a reduction in the frequency, duration and intensity of odours noticed by sensitive receivers, however I consider that the proposed mitigation measures, in conjunction with existing measures, will have a more significant impact on reducing off-site odour. Notably, with the proposed mitigation measures in place, odour control will be consistent with what I consider to be industry best practice.

85 In addition to these mitigation measures, several other factors will influence off-site odour effects throughout the duration of the consent, which may not have been fully considered by Ms Freeman:

(a) The landfill has an expected remaining lifespan of approximately five years. During this period, the volume of material arriving at the site will decrease as the Resource Recovery Park continues to be developed and comes into full operation.

(b) As landfilling operations near completion, more of the site will undergo final capping, which will further reduce fugitive emissions.

(c) DCC has recently employed a dedicated landfill technician with a primary focus on odour management. This role includes: management of special waste placement, proactive and regular odour monitoring, complaint investigation and implementation of improved odour controls based on feedback from proactive odour monitoring and complaints.

(d) DCC has recently launched the Waste Futures Programme to develop a more comprehensive waste management strategy and divert materials from landfill. As part of this initiative, a new kerbside collection system for organic waste has been implemented, which is expected to reduce the volume of putrescible material disposed of at Green Island Landfill, thereby lowering the potential for odour emissions. I understand that during the six-month period July – December 2024 the new kerbside collection system has collected and processed 7,618.3 tonnes of food and garden waste. This is waste that would otherwise be placed in the landfill generating odour.

86 When considering the above in conjunction with the additional mitigation measures, limited complaints and DCC odour scouting results, I consider that landfill odours, excluding abnormal events, are unlikely to result in offensive or objectionable effects beyond the boundary of the Site.

87 In the context of these factors and notwithstanding the short duration until closure, I consider that the effects of the operation of the landfill will be no more than minor.

Ms Freeman's Evidence

88 I have read Ms Freeman's evidence attached to the s42A report and note that it reflects her previous comments outlined in her technical audit. While I don't have any specific comments, other than noting my disagreement regarding the overall conclusion reached regarding odour nuisance, I provide comments further below on resource consent conditions proposed by ORC, which have been informed by Ms Freeman's advice.

S42A Report

89 I reviewed the s42A report and I agree with the overall conclusions reached by Ms McDonald, namely:

> "Even with best practice management measures, it is not possible to eliminate odours at any landfill. However, subject to the recommended consent conditions being adopted, I am satisfied that the potential adverse air quality effects can be managed appropriately."

Resource Consent Conditions

90 I have reviewed the proposed conditions attached to the s42A report in Appendix C and agree with most of the conditions proposed by Ms. McDonald. However, I recommend the following amendments to some of these conditions in Schedule G.

Condition 4

91 As previously mentioned, I recommend that Condition 4 is redrafted to reflect the condition wording recommended by MfE as follows:

> "There shall be no noxious, dangerous, offensive or objectionable odour to the extent that it causes an adverse effect at or beyond the boundary of the site."

Condition 17

92 I recommend that "visible flame" is included under the list of exclusions associated with the flare as the candle stick flare has a prominent visible flame above the top of the flare.

Condition 33

93 I agree that an annual review of complaints, as described in Condition 33, is helpful for better understanding the causes of odour nuisance events and provides an opportunity to adapt odour management to reduce the potential

for odour complaints. However, I consider that this review should cover complaints associated with both Green Island Landfill and the RRPP, given their close proximity and their potential to discharge similar types of odour that may be easily confused by complainants.

Condition 35

94 I agree with the requirement to monitor the sulphur content (H_2S) of the LFG feed to the flare and engine as a consent condition to ensure that the H_2S concentration does not exceed 500 ppm. However, the frequency that H_2S requires monitoring is not clear to me as the condition is currently written.

95 I recommend that the condition be amended to specify that the H_2S concentrations in the LFG feed to the flare and engine should be monitored weekly rather than continuously, as implied by the condition noting the reference to “hourly averages”.

96 Given that historical data shows H_2S concentrations are typically below 350 ppm and that blended gas conveyed to the flare/engine is unlikely to exhibit rapid fluctuations, I consider that weekly measurements will be sufficient to detect any upward trends and ensure compliance with the 500 ppm limit. For this reason, I consider that weekly measurements are appropriate.

Conclusion

97 I have assessed the potential air quality effects from the landfill, focusing on odour, dust, LFG and combustion emissions. My assessment followed good practice guidelines and considered odour to have the greatest potential to cause off-site nuisance effects.

98 My assessment included a review of complaint records, odour scouting results, an evaluation of site activities that may contribute to odour and FIDOL analysis. I also considered existing management measures and identified opportunities for further mitigation. These measures aim to minimise emissions and reduce the potential for off-site effects.

99 I consider the following factors to be relevant to ensuring the site will operate in a manner that will reduce the potential for offensive and objectionable odours to be observed at off-site locations.

(a) Current and proposed odour mitigation measures

(b) Limited complaints

(c) Recent odour scouting results

(d) Reduction in waste volumes and diversion of organic waste streams to the RRPP

(e) Progressive expansion of final capping

(f) Completion of the landfill gas capture system

(g) Limited term of the consent (five years)

100 Based on my odour assessment and considering the above factors, excluding abnormal events, I consider that offsite odours will not be at a frequency, duration and intensity that results in offensive or objectionable effects. While some odour may occasionally be detectable, I expected it to be infrequent and of generally low intensity, unlikely to cause nuisance effects.

101 Overall, I consider that the effects from the operation of the landfill will be no more than minor.

Peter Stacey

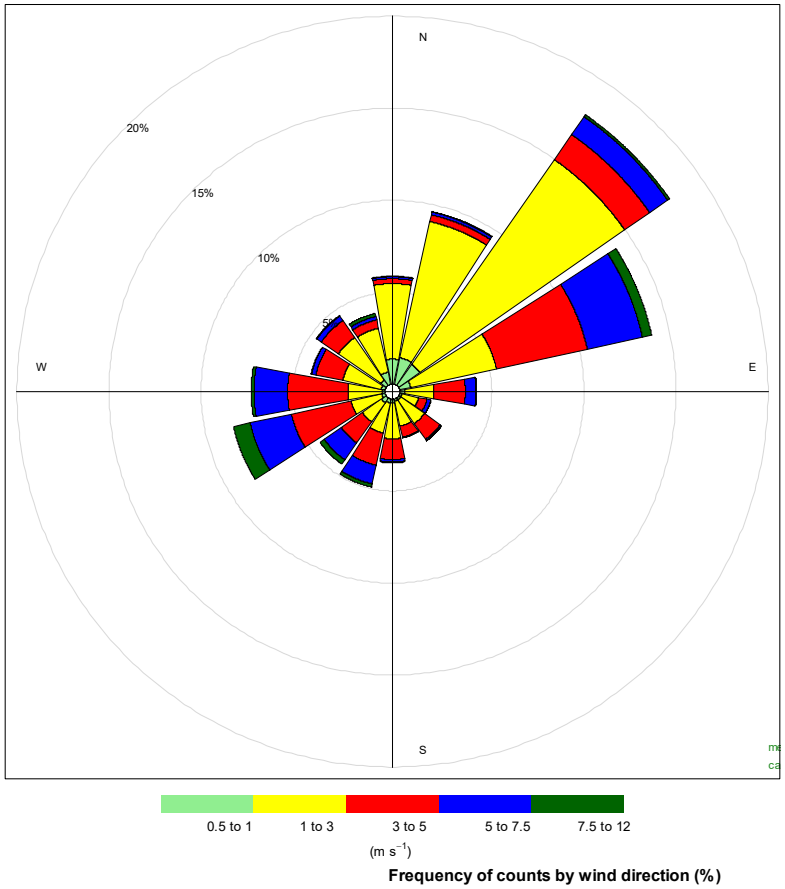
4 March 2025

Appendix A:

Figure 1: Receptor Map

Figure 2: Green Island Wind Rose Data

Green Island Wind Rose: 3 February 2022 to 10 January 2023



Green Island Wind Rose: 3 February 2022 to 11 February 2025