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	An application RM23.185 by Dunedin City Council for the continued operation and closure of the Green Island Landfill, Dunedin

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STATEMENT OF EVIDENCE OF ELIZABETH MORRISON ON BEHALF OF OTAGO REGIONAL COUNCIL

21 FEBRUARY 2025

INTRODUCTION

1. This report forms part of the Otago Regional Councils audit of the assessment of environmental effects (AEE) provided by Dunedin City Council (the applicant) in support of a resource consent application (the application) for the operation, expansion and closure of the Green Island Landfill (the landfill, the landfill working area). I have been engaged to provide independent review on matters pertaining to ecology relevant to the application.

2. My full name is Elizabeth Morrison.

3. I have a Bachelor of Science majoring in Biology with an Environmental Science specialisation and have a Postgraduate Diploma in Environmental Science from the University of Auckland.

4. I have 19 years' experience as an ecologist working in consultancy. I am currently a Principal Ecologist at SLR Consulting New Zealand Ltd (SLR) and have held this position since July 2022. Prior to joining SLR I was a Senior Ecologist and Ecology Team Leader at Thomas Consultants Ltd.

5. I am a generalist terrestrial ecologist with a broad range of experience in vegetation ecology, aquatic ecology, wetlands, avifauna, pest animal control, and ecological restoration. I regularly assess terrestrial habitats across New Zealand by undertaking significance assessments, vegetation surveys and classification, wetland surveys and management, stream surveys, ecological restoration, catchment management and impact assessments.

6. I am a member of the New Zealand Ecological Society and the New Zealand Freshwater Sciences Society.

7. 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.

SCOPE OF EVIDENCE

8. To carry out my audit of the consent application, I have:

(a) Reviewed ecology aspects of the application as outlined in the Ecological Impact Assessment[1], Bird Risk Assessment Report[2] and Draft Southern Black Backed Gull Management Plan[3].

(b) Reviewed the proposed conditions of consent dated October 2024 supplied by the applicant.

(c) Prepared a memorandum entitled RM23.185 - Green Island Landfill Ecology Technical Review – V2, dated 23 October 2024, that was provided to the Council as part of the application review responding to specific queries from the processing planner.

(d) Considered relevant issues raised by submitters in relation to the effects I have considered in this report.

(e) I attended a joint site visit with Otago Regional Council and other reviewing technical specialists on 4 April 2023.

9. If the decision makers are of a mind to grant the application, this report provides recommendations on additional conditions of consent or modifications to those proposed to ensure adverse effects on ecology can be adequately avoided, remedied or mitigated.

DESCRIPTION AND ECOLOGICAL VALUES OF THE AFFECTED ENVIRONMENT

10. The application provides a broad description of the existing environment and fauna, with a focus mostly on the receiving environments upstream and downstream of the landfill and associated freshwater ecology monitoring sites.

11. The Kaikorai Stream and estuary, which extend along the site's north and west margins, are located within an area identified as a Regionally Significant Wetland in the Otago Regional Plan and an Area of Significant Biodiversity in the Dunedin City Council Plan.

12. The Kaikorai stream and estuary have been highly modified. Both residential and industrial activities are present in the wider catchment and there are many stormwater discharges to the stream. The catchment has been impacted by heavy industrial,

[1] Appendix 12 - Green Island Ecological Impact Assessment, updated October 2024, prepared by Boffa Miskell
[2] Appendix 08 - Green Island Landfill. Bird Hazard Assessment – Final (Rev 02), March 2023, prepared by Avisure
[3] Appendix 09 – Draft Southern Black-backed Gull (SBBG) Management Plan Dunedin and Environs. Final Draft, November 2023, prepared by Avisure

landfills, quarrying, and agricultural activities. Water quality monitoring by Otago Regional Council in the Kaikorai Stream at Brighton Road, approximately 300 m upstream of the discharge from the landfill's Eastern Sedimentation Pond and wetland shows a degraded catchment with poor water quality due to effects of past and present land use.

13. Within the working landfill area there is limited terrestrial vegetation habitat of any ecological value. Most habitat is on the margins of the landfill and includes areas of planted native and exotic vegetation.

ASSESSMENT OF EFFECTS

Actual and potential effects on avifauna

14. A comprehensive assessment has been undertaken on potential effects to birds as it relates to the landfill and the airport. There are several bird species associated with the operation of the landfill. The native Southern Black-backed gulls are present at the landfill in the thousands. Bird volumes at the site will reduce as the bird populations disperse with the reduction in putrescible waste and eventual closure of the landfill.

15. International guidance generally looks at activities within 13 km of an airport in regard to potential impacts on airports. The Dunedin airport is located approximately 16 km west of the landfill. There is the risk however that, as landfill operations reduce, the large bird population may search for food further afield as the landfill operations change as part of closure. Hence, bird strike risk at the airport has been considered as part of this application.

16. Bird strike risk has been addressed by a bird risk assessment and a draft Southern Black-backed Gull (BBG) Management Plan (the BBGMP) was submitted by the applicant. The BBGMP that has been prepared and reviewed as part of the separate application and conditions of consent for the new Smooth Island landfill (which is located further south of Dunedin). A final BBGMP and its implementation is proposed as a condition of consent.

17. I agree with the level of adverse effects to birds as a result of the ongoing operation of the landfill followed by closure, as summarised in the ecological assessment. The assessment asserts that the operation of the landfill has negligible impacts on birds, with a positive impact in the short term for food supply, reducing to low as the food supply sources decrease. The closure of the landfill in the long-term will have a positive effect on

avifauna utilising the nearby estuary as sedimentation and contaminants entering the receiving environment will be reduced.

18. A Vegetation Management and Restoration Plan (VMRP) is proposed to be developed and implemented as a condition of consent (condition 41). This VMRP will include the removal of exotic trees. Impacts of tree removal associated with this plan have not been addressed in the ecological assessment. Depending on when the trees are removed, there is the potential that native nesting birds may be present in these trees. Almost all native bird species and their active nests are protected under the Wildlife Act 1953. It is an offence to deliberately disturb or destroy them, their eggs, or nests. Management is required to ensure any nesting birds are not adversely impacted as part of the VMRP is has been recommended as a condition of consent.

Actual and potential effects on terrestrial ecology

19. Landfill expansion within the next few years before closure will be in areas already cleared of native vegetation. There will be limited impact on fauna (birds and lizards) due to low habitat values of any vegetation (mostly grass) that may be disturbed in these areas.

20. It is proposed that exotic trees will be removed as part of the VMRP. Concern has been raised by council's consultant landscape architect Rachel Annan, that the removal of these needs to be balanced against visual amenity with potential staging required. Removal of large trees also needs to consider the habitat value of these trees and ensure that any native birds that are nesting in these are not disturbed (see paragraph 18 above).

21. Areas will be revegetated as part of a wider VMRP, that has yet to be developed. While this is primarily being developed as part of landscape mitigation it also seeks to enhance ecological and cultural values. In addition, it provides a valuable method to mitigate historical landfill impacts and remediating the landfill after closure to better buffer the receiving environment and provide improved ecological habitat at the site.

22. It is proposed as part of the VMRP to incorporate eco-sourced native species, riparian planting and pest management to support restoration of ecological values and provision of habitat for native fauna. The VMRP is to be prepared by appropriately qualified personnel. The plan should be reviewed and verified by a suitably qualified and experienced expert/s as part of the condition to ensure that both the intended landscape and ecological benefits are appropriately reflected in the VMRP.

Actual and potential effects on freshwater ecology

23. There are no natural freshwater streams remaining within the working landfill area with these either piped, modified or associated with constructed features as part of earlier stages of the landfill development.

24. Freshwater ecological monitoring included locations both upstream and downstream of the landfill. Water quality, sediment quality, macroinvertebrate community and fish community data were provided and discussed in the application. A summary of water and sediment quality findings is included in the surface water quality evidence prepared by Dr Peter Wilson. The monitoring of macroinvertebrate communities, instream habitats and native fish communities of the Kaikorai Stream in the vicinity of the landfill, and at upstream and downstream monitoring sites, determined that species present were indicative of tolerant (able to tolerate some level of pollution) freshwater communities.

25. Sport fish values were not addressed in the ecological assessment. Brown trout were identified as having been recorded from the Kaikorai Stream catchment, but no specific assessment of potential effects of the landfill on these fish was provided. However, it is anticipated that the Kaikorai Stream in proximity of the landfill is unlikely to be an important habitat for sport fish such as brown trout. It is noted that the Fish and Game Council have indicated in their submission they would like this catchment to become suitable for sport and recreational fishing.

26. The attributes of the sensitive areas surrounding the site are only discussed very broadly and the report does not clearly describe other potentially sensitive areas such as the drainage channels in the wetland areas and small tributary channels alongside it.

27. Any potential impacts related to the historic estuary reclamation which could adversely impact groundwater quality (refer groundwater quality evidence prepared by Tim Baker) and thus result in potential diffuse discharge to the receiving freshwater and estuarine environment have not been addressed in the ecological report. It is noted that the application is not required to address the impacts of historical activities. It is acknowledged that leachate management is proposed covering the entire landfill operation with this assessed in the groundwater assessment evidence of Tim Baker.

Actual and potential effects on significant wetland/stream/lagoon

28. Part of the regionally significant wetland has historically been reclaimed associated with the landfill. There is no further direct impact to the significant wetland, Kaikorai Stream and estuary anticipated as a result of the landfill expansion and closure.

29. Monitoring and management of stormwater is currently undertaken and will continue across the landfill for leachate and water quality management, including a series of stormwater ponds that seek to treat discharges before their eventual discharge to the Kaikorai Stream. Leachate is not directly discharged to the stream with the leachate trenches being treated via the wastewater treatment plant located adjacent to the landfill. This has largely been effective however there are some gaps in understanding which are addressed in the evidence of Tim Baker and Dr Wilson. Further parameters they recommend be measured are outlined in their evidence accordingly.

30. It is difficult to ascertain potential ecological impacts from stormwater and leachate on the adjacent significant areas due to the degraded nature of the catchment and receiving environment surrounding the landfill, In addition, the Kaikorai Stream transitions from freshwater to brackish and estuarine habitats alongside the landfill. This results in difficulties with comparability between upstream assessments in freshwater systems and the saline area adjacent the site. However, it is agreed that it is unlikely that the health of the significant areas will be adversely impacted with any potential contamination likely to be low and diffuse rather than a point source discharge to the receiving environment.

31. As only tolerant freshwater communities have been recorded from the nearby stream, and taking into account the wider impacted catchment, ecological monitoring is not proposed by the applicant, other than for the current surface and groundwater monitoring of contaminants to continue.

32. The frequency of surface and groundwater monitoring proposed by the applicant varies, depending on the location and measurement/analyte being monitored. For some of these the period of monitoring reduces after landfill closure. To ensure monitoring is useful and comparable to previous data, monitoring should continue and be undertaken in accordance with the recommendations outlined in the surface water technical review and evidence of Dr Wilson.

33. Proposed conditions 47-50 were updated by the applicant to require follow-up monitoring and reporting, including actions to prevent further exceedances, should

nominated guidelines or concentrations be exceeded. This is considered appropriate for the site and is supported.

34. The applicant has updated the ecological assessment to indicate that the ecotoxicology tests were not intended to confirm what was driving the impact on ecotoxicology and thus they have removed the previously proposed monitoring and analysis of ecotoxicity. However, it is recommended that consideration be given to ecotoxicity testing undertaken as a tool as part of follow-up monitoring which is addressed separately in the evidence of Dr Wilson.

35. Ecotoxicity monitoring indicates there may be some unaccounted for leachate loss from the site to the adjacent receiving environments. This has been indicated in the technical memorandum previously prepared by Dr Claire Conwell. Ecotoxicity testing is a fairly new, novel and costly method of monitoring. The extensive monitoring proposed for surface and groundwater are intended to capture potential effects and thus trigger further management actions before they reach the receiving environment. Ecotoxicity testing should be considered to be incorporated into any adaptive monitoring plan to enable a better understanding of the landfill effects, should further investigation be required if leachate is confirmed to be migrating offsite.

36. Cumulative effects have not been discussed in the ecological assessment with there being a lack of integration between the surface water and ecology assessments. The applicant anticipates that there will be no change in the amount of sediment reaching the Kaikorai Lagoon from continued use of the site because of stormwater management measures in place at the site. It is noted in the evidence of Dr Wilson that no sediment monitoring in Kaikorai Stream is proposed, which he has recommended be integrated into water quality monitoring, to assess whether this is the case.

37. Given the stage of the development nearing closure, with no new direct ecological impacts anticipated, cumulative effects are not a significant consideration for flora or fauna. Continued monitoring is proposed and recommended to determine any cumulative impacts on surface water quality (refer to the surface water evidence of Dr Wilson).

Management and mitigation of ecological effects

38. Extensive monitoring is proposed as part of groundwater and surface water monitoring at the landfill. Monitoring and management of these parameters will capture potential effects to trigger additional management measures and reduce the chances of

them impacting the receiving environment of Kaikorai Lagoon. Some additional parameter monitoring is recommended in the evidence of Dr Wilson and Tim Baker. Integrating eco-toxicity testing as a tool as part of adaptive management is also recommended.

39. The draft VMRP has not considered a requirement of the ecological effects assessment by the applicant. However, this framework seeks to ensure the successful restoration of the site following closure of the landfill.

40. Revegetation and restoration at the landfill alongside closure will provide an ecological benefit to the receiving environment by creating a large, vegetated area that will aid in buffering the Kaikorai Stream, in addition to increasing terrestrial ecological values and fauna habitat. The development and implementation of the VMRP is therefore supported as a positive outcome of the application.

Overall level of effect

41. Overall, the ecological assessment accompanying the application indicates the level of adverse effect of the proposed operation and ultimate closure of the landfill on the aquatic environment and aquatic fauna is low, due to a negligible magnitude of effect on moderate-high ecological values.

42. I agree that the groundwater drawdown will have a negligible effect on the aquatic environment and that no discernible effects have been found in surface and groundwater quality monitoring.

43. There are however, indicators of some unaccounted-for leachate loss to the receiving environment. Ecotoxicity tests recorded increased toxicity downstream of the landfill. The ecological assessment assigned the cause of this to other ecological stressors not associated with the landfill. This conclusion may be incorrect as old stream channels beneath the landfill, in conjunction with the leachate trench location, may provide pathways for unrecognised leachate loss. This is discussed further in the groundwater technical review prepared by Tim Baker. The ecotoxicology results indicate there may be effects associated with the landfill leachate, that would otherwise not have been detected or been identified if only the surface or groundwater water chemistry results themselves were assessed in isolation. It is proposed to repair a broken pipe and extend the leachate collection trench to (almost) fully encircle the landfill to minimise potential effects of unrecognised leachate loss.

44. I agree that appropriate sediment erosion and sediment control measures are required to manage potential adverse effects of the earthworks activities associated with the landfill operations and closure.

CONSIDERATION OF SUBMISSIONS

45. Of the four submissions received two of these specifically mention biodiversity and/or ecology concerns. These are primarily related to the potential for leachate loss and its impacts on the receiving environment.

46. Both Te Rūnanga o Ōtākou and Otago Fish and Game Council seek for the receiving environment to be able to be restored to enable the harvesting of mahinga kai and fish, which is currently not possible due to the poor water quality of the lagoon and contributing catchment. While I agree that the closure of the landfill will improve the water quality it may be a long time before these aspirations are achievable due to the long-term poor water quality and wider catchment issues.

CONCLUSIONS AND RECOMMENDATIONS

47. The application proposes to continue the landfill operations until the Smooth Hill Landing landfill is in operation. At this point closure of the landfill will commence. Proposed conditions of consent have been provided by the applicant and reviewed by council and its technical reviewers to aid in ensuring that effects of the landfill are monitored and appropriately managed to reduce or minimise potential adverse impacts on the receiving environment.

48. No new areas of native vegetation or watercourses will be impacted under the proposed application, in comparison to those already impacted by the historic and current landfill operations, as the landfill will continue within the current active landfill area.

49. Ecological impacts related to the increased risk of bird strike at the airport appear to have been appropriately considered and management actions proposed to reduce this risk.

50. Aquatic ecological values of the receiving environment have been described through comparison to upstream monitoring locations. However, the locations surveyed are not directly comparable given the saline influenced waters adjacent the landfill.

51. Continuing with the existing groundwater and surface water quality monitoring is considered appropriate for the site to ensure that impacts of the landfill are monitored, and to allow for actions to be undertaken should a decline in quality be observed or guidelines be exceeded.

52. The ecotoxicity results and recommendations are assessed separately in the surface water technical review and were useful to identify potential unrecognised leachate loss. Ecotoxicity testing may be appropriate to incorporate into future monitoring of the site as part of an adaptive management approach.

53. Cumulative impacts were not adequately addressed in the ecological report as they have focused on contaminants adjacent the landfill not being higher than those recorded at either or both of the upstream control locations, indicating that these contaminants are present in higher concentrations and likely coming from up-catchment sources. Ongoing monitoring of stormwater discharges, groundwater and leachate is considered appropriate to ensure that any issues can be identified, and appropriate actions undertaken to manage these impacts.

54. There will be no direct impacts on terrestrial and freshwater ecology from the continued operation and closure of the landfill. There are however potential cumulative effects potentially related to unidentified leachate loss. Further information is required to fully understand the potential unaccounted for leachate loss and management. It is vital that measures are put in place to understand the impacts surrounding this and ways that may be possible to remedy this. Conditions as recommended by Tim Baker will allow a better understanding of any potential leachate loss and outline appropriate management that will in turn aid in protecting the receiving environment of Kaikorai Stream and estuary.

CONDITIONS

55. I support the proposed ecological conditions related to the revegetation plan and updated bird management plan. Condition 41 should be worded to require a VMRP be provided, in accordance with the proposed VMRP framework submitted as part of the application. Review and approval of the VMRP should be completed on behalf of ORC by a suitably qualified expert. A condition is also required to implement the conditioned VMRP, and it should be directly referred to in the Landfill Closure Management Plan (condition 18). A timeframe for the VMRP to be prepared and implemented should also be included with a minimum three year plant maintenance requirement for new planting

areas. An additional condition to require completion reports for planting is also recommended, which could be integrated into the annual monitoring report required by condition 55. The proposed revised condition wording for the VMRP is as included in the evidence of Rachael Annan.

56. A condition shall be included requiring the applicant to avoid disturbance of native nesting birds as part of any tree removal that may occur as part of the Vegetation Management and Restoration Plan.

57. An adaptive monitoring plan should be prepared should leachate be confirmed to be migrating offsite that is unable to be addressed as part of the existing leachate management. Ecotoxicity monitoring should be considered as a potential tool as part of any additional monitoring, in accordance with the method outlined in the Cawthron report. Surface water components that should be included in this plan are outlined in Dr Peter Wilson's evidence.

58. No additional ecological conditions are recommended.

59. Silt and sediment control requirements, surface water monitoring and ecotoxicity monitoring should be conditioned as outlined in other technical specialists evidence.

Elizabeth Morrison

21 February 2025