Tonkin+Taylor

Job No: 1011469
5 April 2022

Otago Regional Council
Private Bag 1954
Dunedin 9054

Attention: Hilary Lenox

Dear Hilary

Technical Review: Smooth Hill Landfill - Appendix 11 - Ecology Assessment

Introduction

1 Dunedin City Council (DCC) proposes to establish a new Class 1 landfill, to be located at Smooth Hill to the south of Dunedin Airport. DCC has applied to Otago Regional Council (ORC) for a range of resource consents required for the establishment and operation of the proposed landfill.

2 Tonkin & Taylor Limited (T+T) has been engaged by ORC to undertake a technical review of the ecological assessment lodged by DCC in support of its resource consent applications.

3 The purpose of this report is to set out the findings or our technical review of DCC's ecological assessment to inform a decision support a Section 42a report and inform a decision by ORC on the resource consent applications.

4 The following documents have been considered as part of this technical review:

- **Dunedin City Council - proposed Smooth Hill Landfill: Section 92 review - requests for further information:** *Report prepared for ORC by T+T, September 2020.* (Herein referred to as the s92 request')
- **Smooth Hill Landfill – Assessment of Environmental Effects for Updated Design:** *Boffa Miskell May 2021. Report prepared by Boffa Miskell for Dunedin City Council.* (Herein referred to as the 'AEE').
- **Revised Appendix 11 – Ecological Impact Assessment Report:** *Boffa Miskell May 2021. Smooth Hill Landfill Ecological Impact Assessment. Report prepared by Boffa Miskell for Dunedin City Council.* (Herein referred to as the 'Ecology Report').
- **Revised Appendix 9 – Surface Water Assessment Report:** *GHD May 2021. Waste Futures Phase - Smooth Hill Landfill Surface Water Assessment. Report prepared by GHD for Dunedin City Council.* (Herein referred to as the 'Surface Water Report').
- **Revised Appendix 8 –** *Groundwater Report: GHD May 2021. Waste Futures Phase 2 – Work Stream 3. Smooth Hill Landfill Assessment of Effects to Groundwater. Report prepared for Dunedin City Council* (herein referred to as the 'Groundwater Report').
- **Smooth Hill Landfill further information.** *Provided by ORC as part of its s92 response of 4 August 2021.* (Herein referred to as the 'further s92 response')

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- **Smooth Hill Landfill Draft Landfill Management Plan.** Prepared for Dunedin City Council by GHD (Herein referred to as the 'draft LMP').
- **Smooth Hill DCC responses to ORC questions 18 March 2022** Provided by the Applicant to ORC.
- **Smooth Hill Landfill Draft Conditions, version dated 18 March 2022** Provided by the Applicant to ORC (Herein referred to as the 'Draft Conditions')

5 This technical review has been undertaken by Mike Lake, Senior Freshwater Ecologist at T+T and Josh Markham, Senior Terrestrial Ecologist at T+T. Mike Lake has reviewed the aspects of the application relating to effects on freshwater ecosystems while Josh Markham has reviewed aspects relating to effects on terrestrial ecosystems including wetlands. It has been prepared in accordance with T+T's letter of engagement with ORC dated 12 November 2019.

6 Mike Lake attended a site visit to the proposed landfill site on 6 October 2020.

7 Mike Lake and Josh Markham attended an online meeting on the 14 March 2022 with the Applicants ecological specialist (Dr Jaz Morris from Boffa Miskell) to discuss outstanding matters.

Review Scope

8 The scope of this assessment covers:

- Effects of construction, operation and closure of the landfill on:
  - Terrestrial ecosystems.
  - Freshwater ecosystems.
- Our opinion on the effects of the activity on ecosystems.
- Measures proposed to address adverse effects.
- Monitoring.
- Proposed conditions.

Description of the proposal

9 The proposed Smooth Hill municipal landfill is intended to replace the existing Green Island landfill located in Dunedin. The Smooth Hill Landfill is reduced in scale from the original application as follows:

- A footprint of 18.6 ha instead of the original 44.5 ha.
- A gross capacity reduced form 7.9 million m^3 to 3.3 million m^3.
- Net waste capacity of 6.2 million m^3 to 2.9 million m^3.
- The predicted landfill life reduced from 55 years to years.

Freshwater ecology review

10 The proposed landfill is to be located in the upper catchment of the Ōtokia Creek, which flows into the sea at Brighton. The existing landuse for the proposed landfill catchment is plantation forestry with the last harvest of trees occurring in 2017. The catchment outside of the Landfill Footprint will continue to be used for plantation forestry and this activity is likely to exert a strong influence on the freshwater environments both within and downstream of the proposed landfill.

11 The classification of watercourses used by the applicant was based on the system developed in the Auckland Region. However, that classification system appears to be inconsistently

applied within the Ecology Report, mainly with respect to the distinction between perennial[1] and intermittent watercourse types. Section 8.5.2 of the AEE refers to ephemeral and perennial watercourses but not any intermittent watercourses. The Ecology Report identified that the landfill designation contains only ephemeral watercourses with no defined channels although there is water at or near the surface as indicated by the presence of wetland vegetation. By the time the Ōtokia Stream tributary has reached the McLaren Gully Road (approximately 1.3 km downstream of the designation site) it has transitioned to an intermittent watercourse[2].

12 The Ecology Report identifies the watercourse between the designation site and McLaren Gully Road as being perennial, however, the subsequent description of that reach would more accurately describe an intermittent watercourse (surface water present for some but not all of the year). The point at which the watercourse transitions from ephemeral to intermittent watercourse has not been identified within the Ecology Report. The ephemeral – intermittent watercourse transition point is likely to be difficult to define due to the wetland occupying the valley floors and may shift from year to year in response to climate variability. At some point downstream of McLaren Gully Road the watercourse will transition from an intermittent to perennial (continuously flowing) watercourse and that point was also not identified in the Ecology Report. The distinction between ephemeral and intermittent/perennial watercourses is relevant because it helps determine when a watercourse meets the definition of a river under the Resource Management Act and provides an indication of when a watercourse can support aquatic communities.

13 Macroinvertebrate, habitat, and fish surveys were completed at four sampling sites in June 2020. It is not clear how long a section of channel was sampled at these sites. Macroinvertebrate communities were assessed using Macroinvertebrate Community Index (MCI) and Semi-quantitative Macroinvertebrate Index (SQMCI) metrics and utilising soft-bottomed tolerance scores appropriate to the stream environments that were sampled. MCI and SQMCI results were indicative of 'poor' stream health. In our view macroinvertebrate and habitat assessments were adequate for characterising freshwater values.

14 Fish surveys were completed in June 2020 and April 2021. The 2020 surveys consisted of electrofishing at the four sampling sites as well as at "a variety of locations along the downstream tributary, wherever sufficient habitat was found". Standard electrofishing sampling protocols were followed in 2020, however, because sampling was undertaken in winter it was outside of the recommended window for fish surveys. It is not clear if 150 m of channel was electrofished at each of the sites as prescribed in the protocols to give a total length of channel sampled of over 600 m. No fish were detected during the electrofishing survey.

15 Fish sampling was undertaken again in April 2021 to ensure that no species had been missed in 2020 because sampling took place in Winter. The April 2021 fish sampling was constrained by a lack of water in the stream following a long dry summer. Sampling was therefore limited to setting fyke nets and Gee's minnow traps in the only pool found to still contain water. One longfin eel and one shortfin eel were recorded during the April 2021 survey.

16 In our opinion the ecological surveys conducted in watercourses within the designation and in the Ōtokia Stream tributary upstream of McLaren Gully Road were sufficient for identifying fish values that were present. These watercourses would be very difficult to survey effectively because of their intermittent flow regime, shallow depth, and dense macrophyte cover. The use of eDNA sampling could have provided useful additional data to confirm fish community values as recommended in T+T's initial review of the draft Ecology Report[3]. We do not agree

[1] We have taken this to be equivalent to the classification of "permanent river or stream" used by Auckland Council

[2] Based on observations made by Mike Lake during the site visit on 6 October 2020

[3] Dated 19 August 2020

with the statement in the Ecology Report that eDNA samples could not have been collected or that sample contamination would have been an issue. Figure 9 of the report shows a fyke net set in the only pool that contained water in April 2021. Baited fyke nets set in this manner, with the leader sitting on the bank, is unlikely to capture any fish species other than eels. However, we accept that the eels are probably the only fish species that are likely to be able to persist in that habitat.

17 The applicant has not assessed the value of watercourses within the designation on the basis that all watercourses were classified as ephemeral and therefore do not provide any stream habitat. We agree with that the ephemeral watercourses do not provide stream habitat and that watercourses within the landfill footprint are ephemeral, however, wetland areas within the designation may meet the definition of an intermittent stream if they have a defined channel. We also note that some portions of ephemeral watercourses do provide ecological value, including as wetland habitats, which are considered elsewhere in the application.

18 The applicant has assessed the section of the Ōtokia Stream tributary between the designation and McLaren Gully Road as having moderate ecological value. That assessment considered the relatively low Rapid Habitat Assessment and macroinvertebrate community metrics, the presence of At-Risk longfin eel and the fact that the watercourse is connected to marginal wetlands. We also agree with that assessment of ecological value.

19 The proposed landfill has the potential to result in the loss of stream habitat as a consequence of reduced groundwater contribution to surface flows in the intermittent and perennial watercourses.

20 We support the recommendation in section 6.1 of the Ecology Report that changes to extent of perennial reaches that might support fish and large invertebrates be avoided. However, in our opinion, effects management should also include intermittent reaches of watercourses because these also support ecological values and functions. If the loss of habitat in intermittent reaches cannot be avoided, then that effect should be managed through adherence to the effects management hierarchy.

21 The Ecology Report concluded that there will be very low level of effects with respect to the loss of freshwater habitat. This conclusion was based on a negligible magnitude of effect on moderate ecological values. While we agree that the proposed landfill may result in a very low level of effects on surface water flow, we also note that there is some uncertainty[4] as to how surface water flows may respond to the establishment of the landfill. The Ecology Report identifies changes in water quantity may occur along up to 300 m of channel. The Groundwater Report also states that the reductions in groundwater flow were anticipated to result in the stream "transitioning from an ephemeral to perennial stream" up to 45 m further downstream from its current location. In our view those two assessments of hydrological alteration could potentially result in a high magnitude of effect and therefore a moderate overall level of effect, which may justify further effects management. Our reasoning for the potential for a high magnitude of effect to occur is that there is a risk that permanent loss of intermittent or perennial stream length could occur.

22 Given this level of uncertainty we are of the view that appropriate surface water hydrology monitoring should be established to ensure that the actual magnitude of effects on intermittent and perennial watercourses is negligible or low. Wetlands are particularly sensitive to changes in hydrology, and it would therefore be appropriate to monitor changes in wetland extent as well (see paragraph 26 in the terrestrial ecology section). If the magnitude of effects is moderate or higher then additional effects management will need to be triggered. The adaptive management approach included in conditions would be a suitable

[4] We understand this uncertainty is described in more detail in the Surface Water Technical Review completed by Peter Cochrane.

mechanism for ensuring that any stream or wetland loss effects are adequately managed. However, in our opinion the surface water monitoring programme referred to in proposed draft condition 28 and 60 won't be able quantify any downstream shifts in intermittent or perennial water courses or within wetland environments on its own. Direct measurement of changes in the extent of downstream watercourses and wetlands pre, during and post construction would be a simpler and more accurate approach.

23 The Surface Water Report states that there will be no significant downstream effects on water quality. The Ecology Report goes further to state that there could be overall positive benefit due to a reduction in plantation forestry within the catchment, a landuse which typically has few sediment controls in place, and which can result in sediment discharges during harvesting phases. The overall level of effects on water quality were assessed as very low in the Ecology Report. We agree with that assessment and support the purpose of proposed draft condition 60 requiring an ecological monitoring programme be developed and implemented to ensure that the actual effects of the proposed landfill will be as low as predicted. In this respect we can see how water quality trigger levels specified in draft condition 28 would work effectively. Monitoring will also be useful for establishing a baseline for understanding the magnitude of effects and trajectory of recovery for any future unintended impacts (e.g., discharge of leachate to surface water receiving environments).

24 According to the Ecology Report Potential effects of road construction on fish passage will be managed through adherence to National Environmental Standards for Freshwater (NES-F), or if necessary, separate resources consents. We are satisfied that the proposed approach would result in a very low level of effect on fish passage or be managed outside of the current application.

Terrestrial ecology

25 The ecological effects assessment in the Ecology Report and subsequent s92 responses have not been clear resulting in confusion of the magnitude and overall level ecological effect pre and post effects management. The Applicant has acknowledged this confusion in the August s92 response, and they have provided further information. The further information provided by the applicant is brief and doesn't provide the clarity needed. The above was raised in the meeting with the applicant's ecologist and the response was that the level of detail was adequate for the scale of residual effect. There is still disagreement on this matter regarding the magnitude of effects on lizards, avifauna, wetlands, and vegetation. However, it is our opinion that if the current ecological value is combined with a greater magnitude of effect the overall level of ecological effect would still be manageable and able to be offset or compensated for. There is agreement with the applicant's ecologist regarding residual effects and the need use the effects management hierarchy and best practice using appropriate offsetting and compensation tools. Therefore, it is our opinion that agreement should be reached on an appropriate set of conditions which bridge the above gap in information to appropriately manage any residual effects.

26 The residual ecological effect on the down catchment wetlands appears to be understated without sufficient supporting information. The construction and management of the landfill has the potential to significantly alter hydraulic connectivity or input into any downstream wetlands which could cause a decrease in wetland area and the alteration or loss of species assemblages. The applicant has provided further information regarding the diversion and alteration of hydrology and potential effects on the wetland down catchment. On behalf of ORC, Mr Cochrane provides comment on these hydrological matters in his technical review which I rely on. There still isn't enough specific information on the tolerance of this wetland complex to any potential alteration of hydraulic regime to make a conclusion on the quantum of ecological effects or if an appropriate quantum of offset / compensation has been applied to appropriately manage residual effects. Therefore, it is our opinion that agreement should

be reached on an appropriate condition(s) that allows for pre and during operation monitoring of the down catchment wetland complex. This would aid the understanding in any shift in hydraulic regime and allow the quantification of the residual effect. Once identified and quantified then offset and compensation tools can be used to appropriately manage these residual effects.

27 Like the above, the residual effect on of wetland(s) along McLaren Gully Road appear to be understated without sufficient supporting information. This was raised with the applicant's ecologist, and it appears the differences in opinion are related to scale (the complete loss of a discrete area of wetland through reclamation v's the complete loss of a small proportion of the overall wetland through reclamation). There is still disagreement on this matter. However, it is our opinion that if the current ecological value is combined with a greater magnitude of effect the overall level of ecological effect would still be manageable and able to be offset or compensated for. Since there is an agreement with the applicant's ecologist regarding residual effects and the need use the effects management hierarchy and best practice using appropriate offsetting and compensation tools, it is our opinion that agreement should be reached on an appropriate set of conditions which bridge the above gap in information to appropriately manage any residual effects. Furthermore, from the discussion with the applicant's ecologist further work was going to be done to see if the access road could be redesigned to avoid the wetland(s) along McLaren Gully Road. This information is yet to be supplied.

28 The applicant has used a Biodiversity Offset Accounting Model (BOAM) in order to quantify the offset required for the wetland loss along McLaren Gully Road only. No BOAM's have been provided for potential residual effects on lizards, avifauna, or terrestrial / freshwater habitats. In regard to the BOAM provided, no benchmark data or justification table has been provided. Providing benchmark data and justification tables for BOAMs is considered an important step in the process of ascertaining the appropriateness of the information used in the model and therefore if the modelled results are supported and if the predicted net gain in ecological / biodiversity value is accurate. It is important that the model and associated data are transparent and robust at this stage, as it should be used to ascertain standards to be incorporated into proposed conditions of resource consent. These standards can then be used to develop long term ecological monitoring to determine when or if the proposed net gain in ecological / biodiversity value is achieved. This was raised with the applicant's ecologist, and it was agreed that a simplistic justification table would be beneficial to understand the BOAM used and for future BOAM's. No further information has been supplied by the applicant regarding this point. As stated above, since there is an agreement with the applicant's ecologist regarding residual effects and the need use the effects management hierarchy and best practice using appropriate offsetting and compensation tools, it is our opinion that agreement should be reached on an appropriate set of conditions which bridge the above gap in information to appropriately manage any residual effects using BOAM and BCM (Biodiversity Compensation Model) models.

29 The applicant has provided a Draft Smooth Hill Bird Management Plan to manage bird density and populations within the flight path of Dunedin International Airport. This draft plan provides a good baseline but doesn't provide the level of detail to provide confidence that bird density and populations will be sufficiently controlled. It is important to not let bird populations become established, if they do become established then they are very hard to control as they will migrate offsite for roosting and breeding and only use the site during the day for feeding. Methodologies for controlling bird populations onsite include the reduction of the tipping face (active and open landfill area), any grassed areas being kept long to block the bird's line of sight, specified daily cover of topsoil to reduce bird attraction and the processing certain types of waste before and on arrival at the landfill. It is important not to limit this plan to a select species of birds but define the parameters in what would classify a species and

population to need control to zero densities. Therefore, it is appropriate to include all bird species over 50 grams in body weight as this size and above would cause the greatest risk in terms of bird strike on aircraft. The above was raised in the meeting with the applicant's ecologist; however, no discussion was had as the right technical specialist wasn't present. It is our opinion that agreement should be reached on an appropriate set of conditions which relate to operational bird management to bridge the above gaps in information to appropriately manage bird populations onsite and the risk of bird strike on aircraft. It is important that these conditions are detailed with defined triggers such as covering and closing the site if a certain density of birds over 50 grams become established.

Review of draft ecological conditions (from DCC 18 March 2022)

30 In summary the proposed draft conditions (conditions 55 to 65) on ecological matters will need to be updated to reflect changes to the matters raised above and conditions which were supplied by ORC – condition set v7.

31 Proposed draft condition 56 seems to vary from information within the Ecology Report and the ORC proposed condition 48. No additional information has been provided to explain why Radiata Pine / Gorse / Cocksfoot-Yorkshire Fog Treeland – 33.88 ha, Gorse Scrub – 0.41 ha and Exotic Grass Grassland and Fodder Crop Herbfields – 0.69 ha have been removed.

32 As defined in the ORC proposed conditions 51 to 53 the wording "residual effects assessment using BOAM or BCM modelling and defining offset or compensation outcomes that appropriately address any residual effects" has been removed the proposed draft conditions 57, 58 and 60. An attempt has been made to incorporated similar intent as to the above wording into proposed draft condition 59. It is our opinion that the wording should be incorporated back into the proposed draft conditions 57, 58 and 60 for consistency and ease for the peer review and certification process and compliance as each management plan is standalone. If this is done, then ORC proposed condition 47 would need to be reinstated and advice note on proposed draft condition 60 removed. If the intent of the applicant is to reduce duplication of wording throughout the ecological conditions, then one "ecological management plan" condition should be constructed in which case the current advise note on proposed draft condition 60 would pertain to all sections of the ecological management plan (Eastern Falcon, Lizards, Avifauna, Restoration, Freshwater and Wetlands).

33 Proposed draft conditions 63 and 64 contain the wording "to the extent practicable". It is our opinion that this isn't enforceable in terms of compliance and should be removed.

34 It is our opinion that the ORC proposed conditions 55 should be retained if the operational bird management plan fails, and bird numbers / densities increase. This will enable the bird population to be managed down to zero densities and eliminate any bird population becoming established.

35 Pre, during and post construction monitoring in proposed draft condition 60.c should not be reliant on water level monitoring as a trigger. It is not clear to us how appropriate triggers would be identified and, in our view, it would be more effective to directly measure changes in watercourse and wetland extent and ecological parameters. It is our opinion that the wording "to be undertaken in the event that water level monitoring undertaken under condition 28 identifies an exceedance of trigger levels" should be removed.

36 Proposed draft condition 60 refers to a Freshwater and Wetland Monitoring and management plan includes a requirement that the plan be submitted no less than 3 months prior to commencement of construction. In our opinion this would not allow sufficient ecological baseline data to be collected prior to potential impacts occurring. As a minimum at least one round of baseline surveys will need to be completed at an appropriate time of year prior to construction. We recommend that the plan be submitted no less than 3 months prior to commencement of monitoring.

Conclusion

37 Regarding freshwater ecological matters, we are in general agreement that the level of effects is likely to be low provided all effects management actions are implemented. However, we note that a considerable level of uncertainty exists regarding the degree of hydrological alteration that may occur. In our view this uncertainty can be managed though consent conditions requiring hydrological and ecological monitoring in the receiving environment and clearly identified adaptive management responses.

38 In terms of terrestrial ecological matters, we have low confidence with regards to the Applicant's magnitude and level of ecological effects conclusions. This low confidence in the level of ecological effects means that an assessment of the overall offset package is unable to be finalised, and a conclusion is unable to be reached as to whether it is appropriate and will result in no net loss and a preferable net gain in ecological / biodiversity value at this point. Well considered and detailed conditions of consent would need to be constructed and agreed to bridge the gap in knowledge and give confidence that the overall ecological effects can be appropriately managed and offset or compensated for. It is our opinion that changes to the proposed draft conditions in line with the ORC proposed conditions is needed to ensure confidence that the conditions would be implemented as envisaged to appropriately manage ecological effects.

Applicability

39 This Report been prepared for the exclusive use of our client Otago Regional Council , with respect to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose, or by any person other than our client, without our prior written agreement.

Tonkin & Taylor Ltd

Environmental and Engineering Consultants

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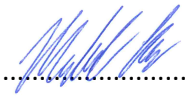

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