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23rd January 2024

Otago Regional Council
Private Bag 1954
Dunedin 9054

Attention: Shay McDonald
Senior Consents Planner

**Memorandum: Technical Review of Assessment of Effects of
Discharges to Air from the Clutha District Council Mt
Cooee Landfill Expansion**

Preliminary

The Clutha District Council (**CDC**) has applied for consent to discharge contaminants to air from expansion of the Mt Cooee Landfill at Balclutha. The proposed expansion of the existing landfill site includes new lined waste cells and a waste transfer station. WSP has prepared that assessment of effects (**AEE**), including separate assessments of air quality effects for the existing and proposed landfill sites (Appendix H of the AEE).

Otago Regional Council (**ORC**) has commissioned Specialist Environmental Services Limited (**SESL**) to undertake a technical review of the assessment of effects of the discharge of odour and dust to air. This brief memorandum report reviews the assessment prepared by WSP and specifically responds to questions raised by the ORC processing planner. The response to these questions is detailed in the following sections.

The technical review has been undertaken by the author, John Iseli, on behalf of SESL. I have over 30 years of experience in the field of air quality in New Zealand and have undertaken numerous assessments and reviews relating to discharges to air from industrial processes and waste management facilities. I am experienced in the use of various odour assessment tools for such assessments. I confirm that the findings expressed are my own conclusions and I have not delegated review work to any other party.

My initial review of the AEE resulted in several questions to the applicant to clarify matters in the air quality assessment. I have reviewed the Section 92 response prepared by WSP.

I visited the existing Mt Cooe landfill site with ORC staff and other technical reviewers on 17th May 2023. We observed the current landfill operation, including the tip face. I also viewed the location of neighbouring properties that could be potentially affected by the discharge in a tour of the neighbouring area.

ORC Question 1: Is the technical information provided in support of the application robust, including being clear about uncertainties and any assumptions? Yes, or no. If not, what are the flaws?

The AEE has correctly identified odour and dust as the primary contaminants discharged to air from the transfer station. I agree that odour is the key focus. The WSP odour assessment has relied on qualitative assessment tools, generally consistent with the Ministry for the Environment's Good Practice Guide for Odour Assessment. The presence of the existing operating landfill has allowed evaluation of current odour effects using community survey, odour scout monitoring and complaint analysis tools.

Having reviewed the further information provided (discussed below), I consider that the technical assessment provided by WSP is sufficiently robust given the scale and significance of the discharge. The further information has provided some additional detail regarding operating procedures and mitigation that has been included in suggested conditions of consent.

Q2: Are there any other matters that appear relevant to you that have not been included? Or is additional information needed?

Additional information has been sought as follows:

Landfill Gas Collection and Flaring

- 1. The proposed conditions do not specifically require landfill gas (LFG) collection and flaring from the expansion, which appear to be inconsistent with the technical air quality assessment and the NZ Emissions Reduction Plan guidance. Given that LFG collection is a key mitigation measure (both in terms of odour control and Greenhouse Gas effects), why is LFG collection and flaring not proposed at the outset of the expansion? In particular, would it not be appropriate to establish an LFG collection network as new cells are formed?*
- 2. Please specify the location and design aspects of the LFG flare (including failsafe measures and monitoring) to be included in potential consent conditions.*
- 3. Please describe the LFG monitoring that is proposed. Will the current quarterly monitoring of methane and hydrogen sulphide be continued at the existing and new landfill areas?*

Liquid Wastes and Special Wastes

1. *The design report states that the existing liquid waste pit will be decommissioned within two months. Please confirm if liquid wastes (such as septage and DAF sludge) will no longer be accepted at the landfill under the proposal.*
2. *Is a condition proposed limiting moist wastes received to “spadable sludge” (e.g. maximum 20% moisture)?*
3. *Please confirm that special wastes received will not include material in an odorous condition, such as fish wastes, rendering by-products, dissolved air flotation (DAF) treatment sludge or material that is in an anaerobic or putrid condition. What procedures are proposed to ensure that such wastes are not accepted at the landfill?*

Leachate Collection

1. *What specific measures are proposed to control potential odour from the leachate collection system? Will the leachate sump be emptied every day by pumping to the treatment plant?*
2. *Are regular (e.g. daily) inspections of the leachate sump proposed as part of the odour monitoring programme undertaken at the site?*

Dust

1. *The AEE refers to “standard mitigation measures”. What specifically are these measures? Will they be included in proposed consent conditions?*
2. *Is it proposed that a water cart will be held on site at all times to respond to any dust or minor combustion events that may arise?*
3. *Earthworks as part of the landfill expansion are a potentially significant source of dust that have not been specifically assessed. Please describe the dust control measures proposed for this activity. Will these measures be included in proposed consent conditions, or in the Construction, Erosion and Sediment Control Plan?*

I am satisfied that the responses received from WSP address the matters raised by SESL. I have taken the s92 response into account in my subsequent review comments, including the suggested conditions.

Q3: If granted, are there any specific conditions that you recommend should be included in the consent?

I have reviewed the conditions proposed in Appendix S of the AEE, including the further amendments suggested or implied in the further information response from WSP. The conditions proposed in the AEE are general in nature and do not cover all air quality matters that are normally addressed in landfill conditions. I consider that some additions are necessary to include the specific mitigation measures proposed and be consistent with conditions typically applied to landfill operations to control odour and dust effects.

I recommend that the following matters should be covered in additions and amendments to the conditions proposed in Appendix S. It would assist if the applicant prepared an updated set of conditions addressing all these key matters.

General

Daily cover specification (condition 21) specification should be at least 500mm of soil or other similar material. If membrane cover is to be used, it should be demonstrated to provide at least equivalent odour control to 500mm soil cover.

A condition should be included that prohibits burning or composting of any material.

A condition detailing asbestos handling procedures (such as containment and burial on arrival) is required.

Odour

In keeping with current accepted practice, condition 30 should be amended to specify no offensive or objectionable odour beyond the site boundary. Reference specifically to guidance documents or officers' opinion limits the scope of the condition. Rather, the enforcement authority should have access to the full range of tools and information in determining compliance with the condition.

Condition 31 should specify the maximum area (m²) of landfill working face open at any time (applicant to confirm).

In addition to procedures for management of odorous wastes being included in the Landfill Management Plan (LMP), minimum requirements should be included in a separate condition. These requirements include:

- moisture content of any waste not to exceed that of spadable sludge (15-20% solids).
- a trench being prepared prior to odorous waste acceptance, with cover material stored adjacent to the trench.
- waste to be placed directly in that trench with at least 500mm soil cover applied immediately.
- provisions for rejection of any highly odorous waste material with potential to cause breach of the "no offensive or objectionable odour" condition.

A condition should require that any greenwaste stockpiled on site is managed to prevent decomposition or combustion prior to shredding or removal. Stockpiles should be kept in an aerated state and not contain significant quantities of dense materials such as grass clippings. The temperature and moisture content within such stockpiles should be regularly monitored in accordance with procedures described in the LMP.

A further condition should prevent stockpiling of shredded greenwaste on site due to potential for combustion. Shredded material is to be used as cover or removed from the site.

A condition should require that the leachate collection sump is emptied to the trade waste sewer at least daily to minimise odour generation. The sump should be inspected daily as part of site walk-over monitoring.

Landfill Gas (LFG)

The Landfill Gas Abstraction Report required by condition 32 should be submitted to ORC for review and approval.

The recommendation report required by condition 33 should be completed every 3 years until such time that LFG collection and destruction occurs. The report should be submitted to ORC for review and approval.

In the event that an LFG collection and destruction system is ultimately installed, a LFG Management Plan (LFGMP) should be required by condition that addresses:

- Design and construction of the landfill gas management system, including flares and generators.
- Operation and maintenance of the landfill gas management system.
- Procedures for landfill gas surface emission monitoring and perimeter probe monitoring.
- Criteria to be followed to judge when flaring of gas will be commenced.
- Procedures for removing and disposing of condensate from condensate traps.
- Contingency plans to address the protection of public health and safety and the environment in the event of emergency situations such as landfill fires, or reference to a fire response plan, or in the situation of a mains power failure.

The LFGMP should be submitted to ORC for certification.

A condition should require that any future LFG flare or other combustion source be located at least 100m from any sensitive receptor beyond the property boundary.

A condition should detail basic minimum specifications for any LFG flares installed in future, including:

- Gas residence time
- Temperature
- Re-ignition and alarming.

Dust

In regard to condition 34 (no offensive or objectionable dust), my observations made in respect of the “no offensive or objectionable odour” condition apply.

Condition 35 should require that dust mitigation measures be described in the LMP and should include, but not be limited to:

- Maintaining adequate water supply at the site to control dust at the working face, and to dampen down unsealed access roads.
- Use of water cart and sprinkler systems as necessary.
- Sealing the main vehicle access routes.
- Limiting vehicle speeds to 20 kilometres per hour on unsealed roadways and working areas.
- Applying gravel to unsealed roadways that are subject to regular vehicle traffic.
- Rejection of dusty loads or loads containing asbestos that is not sealed/contained.
- Applying water to unsealed surfaces, as necessary.
- Regular sweeping and cleaning of sealed surfaces.

Condition 46 (Construction Erosion and Sediment Control Plan) should require that dust control measures be included.

Monitoring

A condition should require daily inspections of the site (including the working face, transfer station area, leachate collection sump and site boundaries) for odour, dust and litter. A record should be kept of these inspections and provided to the ORC on request.

Monthly monitoring of methane and hydrogen sulphide at the landfill surface should be specified by condition.

A condition should require methane concentrations, as measured by Flame Ionisation Detector (FID), at the surface of landfill areas with intermediate or final cover to not exceed 0.5% by volume.

A further condition should require monthly visual landfill surface inspections (walk-over surveys) for cracks, areas of vegetation damage, state of cover, breakout of leachate or refuse through the cap.

Continuous PM monitoring should be required, with appropriate response trigger concentrations, when works occur within 200m of the dwelling curtilage area of the property to the east.

A condition should require a meteorological monitoring station (temperature, wind direction and velocity) to be established and maintained, to assist with response to any complaints and monitoring of air quality impacts.

Review of Conditions

The review condition should specifically include a clause relating to LFG Management, given that LFG collection and combustion is not proposed from the outset.

Q4: Has the applicant accurately assessed odour effects associated with the operation and management of the landfill, including the proposed expansion? Please explain.

The AEE has appropriately described the receiving environment and identified neighbouring parties (including sensitive receptors) that could be affected by the discharges. Potential odour effects on these parties have been assessed qualitatively using various tools, including:

- Complaint records relating to the existing landfill;
- Analysis of terrain and meteorological conditions;
- Odour survey information;
- Review of proposed odour controls and industry good practice;
- Odour scout observations; and
- Reference to separation distance guidance for sensitive receptors.

I consider that the assessment approach adopted is reasonable and in accordance with good practice guidance. I agree with WSP that odour dispersion modelling would offer little value in this case.

Australian EPA guidance referenced by WSP indicates that, for initial evaluation purposes, a setback of 500m from the landfill to sensitive receptors (dwellings in this case) is appropriate. The applicant has identified that there are potentially affected dwellings in the elevated Arthur Terrace/Golfers Drive area to the northwest of the landfill, and also a dwelling on the property on Kaitangata Highway immediately to the southeast of the landfill. The proposed future landfill development would move further away from the residential area to the northwest, but closer to the dwelling on Kaitangata Highway. The golf course immediately north of the site will also be affected by odour from the landfill.

Balclutha meteorological data provided by WSP indicates that dwellings to the northeast of the site (elevated residential area) will be downwind of the discharges for approximately 10% of the time, 1% of the time during light winds of less than 1m/s. I agree that such light wind conditions are associated with poor dispersion and worst case odour impacts. However, I note that the daily and seasonal wind roses indicate that the frequency of southeasterly winds will be greater during summer and during the daytime, coinciding with the times when odour emissions from the landfill will typically be greater.

The meteorological data indicates that the property to the southeast of the site will be downwind of the landfill during prevailing north-westerly winds for approximately 26% of the time, 5% of the time during light winds of less than 1m/s. The AEE states that the dwelling on this property will be approximately 170m from the active face of future landfill cells at the closest point. I agree with WSP that this dwelling is expected to be the most potentially affected by odour due to the landfill expansion. That is particularly the case because LFG destruction and treatment is not proposed from the outset.

The golf course to the north will be downwind of the landfill for approximately 20% of the time, 4% of the time during light winds of less than 1m/s. Given the proximity of the golf course to the landfill, I consider that golfers on the course will experience odour at times.

The AEE states that odour complaints associated with the existing landfill have not been lodged over the past 5 years. ORC has confirmed that odour complaints have not been received at the time of writing (21.1.24). I am not aware if any odour complaints have been made directly to the landfill operator or the CDC. However, I note that the Landfill Management Plan submitted with the AEE (dated August 2022) states at page 49 that previous complaints have arisen from properties at Arthur Terrace and Golfers Drive relating to deposition of waste from the Danone dairy plant. I also note that caution should be applied when evaluating complaint records, as parties can be reluctant to make complaints to the regional council for a variety of reasons.

The limited odour scout observations undertaken by WSP (20 observations at 10 locations on 3 days in late 2022) indicate that weak odours were intermittently detected at the Golfers Drive and Arthur Terrace area, approximately 250m from the landfill. The observations concluded that there is a low frequency of observing very weak to weak intensity odours downwind of the existing landfill. WSP considered these odours to be mainly associated with the tipping and compaction of waste.

The AEE states that WSP staff surveyed some of the nearest residents during their site visit to assist in their understanding of dust and odour impacts. WSP noted that they did not record any odour or dust concerns associated with the existing landfill during the survey.

Overall, I consider that the assessment of odour effects undertaken by WSP is sufficient, bearing in mind the scale and significance of the discharge.

Q5: Has the applicant accurately assessed adverse effects relating to dust associated with the operation and management of the landfill, including the proposed expansion? Please explain.

Odour emissions are the focus of the AEE and the assessment of dust effects is limited. However, the complaints record and the separation distance to sensitive receptors indicates that dust could be controlled at the site to prevent significant adverse effects at neighbouring properties, provided good practice mitigation measures are in place.

I have recommended a condition of consent that requires the following dust control measures to be implemented via the LMP:

- Maintaining adequate water supply at the site to control dust at the working face, and to dampen down unsealed access roads.
- Use of water cart and sprinkler systems as necessary.
- Sealing the main vehicle access routes.

- Limiting vehicle speeds to 20 kilometres per hour on unsealed roadways and working areas.
- Applying gravel to unsealed roadways that are subject to regular vehicle traffic.
- Rejection of dusty loads or loads containing asbestos that is not sealed/contained.
- Applying water to unsealed surfaces, as necessary.
- Regular sweeping and cleaning of sealed surfaces.

I consider that it is also important that dust control measures are included in the Construction, Erosion and Sediment Control Plan. Construction works for the future landfill cells will occur close to the eastern boundary. The AEE notes that the dwelling on the adjacent property on Kaitangata Highway will be 170m from the landfill cells at the closest point. Bearing in mind the prevalence and strength of winds from the western quarter, as indicated by the wind roses presented in the AEE, a good degree of dust control will be required when works are undertaken near the eastern boundary.

Existing vegetation along the eastern boundary and within the neighbouring property will provide some mitigation of dust effects at the dwelling. I suggest that it would be appropriate to undertake continuous particulate matter monitoring at the eastern site boundary when works occur within 200m of the dwelling curtilage of the property to the east.

Provided the recommended mitigation is implemented, I consider that dust emissions from activities within the landfill site are not likely to cause more than minor adverse effects at sensitive receptors.

Q6: Has the applicant accurately assessed adverse effects relating to landfill gas associated with the operation and management of the landfill, including the proposed expansion? Please explain.

The proposed conditions of consent do not specifically require LFG collection and flaring from the landfill expansion, which appears to be somewhat inconsistent the NZ Emissions Reduction Plan guidance. I note that LFG collection and treatment is a key mitigation measure (both in terms of odour control and Greenhouse Gas effects). This matter was raised with the applicant in the s92 request and the following response was received from WSP.

“The Air Quality Assessment described the LFG collection and treatment options for the future expanded landfill site, and Section 3.6 of the Air Quality Assessment was meant to provide options for CDC if they seek to collect and treat the gas. However, further discussions have progressed with regards to the collection and flaring of LFG and it is not considered appropriate or efficient to establish a LFG collection system for a landfill operation of this size. The proposed annual tonnage at 8,000 tonnes is very small for running an effective landfill gas collection and flaring system. Whether enough gas could be collected to run a flare would need specific assessment. Further confusing the issue is the policy in the Emissions Reduction Plan that “all municipal landfills shall have landfill

gas collection and destruction in place by 2026 where feasible". To date, the term "where feasible" has not been defined.

Experience at some other landfill sites is that gas collection wells are in practice best installed 6-12 months after refuse placement because working around wells as the refuse lift comes up is difficult. Given the small fill area and depth that will accrue from 8,000 tonnes, it is considered that then installing wells or trenches as waste is placed is not necessary.

In light of the above, we suggest including a condition that requires a specific assessment of gas yields and a design of a gas system by 1st December 2025. This will then be consistent with the Emissions Reduction Plan, which will be better defined.

I accept that the small scale of the landfill may pose problems for establishing an efficient gas collection and flaring system. There is also uncertainty regarding the definition of "where feasible" in the Emissions Reduction Plan. Given these factors, I consider that the proposed conditions 32 and 33 in the AEE requiring specific assessment of gas yields and a design of a gas system by 1st December 2025 are not unreasonable.

I recommend that the Landfill Gas Abstraction Report required by condition 32 should be submitted to ORC for review and approval. In my opinion, the recommendation report required by condition 33 should be completed every 3 years until such time that LFG collection and destruction occurs. The report should also be submitted to ORC for review and approval. I suggest that an LFG Management Plan should be prepared and certified, in the event that an LFG collection and destruction system is ultimately installed.

The application proposes that any future LFG flare or other combustion source will be located at least 100m from any sensitive receptor beyond the property boundary. Provided this separation is required by condition, I am satisfied that potential combustion of LFG (approximately 800kW output estimated in the AEE) is not likely to cause adverse effects at neighbouring properties.

If LFG collection and treatment does not occur, odour emissions from the future landfill cells will have greater potential to affect the neighbouring properties, in particular the dwelling on Kaitangata Highway. However, odour observations and community feedback regarding the existing landfill (without LFG collection) indicates that mitigation could be applied so that adverse odour effects are acceptable.

The applicant's response to question 46 of the s92 request states that the new landfill cells will be established in greywacke with low permeability. The main risks for off-site migration are identified at the property boundary to the east of the landfill. Accordingly, the monitoring regime in the Gas Management Plan proposes two bores at the eastern boundary. I consider that approach to be reasonable.

I note that the scope of this technical review does not include assessment of the effects of LFG emissions on climate change.

Q7: If monitoring of air quality is required, where should monitoring be undertaken, how should monitoring be undertaken, what parameters should be monitored, and how often?

I have detailed the recommended monitoring for odour, LFG emissions and dust in the conditions suggested in response to Q3.

Q8: In your opinion, is 'investigating design options for gas flaring within five years of commencement of filling of the first new cell' an appropriate way to managed landfill gas, taking into consideration the guidance/direction indicated in the NZ Emissions Reduction Plan 2022? Please explain.

This matter is covered in my response to Q6.

Q9. Have the cumulative effects of the activity been appropriately assessed?

The AEE has not identified any other similar discharges in the local area that are likely to significantly contribute to cumulative effects. I agree that cumulative effects are not expected to be significant in this case.

Q10. Has the Applicant accurately assessed the combustion emissions associated with the operation and closure of the landfill associated with flaring of LFG and operation of vehicles and machinery onsite? Please explain.

Subject to the 100m flare setback from sensitive receptors discussed in response to Q6, I am satisfied that any adverse effects of LFG flaring and internal combustion in vehicles on the site are likely to be minor.

Q11. In your opinion, do you consider that the Applicant manages/proposes to manage septage and liquid waste appropriately with respect to avoiding or minimising odour? Please explain.

In response to the s92 request, the applicant has confirmed that liquid wastes will no longer be accepted at the landfill.

With regard to special odorous wastes, I recommend that procedures for management of such wastes be included in the LMP including:

- moisture content of any waste not to exceed that of spadable sludge (15-20% solids).
- a trench being prepared prior to odorous waste acceptance, with cover material stored adjacent to the trench.
- waste to be placed directly in that trench with at least 500mm soil cover applied immediately.

- provisions for rejection of any highly odorous waste material with potential to cause breach of the “no offensive or objectionable odour” condition.

The applicant does not propose to limit the quantity of such odorous wastes, which could include fish waste, rendering material and de-watered sludge. I accept that there is a need for disposal of such materials from time to time but note that they can be a significant source of odour. It is therefore important that the above controls are prescribed in any consent.

Q12. In your opinion, does the risk of landfill fire need to be assessed? Please explain.

Good practice measures to prevent landfill fires are proposed and should be detailed in the LMP. I do not consider that specific assessment of the risk of landfill fires in relation to air quality impacts is necessary given the mitigation proposed.

The storage of greenwaste does pose a risk of decomposition and combustion under some circumstances. I have recommended conditions to address this as follows:

- Any greenwaste stockpiled on site is to be managed to prevent decomposition or combustion prior to shredding or removal. Stockpiles should be kept in an aerated state and not contain significant quantities of dense materials such as grass clippings. The temperature and moisture content within such stockpiles should be regularly monitored in accordance with procedures described in the LMP.
- There should be no stockpiling of shredded greenwaste on site due to potential for combustion. Shredded material is to be used as cover or removed from the site.

Q13. Are the mitigation, monitoring, and management procedures proposed in the air quality reports, and the proposed conditions of consent in Appendix S appropriate for the site and activities? Please explain.

I have recommended several additions and amendments to conditions in response to Q3. Provided these conditions are adopted, I consider that the mitigation, monitoring and management in relation to air quality effects is appropriate.

Q14. Do you agree with the Applicant’s conclusions as to the level of adverse effects on air quality? Please explain.

The WSP technical assessment of air quality effects from the proposed landfill expansion concludes that it will have less than minor potential for causing offsite odour effects at all receptors excluding the dwelling on Kaitangata Highway. For this receptor, similar or elevated odour effects compared to the current landfill operation are predicted by WSP, due to the smaller separation distances to the active landfill face. I note that the WSP assessment is specifically subject to LFG capture and destruction being undertaken.

Given that LFG capture is no longer proposed from the commencement of consent, odour effects of the landfill expansion in the eastern portion of the site are expected to be greater than those predicted by WSP. However, the small scale of the landfill and observed effects of the existing landfill discharge indicate that offsite effects are not expected to be more than minor.

Overall, subject to the amendments and additions to consent conditions I have recommended, I consider that there is potential for minor odour and dust effects at the adjacent property to the east on Kaitangata Highway. I also consider that there is potential for minor odour effects at the golf course and the residential area to the northwest of the landfill in the general vicinity of Arthur Terrace/ Golfers Drive.

Q15. In relation to impacts on air quality, do you consider that there are any persons adversely affected by the application to a minor or more than minor degree?

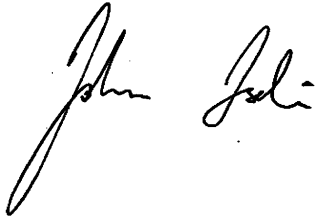
The WSP AEE has used an initial separation distance of 500m from the landfill to sensitive receptors (such as dwellings) for evaluation purposes. Based on the site-specific evaluation of terrain and meteorological conditions, plus the complaints record, odour survey and odour scout information, the setback distance to the northwest of the site has been reduced to potentially affected dwellings in the Arthur Terrace/Golfers Drive residential area.

Taking into account the scale of the landfill and the mitigation proposed, I consider that the overall approach adopted by WSP to identifying affected parties is reasonable.

The AEE provides a list of potentially affected parties. In my opinion this list is generally appropriate with regard to air quality effects. However, I note that specific numbered properties on Arthur Terrace and Golfers Drive are listed. I consider that all residential properties located within 300m of the landfill in this residential area have potential to be affected by odour to a minor degree. I therefore recommend that ORC ascertains that all such properties are included within the list of affected parties.

Please contact me if you require any clarification of the above matters.

Yours sincerely

A handwritten signature in black ink, appearing to read "John Iseli". The signature is written in a cursive style with a large, sweeping initial "J" and a distinct "I" and "S" in the second name.

John Iseli
Principal Air Quality Consultant