

BEFORE INDEPENDENT COMMISSIONERS

AT WAIKATO

IN THE MATTER

the Resource Management Act 1991 (“**RMA**”)

AND

IN THE MATTER

of an application under section 88 of the Act to **WAIKATO REGIONAL COUNCIL** (reference APP144475) by **GLEESON MANAGED FILL LIMITED** to establish and operate a managed fill disposal activity at 310 Riverview Road, Huntly.

**STATEMENT OF EVIDENCE OF JONATHAN PAUL CALDWELL
ON BEHALF OF WAIKATO REGIONAL COUNCIL**

Dated 28 NOVEMBER 2022

Statement of evidence of Jonathan Paul Caldwell

Introduction

1. My full name is Jonathan Paul Caldwell.
2. I am a Senior Scientist at the Waikato Regional Council. I have held this position since January 2012 but held the position of Senior Resource Officer in the Industry Programme from January 2007.
3. Prior to my role with the Waikato Regional Council (WRC), I was a Research Scientist at Canesis Network Limited (formerly the Wool Research Organisation of NZ).
4. I hold a Master of Science Degree and Doctorate of Philosophy from the University of Waikato with a major in Chemistry. I am a member of the Clean Air Society of Australia and New Zealand, WasteMINZ and the Australasian Land and Groundwater Association.
5. My responsibilities at the WRC include coordinating and providing science support for the council's regional air quality monitoring programme, science support for council's contaminated land programme, and in a general advisory capacity as a technical specialist in chemical contamination issues relating to air, land and water. I have also had previous regulatory experience at WRC in the processing and compliance monitoring of resource consents.
6. I am currently a member of the Asbestos Disposal Working Group led by WasteMINZ to produce guidance on disposal of low levels of asbestos in soils and a member of an advisory group (including the Ministry for the Environment) assisting Landcare Research in the development of national policy and guidance for implementation of ecological soil guideline values. I was previously a member of the reference group set up by the Ministry for the Environment to provide input into the updated version of the WasteMINZ Technical Guidelines for Disposal to Land.
7. I have read the Code of Conduct for Expert Witnesses in the Environment Court's Practice Note 2014 and agree to comply with it. I confirm that my evidence is within my area of expertise as an Environmental Chemist, except where I state that I am relying on the evidence of another person. As an expert witness, I have considered all the material facts that I am aware of that might alter or detract from the opinions that I express.

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Assessment of discharges to air

8. On the 9 August 2022, I prepared a Technical Assessment of discharges to air associated with the proposed managed fill operation (refer to WRC Doc# 24495227). This assessment was updated on 14 November 2022 and appended to the section 42A report under Appendix 5.
9. I have read the statements of evidence from the relevant experts acting for the applicant, Ms Deborah Ryan and Mr Rod Lidgard on air discharge and asbestos disposal matters. There are no issues of contention and no further matters that have arisen since my assessment was completed and therefore, I do not intend to repeat or summarise my assessment further.

Assessment of discharges to land and water

10. On the 22 August 2022, I prepared a Technical Assessment of discharges to land and water associated with the proposed managed fill operation (refer to WRC Doc# 24065024). This assessment was updated on 14 November 2022 and appended to the section 42A report under Appendix 3.
11. I have read the statements of evidence from the relevant experts acting for the applicant, Mr Andrew Rumsby, Mr Michael Parsonson and Mr Parviz Namjou on contaminant discharges, erosion and sediment control and groundwater. There are no significant issues of contention but there are some more minor points of difference with regards to Mr Rumsby's statement of evidence which I consider it important to discuss along with some minor changes to my original recommendations. In addition to this I have also identified a paragraph from my Technical Assessment of 14 November which requires correction.
12. With regards to Mr Rumsby's recommended waste acceptance criteria (refer paragraph 7.10, Table 5), and as previously identified in my Technical Assessment, I agree with the site specific derivation of these criteria using fate and transport modelling in preference to the WasteMINZ Class 3 generic waste acceptance criteria.
13. In most cases the criteria Mr Rumsby has recommended provide a higher level of protection and for some contaminants where higher criteria are being sought, adequate justification has already been provided by the results of the fate and transport modelling.
14. Since finalising my Technical Assessment (dated 14 November), I have identified, in the second paragraph on page 7 of my assessment, a contradiction to my agreement to the use of the site

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specific derivations for the organic parameters. In that paragraph I had referred to applying the WasteMINZ Class 3 criteria for organic parameters which had been an earlier viewpoint that I had amended in the rest of my assessment but had forgotten to amend in this paragraph. In summary, I agree with the use of Mr Rumsby's proposed waste acceptance criteria for both elemental and organic parameters.

15. However, as discussed in my assessment of 14 November, I recommend that the total boron limit is reduced from 45 mg/kg to 20 mg/kg which is better aligned with the upper range of the background concentrations for boron in the Waikato region. It also reflects the lower level of control on boron that is provided by a sediment retention pond compared to the other metals as boron in the dissolved phase is less likely to be attenuated by adsorption to soil particles. The ability to accept higher concentrations up to 260 mg/kg should still be justified though, subject to also meeting the SPLP criteria.
16. The other change to the proposed waste acceptance criteria that I recommend, is associated with copper. I recommend that the total copper limit is reduced from 325 mg/kg to the WasteMINZ Class 3 criteria of 280 mg/kg. My justification for this is that there have been some difficulties identified with meeting copper trigger limits in receiving waters at other managed fill sites in the Waikato region and therefore an extra level of precaution is warranted in my view for copper. I also have recommended that concentrations up to 325 mg/kg could still be allowed subject to meeting SPLP criteria. My original recommendation for the SPLP acceptance criteria was 0.5 mg/L but on reading Mr Rumsby's evidence and recommendations on using newer SPLP criteria (refer paragraph 7.3, Table 4), I recommend applying a lower SPLP criteria of 0.14 mg/L.
17. I have also recommended in my assessment, the following approach for developing waste acceptance criteria for contaminants not listed in the Table of Waste Acceptance Criteria. Often it is very low concentrations of pesticides and other related organic compounds that are occasionally identified through soil investigations for which it is not possible to provide an exhaustive list in a consent. Having an agreed-on method for deciding whether that material can be accepted at the site provides certainty for both the consent holder and the consenting authority.
18. My recommended approach is that Synthetic Precipitation Leaching Procedure (SPLP) testing be used with the requirement that the SPLP concentration should not exceed 100x the ANZ guideline for 95% protection. For pesticides for which there is no ANZ guideline available, then

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the SPLP concentration should not exceed 20x the Queensland Proposed aquatic ecosystem protection guideline values for pesticides (Department of Environment and Science – 2018).

19. Under Section 9 of Mr Rumsby's Statement of Evidence, he discusses the impacts of water quality including the existing baseline conditions in the downstream receiving environments from the fill areas, namely the Puketirini stream that will receive stormwater from Fill Area 2 and discharges to Lake Puketirini and the O'Reilly stream that will receive stormwater from Fill Areas 3 and 4 and discharge to the Waikato river. I note that paragraphs 9.6 and 9.7 of Mr Rumsby's statement refer mistakenly to O'Reilly Stream below Fill area 2 and Puketirini Stream below Fill Areas 3 and 4 rather than the other way around. However, I agree that the water quality assessment provides evidence that the two streams are already impacted by various agricultural and mining sources.
20. While I agree that the Puketirini stream sampling results (25 samples over two years) indicates regular exceedances of the 80% ANZ guideline for aluminium with occasional exceedances of thallium (six exceedances of the low reliability), chromium VI (two exceedances of the 95%) and zinc (one exceedance of the 95%), I could not identify any evidence from the results that indicated exceedances for cadmium or copper.
21. For the O'Reilly Stream, the stream sampling results (11 samples over two years) indicates only one exceedance of the 95% ANZ guideline for aluminium (meets 90%) and one exceedance of the thallium guideline but no exceedances of the 95% ANZ guideline for chromium VI.
22. Mr Rumsby recommends the following receiving water quality trigger values as per paragraph 9.14 of his statement. I am in agreement with the general approach of setting trigger limits for the receiving monitoring locations DS2 (O'Reilly stream) and DS5 (Puketirini stream) with the intent of achieving 95% protection which provides the default level of protection expected for surface water. For aluminium and chromium, the 90% protection values have been proposed.

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Parameter	Proposed Trigger values (mg/L)	Source and Rationale
Dissolved Aluminium	0.080 ¹	ANZG (2018) 90% Guidelines. Background may be elevated during storm conditions.
Dissolved Arsenic	0.024 ²	ANZG (2018) 95% Guidelines.
Dissolved Boron	0.940 ²	ANZG (2018) 95% Guidelines.
Dissolved Cadmium	0.0002 ²	ANZG (2018) 95% Guidelines.
Dissolved Chromium (as Chromium VI)	0.006 ¹	ANZG (2018) 90% Guidelines. Background may be elevated.
Dissolved Copper	0.0014 ²	ANZG (2018) 95% Guidelines.
Dissolved Lead	0.0034 ²	ANZG (2018) 95% Guidelines.
Dissolved Nickel	0.011 ²	ANZG (2018) 95% Guidelines.
Dissolved Thallium	0.00003 ²	ANZG (2018) 95% Guidelines.
Total petroleum hydrocarbons (TPH)	5 ⁴	33% of the MfE (1989) Petroleum Guidelines. To avoid visible sheens on the surface of the water.

23. For chromium there has been some changes to the approach with an earlier change from 90% value for chromium VI (a high reliability guideline value) to the default guideline value for chromium III (a low reliability guideline value) with the most recent statement of evidence now proposing the chromium VI 90% protection value again.
24. I agree with Mr Rumsby that the high reliability value is a better one to use where it is available despite the fact that chromium is most likely to be in the lower toxicity oxidation III state. For the Puketirini stream (downstream of Fill Area 2) the evidence indicates that the 90% guideline would be able to be met and for the O'Reilly stream the 95% guideline would be able to be met. The question is, would it be simpler to apply the 90% protection value for both receiving water sampling locations or should there be a higher level of protection set for the O'Reilly stream as the baseline monitoring indicates that this should be achievable? In my opinion it would be simpler to apply 90% to both locations with the knowledge that chromium is likely to be in the lower toxicity form anyway and therefore should be suitably protective.
25. For aluminium, the 90% protection value is a realistic trigger value for the O'Reilly stream but is definitely not realistic for the Puketirini stream as even the 80% value is regularly exceeded. Therefore, I am not sure why the 90% value has been proposed for the Puketirini stream as it is already being exceeded. A potential solution to this could be not to have an aluminium trigger

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limit in the receiving environments but to control it at the sediment retention pond outlets. Mr Rumsby has proposed a dissolved aluminium trigger value at the discharge points of 0.980 mg/L which is the US EPA CMC acute guideline value. This is actually somewhat higher than the typical aluminium discharge value of 0.1 mg/L to 0.2 mg/L that Waikato Regional Council has previously applied for sediment retention ponds that have aluminium-based flocculation. The discharge value of 0.1 mg/L is based on the advice from Auckland Regional Council Technical Publication 227 (June 2004) that dissolved aluminium concentrations of 0.05 to 0.1 mg/L at a pH of between 6.5 to 8.0 generally presents little threat of toxicity. My preference would be to have this lower value of 0.1 mg/L at the discharge points of the SRPs if it is not possible to set a realistic trigger limit in the receiving locations.

26. For thallium, the low reliability default value has been proposed. The monitoring in both streams indicates that this trigger value will be exceeded from time to time. I would however note that the proposed discharge trigger value for thallium from the sediment retention pond is also set at the low reliability default value and therefore, as long as it is being controlled within this limit at the discharge point then a solution could be to just not have a thallium trigger limit within the receiving streams. Thallium is already elevated in the receiving environment, potentially as a result of mining sources. Thallium is not likely to be a common contaminant in the typical fill material brought to the site apart from fill excavated from under Fill area 3 during construction of the managed fill, or if it is sourced from a mining site. I would however recommend that thallium continues to be monitored in the streams so that any emerging trends can be identified.
27. Table 9 under paragraph 9.15 of Mr Rumsby’s statement provides proposed trigger values for discharging to the Fill Area 3 SRP from the underdrain storage tank. As previously raised in my Technical Assessment, while I agree with the Level 1 criteria, the Level 2 criteria are slightly too high for copper, lead and zinc. The correct values based on my calculations of dilution and attenuation are as follows. In addition to this there needs to be a specified pH range of 6.0 to 9.0 appended to this table.

Parameter	Proposed Trigger values (mg/L)	
Total Boron	1.0	5.0
Total Copper	0.5	1.5 1.25
Total Lead	0.1	0.3 0.25
Total Zinc	0.6	1.8 1.55

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28. With regards to receipt of both treated and non-treated acid sulfate soils and peat soils and marine sediments, I have made the following recommendations in my technical assessment.
29. Pond water containing run off from the treatment pad will need to be monitored for pH on a daily basis to ensure that it is between 6-9 pH units before it can be discharged to the quarry pit. Any discharge to the quarry pit should also be subject to boron, copper, lead and zinc analysis using the onsite HACH D 3900 spectrophotometer as per the methodology proposed for allowing release of the contaminated groundwater from under Fill area 3 to the Fill area 3 sediment retention pond. This would require development of appropriate criteria based on the sizing of the treatment pad pond volume and the volume of the quarry pit. If it doesn't meet this criteria then contingencies for treatment such as pH neutralisation or flocculation or trucking away for authorised offsite disposal will need to be undertaken.
30. I also recommend that discharges from the quarry pit are subject to routine monitoring and analysis for the full suite of contaminants as per discharges from the managed Fill Area sediment retention ponds (i.e. Al, As, B, Cd, Cr, Cu, Pb, Ni, Tl, Zn and TPH) with trigger limits based on ANZ guidelines for freshwater 95% protection and a TPH trigger of 5 mg/L (33% of the MfE 1998 Petroleum Guidelines). I would recommend that this monitoring occur at least six times per year (i.e. 2 monthly).
31. For Acid sulphate soils (including peat soils) that have been limed and stabilised offsite prior to delivery (subject to provision of adequate evidence prepared by a SQEP), I recommend that field pH peroxide ($\text{pH}_{\text{FOX}} > 6$) testing of representative samples of soils from each delivered load prior to acceptance should also be required as an additional level of confirmation of adequate treatment.
32. I recommend that marine sediments, even if lime-treated, should not be received due to potential risk of elevated concentrations of contaminants. Marine sediments are unlikely to have been through a robust sampling investigation process that land-based soils from HAIL sites will have been through.
33. Finally, Mr Rumsby comments under paragraph 12.23 of his Statement of Evidence that he disagrees with my recommendation for additional modelling using RCBA to derive site-specific values for Fill area 2 in the event that groundwater is intercepted during its construction. Instead, he recommends that it would be more appropriate to undertake a hydrogeological

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investigation of Fill area 2 to verify the model and then if necessary develop appropriate engineering solutions. I agree that this would be a better solution.

Conclusion

34. Subject to addressing these points of difference discussed above, I am in agreement with Mr Rumsby that the discharges associated with the proposed managed fill operation will not result in a more than minor level of effects within the receiving surface waters and would not be expected to result in a measurable change in water quality within Lake Puketerini or the Waikato river

Jonathan Paul Caldwell

Waikato Regional Council

28 November 2022