

Your ref:
Our ref: 12684888

13 February 2026

Ms Jessie Richardson
Application Lead
Environmental Protection Authority
New Zealand

RE: Green Steel – Applicant’s additional material following conferencing (V2)

Dear Jessie

1. Background

I refer to Joint Witness Statement confirmed on 23 January 2026. Items agreed to be subject to additional assessment were:

- Leachate volumes (based on an updated leachate water balance)
- The monofills’ proposed capping system (based on an updated leachate water balance)
- The groundwater model regarding the ability of the proposed monofill barrier system (Liner Selection) to meet ecological criteria for off-site freshwater ecological receptors.

It was agreed in the Joint Witness Statement that I was to have input into the parameters to be adopted for the leachate water balance.

I refer to your email of 2 February 2026 which contains information from the Green Steel applicant in response to the Joint Witness Statement. The information included:

- A technical memorandum from Envitech which included an excel spreadsheet which are in relation to the predicted leachate generation volumes
- A sensitivity analysis report completed by Stantech with relation to “Liner Selection”
- Draft conditions of approval.

I have provided no input on the parameters adopted in the updated leachate water balance (technical memorandum from Envitech which included an excel spreadsheet). No input was sought from me by the applicant (or Envitech).

I have reviewed the 4 February 2026 emailed response by Waikato Regional Council regarding the above Envitech and Stantec documents.

2. Advice

This advice is structured in three parts as follows:

- Leachate volumetric water balance and the proposed capping system

- Liner selection
- Draft conditions of approval.

This advice needs to be read in conjunction with limitations contained in Attachment 1 of this letter.

2.1 Leachate volumetric water balance and proposed capping system

The consequences of underestimating the leachate generation rates are explained in my initial report of 12 December 2025 and include increased risks of groundwater and surface water pollution and higher vehicle movements on external roads (as the applicant relies on tankering the leachate off site to dispose of it).

Two modelling approaches are presented in the 2 February 2026 Envitech technical memorandum and associated spreadsheet:

- Method A being the Applicant's preferred model and which is the same as the version presented in the Engineering Report, with the addition of monthly timesteps (rather than a yearly timestep)
- Method B is based on rainfall, runoff, evapotranspiration and storage (via absorption by the waste).

In both methods, other than rainfall, the key parameters are not justified or even assessed by sensitivity analysis.

I have mostly disregarded Method B due to the uncertainties even acknowledged by the Applicant. I do note however that when considered monthly the percentage of rainfall which is predicted to become leachate is around 40% for periods from May to the end of August when evapotranspiration conditions are low compared to the warmer months.

In my experience and I agree with the applicant that landfilled waste (floc) acts like a sponge and will absorb some portion of the infiltrating rainfall and not result in the absorbed leachate being needing to be extracted from the landfill. This absorptive property of waste is referred to as field capacity. However, in my experience the field capacity (and contributed by dry weather) can lull a landfill operator into considering that the rainfall infiltration rate is lower than what is being experienced. Once a landfill stops receiving waste the field capacity of the waste at some point in time is exhausted and the leachate generation rate generally matches the rainfall infiltration through the final cover.

I have adjusted the Method A model with a focus on the final cover rainfall infiltration percentage to account for the fact that there is no guarantee that the waste will be exhumed and reused at some time in the future and to account for the fact that the field capacity of the waste will be exhausted in time. I have done this to gain greater understanding of the potential leachate volumes that may be generated by the monofills as I consider that the Applicant's leachate generation rates for the proposed final cover are too low.

I have adjusted the Method A model by increasing the final cover rainfall infiltration to 25%. The literature¹ indicates that a final cover profile like that proposed by the Applicant could result in up to 17% of rainfall infiltration. However, this is for a final cover barrier with a saturated hydraulic conductivity (K) in the order of 10^{-8} m/s. On the basis that the Applicant has advised that the proposed final cover may have a K greater than 10^{-7} m/s (which is the minimum guidance in the NZ Landfill Guidelines²) I have increased the rainfall infiltration percentage to assess the leachate volumes that may be experienced should the proposed capping system be installed.

Based on the above adjustment for the modelled rainfall year, this would result in a leachate generation rate for both monofills of a peak monthly rate of 133.5m³/day and 21,700 m³/year. Based on a common tanker volume of 30 m³ this would equate to 5 tankers a day in the peak modelled month or 724 tankers each year needed to maintain leachate levels within 300mm from the floor of the landfill (and to lower the risk of groundwater impacts).

¹ <https://access.onlinelibrary.wiley.com/doi/10.2134/jeq2004.2317>

² <https://wasteminz.sharepoint.com/Shared%20Documents/Forms/AllItems.aspx?id=%2FShared%20Documents%2FWEBSITE%20CONTENT%2FMember%20resources%2FGuidelines%2FTechnical%20Guidelines%20for%20Disposal%20to%20Land%202023%2Epdf&parent=%2FShared%20Documents%2FWEBSITE%20CONTENT%2FMember%20resources%2FGuidelines&p=tr ue&q=1>

In comparison the Applicant is suggesting that leachate generation rate for both monofills of a peak monthly rate of 37.4m³/day and 6,076 m³/year. Using the same tanker volume of 30 m³ this would equate to 2 tankers a day in the peak modelled month or approximately 200 tankers a year.

On further review of the NZ Landfill Guidelines I note that one suggested example of a final cover includes a geomembrane as the barrier. Geomembranes are commonly included in landfill final covers and result with good construction quality control in the order of 1% of rainfall infiltration (see reference 1 above). Based on a 1% rainfall infiltration rate by the installation of a geomembrane in the final cover for the monofills the closed landfills are predicted to generate a peak daily leachate quantity of 5.3 m³/day and 868 m³/ year. Using the same tanker volume of 30 m³ this would equate to 6 tankers a month in the peak modelled month or approximately 30 tankers a year, which is significantly less than predicted by the Applicant.

The Applicant claimed in the joint conference it would be beneficial to flush the waste with higher rainfall infiltration. I reject this argument on the basis that generating additional leachate volumes will increase the risk of environmental impacts.

2.1.1 Recommendation – capping system

I recommend that a condition of the approval require the Application to include a geomembrane in the final cover system design for construction and addressing but not limited to stability and construction quality assurance requirements. This type of barrier would significantly reduce the generation of leachate from the final covered monofills.

I also recommend that during filling of the monofills that every month the measured leachate volumes extracted from the landfill are compared to the monthly predictions (using the actual rainfall) to assess the model predictions (20% rainfall infiltration for daily cover, 12% rainfall infiltration for intermediate cover and 1% rainfall infiltration for final cover). If the yearly total volume of leachate extracted from the monofills is greater than the yearly volume prediction then additional controls should be advised by the Applicant to reduce leachate generation (and reduce the risk of leachate levels rising in the landfill). The results of these measurements and an annual comparison should be reported each year to Waikato Regional Council, together with any measures planned to reduce leachate generation volumes.

2.2 Liner Selection

I have reviewed the Sensitivity Analysis prepared by Stantec dated 2 February 2026. The purpose of this work is to further assess whether the proposed composite lining system for the monofills would likely result in the NEMP 3.0 ecological criteria being met at the receiving surface water streams. The NEMP 3.0 states that for higher concentrations of specific PFAS compounds that a double composite liner should be implemented.

The Stantec work considers the leakage rate of leachate through the composite line for the SW monofil entering the shallow alluvial and residual/weathered material aquifer and discharging into the nearby Waipapa Stream where assumptions are applied that dilute it below the NEMP 3.0 criteria. The dilution would occur after a period of streamflow and mixing.

These findings differ from the initial modelling work contained in the Monitoring Plan and Evaluation of Surface and Ground Effects which relied on much larger assumed groundwater dilution and no stream dilution being considered. Stantec conclude that the groundwater offers a dilution factor of 10 and meeting the NEMP 3.0 criteria mostly relies on the dilution provided by streamflow.

I consider there are still of a number of uncertainties in the Stantec work, including no evidence of the Waipapa Stream flow rate for varying climatic conditions, no evidence of background concentrations of PFAS and relate compounds (as a zero background concentrations were assumed) and uncertainty with the PFAS concentrations in the leachate as the testing methodology for PFAS compounds specified in NEMP 3.0 was not followed and the chemical composition of the floc will be variable over time.

2.2.1 Recommendation – liner selection

I recommend a condition of the approval requires the Applicant to include a double composite liner for the monofills unless further work is undertaken to address the data gaps listed below. This is to provide confidence in the modelling work by Stantec is robust and that a single composite liner is sufficient to protect water quality at the receiving surround surface waters streams. The data gaps to be addressed include:

- Stream flow data for a range of climactic data (focusing on dry weather)
- Background Pfas and related compounds (so that cumulatively the contribution from the landfill would not exceed the NEMP 3.0 99th level of protection criteria)
- Testing of representative samples of the flocc waste in accordance with the test methodology in NEMP 3.0 (and ongoing testing periodic so that if needed future areas of the monofills could be double lined).

The findings from the updating the model with the above data should be independently reviewed and confirmed prior to lining any portions of the monofills.

2.3 Draft conditions of approval

I have recommended a number of draft licence conditions and these are detailed in the word document attached to the email with this letter (Green Steel Project - Proposed Draft Conditions, Waikato Regional Council) and shown as track changes. With time being limited, I would welcome the opportunity to provide further input on the draft conditions.

If you have any questions in relation to my advice, please contact me and I will respond.

Regards

[Redacted signature]

Anthony Dixon
Technical Director & Business Group Leader –
Waste Management

[Redacted contact information]

Attachment 1

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