

# Memo

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**Date:** 12 February 2026

**To:** Jessie Richardson – Application Lead, Environmental Protection Authority

**From:** Jonathan Caldwell – Senior Scientist (Environmental Chemistry), Waikato Regional Council

**Subject:** **Feedback on Green Steel’s additional material regarding the monofills following expert conferencing**

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As requested by the panel, here is my feedback on some additional material provided by the Fast Track applicant, Green Steel [FTAA-2506-1074] in response to matters raised during the expert conferencing held on 22 January 2026.

Specifically, my feedback relates to:

1. Stantec’s Sensitivity analysis report;
2. Some additional questions from expert panel member Tim Baker of SLR Consulting regarding PFAS in Stantec’s Sensitivity analysis report;
3. EnviTech’s monofill leachate production additional assessment; and
4. Shearer Consulting Ltd’s proposed amendments to the Waikato Regional Council consent conditions.

## **EnviTech’s monofill leachate production additional assessment**

### **Summarised feedback:**

This additional assessment needs further work to address the agreed recommendations of the signed Joint Witness Statement (JWS) relating to the Expert Conferencing held on 22 January 2026.

### **Detailed feedback:**

This additional assessment of the monofill leachate production rate is in response to the matters of agreement under the JWS relating to Leachate, points a, b and c as detailed below.

*a. Confirmation of volumetric leachate predictions (can assumptions / experience be substantiated and checked). Including whether seasonal variations in rainfall have been considered.*

*b. Whether HELP modelling, or similar should be carried out.*

*c. Implications if leachate quantities are underestimated, particularly whether potential effects change, including cultural effects.*

And also in response to Monofill Capping, point a.

*a. Whether Monofill stability needs to be demonstrated (via modelling), in particular to determine if stability is impacted by leachate levels.*

Specifically, the agreed actions to address these points included an additional assessment of leachate production to be undertaken by Lindsay Strachan and Aidan Nelson of EnviTech with Anthony Dixon contributing to modelling parameters. This assessment should also include an assessment of monofill stability based on leachate levels.

In response to this EnviTech has undertaken the additional reassessment by comparing their standard method A based on actual landfill/monofill leachate data from other landfills and Method B which is based on a Water balance approach which I am assuming is the method recommended by Anthony Dixon.

EnviTech has prepared a Technical Memorandum which summarises the findings of their additional reassessment based on calculations and outputs provided in an Excel spreadsheet.

In summary:

- The Technical memo does not provide much detail explaining the two methods and it doesn't explain what inputs/ modelling parameters were recommended by Anthony Dixon.
- The memo also does not summarise the volumetric monthly predictions for each method but just states that the predictions from both methods align.
- The memo also does not compare these updated predictions with the original predictions or explain what the implications of these updated predictions are with regards to managing the leachate volumes or how the permeability of the cap would impact the leachate production (i.e. would there be benefit in having a lower permeability cap?).
- The memo also does not address how leachate volumes will impact on monofill stability (i.e. Lindsay was to run numbers for 3 m leachate head in response to concerns by Debbie Fellows and Anthony Dixon on leachate level impact on monofill stability).

In lieu of providing this summary explanation I have had a look through the excel spreadsheet and have determined that Method B predicts a maximum daily leachate production rate of approximately **72 m<sup>3</sup>/day** (based on monthly July prediction divided by 30 days for the final capped stage using natural soils). This can be compared to Method A which predicts a maximum daily leachate production rate of approximately **39 m<sup>3</sup>/day** (based on monthly January prediction divided by 30 days for both Stage 2 and the final capped stage – presumably also with natural soils).

These volumes are both higher (2 to 3 times) compared to the original assessment which predicted a peak daily rate of **25 m<sup>3</sup>/day**.

The question is, can these higher daily volumes be managed to ensure that the 300 mm head of leachate is not regularly or significantly exceeded? And if for example, there is a 3 m head of leachate, what is the potential impact on the monofill stability?

## Stantec's sensitivity analysis report

### Summarised feedback:

This report addresses the agreed recommendations of the signed JWS relating to the Expert Conferencing held on 22 January 2026.

### Detailed feedback:

This analysis is in response to the matters of agreement under the JWS relating to Liner Selection, points for consideration b and c as detailed below.

*b. Whether groundwater concentration assessments are adequately conservative, particularly with respect to conceptualisation of groundwater flow area.*

*c. Implications of underestimating contaminant concentrations at the boundary and how this could be managed.*

Stantec's sensitivity analysis included a review of the hydrogeology information for the SW monofill and used it to update the conceptual site model. The review confirmed the assumption that the liner depth will be above the unsaturated zone and 7 metres above the saturated zone.

However, I understand that confirmation of depth of the liner above the saturated zone will be confirmed at a later stage and is addressed by a requirement to confirm this under condition 8a under the Authorisation for the Monofill Activities (as has been added by Craig Shearer to the draft conditions).

Stantec's sensitivity analysis included:

- Doubling of the flow of leachate through the monofill base at 8.6 L/day to account for approximately double the number of defects.
- 100% leachate leakage to groundwater based on assumption of no subsoil drain (c.f. original calculation of 50% leakage to GW based on 50% collection via subsoil drain).
- Assumed aquifer depth of 4 m and 330 m width (c.f. original calculation based on 50 m depth)
- Assumed 300 mm head of leachate above liner
- Confirmed that original calculations used conservative hydraulic conductivity parameters (K) for the observed soil type so left the modelling with these K values.
- Assumed very low stream flow rates of 0.5 L/s and 1 L/s based on likely low flow stream conditions.
- Used Earthtech's first wash TCLP concentrations from the Lysimeter trials for the loading rates.

The results of this sensitivity assessment predicts that even in low flow stream conditions, the determinand concentrations (including for PFAS) will be within the relevant ecological and drinking water guidelines. In addition to this, Stantec notes that these calculations are conservative and do not take account of natural attenuation processes that would reduce concentrations further prior to discharge within the Waipapa Stream.

I agree that this sensitivity analysis by Stantec provides confidence that based on the proposed monofill liner system and the assumed hydrogeology and stream flow rates, relevant ecological and

drinking water guidelines will be met at the boundary, including meeting the PFAS 99% ecological protection values specified under the NEMP 3.0. This analysis was also based on conservative inputs.

Stantec has also noted that liner integrity surveys can be done using electric dipole methods, which can identify minor defects in the constructed liner even after the soil protection layer has been placed. This would provide significant certainty regarding the integrity of the monofill liner given that such a survey would enable the location of all defects, even down to pin-prick size, to be identified, and the defects remediated.

I would recommend that the use of electric dipole methods to identify minor defects in the constructed liner is included as a condition of consent/ included in the liner installation requirements. I have proposed some amended wording (in green text) to condition 3 of the draft consent conditions for the Authorisation for Monofill Activities.

In summary, I consider that points b and c under the Liner Selection have been adequately addressed. I also consider that point a which refers to consideration of basing the liner selection on the NEMP 3.0 requirements is addressed through Craig Shearer's added conditions 8b and 8c which will require ongoing 6 monthly analysis of PFAS leached from the floc using the NEMP 3.0 method. However, I have proposed some amendments (in green text) to condition 8 of the draft consent conditions for the Authorisation for Monofill Activities to make this clearer.

### **Response to Tim Baker's query on Stantec's sensitivity analysis report**

Expert panel member Tim Baker of SLR Consulting asked me on 9 February 2026 for some clarification around the predicted PFAS concentrations presented in Stantec's sensitivity analysis report.

Stantec had compared the predicted PFAS concentration which represents the sum of a suite of 30 or so individual PFAS compounds against the NZ Drinking Water Standards (DWSs) and the PFAS NEMP ecological freshwater guidelines.

I agree with Tim Baker that this is a confusing way to present the findings because the NZ DWSs are based on maximum acceptable values (MAVs) for the individual PFAS compound, PFOA and the sum of two other PFAS compounds, PFHxS + PFOS. Likewise the PFAS NEMP has a guideline for PFOA and a guideline for PFOS.

#### **My response to Tim Baker was:**

Yes, I did notice that Stantec modelled based on total PFAS rather than specifying based on PFOA and PFHxS + PFOS.

You are correct that there is no DWS for PFAS. The value of 0.63 ug/L comes from:  
DWS for PFOA is 0.00056 mg/L (or 0.56 ug/L) and sum of PFHxS + PFOS is 0.00007 mg/L (or 0.07 ug/L).

Therefore the 0.63 ug/L comes from adding 0.56 and 0.07 together which is the combined DWS for PFOA plus PFHxS + PFOS.

But I agree that Stantec could have explained this and probably better to have broken it out into the individual compounds.

Also, a bit confusing for also comparing against the NEMP as well when modelling on total PFAS. I have therefore run through this by proportioning the amount allocated to Stantec's worst case stream dilution prediction for 0.5 L/s flow for the stream to the individual PFAS compounds from the applicant's high strength leachate analysis results from 2021 as per my table below. And see attached spreadsheet.

This shows that even when breaking it down to individual PFOA, PFOS or PFHxS + PFOS, the DWS's and the NEMP water quality 99% guidelines will be met.

	Max conc. From Feb, Mar, Apr and May 2021 leachate tests (ug/L)	Stantec Prediction Stream dilution 0.5 L/s (ug/L)	JC's Proportional prediction for separate PFAS cpds (ug/L)	NZ DWS 2022 (ug/L)	NEMP 2 & 3 Ecological 99% Water quality guidelines (ug/L)	NEMP 2 & 3 Ecological 95% Water quality guidelines (ug/L)
PFHxS	0.114					
SumPFAS	0.682	0.000139		0.63		
PFOA	0.12		0.0000245	0.56	19	220
PFOS	0.023		0.0000047		0.00023	0.13
PFHxS	0.092					
PFHxS + PFOS	0.115		0.0000234	0.07		

Anyway, that's based on my assessment of what Stantec has done.

**My summary assessment of the PFAS predictions:**

In summary, while Stantec's assessment of PFAS could have been clearer by basing it on the relevant individual PFAS compounds rather than the sum of the typical PFAS suite that laboratories analyse for, I agree with the conclusions made by Stantec that the relevant drinking water standards and ecological water quality guidelines will not be exceeded at the site border and in the Waipapa stream.

**Shearer Consulting's proposed amendments to consent conditions**

I've reviewed the proposed amendments to consent conditions relevant to Waikato Regional Council that Craig Shearer of Shearer Consulting Ltd provided in response to the JWS agreement. I consider that Craig's proposed amendments (in blue text) are in general accordance with the JWS agreement except for his proposed condition 7(c) under the Authorisation for Monofill Activities which I had thought would be addressed through this current response to the expert conferencing JWS agreement rather than deferring it. I have included a comment to this effect in the attached conditions.

For purposes of additional clarity and correct referencing of guidelines, I have provided some suggested edits and amendments in green text under the Authorisation for Monofill Activities from page 41 onwards within the word document entitled: Attachment 3 WRC Amended Conditions 2.02.26 – JC edits.docx which I provide as an attachment to this memo.



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