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EPA Review – FTAA1074 Green Steel – Landfill Advice

Dear Tim

1. Introduction

The Environmental Protection Authority (EPA) engaged GHD on 25 November 2025 to undertake a review of the proposed two landfills which are part of the proposed National Green Steel project at 61 Hampton Downs Road, Waikato. The proposed two landfills are intended to dispose of a single waste type and are referred to as monofills.

1.1 Scope and purpose

The purpose of the commission is to provide specialist landfill advice with respect to the monofills to the Green Steel Expert Panel (the Panel) appointed by the EPA. The Panel is to consider and determine the project application. This scope is as follows:

– Undertake a desktop review of the following application documents supplied by the applicant:
  - Attachment 17A & 17B Monofill Engineering Reports
  - Assessment of Environment Effects where it references the above reports
  - Attachment 18 Monitoring Plan and Evaluation of Surface and Groundwater Effects. This report will be reviewed in the context of evaluating if the Attachment 17A & 17B Monofill Engineering Reports, have responded to the potential effects identified in the Attachment 18 report
– Generate a draft report based on the documents reviewed, relating to the actual and potential environmental impacts of the proposed activity and the proposed mitigation measures
– Any other matters as requested by the Panel. The Supplier will advise if the matters additional to the above, can be completed within the budget provided for, or if a variation to this contract will be required.

This letter report must consider the scope and limitations provided in Section 5.

1.2 Documents reviewed

The following documents have been reviewed for the preparation of this advice:

– Fast track Approvals Act Substantive Application to construct and operated a structural steel manufacturing plans and accessory activities. National Green Steel, 61 Hampton Downs Road. By Kinetic Environmental, Dated 2 July 2025
– Monitoring Plan and Evaluation of Surface and Groundwater Effects. Green Steel Monofill, Hampton Downs. By Earthtech Consulting Ltd. Dated 9 June 2025 (Attachment 18 of the application)
– Engineering Report Green Steel Monofill, Hampton Downs. Volumes 1 and 2 by Earthtech Consulting Ltd. Dated 30 May 2025 (Attachments 17A & 17B of the application)
– Technical Guidelines for Disposal to Land – Revision 3.1, by the Waste Management Institute New Zealand (WasteMINZ). Dated September 2023. Herein referred to as the "WasteMINZ Guideline"
– PFAS National Environmental Management Plan 3.0, by the National Chemicals Working Group of the Heads of the EPA Australia and New Zealand. Dated 2025. Herein referred to as "NEMP 3.0"

1.3 Project background

National Green Steel Limited plans to develop an integrated metals resource recovery and steel manufacturing facility at 61 Hampton Downs Road, Waikato, approximately 70km south-southwest of Auckland. The proposal includes the development of a steel smelter complex with an electric arc furnace, mill areas, transformers, storage, and administration buildings, covering approximately 21.2 hectares. The project also incorporates a shredder and recycling facility to process end-of-life vehicles (ELVs), creating a closed-loop circular economy for metal recovery in New Zealand.

A key component of the project is the management of floc waste generated during shredding of ELVs and recovery operations, which will be produced at approximately 36,000 tonnes per annum. The development proposes the staged development of two new engineered monofill sites located southwest (SW) and northeast (NW) of the smelter complex to dispose of the floc waste. The two proposed monofills will provide a combined capacity of 422,500 to 661,200 m³, offering an estimated airspace lifespan of 12–18 years. The larger capacity would be achieved should the southwest monofil have a lower base level of RL 12 m.

The design includes Class 1 landfill liners with associated leachate and subsoil drainage measures. The management and monitoring plan provided in the application includes the concept design for the SW monofill. High-level concept plans are provided for the NE monofill, noting that it will be developed at a later date if the additional airspace becomes necessary, and the design will generally mirror the SW monofill.

The following advice comprises a review of the proposed design, operation, monitoring and closure of the two monofill sites with consideration to the WasteMINZ Guidelines for Disposal to Land (September 2023), NEMP 3.0, industry practice and our experience with landfills.

2. Environmental Risk

To assist the Panel this report identifies key environmental risks, including those with the potential to significantly impact the environment.

2.1 Significant environmental risks

2.1.1 Fire

There are two types of fires that can occur at a landfills and they are:

– Surface fires
– Subsurface fires.

Surface fires are the most common landfill fire and are the result of having combustible waste at the surface which is not covered by non-combustible cover material (soils/crushed rock). Surface fires are fast moving.

Subsurface fires are slow moving and generally more difficult to extinguish than a surface fire.

The documentation reviewed suggests that cover material would only be applied when a lift of floc reaches 3 m so there would likely be times when the floc would not be covered. This would present a significant risk of a surface fire. Furthermore, it is unclear from the documentation on whether:

– there would be enough material made available by the project's cut and fill balance to meet the cover, buttress (SW monofil) and capping requirements
– enough area at the site to stockpile sufficient cover material.

Other aspects that increase the risk of a surface fire is the area of the active landfill, and the project documentation indicates that it could be up to 1,000 m^2 (Section 8.1.1 of the Management Plan), which is a very large area considering the relatively small tonnes of waste floc to be landfilled.

It is recommended that a fire management plan should be developed addressing the above issues and including but not limited to:

– all floc waste is covered at the end of each day's operations by a non-combustible soil/crushed rock of a depth of 150 mm (and this is a recommended deviation from the WasteMinz Guideline, the daily cover depth of 150 mm is an industry standard). Intermediate non-combustible cover of 300 mm of the same material should be applied on any landfill surface not landfilled over after 3 months
– Committing to limit the active landfill area of no more than 200 m^2 of uncovered floc waste
– Setback distances from the landfill area and vegetation surrounding the landfill
– Availability of a secure and sufficient water supply close to each monofill and a tanker with a water cannon to apply water for fire suppression
– the application of IR camera/s to monitor the landfill for surface fires during operations
– Procedures to monitor and remove batteries from the floc to be landfilled (batteries are a common cause of landfill fires)
– Procedures to monitor for the presence of possible subsurface fires

The importation of cover soils risks introducing other contaminants that have not been assessed by the project (and associated impacts with increased traffic and noise).

2.1.2 Leachate quantities and disposal

The quantities of leachate predicted to be generated by the monocells have potentially been underestimated. For example, the proposed capping profile does not include a low infiltration sealing layer and even the permeability recommended in the WasteMinz Guideline (10^{-7} m/s) would likely result in more rainfall infiltration than the assumed amount (of 7% of rainfall). A geosynthetic (geomembrane and geosynthetic clay liner (GCL)) sealing layer in a cap can generally result in less than 1% of rainfall generating leachate.

The consequence of underestimating leachate volumes is:

– Increased levels of leachate in the landfill increasing the leakage rate to the groundwater and potentially polluting the groundwater above assessment criteria
– Making it difficult to landfill, particularly in the early stages of the landfilling in each cell as the leachate level can be at the surface
– Increased risk of waste instability by increased leachate levels
– Increased risk of batter seepages of leachate and impacting surface water quality

It is recommended that the applicant should provide further information on the following:

- Justification of the rainfall infiltration rates (using a model e.g. HELP[1]) over into daily, intermediate and final capped waste
- Assume 100% infiltration for the active tipping area (200 m^2)
- Include the volumetric contribution from the subsoil drainage system (as it is acknowledged by the applicant that the liner system will leak and to not assume this water can be directed to the stormwater system). The basis for the potential subsoil drainage system's collected volume should be justified.
- Undertake a water balance model for wet rainfall conditions (1,400 mm year) based on a monthly timestep to demonstrate there is sufficient disposal capacity (tankering off-site)
- Evidence that WaterCare will accept the predicted volumes and quality of leachate (see the section below as further testing of the floc waste is recommended)

It is important that the floc waste is covered (as discussed above) and the active area is minimised to reduce the potential for rainfall runoff (leachate) from the surface of the floc to enter surface water.

2.1.3 PFAS and liner selection

A pilot scale test was undertaken to evaluate the potential concentrations of PFAS[2] (and other substances) in the leachate (Appendix A of Attachment 19, lysimeter trial). The pilot scale test indicated that the waste has the potential to discharge PFAS to the environment. To manage uncontrolled PFAS leachate discharge risks to the groundwater, the proposed liner system is a single composite liner (geomembrane, GCL and compacted soils).

The NEMP 3.0 includes guidance on the concentrations of PFAS in leachate and waste and based on the concentrations, recommends the landfill type (and its liner) to protect groundwater from leachate. Very low concentrations of PFAS allow the waste to be landfilled in an unlined landfill and as the concentrations increase the recommendation is a single composite liner and for the highest concentrations is a double composite lined landfill. NEMP 3.0 notes that 'the environmental regulator may determine that these criteria are not suitable for a specific landfill or landfills and derive and implement alternative criteria'.

The NEMP also states that 'in New Zealand, provisions in the Hazardous Substances (Storage and Disposal of Persistent Organic Pollutants) Notice 2024 must be followed'. The requirements of this Notice have not been considered by the applicant.

The pilot scale test used by the applicant did not use the PFAS leachate testing methodology (ALSP) recommended in the NEMP 3.0 guidance and also did not assess the total concentration on a mass basis for PFAS. Further, it is expected that PFAS concentrations (and other substances) in the waste may vary over time as the source of the waste is variable. Therefore, it is unclear if the waste used in the pilot scale testing will be representative of the waste to be landfilled over time.

Based on the above, it is considered that the applicant has not provided sufficient information to determine if the liner system is appropriate for the proposed waste stream, and / or provide controls to confirm that the (future) waste stream is appropriate for the liner proposed to be installed (e.g. through regular testing of the waste). The Panel should consider seeking this information from the applicant.

2.1.4 Stability

Landfill liners have the potential to move or 'slip' on interfaces and steep slopes, therefore presenting the potential to cause uncontrolled leachate contamination of the groundwater and surface water and increase the risk of fire from exposed waste.

GHD in separate advice has commented on the stability of aspects of the monofills.

It is considered that the applicant has not provided sufficient information to determine if the liner stability will be sufficient to manage potential adverse discharge risks.

[1] **https://www.epa.gov/land-research/hydrologic-evaluation-landfill-performance-help-model**

[2] Per- and Polyfluoroalkyl Substances, collectively known as PFAS

In addition to the other GHD advice on the stability aspects of the monofils, it is recommended that further stability analysis is completed for the concept design base and the sidewall lining system for both the SW and NW monofills (note detail shows 1 in 3 but excavation on NE cell is 1 in 2). Also this work should include veneer stability analysis of the sidewall liner.

2.1.5 Operational competence

Our experience in the industry is that there is a deficit of capable and experienced people in the operation of landfills. We have had recent experience with newer landfills which have suffered a number of operational issues and in particular with fires, leachate management and the pollution of surface waters.

This presents a significant environmental risk and it is recommended that the should the project be approved that a condition of the approval require the operational staff have sufficient experience and capability to operate the monofills appropriately.

2.1.6 Cumulative environmental impacts

The application has not assessed cumulative environmental impacts to groundwater and surface water quality in the locality from the nearby operational Hampden Downs landfill. It is recommended that the application consider and assess any cumulative environmental impacts to water quality from the existing Hampden Downs landfill and the project's monofills.

3. Landfill Design Review

A review of the key design considerations for the concept design of the two monofills is summarised in section 3.1 below. This review is not exhaustive. Components of the design which warrant a more detailed discussion have been covered in the sections that follow.

3.1 Landfill concept design review

Design Component	Review Comments
Siting	
Hydrogeology	Both sites are claimed to be above the water table (this has not been assessed by GHD). Refer to further discussion in groundwater section below.
Surface hydrology	Siting effectively limits upstream catchments.
Site stability	Refer to geotechnical review prepared by GHD and comments in Section 2.1.4 above.
Liner	
Extents	The extents of the basal liner for the NE monofill indicated on figure M5.4 do not appear to align with the basal area shown in the base grade contours plan on figure M2.5. The area delineated for the basal liner is also relatively small, consisting of only a 15m wide strip along the northeastern edge of the fill and may not allow for trafficable access. Clarification required on lining extents for the NE monofill.
Basal grading	The proposed base grade of the SW monofill has been depicted as 1:50 on the design plans and noted as 1:100 to 1:40 in the engineering report. A 1:50 grade aligns with the WasteMINZ recommendation of a minimum base grade of 2%. The standard in NSW is to adopt base grades of 3%. It is noted that the stability of the monofills will be impacted by steeper base grades, however grades as low as 1% may be insufficient to promote adequate drainage of leachate. The proposed base grade of the NE monofill of 4% may present a liner stability risk and should be checked with detailed calculations to support the design.
Protective soil layer	The protective soil layer design relies on appropriate soil to serve this function being sourced on site and constrains construction to the use of small machinery to avoid damage to the liner during installation of the soil layer. The soil layer also introduces a veneer

Design Component	Review Comments
	stability risk on batter slopes and increases standing leachate head in the basal areas. These risks may be considered alongside alternative protective measures for the liner.
Batters	The 1:2 batter for the NE monofill design precludes benching. This steep slope may cause stability issues which have not been assessed in the application. The slope may also result in construction and access difficulties.
Leachate Drainage System	
Drainage aggregate	The WasteMINZ guidelines advise incorporating a protective filter layer above the drainage layer to prevent physical clogging caused by the downward migration of fine materials from the overlying waste. However, a separation geotextile has not been provided on the drainage aggregate. The proposed aggregate depth of 100–200 mm is relatively thin. The recommendation in the NSW Guidelines for Solid Waste Landfill Standard is 300mm and with a permeability of greater than 10^{-3} m/s. This increased depth facilitates effective drainage within the layer to maintain leachate head below the WasteMINZ recommended maximum of 300 mm.
Leachate drainage alignment	The 'finger drain' alignment proposed for the NE monofill runs uphill for a portion. This alignment may also introduce construction and stability issues for the finger drain. The alignment of the leachate drains in the SW monofill is ineffective without the addition of cross drains to collect leachate from the areas of the base which are delineated as side slope liner. The broad application of the side slope liner profile without finger drains across the SW monofill, which has uniform low grades, does not promote effective drainage.
Sump and pump arrangement	The proposed sumps do not include a localised depression, resulting in permanent standing leachate over a larger area of liner, particularly considering the increased head induced by the soil protection layer. Bund arrangements at the sumps for both monofills are unclear. Low available head created by the bunding in the sumps may lead to the seepage of leachate over the bund. Additional leachate risers should be considered for each cell in the SW monofill to assist with the effectiveness of being able to extra leachate from the landfill. This would assist too with the filling where it appears the initial stages are not connected to a leachate riser increasing the risk of leachate building up in the early filling stage and overtopping the waste and potentially entering the stormwater system.
Surface and Stormwater Management	
Final landform batters	Final landform batters are design at 1:3 with no access or surface water management detailed. These aspects need to be considered in the concept design
Landfill Gas	
No design provision	The application has not provided any management strategy for landfill gas as it is claimed it is not anticipated. Further discussion on this omission is below.
Capping	
Extents	The capping extents for the NE landfill to not appear to align with the extents of the liner, noting the lack of clarity on the liner extent commented on above.
Profile	Discussed in Section 2.1.2 above
Intermediate soil cover	Intermediate cover layers are inferred to remain in place as per the section on figure M5.4. These layers have the potential to encourage perched leachate and may lead to breakouts in the form of batter seeps. Cover material should be removed before placement of waste the following day.

3.2 Landfill gas

No information is provided to guide whether anaerobic decomposition of the floc may generate estimated quantities of landfill gas (including hydrogen sulphide) and cause odour and subsurface gas migration risks.

Data on the composition of leachate indicates it has up to 2000 mg/L of COD (Appendix A of Attachment 19, lysimeter trial). COD can indicate bioavailability of organics.

The applicant should include a program to assess during operations whether landfill gas extraction and management is needed.

Monitoring of landfill gas and hydrogen sulphide should be included both from the atmosphere in the leachate riser and at the surface of the landfill. The management plan should be updated and also take into account available Australian and New Zealand landfill gas monitoring guidance, and include testing for carbon monoxide as an indicator of a subsurface fire.

3.3 Groundwater

The following is advised with respect to protecting groundwater quality:

– Sealing the groundwater bore in the footprint of the SW monofill prior to construction
– Review by another specialist of the groundwater monitoring network
– Review by another specialist of the potential impact on off-site groundwater quality (considering cumulative impacts from the nearby operational landfill). It appears for example the assumed leachate leakage rate may be underestimated for the proposed liner arrangement[3], does not consider the possible storage leachate (at elevated levels in the monofills) and there are unsubstantiated assumptions in the analytical modelling.

4. Other issues

The following other issues are raised for consideration by the Panel:

1. The concept design should provide details of how seepage of leachate from the batters can be avoided (in addition to the suggest above for removal of cover before placement of further waste). Seepage of leachate from batters is a common problem at landfills (if not well managed) which results in leachate impacting surface water quality discharged off site.
2. Considering the small landfilling rate, the stages for the SW monofill would benefit from being reduced in area to assist with site operations (eg leachate and stormwater management). However they should still be large enough to be safely trafficable.
3. Peat and organic soils identified in the project site should be subject to a program to exclude them from use as cover soils in the landfill. These soils could generate landfill gas and possibly cause spontaneous combustion and a subsurface fire in the monofills. Similarly no acidic sulphate soils should be utilised for covering the floc waste.
4. The monitoring program should measure leachate levels in the landfill.
5. The QA/QC plan should be updated to reflect the WasteMinz guidelines and consider the more complete guidance available from the NSW EPA[4].

5. Limitations

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The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

[3] **https://www.resolutionmineeis.us/sites/default/files/references/rowe-2012.pdf**
[4] **https://www.epa.nsw.gov.au/Publications/waste/solid-waste-landfill-guidelines-160259**

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