

Fast-track Approvals Act 2024 – Delmore Substantive Application
Technical Addendum
FTAA-2502-1015 / BUN60444768

1.0 Technical Specialist – Geotechnical

From:

Frank Zhou, Senior Geotechnical Specialist
Engineering, Assets and Technical Advisory

Date:

28/07/2025

2.0 Executive Summary / Principal Issues

Key geotechnical issues identified include management of land instability both from a global stability perspective and for localized excavations particularly those located proximal to a site boundary which may have adverse effects offsite and between staged works. Concerns remain regarding the long-term performance of the counterfort drain in the absence of a regular maintenance plan. Our previously recommended condition for an Operation and Maintenance Plan for subsoil and counterfort drainage has not been adopted. Additionally, there is an information gap regarding retaining wall alignments. It would be beneficial for the applicant's geotechnical engineer to review the updated earthworks and retaining wall plans to ensure consistency.

An Erosion and Geomorphology Suitability Memo has been submitted to justify that a Geomorphology Risk Assessment is not required for this development, which has been reviewed by Healthy Waters (and I understand Healthy Waters continues to consider that a Geomorphology Risk Assessment is needed).

This assessment should be read in conjunction with the Geotechnical Regulatory Review by Engineering, Assets and Technical Advisory (reference: Fast Track Application – BUN60444768, dated: 19 June 2025).

3.0 Specialist Assessment – Previous Memo / Comments Overview

Key Headings – Summary of 25/06 Issues identified

- A sensitivity analysis assuming 50% saturation of engineered fill was undertaken to assess potential pore pressure build-up in case of drainage failure. Results show the retention system remains marginally stable ($FoS > 1.0$). A drainage maintenance plan is recommended to reduce blockage risk and ensure long-term performance of subsoil drain installed for the counterfort drain system.

- A maximum cut of ~5.5 m is proposed along the Stage 1A-4 boundary. The proposed top-down construction approach is acceptable in principle. A final construction methodology should be provided at detailed design stage.
- Due the significant extent and scope of fill placement, I have recommended a Settlement Monitoring Plan to be conditioned which has been adopted by the applicant.
- I highlighted potential effects of long-term stream migration over a 100-year timeframe under E36.9(2), as stream meandering could impact building platforms and accessways. I understand that Healthy Waters will address this further as part of their assessment.
- Initial concerns were raised about steep batters between Lots 173-182, 184-194, and 254-256. The applicant has since confirmed new retaining walls will be included to stabilize these slopes. Plans showing the intended retaining structures were not provided at the time of this memo.

4.0 Specialist Assessment – Material Reviewed

Key Headings – Review of 07/07 Updates

- Appendix 43.2 – Response to AC Geotechnical (1) & (2) (ref. 240065-M dated 1 July 2025)
- Appendix 44.5 – Retaining Memorandum – Rev B by Terra Studio
- Appendix 44.5 (1) – Retaining Wall Sections – Rev B by Terra Studio
- Appendix 48.2 – Memorandum – Rev B Changes prepared by Terra Studio
- Appendix 49.3 (3) – Stage 1 Earthworks Part 1
- Appendix 49.3 (3) – Stage 1 Earthworks Part 2
- Appendix 49.3 (3) – Stage 1 Earthworks Part 3
- Appendix 49.3 (3) – Stage 1 Earthworks Part 4
- Appendix 49.3 (3) – Stage 1 Earthworks Part 5
- Appendix 49.3 (6) – Stage 2AB Earthworks
- Appendix 49.3 (6) – Stage 2CDE Earthworks
- Appendix 57 – Proposed Conditions

The additional response, proposed conditions, and updated plans have generally addressed key issues raised in our previous memo (e.g., deviations from fill specifications, requirement for settlement monitoring plan for filling works, slope stability accounting for appropriate surcharges etc.) with exception to the counterfort drain maintenance plan. I also note some additional information gaps, discussed further in Section 5 below.

5.0 Specialist Assessment – Addendum – Outstanding Issues / Information Gaps

At the time of writing this Memo, and having reviewed the 7 July updates from the Applicant, I have identified the following outstanding / new issues [and/or] information gaps:

Outstanding

The key outstanding issue is as follow:

- Riley considered the counterfort drain maintenance is not required as the TNZ F/2 compliant drainage material is adequate to prevent the drainage from becoming locked during the entire

design life. Therefore, our previously suggested condition of Operation and Maintenance Plan for the counterfort drain has not been adopted.

The proposed underfill subsoil and counterfort drains are to be wrapped in filter sock and surrounded by drainage aggregate meeting TNZ F/2 specifications. While this is generally a robust system, there remains uncertainty regarding potential construction damage to the filter sock and the risk of fine particle accumulation leading to blockage.

Sensitivity analysis indicates that, even with 50% saturation due to drainage failure, the factor of safety (FoS) remains above 1.0, suggesting slope failure is unlikely. However, the FoS falls below the minimum recommended threshold demonstrates reduced resilience to potential instability. Without a scheduled maintenance regime, such issues may go unnoticed and unresolved, prolonging exposure to risk.

I do not believe it appropriate to defer this to a consent holder's obligation under the Stormwater By-Law and strongly recommend the panel to consider implementing a minimum 5-yearly flushing schedule to maintain counterfort drainage performance and reduce long-term stability risk. This is also recommended in a published literature from New Zealand Geotechnical Society and aids in certainty that the works and activity is not compromised as a result of negligent maintenance.

I therefore reiterate our recommendation for an Operation of Maintenance Plan for subsoil and counterfort drainage to prevent porewater pressure build up and increased risk of slope instability. This should be included as part of the land use conditions and updated in Condition 116 of the subdivision conditions.

New Information Gaps

The new information gaps are as follows:

- I note minor discrepancies of retaining wall alignment between that shown on Drawing No A-S-1-09 Rev B by Terra Studio and Riley Sketches SK180-189.

Information gap (existing / new)	Nature of deficiency	Decision-making impact	Risk / uncertainty created
1. Retaining wall alignment discrepancy.	<ul style="list-style-type: none"> • Riley indicates a tiered wall along the northern boundary of NOR 6 Stage 1 to support return cuts—this is omitted on the Terra Studio drawing. • A retaining wall within Lots 764–769 (Stage 2) is shown on Riley's sketches but is missing from the Terra Studio drawing. • For Lots 6–10 and Lot 473, Terra Studio shows a 2.5–3.0m high retaining wall along the northern boundary, which is not shown on Riley's sketches. 	<p>Cannot accurately assess the remediation scope or suitability for these areas.</p> <p>It is unclear if cut ground will be adequately retained.</p>	While variations in retained height can be addressed at the detailed design stage, the alignment discrepancies raise concerns about how cut ground will be managed long-term where no retention is currently shown. It would be beneficial for Riley to review the updated earthworks and retaining wall

	<ul style="list-style-type: none"> The earthworks plan (Drawing No. 3725-1-2103 Rev J, dated 02/07/2025) indicates cuts up to 6.5m, which contradicts the retained heights shown on Terra Studio drawings. 		plans and confirm whether their proposed remediation measures remain valid.
--	---	--	---

6.0 Proposed Conditions

I have reviewed the current proposed conditions including Conditions 26, 47 to 52, 113 & 114, 142, 163 and 181, which are generally acceptable. I acknowledge that the applicant has updated the conditions set and adopted a Settlement Monitoring Plan (Conditions 17 and 48) which is appropriate given the scale of the filing works proposed.

We suggest a small change to condition 51 to reference the Settlement Monitoring Plan:

The GCR must also provide justification on soil expansivity, subsoil site class, foundation requirements, confirming that the works have been completed in accordance with the approved construction methodology as required by Condition 26 and evidence of settlement monitoring as required by Condition 48 have been met. The GCR must include results of settlement monitoring and demonstration that sufficient settlement attenuation has occurred and be provided to the satisfaction of the Council.

For reasons outlined above and in alignment with the previously provided geotechnical regulatory memo, I recommend a condition for an Operation and Maintenance Plan for the subsoil and counterfort drainage to prevent porewater pressure build up and increase risk of slope instability. This can be included as part of the land use conditions and updated in Condition 116 of the subdivision conditions.

Prior to the issue of a s224(c) certificate for a subdivision stage (or sub-stage), the consent holder **must** prepare an Operation and Maintenance Plan for all residential lots that include on-lot stormwater infrastructure, including **subsoil and counterfort drainage**, raingardens and stormwater roof tanks.

7.0 Recommendation

Based on the provided information I can advise that the reporting, conclusions and recommendations of the provided geotechnical report are reasonable for the scale and magnitude of the works and indicate the site can be safely developed from a geotechnical/stability perspective, subject to the conditions mentioned above. If appropriately managed, no other properties are likely to be affected from soil instability issues arising from the earthworks.

To aid in the certainty of outcomes and assurances for global stability, it is recommended that land use and subdivision conditions support the Operation and Maintenance of subsoil and counterfort drainage.

In terms of the wall alignment discrepancy issue, it is recommended Riley to undertake a review of the updated retaining wall and earthwork plans and confirm if the geotechnical assessment and recommendations remain valid.