Milldale Fast-Track

29/07/2025 – Auckland Council Response

Annexure 9:

Geotechnical

Technical Specialist Memo – Geotechnical

To:	Dylan Pope – Processing Planner Carly Hinde – Premium Project Lead
From:	Luke Xu – Senior Geotechnical Specialist Engineering Assets and Technical Advisory
Date:	16/07/2025

1.0 APPLICATION DESCRIPTION

Application and property details

Fast-Track project name:	Milldale
Fast-Track application number:	BUN60446761 & FTAA-2503-1038
Site address:	Wainui Road, Upper Orewa

2.0 Executive Summary / Principal Issues

A consent is sought for the Milldale Development that involves Stages 10-13 and Stage 4C works, together with a supporting temporary Wastewater Treatment Plant. We have undertaken a regulatory geotechnical review based on the information provided and outlined in Section 3.0. While the information provided appears to be generally reasonable for the proposed development, we have identified inconsistencies and missing information in certain areas which raise concern whether the risk posed by geohazards has been fully captured. Based on discussion with the applicant's geotechnical engineer CMW, we understand that our queries would be addressed via an addendum, which has not been provided at the time of writing this memo.

A more detailed breakdown is included below

<u>Stage 10-13:</u>

We consider additional characterisation of geohazards including settlement monitoring of filling works and slope stability analyses is necessary to inform E12, E36 and E38 assessment.

We have queried if the cross sections utilised for slope stability analyses are representative as the most critical cases, particularly around if deeper softened alluvium material could be present. Furthermore, we have also raised concern that some geotechnical design parameters were identified in the report but not utilised in the current slope stability analyses.

There are a number of inconsistencies and missing components in the information provided, such as investigation records (TPO4-24), lack of assessment of impact for the proposed stockpile location, lack of commentary on boundary stability, lack of consideration on stream meandering and its impact on the proposed development, reinforced slopes which are shown in P24-128-00-0013-SU however are omitted from the remedial slope stability analyses etc.

Stage 4C:

We identified a lack of site investigations to support reporting, assessment and recommendations.

The geotechnical assessment for this area of work was assessed on the basis of existing information on and surrounding this site, as well as previous construction activities that were conducted on this site (e.g., preloading). However, we were not made available to these supporting documents and therefore are unable to verify the relevance or applicability of the referenced information on the intended works for Stage 4C. Geological cross section(s) is also missing from the submission, which its presence would largely aid in understanding the underlying geological conditions of the site and thus informing the potential geohazards.

With the available information supported, we note that earthworks and retaining are intended to be staged but details to clarify how stability will be maintained between the substages of Stage 4C2 - 5 (particularly where earthworks and retaining are proposed at the stage boundaries) remain lacking. This is necessary to inform E12 and E38 assessment.

WWTP:

We consider there to be some gaps in the information provided, particularly with historical geotechnical reporting not supplied and how the deep ground profile was developed. Additionally, the evidence provided does not wholly address potential for global instability as the site is underlain by Allochthonous materials and the proposal seeks to create slopes up to 1V:3H. This is necessary to inform E12 assessment.

3.0 Documents Reviewed

Stage 10-13:

- Geotechnical Investigation Report by CMW Geosciences (Reference: AKL2024-0257AB Rev3, dated 24 March 2025)
- Consent Drawings by Woods (Title: Milldale Fast Track Stages 10-13 Rev1, dated February 2025)

Stage 4C:

- Geotechnical Assessment Report by CMW Geosciences (Reference: AKL2024-0257AD Rev1, dated 20 February 2025)
- Consent Drawings by Woods (Title: Milldale Fast Track Stages 4C Rev1, dated February 2025)

WWTP:

- Geotechnical Investigation Report by CMW Geosciences (Reference: AKL2024-0185AC Rev1, dated 26 February 2025)
- Consent Drawings by Woods (Title: Milldale Fast Track Private Wastewater Treatment Plant Rev1, dated February 2025)

Conditions:

- Milldale Stages 10-13, 4C and WWTP Proposed Conditions of Consent, Rev1, dated 28 March 2025

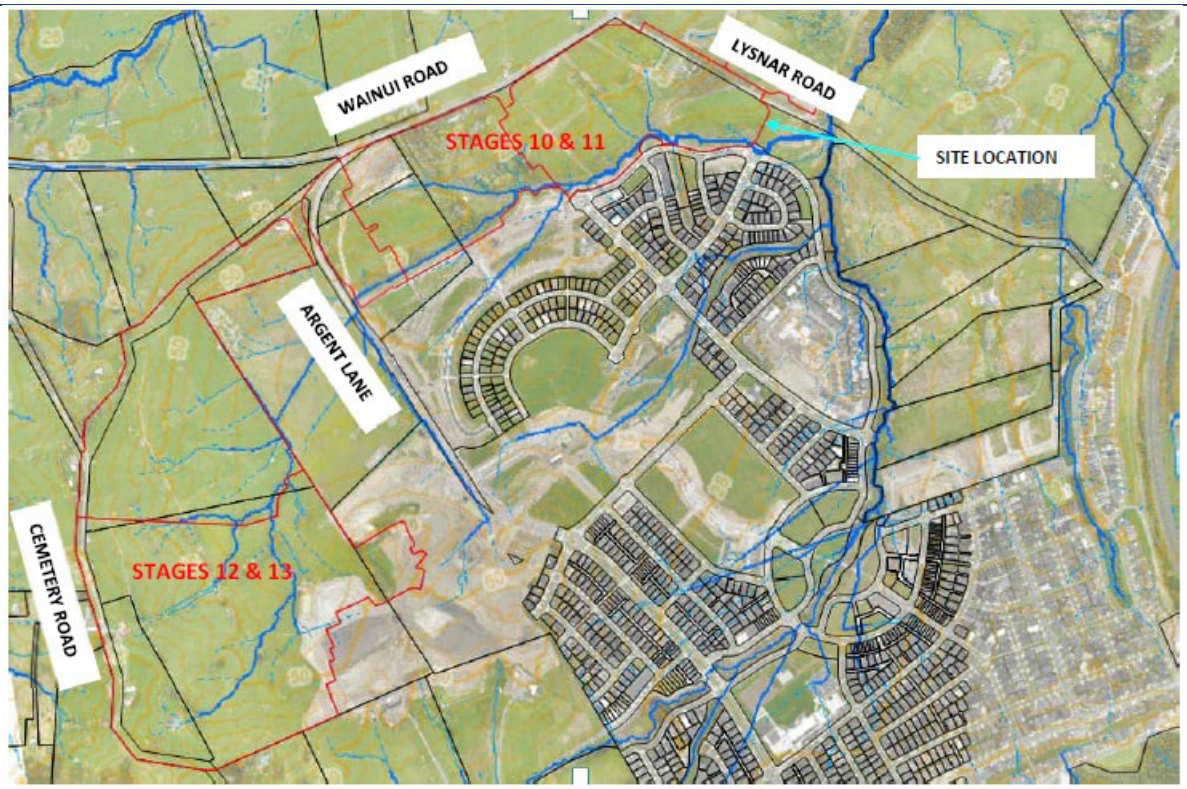
4.0 Additional Reasons for Consent Not included in AEE

- Stage 10 – 13 AEE excludes E36 for land which may be subject to land instability. We anticipate that despite historic reporting for the wider area, the geotechnical reporting may not be specific to the intended works and may be a reason for consent as a restricted discretionary activity.

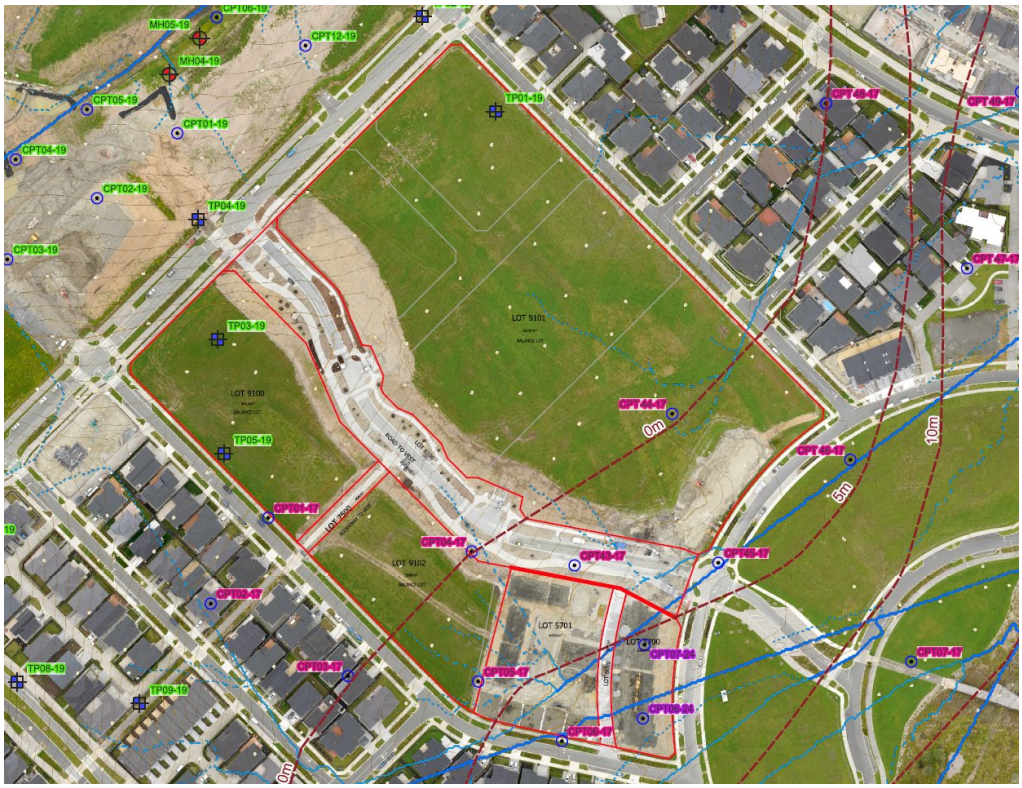
5.0 Specialist Assessment

Overall Site Plan

Stage 10-13:


WAINUI ROAD
LYSNAR ROAD
STAGES 10 & 11
SITE LOCATION
ARGENT LANE
CEMETERY ROAD
STAGES 12 & 13

Stage 4C:


MH05-19
CPT12-19
MH04-19
CPT05-19
CPT01-19
CPT04-19
CPT02-19
TP04-19
CPT03-19
TP03-19
TP01-19
LOT 9101
LOT 9100
TP05-19
CPT44-47
0m
10m
5m
LOT 9102
LOT 5701
TP08-19
TP09-19
0m

WWTP:

The documents reviewed have been included in Section 3.0 above.

1. **<u>Stage 10-13:</u>**

<u>Geohazards:</u>

Geohazards such as land instability, liquefaction, compressible soil has been discussed in the reporting provided. Mitigation measures in the form of retaining walls, shear keys, engineered fill buttresses, underfill drain etc. have been proposed to mitigate the identified geohazards.

A development restriction zone plan to protect the proposed reinforced earth batters should be provided in a Geotechnical Completion Report.

Slope stability

The analyses results and approach undertaken are generally reasonable, where the proposal achieves the minimum factor of safety requirements at the location of the areas of development under the Auckland Council Code of Practice for land development and subdivision. However, we have noticed some concerns.

- Softened alluvium material was identified in the site investigation. There is no cross section or slope stability analysis along the existing overland flow path where the softened alluvium material is expected to be the deepest.

- The design parameters utilised in the slope stability analyses have omitted the 'softened base contact' material that was previously identified in the geotechnical reporting.
- There is a proposed stockpile area located above a gully feature and overland flow path, which may pose a risk of instability. This was not addressed in detail in the geotechnical report.

Based on discussions with CMW Geosciences, the design parameters will be updated to align with the reporting, additional sensitivity assessment will be carried out to verify the effects of deeper softened alluvium material, and a memo will be provided to address the location and effects for the stockpile. Further, slope stability analyses which had missing information (e.g., outputs for Cross Section A are not presented in the 'remediation outputs' figure when remediation has been identified as being required), adopted retaining structure parameters was not labeled in the outputs. These inconsistencies and omissions in the slope stability analyses are understood to be provided as an addendum to the current geotechnical report. This addendum was not received at the time of this memo.

Effects on boundary excavation

We note cut works have been proposed along the site boundary with no comments made in the geotechnical report regarding how stability will be maintained. CMW informs they will be providing further clarification on this matter. We expect a preliminary construction methodology to be necessary to address this concern.

Significant filling

Significant filling may incur subsidence through ground settlement. We understand that this has been addressed via proposed preloading on site as well as implementation of a settlement monitoring plan. We find this approach generally agreeable, however, it is noted that the t90 timeframe (time to reach 90% of consolidation settlement) was not explicitly stated in the geotechnical report and only partially addressed with reference to t90 observed for filling works done in nearby areas.

We have reviewed the provided Earthworks Specification as part of the geotechnical report. The content of the document is generally reasonable. We sought clarity from CMW on whether the earthworks relating to the structural components of the project will be covered by this Earthworks Specification (e.g. backfill of retaining walls, fill works of reinforced slopes etc.), which we understood that it would be.

It was noted that the compaction acceptance criteria proposed in the specification deviate from the recommendations of NZS 4431:2022 (which was referenced in the Specification). Our understanding is that CMW will be providing additional clarification to verify that the deviation in industry standards will be able to produce compacted hardfill that is fit for purpose for the site.

Liquefaction potential has been discussed in the geotechnical report. CMW concludes that *'the site is expected to perform relatively well with negligible liquefaction induced settlement'*.

Inconsistencies:

We also have noticed the following inconsistencies within the geotechnical report, as well as between the report and the lodged plans, including:

- Missing labels in the geological cross section e.g., groundwater table, proposed remedial works, lot boundaries/accessways etc. We consider these necessary to show underlying geological conditions and therefore ascertain expected geohazards which may be endured. Of note, CMW has explained that groundwater table in the underlying material is perched and showing one uniform profile is not representative of the actual condition of the site.
- Missing investigation records for test pit (TP04-24). In follow up conversations we understand that this test was not conducted.
- Draft settlement monitoring plan presented utilises an outdated earthworks plan underlay.
- Civil plans showing the retaining walls do not show the full extent of wall that is considered necessary for remediation purpose by CMW.
- A single site investigation referenced but missing its log sheet in the report.

We understand that these discrepancies will be revised and presented in an updated addendum/drawing set.

Other Matters:

We have highlighted that considerations should be made to the potential migration of streams over the 100-year period for assessment under E36.9(2). Noting that streams can meander and therefore encroach on building platforms/access ways therefore posing a risk to future development and potential development yield. We understand that this is to be addressed by others.

We also noticed that laboratory tests results for this stage of the project are still pending. We have highlighted that this should be provided when available or with updated geotechnical reporting as this can inform on the appropriateness of geotechnical parameters applied in the geohazard analyses.

2. **Stage 4C**

Geohazards:

No intrusive geotechnical investigation was provided for this stage of works. The geotechnical assessment relied upon reporting from previous stages including investigations and completion reports. While this approach can be acceptable given the context of the site and CMW's long history of involvement, we have not been made available to these supporting documents as part of this consent and are therefore unable to verify the assumptions made in the geotechnical report for this stage of work. We have communicated this to CMW and have been informed that supporting documents referenced in the geotechnical report will be provided.

Slope stability

This was not considered to be a significant concern due to the gently sloping landform. We consider this to be acceptable, but have requested this conclusion to be confirmed in representative geological cross section(s).

Filling

Filling works are proposed on site including near site boundaries, parts of which also include retaining structures at the boundary. We have requested clarification on how stability of the work will be maintained between substages, including a preliminary construction methodology for the proposed retaining structures.

Preloading is reported to have been historically undertaken at the southeast section of the site. The settlement analysis undertaken indicates up to 50mm of post construction settlement may be expected for future development load of 10kPa. On the basis that the planned development does not exceed this load, no further mitigation has been proposed. We suggest that this be communicated to the applicant and included as an advice note or other similar approaches to ensure it is captured. If the proposal deviates from the expected future development load, additional assessment is required to ensure a safe and safe building platform and accessway is achieved.

Liquefaction

Liquefaction potential is based on assessment from reports from previous stages. CMW concludes the site *'is not susceptible to liquefaction'*.

3. WWTP

Geohazards:

Geohazards such as land instability, cut/fill batter stability, compressible soil has been discussed in the reporting provided. No specific mitigation measures was proposed other than excavation and replacement of uncontrolled fill on site. CMW concludes all potential geohazard was considered to have an acceptable risk. We find the information provided to be generally reasonable in supporting the proposed development, but have identified some missing information which we believe relevant to the regulatory review:

- The geotechnical report has references to previous deep investigation undertaken for this site and the adjacent site. However, this information was not provided for our review nor were the previous investigation locations identified on the provided site plan. This raises concerns about the accuracy of the geological long section given that only shallow investigation was completed for this stage of works.
- Indicative groundwater levels and dry basin profile are not presented in the geological long section. This raises uncertainty about how the proposed facility will be affected by the underlying ground condition.

Slope stability

Slope stability was not considered to be a concern due to the gently sloping landform. We noticed that maximum cut and fill batter gradients of 1V:5H and 1V:3H respectively will be created. Given the large surcharge loading and underlying Allochthonous soils, we consider it appropriate to undertake slope stability analyses to demonstrate their stability. Based on conversation with CMW, we understand that additional analyses will be provided.

Filling

Settlement analysis has been undertaken and indicated that predicted post-construction settlements range from 5 to 25 mm and differential settlements from 10 to 25 mm based on a maximum structural bearing pressure of 100 kPa have been estimated. Settlement monitoring has been proposed, and it was recommended that certification of building platform will only take place once settlement targets have been reached. We are agreeable to this approach and recommend the following advice notes:

- structural or civil engineer to confirm the estimated differential settlement of 25mm is acceptable for the proposed wastewater treatment plant.
- settlement analysis to be reassessed if there is a change in the assumed loading.

The provided Earthworks Specification is generally reasonable with exception to the recommended compaction acceptance criteria which deviates from the recommendations of NZS 4431:2022 (which was also referenced by the Specification). Our understanding is that CMW will be providing additional clarification that the variation in requirement will still be able to produce compacted hardfill that is fit for purpose for the site.

6.0 Section 67 Information Gap

I have identified the following Section 67 information gaps:

Information gap	Nature of deficiency	Decision-making impact	Risk / uncertainty created
1. *Additional characterization of geohazards required for Stage 10-13 works.*	***Slope stability analyses*** *to be updated for relevant sensitivity assessment and missing design parameters. Including clarification on how the stockpile location will be affecting the site stability.* *Additional clarification is to be sought for how* ***stability will be maintained*** *throughout the different substages of the work.* ***Inconsistencies*** *in the reports and drawings to be revised for clarity.* ***Missing laboratory testing*** *to verify applied parameters to geohazards.*	*Geohazard risks not fully captured in current assessment.*	***High*** *Potential for inadequate assessment of affecting geohazards.*
2. *Lack of site-specific investigation*	***Relating previous investigation information that was referenced, and geological long section*** *is to*	*Cannot accurately assess the appropriateness on*	***High***

information to support the geotechnical reporting, assessment and recommendations of Stage 4C works.	*be provided to justify how the assessment outcome was reached.*	*how the provided assessment were undertaken due to lack of information.*	*Potential for inadequate assessment of affecting geohazards.*
3. Partially missing information to justify the geohazard assessment outcome of the WWTP.	***Relating previous investigation information that was referenced*** *to be provided to justify the accuracy of the provided geological long section.* ***Slope stability analyses*** *to demonstrate stability of proposed permanent batters.*	*Geohazard risks not fully captured in current assessment.*	***Moderate*** *Potential for unforeseen risks in underlying geohazards and impacting serviceability for wider developments.*

7.0 Recommendation

Based on the information available, there are information gaps and inconsistencies in the geotechnical aspect of the consent which restricts the validity of geohazard characterisation and assessment. I recommend further information is provided to support the consent and such information should be supplied and reviewed prior to consent issue.

8.0 Proposed Conditions

Stage 10-13:

We notice that **Conditions 43 and 44** appear to be in duplication on what they intend to achieve. We recommend removing Condition 43 in favour of Condition 44 to make clear on the expected completion documentation requirements.

We also suggest the following amendments to be considered for the conditions below:

Land-use Condition		**Commentary**
12	**Settlement Monitoring Plan** A Settlement Monitoring Plan (SMP) for consolidation settlement due to placement of fill must be submitted to the Council prior to commencement of earthworks onsite. The SMP must be prepared by a suitably qualified geotechnical engineering professional. Any proposed amendment to	Change from 'shall' to 'must' to align with current practice. We also highlight that the acronym for the settlement monitoring plan (SMP) is similar to the site management & remedial action plan (SMP/RAP) and may cause confusion.

	the SMP must also be submitted to the Council. The SMP must include, as a minimum, the following information: a) A monitoring location plan showing the layout and type of all settlement monitoring stations within the fill areas; b) Timing and frequency of survey of the settlement monitoring stations; and c) Define the settlement criteria to be met on completion of earthworks.	
26	**Geotechnical Works - Supervision and Certification** All earthworks including the construction of retaining walls, building foundations and the placement and compaction of fill material must be supervised by a suitably qualified geo-professional. In supervising the works, the suitably qualified geo-professional must ensure that they are constructed and otherwise completed in general accordance with the "Geotechnical Investigation Report, ref: AKL2024-0257AB, Rev. 2, prepared by CMW Geosciences, dated 25 February 2025" including the engineering plans and geotechnical recommendations, relevant engineering codes of practice and detailed plans forming part of the application. The supervising engineer's contact details must be provided in writing to the Council at least two weeks prior to earthworks commencing on site.	Referenced document outdated. Most up to date version is Rev3, dated 24 March 2025
44	**Geotechnical Completion Report** At the completion of each stage of earthworks, a Geotechnical Completion Report (GCR) prepared by suitably qualified engineering professional must be provided to the Council to confirm the suitability of the site for the intended development. The GCR must include (but not to be limited to): a) Earthworks operations (e.g. excavations, filling works, replacement of unsuitable materials etc); b) Retaining wall and reinforced earth slope construction; c) Settlement monitoring; d) Testing; and e) Inspections. f) Statement of professional opinion g) Certified as-built plans	We suggest the inclusion of a statement of professional opinion and certified as-built plans as part of the GCR requirements.

	The GCR must also provide justification on soil expansivity, foundation design parameters, and settlement criteria defined in the SMP (as per condition 10) have been met. The GCR must be provided to the satisfaction of the Council. Advice Notes • Further investigation/testing may be required to determine soil expansivity. • A building consent may be required for the construction of retaining walls and reinforced earth slope. • Please send documents required as a condition of consent for the Council to: *monitoring@aucklandCouncil.govt.nz*	
69	**Design and Construction of Earthworks and Retaining Walls** The design and construction of the earthworks and retaining walls must be undertaken in general accordance with the specifications contained in the following documents: a) A report titled "Geotechnical Investigation Report, ref: AKL2024-0257AB, Rev. 2, prepared by CMW Geosciences, dated 25 February 2025" referenced in condition 1. b) Engineering plans "Milldale Fast track Stages 10 - 13", prepared by Woods, dated Feb 2025" referenced in condition 1. c) A report titled "Earthworks Methodology Report – Milldale Earthworks 10 – 13, Version 1, prepared by Woods, dated 19 March 2025" referenced in condition 1.	Referenced document outdated. Most up to date version is Rev3, dated 24 March 2025
86	**Geotechnical** The Consent Holder must construct retaining walls, construct reinforced earth slopes and place and compact material in general accordance with the recommendations of the "Geotechnical Assessment Report, ref AKL2024-0257AD, Rev. 1 prepared by CMW Geosciences, dated 20 February 2025" and subsequent	Referenced document seems to be in error as this is the geotechnical report for Stage 4C works

	Council approved versions to ensure the site is stable and suitable for development.	

Stage 4C – Phase 1:

Condition 22 may require an update to reflect updated geotechnical reporting noting that lack of site investigations undertaken. In addition, we suggest the following amendments to be considered for the conditions below:

Land-use Condition		**Commentary**
14	**Settlement Monitoring Plan** A Settlement Monitoring Plan (SMP) for consolidation settlement due to placement of fill must be submitted to the Council prior to commencement of earthworks onsite. The SMP must be prepared by a suitably qualified geotechnical engineering professional. Any proposed amendment to the SMP must also be submitted to the Council. The SMP must include, as a minimum, the following information: a) A monitoring location plan showing the layout and type of all settlement monitoring stations within the fill areas; b) Timing and frequency of survey of the settlement monitoring stations; and c) Define the settlement criteria to be met on completion of earthworks.	Change from 'shall' to 'must' to align with current practice. We also highlight that the acronym for the settlement monitoring plan (SMP) is similar to the site management & remedial action plan (SMP/RAP) and may cause confusion.
29	**Geotechnical Completion Report** A Geotechnical Completion Report (GCR) which includes a statement of professional opinion for the suitability of the site for the intended development, signed by a chartered geo-professional must be provided to the Council. The GCR must include (but not to be limited to): a) Earthworks operations (e.g. excavations, filling works, replacement of unsuitable materials etc); b) Retaining walls; c) Settlement monitoring; d) Testing; and e) Inspections. f) Certified as-built plans The GCR must also provide justification on soil expansivity, building and/or earthworks limitations, and foundation design	We suggest the inclusion of certified as-built plans as part of the GCR requirements.

	parameters. The GCR must be provided to the satisfaction of the Council. Advice Notes • Further investigation/testing may be required to determine soil expansivity. • A building consent may be required for the construction of retaining walls. • Please send documents required as a condition of consent for 'The Council' to: monitoring@aucklandCouncil.govt.nz	

Stage 4C – Phase 2:

We suggest the following amendments to be considered for the conditions below:

Land-use Condition		**Commentary**
20	**Geotechnical Completion Report** A Geotechnical Completion Report (GCR) prepared by suitably qualified engineering professional must be provided to the Council to confirm the suitability of the site for the intended development. The GCR must include (but not to be limited to): a) Earthworks operations (e.g. excavations, filling works, replacement of unsuitable materials etc); b) Retaining wall; c) Settlement monitoring; d) Testing; and e) Inspections. f) Statement of professional opinion g) Certified as-built plans The GCR must also provide justification on soil expansivity, building and/or earthworks limitations, and foundation design parameters. The GCR must be provided to the satisfaction of the Council. Advice Notes • Further investigation/testing may be required to determine soil expansivity. • Historic pre-loading and settlement analyses is based on a future development load of 10kPa. If there is an increase in anticipated loading, further assessment may be required.	We suggest the inclusion of a statement of professional opinion and certified as-built plans as part of the GCR requirements.

	• A building consent may be required for the construction of retaining walls. • Please send documents required as a condition of consent for 'The Council' to: monitoring@aucklandCouncil.govt.nz	

WWTP:

Given the relatively small scale of work, we consider it may not be necessary to condition a full geotechnical completion report as outlined in Condition 27. We recommend revising it to be more akin to Condition 43 for the Stage 10-13 works.