WENTZ - PACIFIC
GEOTECHNICAL ENGINEERS

08 December 2025

Ministry of Education
12-18 Normanby Road
Mt Eden
Auckland 1011

Attention: Gemma Hayes

Dear Gemma

**Geotechnical Review Summary for Notice of Requirement**
**Kumeū Secondary School**
**43 Trigg Road and 54/60 Station Road, Kumeū**

## 1 Introduction

Wentz-Pacific Ltd (WP) has been engaged by the Ministry of Education (the Ministry) to provide a geotechnical site assessment to support a Notice of Requirement (NoR) to designate 43 Trigg Road and 54/60 Station Road, Kumeū (the site) for education purposes. The purpose of the assessment was to identify potential geotechnical constraints in the context of the proposed development. WP's work was undertaken in accordance with our agreement with the Ministry dated 26 November 2025.

Access to the site for geotechnical investigations was not available at the time of this report; hence the assessment relies on a desktop study of available information pertaining to the site and nearby area.

Based on the results of our study, WP assess that the site will be suitable, from a geotechnical standpoint, for a new school provided that the school design and construction take into consideration the geotechnical issues contained in this report. An appropriate level of site-specific geotechnical investigation and assessment should be undertaken to inform the school design and construction.

## 2 Proposed Development

The proposed development comprises of a secondary school (Years 9 to 13) with a master planning roll of 2,500 students. New school buildings are anticipated to comprise of conventional timber, steel and / or concrete structures with a maximum height of 3 storeys. All supporting infrastructure (e.g., road access, driveways, parking, stormwater) will need to be provided.

## 3 Information Reviewed

WP reviewed select publicly available information, and information provided to us by the Ministry pertaining to the site and/or surrounding vicinity. This information included:

- Aerial photographs contained on the Auckland Council (AC) and Retrolens websites.
- Natural hazard information contained on the AC website.
- Regional geological information published by the Institute of Geological & Nuclear Sciences Limited (GNS).

- Data from various deep geotechnical investigations undertaken in the general vicinity of the site obtained from the NZ Geotechnical Database (NZGD).
- *Desktop Assessment for Kumeū Secondary School Site Selection*, 29 August 2025, V5.0, Tonkin & Taylor Ltd;
- *Kumeū Secondary School Site Reviews Stage 2 Options Evaluation*, 29 August 2025, Incite Ltd.

# 4 Findings and Conclusions

## 4.1 Topography and slope stability

The northern half of the site (43 Trigg Road and 60 Station Road) is near level and the southern half (54 Station Road) slopes gently downward to the south-southwest at an inferred inclination of approximately 5 degrees based on a review of the AC topographic map[1]. A small pond is located near the centre of the southern site boundary. Based on a review of aerial photographs of the site dating back to 1940, the pond appears to have been constructed some time between 1988 and 1999. A review of 2024/2025 aerial photographs[1] did not show any areas of slumping or hummocky ground or other signs indicative of slope instability.

## 4.2 Ground Conditions

Published geological information[2] shows the site to be surfaced with late Pliocene to middle Pleistocene-age alluvial sediments of the Puketoka Formation (Pup). These sediments are described as "pumiceous mud, sand and gravel with muddy peat and lignite: rhyolite pumice, including non-welded ignimbrite, tephra and alluvial deposits; massive micaceous sand". Just east of the site, the geology is mapped as late Pleistocene-age alluvial/colluvial sediments (IQa) described as pumiceous mud, sand and gravel with muddy peat and lignite.

No site-specific geotechnical investigation data was available at the time of this report. Several cone penetration tests (CPTs) are shown on the NZGD to be located between about 300 and 500 m northeast of the site, at the location of the Country Club Huapai Retirement Village. The logs of these CPTs generally show broadly similar soil conditions as summarised in Table 1.

**Table 1 – Generalised Site Soil Profile**

| Soil layer | Soil description | Approx. depth to top of layer (mbgl) | Approx. layer thickness (m) |
|---|---|---|---|
| 1 | Soft to stiff CLAY | 0.4 | 3 |
| 2 | Stiff clayey SILT / silty CLAY | 3 | 2 |
| 3 | Loose sandy to clayey SILT | 5 | 3 – 5 |
| 4 | Medium dense to dense silty SAND / sandy SILT | 8 – 10 | unknown |

The reviewed information indicates that the depth to groundwater may be in the order of 0.5 to 1 m below existing ground level (bgl); however, this may be a perched layer within the low permeability clay. The depth to fully saturated soil may be considerably deeper – e.g., a log from a water bore located approximately 390 m north of the site indicated a static water level of 13 m bgl.

[1]Auckland Council (2025). GeoMaps, viewed 27 November, https://geomapspublic.auckland council.govt.nz/viewer /index.html

[2]Edbrooke, S.W. (complier) (2001). Geology of the Auckland area. Institute of Geological and Nuclear Sciences 1:250,000 geological map 3. 1 sheet + 74 p. Lower Hutt, Institute of Geological and Nuclear Sciences Limited.

## 4.3 Geotechnical Considerations / Constraints

Liquefaction / lateral spreading hazard

An assessment of the liquefaction hazard was made using the inferred subsurface soil profile and CPT logs discussed in Section 4.2. The assessment assumed a depth to groundwater of 1 m bgl, and the design ground motions shown in Table 1 as derived from Module 1 of the NZGS Earthquake geotechnical engineering practice guidelines[3]. The design limit states are based on the Ministry's Structural and Geotechnical Requirements[4]. This assessment will need to be confirmed and revised as appropriate based on site-specific geotechnical investigation and engineering analyses.

**Table 2 – Ground Motions for Liquefaction Assessment**

| Design Case | Return Period (years) | Magnitude (M) | PGA (g) |
|---|---|---|---|
| SLS – IL2, IL3 | 25 | 5.9 | 0.05 |
| SLS2 – IL2 | 100 | 5.9 | 0.09 |
| SLS2 – IL3 | 250 | 5.9 | 0.14 |
| ULS[1] | ≥ 500 | 6.5 | 0.19 |

[1]M and PGA based on 'lower bound' ULS event (M6.5 earthquake at 20 km distance).

The results of WP's assessment indicate that no liquefaction triggering would be expected under SLS and SLS2 – IL2 levels of shaking, and that only minor triggering may occur under the SLS2 – IL3 level of shaking. The potential damage from these levels of shaking would be anticipated to be "insignificant" (i.e., no damage expected) based on the NZGS Module 3 guidelines[5].

The loose sandy silt (layer 3 in Table 1) would be expected to liquefy under the ULS level of shaking. Based on the results of the CPT assessment, the depth to significant liquefaction is in the order of 5 to 7 m bgl, and free-field ground surface settlement would be the order of 50 to 100 mm. If there is a significant thickness (>4 m) of non-liquefiable soil overlying the liquefiable soils, then the potential for ground surface damage be expected to be "mild" to possibly "moderate" (i.e., little if any significant differential settlement or reduction in foundation bearing capacity).

Based on the reviewed information combined with the relatively level topography of the site and the lack of any significant free faces such as from streams or open-channel drains, the likelihood of the site being affected by lateral spreading during a ULS-level event is considered to be low.

Static ground settlement

Static ground settlement beneath foundations of relatively lightweight structures is anticipated to likely be within normal design tolerances (i.e., ≤ 25 mm over 6 m) based on the reviewed information. However, areas of the site may contain undocumented fill or have been otherwise modified (e.g., where structures or paved surfaces are/were present), and such areas may need to be remediated to reduce the potential for static settlements to occur.

[3]New Zealand Geotechnical Society (2021). Earthquake geotechnical engineering practice – Module 1. Overview of the guidelines. Rev 1. November.
[4]Ministry of Education (2020). Designing Schools in New Zealand – Structural and Geotechnical Requirements, Version 3.0, October.
[5]New Zealand Geotechnical Society (2021). Earthquake geotechnical engineering practice – Module 3: Identification, assessment and mitigation of liquefaction hazards. Rev 1. November.

Expansive soils

No information regarding the potential for expansive (i.e., shrink/swell) soils was available on or near the site. Based on our experience with Puketoka Formation sediments, WP recommends that the site soils be assumed to be at least moderately, and potentially highly expansive (i.e., Class M or H in accordance with AS 2870:2011). The expansivity of the site soils will need to be determined based on appropriate collection and laboratory testing of site soil samples.

Foundation support

Based on WP's review of the available information, robust specifically engineered shallow foundations are considered feasible for support of one and two-storey lightweight structures. An example of such a foundation would be a stiffened, interconnected grid of ground beams designed to reduce the potential for damaging differential settlement.

For taller and/or heavier buildings, the foundation system may need to be a structural concrete mat, potentially supported on an engineered fill raft, or piles extending to a deeper bearing layer. The depth required for end-bearing piles supporting heavy loads is unknown but should be assumed to be at least 10 to 20 m bgl based on the information discussed in Section 4.2.

All foundations will need to be specifically designed based on appropriate site-specific geotechnical information.

### 4.4 Additional work

Further work will be required to confirm the ground conditions and geotechnical findings / conclusions presented in this report. This work is expected to include:

- Deep site investigations (i.e., CPT and possibly machine drilled boreholes) to confirm the site ground profile and material properties, and if necessary, the depth to, and strength of the bearing layer for deep piles.
- Shallow hand auger investigations to confirm the near-surface ground conditions within structure footprints and paved areas and obtain samples for laboratory testing to confirm the soil reactivity/expansivity.
- Site-specific geotechnical assessment including (but not necessarily limited to) liquefaction / lateral spreading potential, static and seismic foundation bearing capacity, foundation settlement, site class for seismic design and soil reactivity/expansion potential.

A suitably qualified and experienced geotechnical engineer should be engaged for the duration of the project to design, monitor and certify the geotechnical aspects of the project.

Limitations

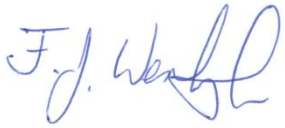
This letter was prepared solely for the benefit of the Ministry of Education (the Client) and their project consultants with respect to the particular brief given to WP. The use by other parties of the information, opinions and recommendations contained in this report shall be at such parties' sole risk. This report is not intended to be used for design or building consent.

WP's services consist of professional opinions and conclusions developed in accordance with generally accepted geotechnical engineering principles and practices. There is no other warranty, either expressed or implied.

The opinions and recommendations in this report are based on subsurface information collected from a desktop review of general information within the site vicinity, none of which is necessarily specific to the site, and the subsurface conditions described herein are inferred. It must be appreciated that the actual soil conditions could vary from those described in this report.

Regards,

Wentz-Pacific, Ltd.



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