19 April 2024
Job No: 1015589.1000

Fale Malae Trust
c/- Office of the AVC (Pacifica)
PO Box 600
Wellington 6140

Attention: Sophie Bishop

Dear Sophie

Fale Malae, Wellington
Summary Geotechnical Assessment Report

Introduction

The Fale Malae Trust propose to construct a single-storey portal frame structure (Fale Building) at the southern end of Frank Kitts Park on Wellington Waterfront.

Tonkin & Taylor Ltd (T+T) has been engaged by the Trust to provide geotechnical services for this project. The project structural engineer is Dunning Thornton Consultants Ltd (DTC).

The report "Frank Kitts Park Redevelopment Geotechnical Report" by T+T dated December 2023 presents the geotechnical investigation, assessment and concept design for the Frank Kitts Park redevelopment, including the Fale foundations. The purpose of this letter is to provide a brief summary of the Fale geotechnical investigations, assessment and foundation concept design. For further details refer to the above-mentioned Geotechnical Report.

The site is located within the liquefaction hazard overlay of the Proposed District Plan. Responding to that hazard has been a focus of the investigations, assessment and concept design as outlined in this letter.

The work is carried out in accordance with our letter of engagement dated 13 August 2021 (T+T Ref. 1015589.1000), and Variation V01 dated 29 June 2022 (T+T Ref. 1015589.1000).

Geotechnical investigations and assessment

Available geotechnical data relating to the site has been collated and reviewed. Additional project specific investigations have been undertaken. These historic and recent investigations have included boreholes and cone penetration tests as indicated on Figure 1.

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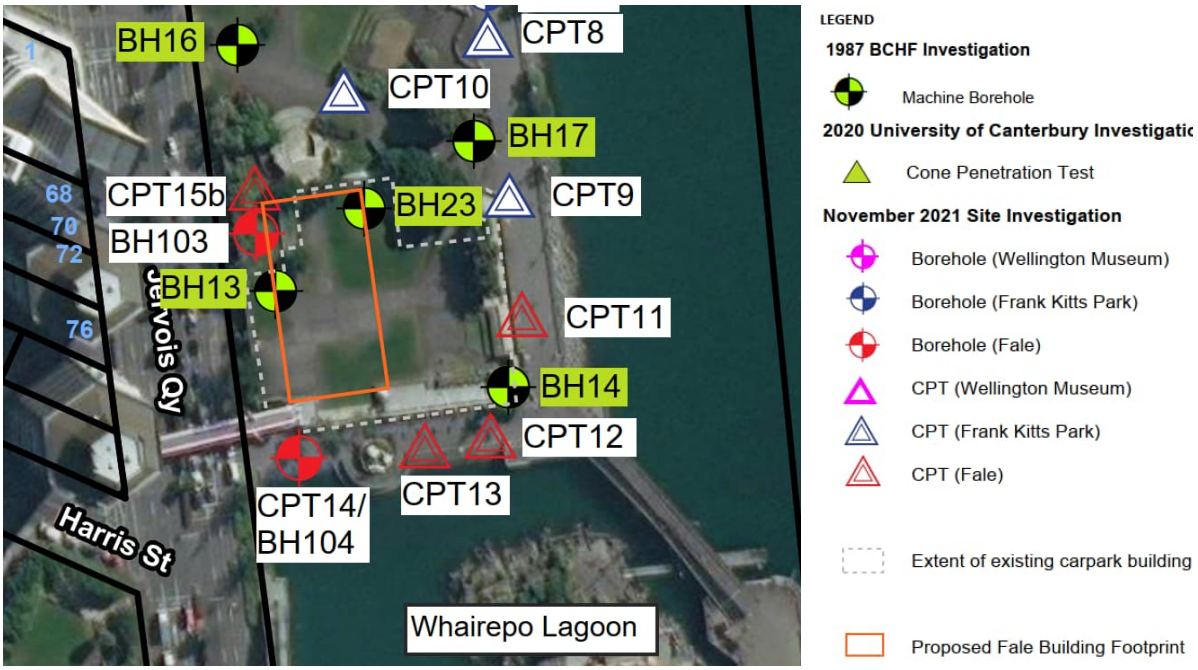

Figure 1: Geotechnical investigation locations

The typical soil profile encountered at the site comprised:

- 0 to 10m depth: Variable end tipped reclamation fill; soft silt, loose sand and gravel.
- 10 to 12m depth: Marine deposit; very soft and soft clayey silt interbedded with loose silty sand and shell fragments.
- 12 to 25m depth: Alluvium; Dense to very dense silty sand and gravel with occasional medium dense sand and lenses of stiff silty clay.
- Below 25m depth: Rock.

The assessment confirmed liquefaction and lateral spread potential within the reclamation fill, and that the underlying alluvium provided a competent founding layer for the Fale building.

The site is approximately 3km southeast of the Wellington fault as indicated on the fault hazard overlay of the Proposed District Plan. Other faults indicated on the fault hazard overlay are more distant.

Fale building foundation concept design

After evaluating various options, two foundation solutions remain under consideration to support the building and respond to the liquefaction and lateral spread risk. These are:

- Large diameter bored piles as indicated by Figure 2. This foundation system provides vertical and lateral support to the building by embedding piles into the dense alluvium at depth. The foundation system isolates the building from the liquefaction and lateral spread of the reclamation fill. This solution was adopted for the Bell Gully Building (Site 9) Elizabeth Lane Wellington.

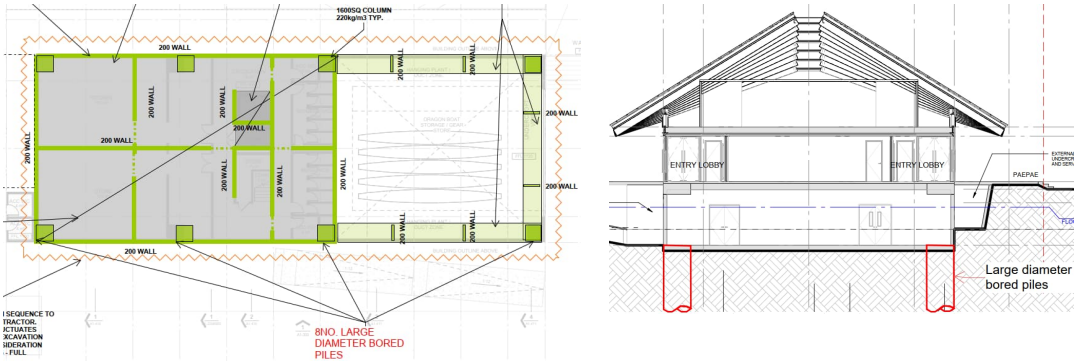

Figure 2: Large diameter bored piles (plan left and cross section right)

- A cellular structure of secant CFA piles as indicated by Figure 3. This is a combined ground improvement and foundation system which mitigates liquefaction and lateral spread potential beneath the building footprint. This solution was adopted for the PWC building at 10 Waterloo Quay Wellington.

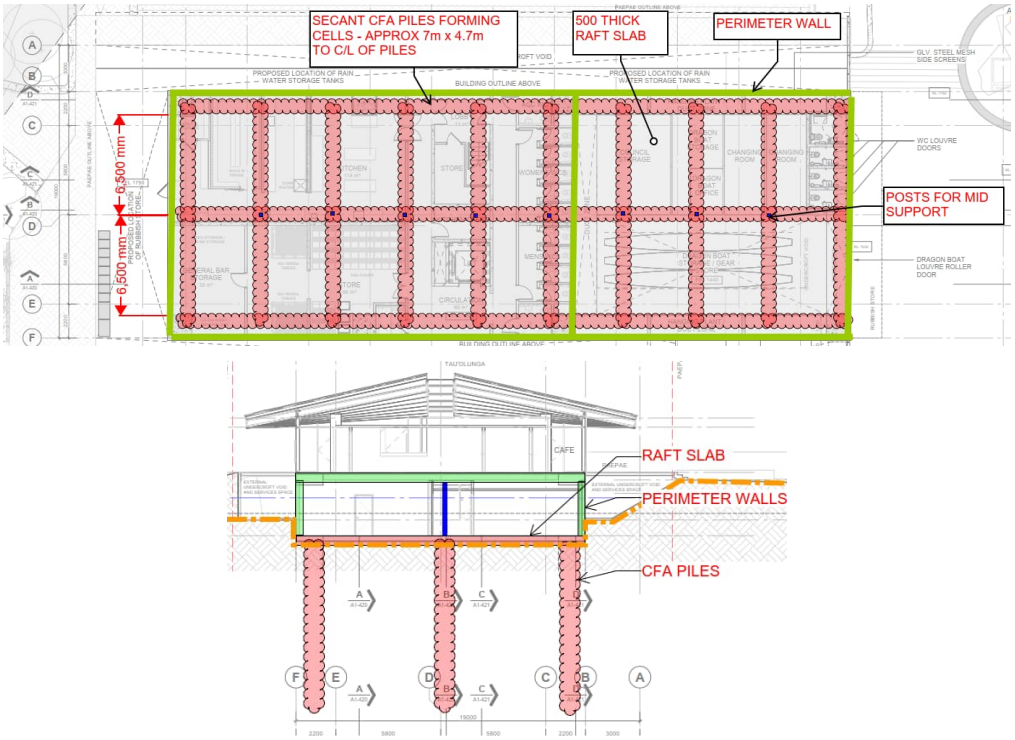

Figure 3: Cellular secant CFA piles (plan top and cross section bottom)

Either foundation system could support the building to meet building code requirements. The ground beyond the building will remain at risk of liquefaction and lateral spread and consequently a risk of damage to access, services and other facilities connected to the building. This risk to services and access exists for other buildings along Wellington's reclaimed waterfront to varying degrees. For the Fale building the following measures are to be considered during design development to reduce this risk:

- Provide flexible joints for services and access connections to the building.
- Minimise the number of locations where services connect to the building and form these in a manner to facilitate repair.
- Provide either articulated joints or isolation joints between hard landscaping and the building.

Conclusion

Liquefaction and lateral spread have been identified as hazards impacting on the site. Foundation concept designs have been developed to respond to these hazards.

Applicability

This report has been prepared for the exclusive use of our client Fale Malae Trust, with respect to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose, or by any person other than our client, without our prior written agreement.

We understand and agree that our client will submit this report as part of an application for resource consent and that Wellington City Council and Greater Wellington Regional Council as the consenting authority will use this report for the purpose of assessing that application.

Recommendations and opinions in this report are based on data from discrete investigation locations. The nature and continuity of subsoil away from these locations are inferred but it must be appreciated that actual conditions could vary from the assumed model.

Tonkin & Taylor Ltd
Environmental and Engineering Consultants

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Technical review by Bhavesh Rama (Senior Geotechnical Engineer)

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