

# Engineering Memo

**DATE:** 30/01/2023

**TO:** Ike Kleynbos, Principal Advisor Planning

**REGARDING:** 254 – 256 Fitzgerald Ave, 5 Harvey Tce

**FROM:** Marie-Claude Hébert, Senior Geotechnical Engineer

## INTRODUCTION

The Council is currently undertaking a plan change (PC14) to implement the government’s intensification direction. I have been asked to comment on the suitability of the construction of three-storey structures enabled at 254 & 256 Fitzgerald Avenue and 5 Harvey Terrace, referred to as “the site” (Figure 1).



Figure 1 Area of 254 & 256 Fitzgerald Avenue and 5 Harvey Terrace. Note the Avon River located to the west of Fitzgerald Avenue. North is up

The sites at 254 – 256 Fitzgerald Ave and 5 Harvey Terrace (collectively ‘the site’) to which PC14 residential intensification rules would apply (Figure 1). Note that Areas marked as A, B and part C (marked in blue lines in Figure 2) are the subject of Private Plan Change 11, which is currently on hold. The property at 256 Fitzgerald Ave already contains a pre-earthquake two-storey block of flats.

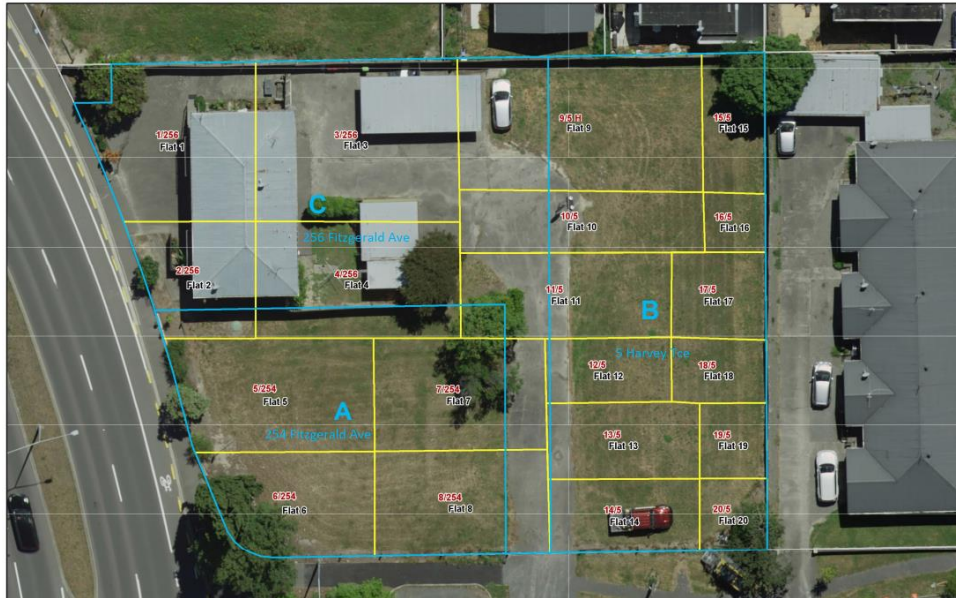


Figure 2 – Proposed realignment of land parcels to create allotments A, B, and C. North is up

## AVAILABLE GEOTECHNICAL INFORMATION

The site is located in the former Red Zone with TC3<sup>1</sup> sites to the North and East. The site is in an area mapped as having “high liquefaction vulnerability”, as shown on the Council’s liquefaction vulnerability map.

A previous desktop assessment of the area by Jesse Dykstra (CCC Principal Advisor, internal email dated 12 December 2022) has identified that the site is partially protected from the effects of liquefaction/lateral spreading by the post-earthquake palisade wall along the opposite side of Fitzgerald Avenue.

A geotechnical report by Geotech Consulting (dated February 2021) has been provided to the Council regarding a private plan change at the site. The geotechnical assessment references a proposed subdivision with two-storey residential buildings of light-weight construction. The report summarises the ground conditions, includes liquefaction and lateral-spread assessment, consideration to RMA Section 106 hazards and provides preliminary foundation recommendations. The report concludes that the only geotechnical hazard on site is related to liquefaction but that the site can be considered as having TC2<sup>2</sup>/TC3 hybrid classification. Shallow ground improvement and shallow foundation systems are recommended for the two-storey development.

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<sup>1</sup> Technical Category 3 (TC3) means that moderate to significant land damage from liquefaction is possible in future significant earthquakes. Site-specific geotechnical investigation and specific engineering foundation design is required.

<sup>2</sup> Technical Category 2 (TC2, yellow) means that minor to moderate land damage from liquefaction is possible in future significant earthquakes. You can use standard timber piled foundations for houses with lightweight cladding and roofing and suspended timber floors or enhanced concrete foundations.

## **ONE TO THREE-STOREY DEVELOPMENT**

The geotechnical report by Geotech Consulting (2021) confirms the site's suitability for two-storey development. From a consenting point of view, we would expect a similar geotechnical assessment report for three-storey development, however the liquefaction analysis must consider the potential effects of liquefaction beyond 10 m depth. This is because the MBIE guidance for repairing and rebuilding houses affected by the Canterbury earthquakes (2012) suggests a cut-off of 10 m depth in liquefaction analysis, and this guidance applies to single or two-storey dwellings only. I would expect three-storey development to be possible at the site considering the information provided in the Geotech Consulting report (2021). The designer would have to consider the serviceability and releveability of the building following a serviceability limit state (SLS) earthquake. This consideration may limit the size or complexity of the proposed building footprints, but this is typical for any residential development at sites with medium to high liquefaction severity.

From a resource consent perspective, I expect that development up to three storeys would be possible and permitted in this area, with input from a suitably qualified geotechnical engineer/engineering geologist during the building consent stage. Specifically designed foundations taking into consideration the liquefaction hazard are expected. Although additional considerations are expected in the liquefaction analysis for three-storey buildings, specifically designed foundations in-line with the TC3 recommendations in the MBIE guidance (2012) are likely appropriate.

We recommend that applicants request a pre-application meeting before lodging their building consent application for any complex geotechnical design or if they have concerns.

## **FOUR TO SIX-STOREY DEVELOPMENT**

Development of up to six storeys may be possible with detailed geotechnical analysis and design information to be provided at the resource consent stage. Foundation design for buildings with four to six storeys would likely need specifically designed deep ground improvement, which could have wider implications and constructability concerns. The scale of the deep ground improvement may have a greater impact on the surrounding area compared to buildings of three storeys or less. These impacts, including noise and vibration, large equipment on site, traffic disruptions, safety concerns, and dust and debris, must be defined at the resource consent stage. It is crucial for the design team to demonstrate the feasibility of the foundation solution and show that they will take necessary measures to minimize the impact of the construction activities before applying for building consent for buildings with four or more stories.

Four to six-story buildings will have added structural considerations and may increase the complexity of the foundation design, potentially adding cost to the project and rendering it unfeasible. It is recommended to determine the potential cost implications early in the project. For buildings of four storeys or more, we expect a geotechnical peer review (PS2) to be provided at building consent.

We would strongly advise a pre-application meeting for buildings over three storeys, especially in areas of high liquefaction vulnerability.

Please don't hesitate to get in touch if you have any questions,



Marie-Claude Hébert  
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