



GeoSolve Ref: 160318.01  
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Abbe Hutchins  
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Dear Abbe,

## Preliminary Geotechnical Hazards Assessment Murcott Burn, Te Anau-Milford Highway

### 1. Introduction

This letter report details the results of a site inspection and preliminary geotechnical hazards assessment undertaken by GeoSolve Ltd for the proposed tourist accommodation site at Murcott Burn, Te Anau-Milford Highway. This work was carried out to review/confirm the findings of the desk-top geotechnical hazards assessment previously undertaken by GeoSolve Ltd for the same site and documented in an email dated 11 October, 2016. For the purposes of this report we have referred to the site as 'Murcott Burn', a tributary which flows in from the west, however there may be a local name for the area.

The aim of this work is to provide a preliminary risk assessment of geotechnical hazards at the proposed site with particular regards to flooding and liquefaction. It should be noted that the work completed to date is preliminary in nature and it is expected that further analysis/assessment will be required to fully define the risks identified. Site specific engineering requirements will also need to be confirmed prior to the detailed design stage of any future development.

Our work has been completed in accordance with the terms and conditions outlined in GeoSolve Ltd.'s short form agreement, dated 16 January, 2018.

### 2. Site Description

The proposed development site is situated on an isolated terrace elevated above a broad alluvial floodplain of the Eglinton River West Branch to the north. The main flow of the Eglinton River bends around the site to the west and borders the base of the steep terrace slopes on its western and southern sides. The terrace surface slopes gradually towards the northeast and grades into the sub-horizontal alluvial surface of the Eglinton River floodplain (Photo 1).

Numerous flood overflow channels from the Eglinton River dissect the broad floodplain to the north of the site. These overflow channels reach the base of the terrace on the southern end of the floodplain and deflect around the elevated terrace to the west back towards the main flow of the Eglinton River. The flood overflow channels were observed to be active and showed signs of recent activity including scoured banks and ponding of water.

Figure 1 in the attachments section shows the general position of the proposed development (circled in red) in relation to the Eglinton River West Branch and the surrounding floodplain.



Photo 1. Site photo looking southwest from the Eglinton River floodplain towards the proposed development site along the bush edge, outlined in red. Murcott Burn is located on the skyline centre of image.

### 3. Hazards Assessment

We have assessed hazards associated with local geology, flooding / erosion from the main river, liquefaction, alluvial fans (debris flow / flood / erosion) and slope instability. These assessments are based on a previous desk-top interpretation of existing mapping and aerial imagery which has subsequently been reviewed and confirmed by a visual site inspection.

Assessed ratings for these hazards use the same rating convention as used previously by GeoSolve for the same client in a separate geotechnical report. See notes below:

- Hazard rating; 1 (negligible risk) – 5 (high risk). Further investigation is recommended for ratings of 2 or greater.
- The site has the potential to be exposed to severe shaking and damage during a significant Alpine Fault seismic event - high probability within next 50 years.

Further detailed analysis/assessment is expected to be necessary to fully define the risks identified and confirm site specific engineering requirements to assist detailed design.

#### 3.1 Flooding

The initial desk-top study for the site indicated that flooding from the Eglinton River West Branch was the main hazard of concern. However, results from the onsite inspection have identified that there is a low risk of flooding from the Eglinton River West Branch. This is due to the elevated nature of the proposed building site above the broad floodplain to the north.

Concept design plans and site survey plans provided to GeoSolve indicate that accommodation Pod D, located on the eastern extent of the development site will only have approximately 0.5 to 1.0 m of clearance above the adjacent floodplain. Accommodation

Pod D coincides with the least elevated part of the site. The Eglinton River West Branch is expected to carry large volumes of water during periods of high rainfall and the site is situated downstream from a significant bend in the river. Therefore, specific engineering considerations such as elevated floor levels, bunding or relocation of the structure will be required for Pod D at detailed design stage. Therefore, a flood hazard rating of 1-2 has been adopted for this site.

Regardless of the building floor levels, there may be access difficulties in a major flood which may affect emergency procedures. Therefore, establishment of a robust flood management plan to provide for early and safe evacuation is recommended to mitigate safety risks.

Figure 2 in the attachments section shows site topography overlaid with concept plans of the proposed development.

### 3.2 Liquefaction

Alluvial floodplains are particularly susceptible to liquefaction due to the elevated groundwater table and the recent, loose nature of the soil materials. The site is elevated above the Eglinton River and the surrounding floodplain on an isolated terrace. Therefore, the groundwater table is anticipated to be deeper than would be expected on the adjacent floodplain. It is unclear at this stage whether the terrace the site is situated on is composed of soil or rock or a combination of the two.

Results from the onsite inspection have identified that there is a low to moderate risk of liquefaction. Accommodation Pod D is located on the eastern extent of the development site closest to the adjacent floodplain and potentially liquefiable soils. Therefore, a liquefaction hazard rating of 2-3 has been adopted for this site. However, confirmation of the sub-soil and groundwater conditions using intrusive ground investigations will be required for a definitive assessment of liquefaction to assist detailed foundation design.

### 3.3 Slope Stability/Erosion

No evidence of existing slope instability was identified during the walkover inspection of the site. Based on aerial imagery the bank on the southern edge of the site identified in the initial desk-top assessment appeared to have undergone slipping and retrogression as there is an exposed face clear of vegetation. However, the site inspection confirmed that this was not the case and that the exposed face clear of vegetation is simply an area densely covered in grey moss along the bush edge.

No excessive erosion along the edges of the elevated terrace by the Eglinton River West Branch or its overflow channels was observed during the time of site inspection. However, some erosion of the base of the terrace can be expected during flood events.

The southern and western terrace risers are particularly steep and present a slope stability issue during a significant seismic event. Subsequently, setback distances for structures from the crest of the terrace edges will need to be confirmed at detailed design stage. This can be carried out in conjunction with intrusive ground investigations.

### 3.4 Alluvial Fans (Debris Flow / Flood / Erosion)

The proposed development site is situated on an elevated terrace in the middle of the valley floor surrounded by the floodplain of the Eglinton River West Branch. The junction of the Murcott Burn and the Eglinton River West Branch is approximately 10-15 m lower than the top of the terrace on its southwestern corner. The site is not located on an alluvial fan, therefore there is no alluvial fan hazard at this site.

### 3.5 Seismic Hazard

A regional scale hazard exists in this area owing to the risk of an Alpine Fault seismic event, which has a high probability of generating a magnitude 8 earthquake within the next 50 years. In such an event, extensive landsliding and debris mobilisation is predicted and widespread damage is expected to structures throughout the southwestern South Island. We have considered at-site seismic effects (liquefaction and slope stability) within our assessment. However macro-scale effects potentially affecting entire landscapes are beyond the scope of this assessment.

## 4. Conclusions and Recommendations

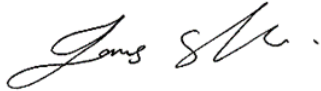
In our opinion the Murcott Burn site is considered technically feasible from a geotechnical hazards perspective. However, the results of this hazard assessment should be considered preliminary in nature and it is expected that further analysis/assessment will be required to fully define the risks identified. The flood, liquefaction and slope stability hazards associated with this site will require further assessment at the detailed design stage.

It is also recommended that site specific engineering requirements, such as foundation conditions, be confirmed prior to the detailed design stage of any future development using sub-surface ground investigations as is standard practice for all building developments.

## 5. Applicability

This letter report has been prepared for the benefit of Abbe Hutchins with respect to the particular brief given to us and it may not be relied upon in other contexts or for any other purpose without our prior review and agreement.

Letter prepared by:



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## **Attachments:**

- Figure 1 – Photo Image
- Figure 2 – Topographic / Concept Plans

**Figure 1**



# Figure 2

