

Geotechnical Assessment of Lot-3, part 82 Riccarton Road East, Dunedin

Report prepared for

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1 Introduction

The writer was requested to assess the geotechnical conditions of a portion of Mr Kelliher's property at 82 Riccarton Road East to be subdivided as Lot-3 (Figure 1).

2 Site Topography & Geology

I made an initial inspection of the property accompanied by the owner on 13 August 2015, and a further examination on 30 March 2016. Proposed Lot-3 occupies the lower northern flank of a ridge that extends west of Riccarton Road East (Figure 1). According to the 1:50,000 scale geological map of McKellar (1990), Lot 3 is underlain by schist rock (Figure 2). The property lies within a structural block bounded by strands of the Titri Fault which extends along the east side of Taieri Plain. Schist is exposed in recently cut slope batters within the adjoining property to the east, between Lot 3 and Riccarton Road East (Figure 3), and in a farm track cutting above Lot-3 (Figure 4). In both areas the schist has a blocky brecciated appearance. This is considered to be a result of tectonic deformation during past movements on Titri Fault. An alternative interpretation is that it is a very coarse grained part of the Henley Formation, an alluvial fan deposit of Cretaceous age locally found elsewhere on the southeast side of Titri Fault. Henley Formation is mapped by McKellar (1990) further to the southeast of the property (Figure 2). The brecciated schist consists of large in-tact schist blocks up to 2x2 m set at various orientations in dense rubbly broken schist matrix. The matrix is relatively unaltered, contains some calcite cement, and includes an estimated <5% of chlorite-derived clay sized material. The 50°-60° (measured from horizontal) batter slope appears stable (Figure 3A).

As indicated in the various exposures, schist rock underlying proposed Lot 3 has a 0.5~1.5 m thick cover of yellow clayey silt sub-soil (loess). This deposit accumulated from wind-blown dust during the Last-Glacial period that ended approximately 10,000 years ago.

3 — Land Stability & Seismic Risk

Selection of a building area is complicated by a broad area of shallow slides that have developed in the loess subsoil cover upslope of Lot-3, however the slides and associated patches of hummocky ground are confined to the western 2/3rds of Lot 3 (Figure 1). The slides, also represented in McKellar's (1990) geological map (Figure 2), are likely of post-European settlement age. One example has an elongated run-out mound (possibly modified) near the center of Lot-3 (Figures 1, 5 & 6). The area of relatively smooth ground with gradients of 14° to 17° (reducing down-slope) between this mound and Riccarton Road East is considered the most suitable for a new house build.

Although the property is bounded by strands of Titri Fault, this section of the fault is considered to have been inactive throughout Holocene time [from ~10,000 years ago to the present] (Litchfield 2001). Underlying geology indicates that the property has a low-moderate susceptibility to earthquake shaking.

4 Conclusions & Recommendations

- A** The easternmost approximately 1/3 of the area of proposed Lot-3, indicated in Figures 1 & 5 of this report, is considered suitable for a house platform.
- B** It is recommended that: (1) piles or concrete footings, and retaining walls are placed directly on schist after removal of soil cover, or on a correctly designed hard fill pad on schist; and (2) drainage systems are installed to intersect and remove any surface water or spring water flow that may affect the stability of ground in the vicinity of the building.

5 References

Litchfield, N.J. 2001: The Titri Fault System: Quaternary-active faults near the leading edge of the Otago reverse fault province. *New Zealand Journal of Geology and Geophysics* 44: 517-534

McKellar, I. C. 1990: Southwest Dunedin urban area. Geological map of New Zealand Miscellaneous Series Map 22, 1:50000 scale. DSIR Wellington

Figures 1-5 appended

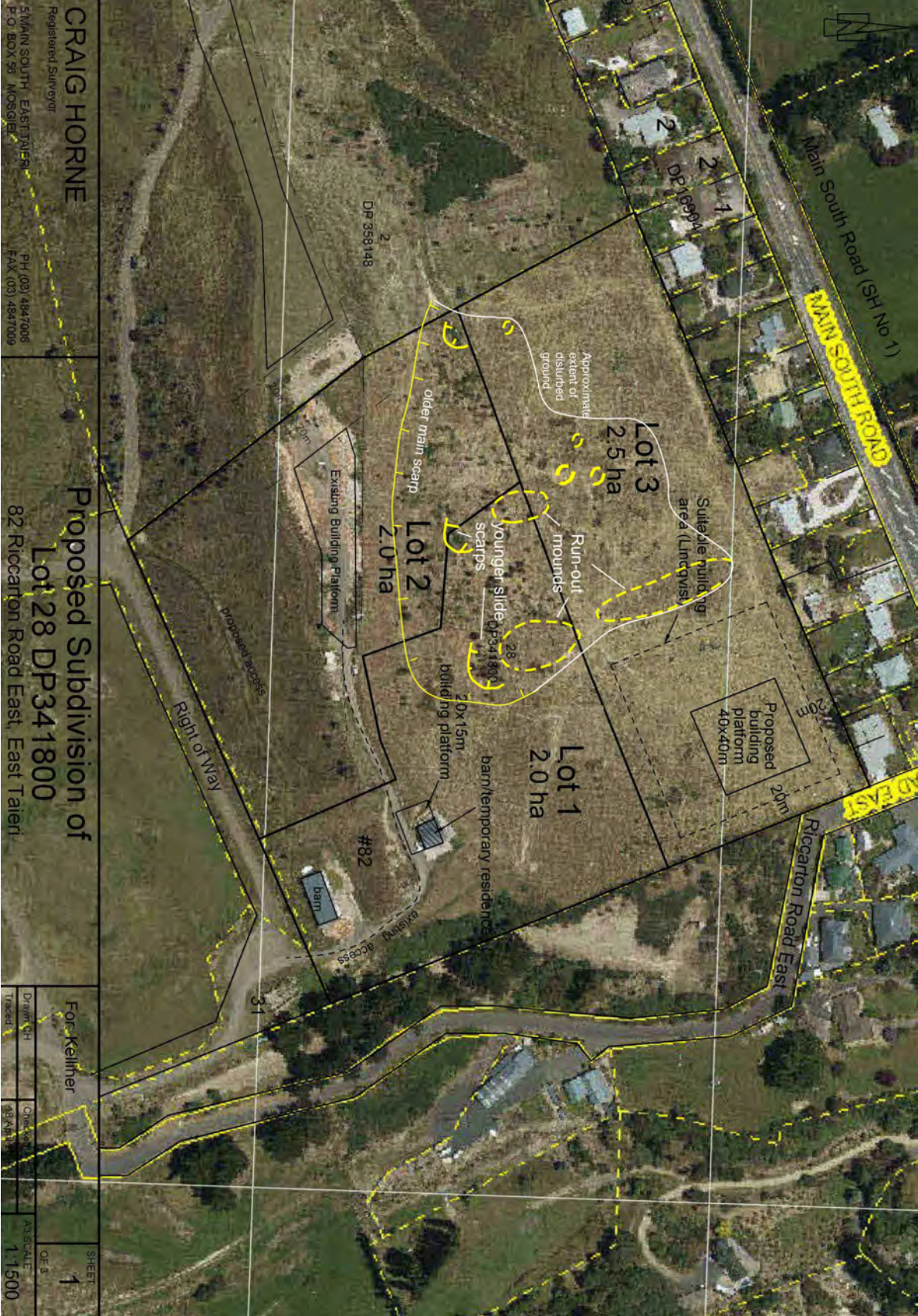


Figure 1 Plan of the 82 Riccarton Road East property. A suggested building area within proposed Lot-3 is indicated east of the area of shallow disturbed ground.

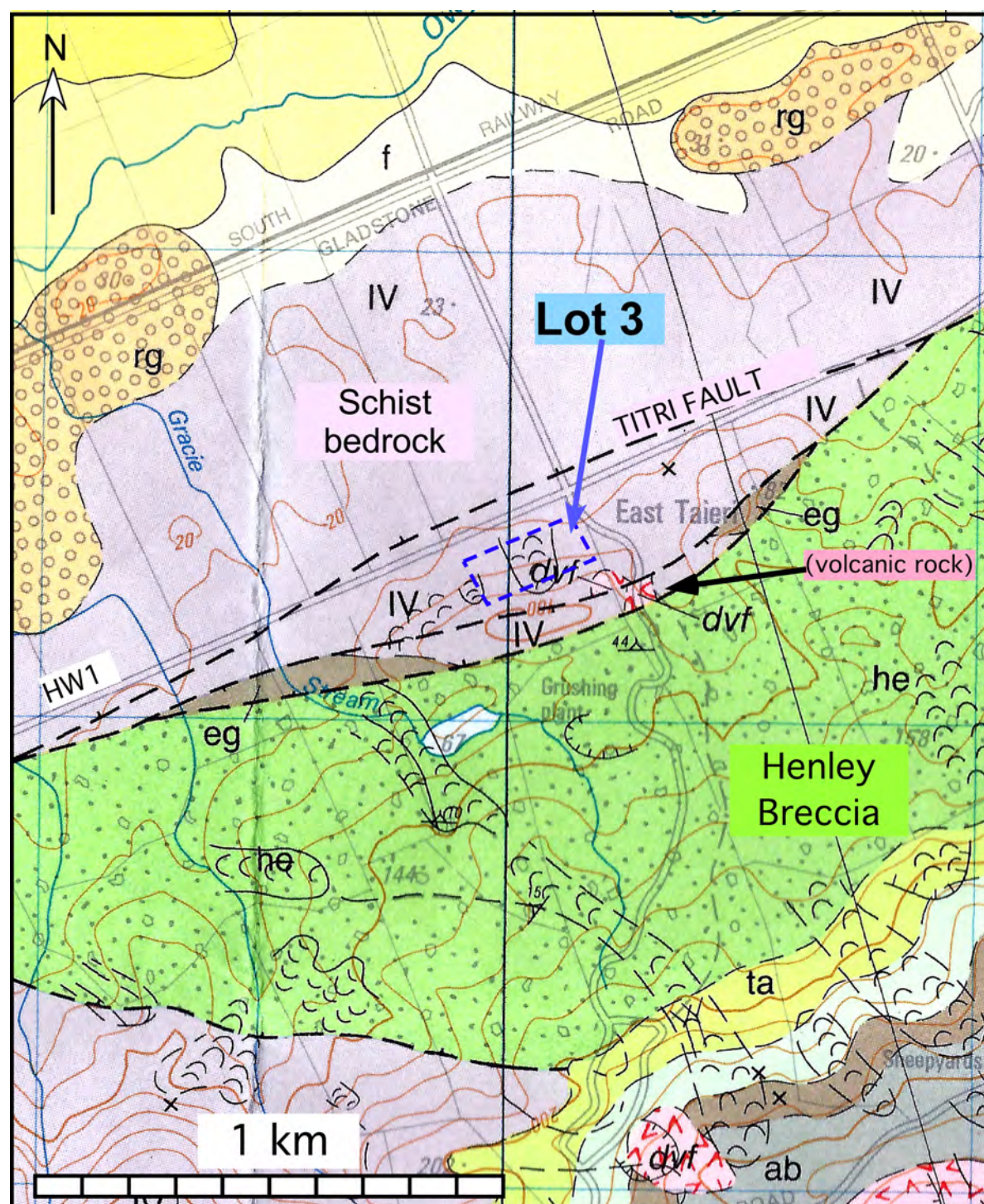


Figure 2 Geological map of the Riccarton Road East area, extracted from McKellar (1990). Proposed-Lot 3/82 Riccarton Road East is outlined in blue.



A (above). B (below).



Figure 3 Schist breccia exposed near the eastern boundary of proposed Lot-3. **(A)** General view. Note the large block in the center of photo, and relatively thin (<50 cm) loessic soil beneath the fence line. **(B)** Close-up view of schist breccia.



Figure 4 Blocky schist (beneath 13cm long camera case) and overlying loess subsoil exposed upslope of proposed Lot-3, directly north of the existing barn building.



Figure 5 Northwards view of the suggested building area.



Figure 6 View of the eastern 1/3 of proposed Lot-3 from the slide mound outlined in Figure 1.