GEOTECHNICAL INVESTIGATION REPORT

PROPOSED SUBDIVISION

11 GARIN HEIGHTS
BROOKLANDS
NELSON
Lot 1 DP 504728

Steve Rolston Ltd

Reference:	26014
Prepared:	22 April 2026
Revision:	1
Issued to:	Steve Rolston *steve@srlbuild.co.nz*

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1. INTRODUCTION

This report presents the findings of a geotechnical assessment carried out on a property which is zoned partly as residential and partly as rural at 11 Garin Heights, Nelson for a proposed subdivision to create one new house site.

The purpose of our investigation was to assess subsoil conditions, quantify various geotechnical risks and determine the geotechnical suitability of the proposed development. We have also been asked to provide appropriate foundation options and stormwater & wastewater management options.

This report has been prepared for Steve Rolston Ltd in accordance with our proposal for geotechnical services dated 11 February 2026 and is intended to inform the design of the proposed subdivision. In its current form it may not be used to accompany an application for resource consent (subdivision). Preparation of a final scheme plan will be required before this report can be updated to a format suitable to accompany the application for consent.

2. SITE DESCRIPTION

2.1 General

The subject property (legally described as Lot 1 DP 504728) is located in Brooklands, Nelson, approximately 2.5 km northeast of Nelson CBD. The property covers an approximate land area of 2.7 ha and is dominated by a north facing, approximately north-south trending spur from a ridgeline at 200 mRL elevation. To the east and west of the spur are low-relief gullies (the 'eastern' and 'western gullies'). These gullies include large areas of hummocky ground and several landslide headscarps.

The property is approximately 240 m long at an elevation range of approximately 35 to 110 mRL from north to south.

The subject area of this report ('the site') is the lower, northern half of the property (approximately) below the 70 mRL contour. In this area, the main spur slopes moderately at about 14° in the north becoming progressively steeper upslope and to the south to about 20°. Localised areas of steeper ground exist where the spur rolls over into the gullies and in the vicinity of landslide headscarps. There is evidence of springs and shallow groundwater in the form of reeds throughout the gullies and at discrete locations on the edge of the spur.

The site is currently undeveloped and is accessed from Garin Heights to the north.

Site plans are attached, Figure 26014-01 & Figure 26014-02.

3. GEOLOGY AND GEOMORPHOLOGY

The published Geology of the Nelson region[1] shows the lower, northern part of the spur is underlain by Port Hills Gravel Formation (PHG) while the southern, higher part of the spur is underlain by Botanical Hill Formation (BHF). The PHG and BHF are separated by the Flaxmore Fault – a northeast to southwest trending, east dipping reverse fault. The gullies are mapped as slope failure deposits.

The Flaxmore Fault is not recorded as an active fault in the GNS Active Faults Database (GAFD), potentially due to a lack of evidence of geologically recent ground rupture. The nearest active fault in the GAFD is a strand of the Waimea Fault approximately 4.5 km south of the site. The Flaxmore Fault should, however, be considered potentially active in geological terms (i.e. likely to have ruptured within the last 125,000 years).

1 Johnston et al; v4-2024 '*Revised Geological Map of the Nelson-Richmond Urban Area.*

4. EXISTING INFORMATION

4.1 Geotechnical Reports

The site is included in several previous geotechnical reports. These are summarised briefly below.

GeoAdvice Ltd (2016)[2]: A report was prepared for a proposed subdivision across several properties, including the subject area of this report, which included refining the location of the Flaxmore Fault and defining building exclusion zones relating to the fault. Thirteen test pits or trenches were excavated to refine the position of the fault over a strike length of about 600 m, including land to the east and west of the site. Active earthflow deposits were identified by GeoAdvice Ltd within the eastern and western gullies. Historical and recent slope failures and associated debris flows were identified along the eastern and western gullies. Minor seepages were also observed. Shallow translation failures within the colluvium cover were identified, likely related to the presence of the Fault. Deeper seated (>1m) rotational failures were identified within the gullies.

CGW Consulting Engineers (2021)[3]: Four test pits were completed across the eastern gully and lower part of the spur as part of a four-lot subdivision assessment. Earthflow deposits up to 5.5 m thick were encountered in the eastern gully, whilst PHG was encountered at relatively shallow depth of 0.8 m on the spur. They described a history of rainfall-triggered slope instability in the eastern and western gullies.

GeoSolutions NZ Ltd (2022)[4]: A desktop review report was prepared for proposed subdivision of 11 Garin Heights. A preliminary geotechnical development area plan was prepared using a traffic light system (green to red) to classify the land in terms of its potential for future development. The lower, less steep parts of the site were identified as an 'area where development will likely be possible (green)' with the upper, steeper slopes within the site identified as an 'area where development may be possible (orange)' with both areas being subject to Specific Investigation and Design (SID) by a GeoProfessional.

PDP Ltd (2025)[5]: A report was prepared by PDP for a proposed building area on 11 Garin Heights toward the top of the spur which was to be accessed by a new driveway from 4 Chamerion Way to the east. The proposed driveway crossed through the eastern gully earthflow. Six test pits were completed with earthflow deposits and springs encountered in the eastern gully. Test pits on the spur encountered colluvium overlying Botanical Hill Formation bedrock.

4.2 Historic & Recent Aerial Photographs

Historic and recent aerial photographs have been reviewed and are summarised below.

1940s & 1957

- Imagery from the 1940's and 1957 shows the site as undeveloped pastoral land. There is hummocky land visible in the eastern gully and a shallow landslide scarp on the western edge of the spur. No signs of instability are visible on the spur itself.

1964 & 1974

- An aerial photograph from 1964 shows similar features to those described for the earlier photographs. The resolution of this image is much higher though and terracettes can be seen in the upper parts of the spur where the ground slope is steeper. These features are indicative of shallow

[2] GeoAdvice Ltd (2016). Geotechnical Investigation Report Brooklands Way Subdivision, Nelson, Stage 2 – Rev 1. Ref. 14149 dated March 2016.
[3] CGW Consulting Engineers (2021). Subdivision Site Suitability Report, 11 Garin Heights, Atawhai (Lots 3 & 4). Document No. 21139-RPTGEO-001-B, issued 15 December 2021.
[4] GeoSolutions NZ Ltd (2022). Geotechnical Desktop Review Report, Proposed Subdivision 11 Garin Heights Atawhai. Ref. 22047 dated 30 June 2022.
[5] Pattle Delamore Partners Ltd (2025). Geotechnical Assessment Report for 11 Garin Heights, Atawhai, Nelson. Ref. N016660001 L001 dated 7 February 2025.

soil creep. Similar features are visible in the 1974 aerial photograph although the site is becoming covered with low growing vegetation at that time, obscuring the geomorphic features.

1983

- The 1983 aerial photograph has low resolution and the site is predominantly covered by vegetation, accordingly no features of interest can be seen.

2005

- An approximately 25 m^2 pond or dam can be seen on the western side of the spur straddling the western site boundary.

2013

- Several shallow landslide scarps are visible within the gullies.
- No evidence of instability on the spur.

2021

- Aerial imagery shows major reactivation of earthflow deposits in the head of the eastern gully, on neighbouring land upslope. Includes numerous cracks, head scarp displacement and formation of lateral scarps
- These movements are upslope of the property, not on the spur.

January 2022

- Evidence of earthworks upslope of the site at the top of the spur.

September 2022 (post-August extreme rainfall event)

- Imagery shows several large landslides and reactivation of earthflow deposits on neighbouring land upslope. Includes:
  - Land movement directly upslope of the spur, with some movement extending into the site.
  - Shallow instability on the western gully side slopes.
  - No evidence of slope instability on the spur itself.

4.3 New Zealand Geotechnical Database

A review of the New Zealand Geotechnical Database (NZGD) shows that the previously discussed test pits by CGW and PDP have been uploaded to the database.

4.4 Existing services

Top of the South Maps shows open stormwater drains and a 600 mm diameter concrete gravity main and intake on the site at the northern end of the eastern gully. This stormwater main connects to the NCC reticulated system on Brooklands Way.

4.5 Natural Hazards

4.5.1 Liquefaction Hazard

Nelson City Council mapping indicates that the site is located within an area with very low liquefaction vulnerability. Per Table 6.2 of the MfE Guidelines[6], site-specific liquefaction assessment is typically not required for this type of development.

[6] Planning and Engineering Guidance for Potentially Liquefaction Prone Land, September 2017

4.5.2 Fault Rupture

The site is mapped within the Fault Hazard Overlay under the Nelson Resource Management Plan[7] (NRMP) which covers almost the entire property bar an approximately 60 m wide corridor at the southern end of the property.

The updated Fault Deformation Overlay, presented on the NCC Nelson Geotechnical Hazards map[8], runs through the centre of the property as an approximately 25 m wide corridor.

4.5.3 Slope Instability

The site is not mapped within any Slope Risk Overlays under the NRMP[7].

During recent mapping released by NCC[8] the spur was mapped within a Tier III Slope Instability Susceptibility Area, meaning that it has been identified as susceptible to slope instability based on the geological and geomorphic setting. The eastern and western gullies were mapped within a Tier II Slope Instability Susceptibility Area, meaning that they are in areas identified as having elevated susceptibility to slope instability, including areas with existing deep seated or earthflow instabilities and/or geologic units known to have an elevated susceptibility to instability.

5. PROPOSED DEVELOPMENT

A subdivision concept scheme plan prepared by Jones & Stanger Ltd (ref. 4519a dated 20April 2026) has been provided. Based on this plan and discussion with the client we understand the proposed development will comprise:

- Subdivision of the property to create two new lots. Proposed Lot 1, which is the subject of this report, will comprise a 6,242 m^2 area located on the lower half of the spur and including part of the eastern gully. Proposed Lot 2 will comprise 21,054 m^2 of land including the eastern side of the eastern gully and the remainder of the spur upslope of Lot 1;
- Building location areas (BLAs) are not shown on the Jones & Stanger plan for either lot. A proposed BLA on Lot 1 has been assessed as part of this report based on discussions with the client;
- Wastewater will be reticulated to the NCC system, with a connection to existing infrastructure on Brooklands Way anticipated;
- Stormwater will also be managed via the existing NCC reticulated network. This might either comprise a direct connection to the existing gravity main within the site boundaries or via discharge into the eastern gully;
- Water supply is expected to be town supply from a connection on Brooklands Way

The location of the proposed subdivision is shown on the attached site plan Figure 26014-01. As there is no BLA proposed on Lot 2, this report only assess the suitability of proposed Lot 1 for residential development.

6. SITE INVESTIGATION

On 3 March 2026 GeoSolutions completed a shallow geotechnical investigation across the proposed development area. The fieldwork comprised the following:

- A walk over visual appraisal of the site;
- Six digger excavated test pits to depths between 2.0 and 3.3 m (TP01 – TP06);

[7] NRMP online Planning Maps accessed 31/03/26

[8] NCC Nelson Geotechnical Hazards accessed 31/03/2026; based on earlier modelling by Beca (2020 & 2021)

- Five Scala penetrometer tests (SC02 – SC06), completed beside the corresponding test pit;
- Where practical, the measurement of groundwater levels in the test pits.

The approximate location of geotechnical test positions is shown on the attached site plan, Figure 26014-02. The test pit logs and Scala test results are attached.

Soil descriptions given on the logs are in general accordance with the New Zealand Geotechnical Society's "Field Description of Soil and Rock." Groundwater levels were measured where encountered and are indicated on the relevant test logs.

7. GROUND MODEL

7.1 Subsoil Conditions

Detailed descriptions of the subsoils encountered in the test pits are attached on the test pit logs. The subsoils were generally found to comprise:

- **Topsoil (0.4 deep)**, overlying:
- **Younger Landslide Deposits (approximately 1.1 to 2.5 m deep)**, comprising silty clay with some gravel, firm, overlying:
- **Port Hills Gravel (generally below 1.1 to 2.5 m)**, comprising clayey gravel, dense.

Some exceptions to the generalised ground model include:

- In TP02 and TP05 (eastern side of the spur), **Older Landslide Deposits**, comprising stiff to hard silty clay, were encountered below the Younger Landslide Deposits layer from 1.8 to 2.0 m depth, extending to the base of the pits at 3.3 and 2.9 m respectively;
- TP01 encountered **Botanical Hill Formation** overlying Port Hills Gravel separated by the **Flaxmore Fault Shear Zone**.

Scala penetrometer tests were carried out adjacent to the test pit locations to confirm the relative density of the near surface subsoils. The results indicate that medium dense to dense ground conditions are generally encountered below the topsoil layer, the exception being SC04 and SC05 where the depth to medium dense ground conditions was 1.0 and 1.5 m respectively.

Where fine grained cohesive soils were encountered, shear vane testing was completed at discrete locations within the shallow soil profile. The results indicate that the Younger Slip Debris deposits are generally very stiff to hard with undrained shear strengths in excess of 120kPa.

7.2 Verification of Fault Mapping

TP01 was excavated to verify the position of the Flaxmore Fault in the vicinity of the site. The test pit was located within a shallow depression initially believed to be the GeoAdvice Ltd trench TR25, which formed the basis of their 2016 fault mapping. During excavation, a clear contact between undisturbed and disturbed ground was exposed, confirming that the original trench had been intersected. TP01 also intersected the Flaxmore Fault shear zone, further supporting the conclusion that TR25 had been found.

Survey by Jones and Stanger Ltd established that TP01, and therefore TR25, are positioned approximately 15 metres southeast of the location shown on GeoAdvice Figure 2 (Ref. 14149, March 2016, Rev 1). This puts some doubt on the recorded locations of the other GeoAdvice test pits and therefore of the Fault Hazard Zone mapped by Beca, which relied on those test pits. A revised Fault location is shown on the attached Figure 26014-01, along with updated offsets.

7.3 Groundwater

During site testing completed on 3 March 2026, no groundwater was encountered in any test pit. Evidence of springs and marshy conditions were observed such as reeds in the inferred vicinity of the Flaxmore Fault

and in the gullies. It is possible that perched groundwater may exist during or immediately following heavy or prolonged rainfall events.

8. GEOTECHNICAL ASSESSMENT

8.1 Building Importance Level

Future development of the proposed BLA is anticipated to comprise IL1 and IL2 buildings.

8.2 Seismic Site Subsoil Category

In accordance with NZS 1170.5:2004 and to account for earthquake amplification effects, the site subsoil classification is interpreted from the surface geology and estimates of depth to underlying rock, to be a site subsoil 'Class C - shallow soil'.

8.3 Faulting

As discussed in Section 7.2, the TP01 findings indicate that the Flaxmore Fault is located further upslope than shown on the GeoAdvice fault location plan, placing it farther from the proposed BLA. The BLA is located approximately 10 metres from the GeoAdvice TR25 position and 20 metres from our TP01 location (which we consider is the actual fault location). Both distances exceed the 5 metre minimum building setback specified under NRMP REr.73.1.

Land upslope of the BLA has been excluded at this time due to the steep slope angle and proximity to potentially disturbed ground, with complex groundwater conditions associated with the Flaxmore Fault. The discrepancy in fault location therefore has no influence on the extent or suitability of the BLA.

We recommend that any future development on proposed Lot 2 be supported by an updated, site-specific fault hazard assessment completed by a suitably qualified GeoProfessional.

8.4 Liquefaction and Lateral Spread

Due to the cohesive and gravelly nature of the soils which underlie the spur and the elevated position of the spur, there is a very low risk of seismic liquefaction or lateral spreading affecting the proposed BLA.

8.5 Slope Instability

The proposed BLA is located on a moderately sloping spur, underlain by historic landslide deposits which overlie PHG. There are areas of active instability in the gullies to the east and west of the BLA and upslope of the property.

The risk of landslide debris inundation from above affecting the BLA is considered low. The main areas of shallow instability are located within the gullies or along the sides of the spur where the land transitions into the gullies. This morphology naturally directs debris away from the BLA. Debris from shallow slope instability occurring further upslope beyond the property boundaries is also likely to be directed into the gullies.

Building loads, fills and cuts have the potential to destabilise the historic landslide deposits within the BLA. For this reason, we recommend that all building foundations extend through these deposits to socket into the PHG below. All foundations and earthworks shall be subject to SID by a GeoProfessional.

Provided future development is located within the BLA and with incorporation of the recommendations of this report into the design and construction of future buildings and earthworks, including Specific Investigation and Design by a GeoProfessional, the slope instability risk to future buildings on the site is expected to be low.

8.6 Bearing Capacity

Based on the shear vane and Scala results, the depth to conditions with an inferred geotechnical ultimate bearing capacity of 300 kPa is typically 0.4 m (i.e. below the topsoil layer). As given above, all building foundations should extend through historic landslide deposits to socket into the underlying PHG, expected from 1.0 to 2.5 m depth within the BLA.

8.7 Static settlement

Consolidation settlement or static settlement occurs due to the presence of soft, potentially compressible soil layers within the zone of influence of proposed building foundations. Consolidation settlement is the vertical displacement of the ground under a load which can result in damage to foundations.

At this site those soils would include the topsoil layer and any uncontrolled fill should it be present. Provided foundations are taken down through these materials into more competent materials below, the risk of static settlement affecting future residential development on the proposed BLA is low.

8.8 Natural Hazards Risk Assessment

Per the National Policy Statement for Natural Hazards 2025 (Dec 2025), a natural hazards risk assessment has been completed for this project and is appended.

9. RECOMMENDATIONS

9.1 Siting and BLA Classification

All buildings and other structures requiring a building consent[9] shall be situated within the BLA shown on attached Figure 26014-02. Building beyond this area is not precluded, but shall be subject to separate investigation and certification by a GeoProfessional.

The entirety of the BLA has been classified as requiring SID by a GeoProfessional. The BLA has been further divided into SID1, SID2 and SID3 areas. This is as an aide for future building designers and is expected to have no influence on planning decisions.

SID1 is the northern end of the spur where ground is less steep and PHG is at shallower depths. This area is expected to be the simplest to develop in terms of foundations, accessways and earthworks. Stabilisation works such as in-ground or cantilever retaining walls may be required, depending on the scope of proposed, future buildings;

SID2 incorporates steeper ground above and to the south of SID1 and below the Flaxmore Fault Exclusion Zone identified by GeoAdvice Ltd. PHG is deeper here than in SID1 and combined with the increase in slope angles, is likely to result in more expensive foundations than for an equivalent development within SID1. Stabilisation works such as in-ground retaining walls, cantilever retaining walls or palisade walls may be required depending on the scope of proposed, future buildings. Earthworks to form an accessway into this area are also likely to be complex and expensive and may also require retention.

SID3 is a narrow strip of ground to the east of SID2 which is located along the edge of the eastern gully. The depth to PHG is likely to be even deeper in this area, which is located near the transition of relatively stable spur to unstable, active earthflow deposits in the gully. In this area foundations may need to be designed to accommodate lateral earth pressures due to soil creep and/or an inground wall required to separate stable ground in the west from unstable ground in the east.

Additional restrictions may be dictated by the NRMP. Interpretation of these is beyond our current scope. Any application to adjust this layout shall be subject to independent checking and certification by a GeoProfessional.

[9] This includes buildings defined under the Granny Flats Exemption (Dec 2025)

Because of the geotechnical restrictions pertaining on this site, it is important that water tanks are sited within the BLA.

9.2 Foundations

As given above, all foundations shall be subject to SID by GeoProfessional.

Piled foundations are preferred, with the dwelling to be constructed with a timber floor. This should reduce the amount of earthworks across the building platform, and have the least negative impact on the stability of the site. We recommend that all piles be socketed a sufficient depth into PHG - to be confirmed by a GeoProfessional during SID.

Concrete slab foundations could be considered. However, it should be noted that extensive earthworks and retaining will likely be required in order to create a suitable level platform while avoiding destabilising the site, which are likely to be very expensive compared to a piled foundation system. For these reasons concrete slab foundations are discouraged, especially in the SID2 and SID3 zones.

The site is outside the scope of NZS3604:2011 and as such all foundations will require specific engineering design by a CPEng.

9.3 Earthworks

Earthworks will likely be required to create an accessway and parking area. Accessway design and construction should be undertaken in a manner that minimises the size of cuts and fills.

Depending on the scale and location of the earthworks, Council may require a site-specific erosion & sediment control plan. Guidance on the development of such plans can be found in the Nelson Tasman Erosion and Sediment Control Guidelines (July 2019). Rules around erosion and sedimentation control are defined in the NRMP and we recommend that you contact council and have the scope of works reviewed by its compliance team to ensure that if required, consents can be obtained and the necessary controls put in place.

9.3.1 Cuts

Any proposal for permanent or temporary cuts shall be subject to specific investigation and design by a GeoProfessional.

9.3.2 Fills

Any proposal for fills shall be subject to specific investigation and design by a GeoProfessional.

All fill shall be placed in full accordance with NZS 4431:2022. No slope steeper than 2.5H:1V is to be steepened by the placement of fill material. It should be noted that fill may need to be retained to ensure it remains stable and underfill drainage measures are likely to be required.

All excavated topsoil and unsuitable material should be removed from site.

9.4 Retaining Walls

Any proposed retaining walls shall be subject to specific investigation by a GeoProfessional.

All retaining walls are to include adequate drainage measures behind the wall to capture any groundwater seepage and the ground above/behind the wall graded to avoid the possibility of surface water ponding behind the wall. Ideally, all walls would have a concrete dish channel above to manage surface water flows.

9.5 Stormwater Management

Stormwater from roofs, hardstandings, tank overflows and other impermeable areas shall be collected and piped to discharge in the axis of the eastern gully in a manner where the discharge shall not cause or contribute to scour or erosion of the drainage channel. The suitability of the intake for the existing gravity stormwater main should be assessed by a suitably qualified person and upgraded if required. Direct

connection to the gravity main via buried pipes is discouraged as the pipes will need to traverse potentially active earthflow deposits which could cause the pipes to become damaged as the ground mobilises. Direct connection via flexible, surface pipes with sufficient slack to accommodate future ground movements in the gully may be possible, subject to specific geotechnical and civil engineering assessment – any such approach is likely to result in higher ongoing maintenance costs.

The proposed earthworks must be designed to avoid concentration of surface water flows. Where this is not possible, sumps and pipes shall be used where possible to avoid having concentrated surface water flows over the historic landslide deposit soils.

Overflow from any water tanks shall be directed to the stormwater system.

9.6 Access

Proposed accessways and associated earthworks and retaining shall be subject to specific investigation and design by a GeoProfessional. Specific design by an architect or civil engineer may be required to optimise grades, curve radii, cross fall and earthworks volumes.

9.7 Services

Where possible services trenches should be located within the SID1 and SID2 area. Any services outside of these areas may be at risk of being damaged due to ground movements. Services trenches should be preferentially orientated perpendicular to the slope (i.e. at 90 degrees to slope contours) to minimise the potential for trench excavations to act as a line of weakness from which slope movement could break out.

9.8 Planting

Planting can provide a degree of protection against small-scale instability and erosion of surficial soils. We recommend that where possible, sloping ground is planted out with species appropriate for the area, with an emphasis on deep rooting varieties. Pines, gums and wattles should be avoided.

9.9 Test Pits

Investigations on the site involved the excavation of six test pits. There have also been at least four test pits excavated in the vicinity of the BLA by other companies. As far as we are aware all test pits have only been loosely backfilled. The pits were sited to minimise the impact on subsequent development, but where they clash with proposed hardstandings, services or shallow foundations, the pits must be undercut and backfilled in accordance with NZS 4431:2022.

10. SUMMARY OF BLA DEVELOPMENT CONDITIONS

General building development recommendations for Proposed Lot 1 are as follows:

i. Buildings shall be located within either of the SID Zones as discussed above and as shown on Figure 26014-02, attached.

ii. Foundations for all buildings shall extend through topsoil to bear in competent Port Hills Gravel or NZS4431:2022 Certified Fill materials.

iii. Within the SID Zones, specific geotechnical investigation and design inputs are required for all foundations, retaining and earthworks to be completed in these areas, to take into account the sloping nature of the land (*i.e. foundations will likely need to be deepened and retaining walls likely required to support any filling*). No unretained fill shall be placed on ground sloping greater than 1V:2.5H.

iv. All temporary or permanent cuts (including for accessways) shall be specifically investigated by a GeoProfessional.

v. All fills (including for accessways) shall be specifically investigated by a GeoProfessional. All fills shall be placed in full accordance with NZS4431:2022.

vi. All retaining walls shall be specifically investigated by a GeoProfessional who shall confirm if specific engineering design is required as part of their assessment. All retaining walls shall be adequately drained.

vii. All stormwater from roofs, hardstanding or impermeable areas, retaining wall drainage, surface drains and subsoil drains and from standing water such as swimming pools and ponds, shall be collected and directed to the reticulation provided. Uncontrolled stormwater discharge to sloping ground shall not be permitted. Overflow from any water tanks shall be directed to the stormwater system.

viii. All accessway alignments, crossing grades and associated earthworks and retaining will require geotechnical input during detailed design.

ix. It is recommended that in areas of steeply sloping ground, the slopes be maintained in a vegetation cover that enhances slope stability with emphasis on deep-rooted trees and shrubs. Pines and gums and wattles should be avoided.

x. This subdivision certification relates to the general suitability of proposed Lot 1; it does not remove the need for specific site investigation, design and inspection as required by the Building Code, NZS 3604:2011 and NZS 4431:2022.

11. PLAN REVIEW

11.1 Prior to Application for Resource Consent (Subdivision)

The final subdivision plans should be reviewed prior to application for consent to verify the boundary and BLA locations, amongst other considerations. An updated version of this report may then be submitted to accompany the application.

12. Next Steps

We recommend that you complete the final subdivision scheme plan, noting requirements for geotechnical review given above. A NZS4404:2010 Schedule 2A Certificate can then be provided, subject to the findings of the geotechnical review.

13. LIMITATIONS

This report has been prepared solely for the use and benefit of Steve Rolston Ltd, their professional advisers and Nelson City Council, in relation to the specific project described. No liability is accepted in respect of its use for any other purpose or by any other person or entity. Data or opinions contained in it may not be used in other contexts, by other parties or for any other purpose without our prior review and agreement.

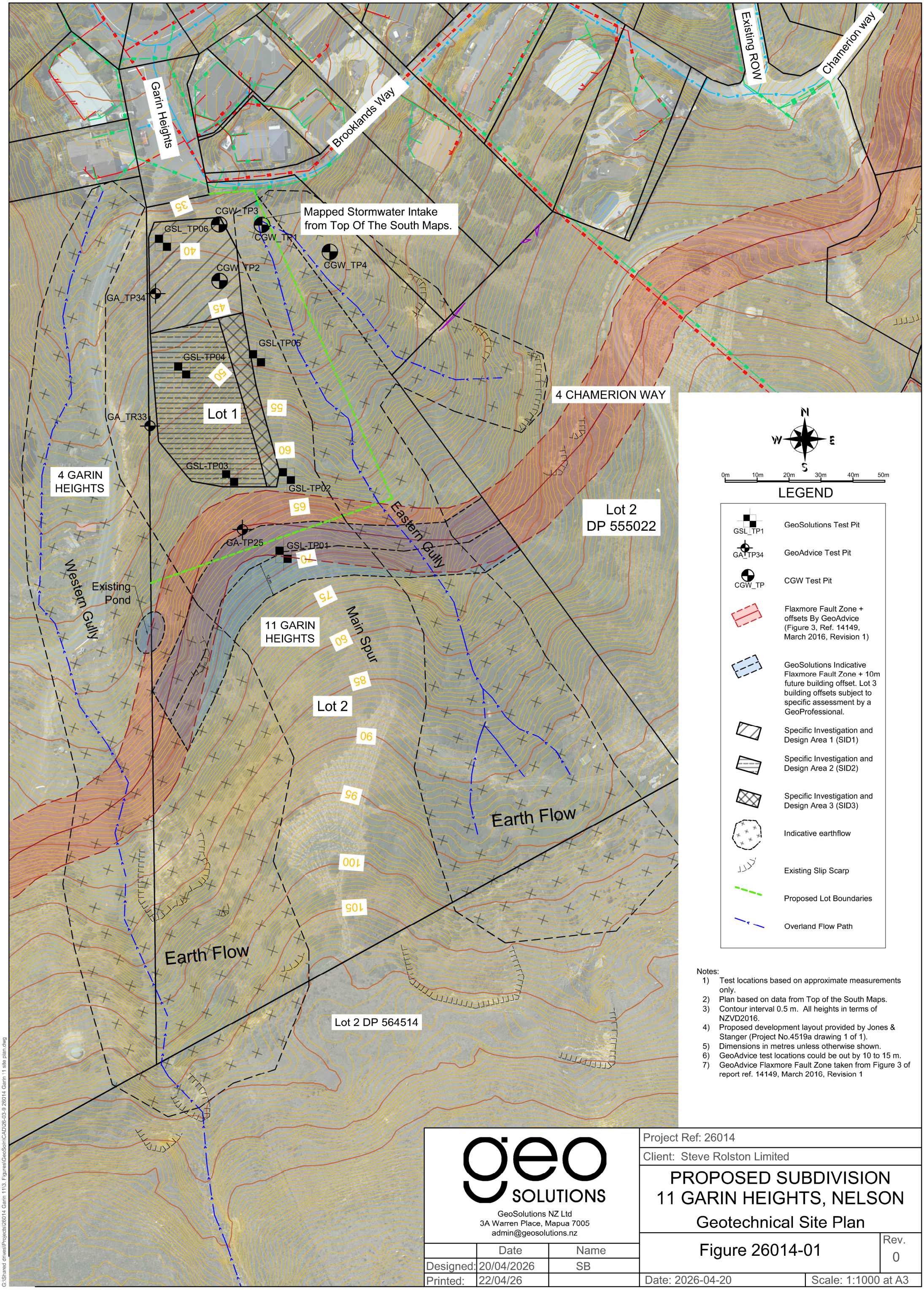
As subsurface information has been obtained from discrete investigation locations, which by their nature only provide information about a relatively small volume of soils, there may be special conditions pertaining to this site that have not been disclosed by the investigation and that have not been taken into account in the report. If variations in the soil occur from those described or assumed to exist then the matter should be referred back to GeoSolutions immediately.

For and on behalf of
GEOSOLUTIONS NZ LTD

Author:	**Mark Gray** Professional Engineering Geologist BSc PMEG CMEngNZ (PEngGeol)	**Signed:**
Review:	**Sally Hargraves** Professional Engineering Geologist BSc PhD CMEngNZ (PEngGeol)	**Signed:**

Attachments:

- Figure 26014-01 – Geotechnical Site Plan at 1:1000 Scale
- Figure 26014-02 – Geotechnical Site Plan at 1:400 Scale
- Test pit logs (TP01 to TP06)
- GeoAdvice Ltd investigation logs (TR25, TP32, TP33)
- CGW investigation logs (TP1 – TP4)
- National Policy Statement for Natural Hazards 2025 Risk Assessment



N
W
E
S

0m 10m 20m 30m 40m 50m

LEGEND

- GSL_TP1 — GeoSolutions Test Pit
- GA_TP34 — GeoAdvice Test Pit
- CGW_TP — CGW Test Pit
- Flaxmore Fault Zone + offsets By GeoAdvice (Figure 3, Ref. 14149, March 2016, Revision 1)
- GeoSolutions Indicative Flaxmore Fault Zone + 10m future building offset. Lot 3 building offsets subject to specific assessment by a GeoProfessional.
- Specific Investigation and Design Area 1 (SID1)
- Specific Investigation and Design Area 2 (SID2)
- Specific Investigation and Design Area 3 (SID3)
- Indicative earthflow
- Existing Slip Scarp
- Proposed Lot Boundaries
- Overland Flow Path

Notes:

1) Test locations based on approximate measurements only.
2) Plan based on data from Top of the South Maps.
3) Contour interval 0.5 m. All heights in terms of NZVD2016.
4) Proposed development layout provided by Jones & Stanger (Project No.4519a drawing 1 of 1).
5) Dimensions in metres unless otherwise shown.
6) GeoAdvice test locations could be out by 10 to 15 m.
7) GeoAdvice Flaxmore Fault Zone taken from Figure 3 of report ref. 14149, March 2016, Revision 1

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	Date	Name
Designed:	20/04/2026	SB
Printed:	22/04/26	

Project Ref: 26014

Client: Steve Rolston Limited

PROPOSED SUBDIVISION 11 GARIN HEIGHTS, NELSON

Geotechnical Site Plan

Figure 26014-01

Rev. 0

Date: 2026-04-20

Scale: 1:1000 at A3

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GARIN HEIGHTS

BROOKLANDS WAY

Mapped Stormwater Intake from Top Of The South Maps.

3 BROOKLANDS WAY

CGW_TP3

CGW_TP1

GSL TP06

CGW_TP4

CGW_TP2

GA_TP34

GSL TP05

GSL TP04

Lot 1

11 GARIN HEIGHTS

GA_TR33

GSL TP03

GSL TP02

GA_TP25

GSL-TP01

Existing Pond

Lot 2

35 40 45 50 55 60 65 70 75

N W E S

0m 4m 8m 12m 16m 20m

LEGEND

- GSL_TP1 — GeoSolutions Test Pit
- GA_TP34 — GeoAdvice Test Pit
- CGW_TP — CGW Test Pit
- GeoAdvice Flaxmore Fault Zone + 10m Offset
- GeoSolutions Indicative Flaxmore Fault Zone + 10m future building offset. Lot 3 building offsets subject to specific assessment by a GeoProfessional.
- Specific Investigation and Design Area 1 (SID1)
- Specific Investigation and Design Area 2 (SID2)
- Specific Investigation and Design Area 3 (SID3)
- Indicative earthflow
- Existing Slip Scarp
- Proposed Lot Boundaries
- Overland Flow Path

Notes:

1) Test locations based on approximate measurements only.
2) Plan based on data from Top of the South Maps.
3) Contour interval 0.5 m. All heights in terms of NZVD2016.
4) Proposed development layout provided by Jones & Stanger (Project No.4519a drawing 1 of 1).
5) Dimensions in metres unless otherwise shown.
6) GeoAdvice test locations could be out by 10 to 15 m.
7) GeoAdvice Flaxmore Fault Zone taken from Figure 3 of report ref. 14149, March 2016, Revision 1

geo SOLUTIONS

GeoSolutions NZ Ltd
3A Warren Place, Mapua 7005
admin@geosolutions.nz

	Date	Name
Designed:	20/04/2026	SB
Printed:	22/04/26	

Project Ref: 26014

Client: Steve Rolston Limited

PROPOSED SUBDIVISION 11 GARIN HEIGHTS, NELSON

Geotechnical Site Plan

Figure 26014-02

Rev. 0

Date: 20/04/2026

Scale: 1:400 at A3

G:\Shared drives\Projects\26014 Garin 1\13. Figures\GeoSoln\CAD\26-03-9 26014 Garin 11 site plan.dwg

EXCAVATION LOG

geo SOLUTIONS

Excavation No. TP01

Sheet: 1 of 1

Project: Proposed Subdivision - Garin 11
Project No: 26014
Location: 11 Garin Heights, Nelson

Coordinates: -41.25749 mN, 173.30675 mE
Datum:
Vertical:

Exposure Method:
Dimensions: 0.60m x 4.00m
RL Ground: 68.50m

RL (m) / Length (m)	Water Level (m)	Sampling Method	Blow Diagram (Blows/50mm)	In Situ Test	Strength	Moisture	Geological Unit	Graphic Log	Material Description	Lab Testing	Photo No.
68 / 0.5		MEX	0 2 4 6 8 10 12 14 16		VS S F St VSt H / VL L MD D VD	D M W S	TOPSOIL		0-0.4m: Clayey SILT, minor organics; dark greyish brown. Very soft, dry to moist, non-plastic.		
							YOUNGER LANDSLIDE DEPOSITS		0.4-2m: Gravelly CLAY, some silt; brown. Stiff, moist, non-plastic.		
67 / 1.5									*1.5m: orange staining.*		
2							BOTANICAL HILL FORMATION		2-2.2m: Silty GRAVEL; grey. Dense, dry to moist; gravel, fine to coarse, angular.		
							FLAXMORE FAULT SHEAR		2.2-2.4m: CLAY, some gravel; light bluish grey. Very soft, moist to wet, low plasticity; gravel, fine to coarse, angular, dipping into the slope at around 20 degrees.		
66 / 2.5							PORT HILLS GRAVEL		2.4-2.9m: Silty GRAVEL, minor clay, trace sand; greyish brown. Dense, moist; gravel, medium to coarse, rounded to sub-rounded.		
									Target depth (TD) - 2.9m		
3											
65 / 3.5											
4											
64 / 4.5											

Hole Depth 2.9m

Comments:

Operator: Steve
Logged by: SB
Date: 03/03/2026

Contractor: Steve Rolston Limited
Checked by: Sam Buckner

EXCAVATION LOG

Excavation No. TP02

Sheet: 1 of 1

Project: Proposed Subdivision - Garin 11
Project No: 26014
Location: 11 Garin Heights, Nelson

Coordinates: -41.25726 mN, 173.30676 mE
Datum:
Vertical:

Exposure Method:
Dimensions: 0.60m x 4.00m
RL Ground: 62.00m

RL (m)	Length (m)	Water Level (m)	Sampling Method	Blow Diagram (Blows/50mm)	In Situ Test	Strength	Moisture	Geological Unit	Graphic Log	Material Description	Lab Testing	Photo No.
62	0		MEX					TOPSOIL		0-0.5m: Clayey SILT, minor gravel, minor organics; dark brown. Very soft, dry to moist, non-plastic.		
61	1							YOUNGER LANDSLIDE DEPOSITS		0.5-1.8m: Silty CLAY, some gravel, trace organics; orange brown and grey. Firm, moist, non-plastic, blocky texture.		
60	2							OLDER LANDSLIDE DEPOSITS		1.8-3.3m: Silty CLAY, some gravel, trace organics; dark reddish brown and grey. Stiff, moist, non-plastic. *2.4m: minor gravel, grey with, minor brown and dark reddish brown, very blocky texture, trace rootlets in block fractures.* Target depth (TD) - 3.3m		
59	3											
58	4											

Blow Diagram: Blows/50mm (0 2 4 6 8 10 12 14 16)

Strength: VS S F St VSt H | VL L MD D VD

Moisture: D M W S

Hole Depth	Comments:	Operator: Steve	Contractor: Steve Rolston Limited
3.3m		Logged by: SB	
		Date: 03/03/2026	Checked by: Sam Buckner

EXCAVATION LOG

Excavation No. TP03

Sheet: 1 of 1

Project: Proposed Subdivision - Garin 11
Project No: 26014
Location: 11 Garin Heights, Nelson

Coordinates: -41.25726 mN, 173.30655 mE
Datum:
Vertical:

Exposure Method:
Dimensions: 0.60m x 4.00m
RL Ground: 60.00m

RL (m)	Length (m)	Water Level (m)	Sampling Method	Blow Diagram (Blows/50mm)	In Situ Test	Strength	Moisture	Geological Unit	Graphic Log	Material Description	Lab Testing	Photo No.
60	0		MEX					TOPSOIL		0-0.4m: Clayey SILT, minor gravel, trace organics; dark brown. Very soft, dry to moist, non-plastic.		
59.5	0.5				●240			YOUNGER LANDSLIDE DEPOSITS		0.4-1.6m: Silty CLAY, some gravel, trace cobbles, trace organics; brown and greyish brown mottled orange with dark brown inclusions. Stiff, moist, non-plastic.		
59	1				●240							
58.5	1.5							PORT HILLS GRAVEL		1.6-2.1m: Clayey GRAVEL, minor cobbles; brown mixed orange brown. Dense, dry to moist; gravel, fine to coarse, rounded to sub-rounded, unweathered to slightly weathered.		
58	2									Target depth (TD) - 2.1m		
57.5	2.5											
57	3											
56.5	3.5											
56	4											
55.5	4.5											

Hole Depth 2.1m

Comments:

Operator: Steve
Logged by: SB
Date: 03/03/2026

Contractor: Steve Rolston Limited
Checked by: Sam Buckner

EXCAVATION LOG

Excavation No. TP04

Sheet: 1 of 1

Project: Proposed Subdivision - Garin 11
Project No: 26014
Location: 11 Garin Heights, Nelson

Coordinates: -41.25696 mN, 173.30637 mE
Datum:
Vertical:

Exposure Method:
Dimensions: 0.60m x 4.00m
RL Ground: 46.50m

RL (m) / Length (m)	Water Level (m)	Sampling Method	Blow Diagram (Blows/50mm)	In Situ Test	Strength	Moisture	Geological Unit	Graphic Log	Material Description	Lab Testing	Photo No.
46 / 0.5		MEX		UTP	VS S F St VSt H / VL L MD D VD	D M W S	TOPSOIL		0-0.4m: Clayey SILT, minor gravel, trace organics; dark brown. Very soft, dry to moist, non-plastic.		
1							YOUNGER LANDSLIDE DEPOSITS		0.4-2.5m: Silty CLAY, minor organics; brownish grey with dark brown mottled orange. Firm, dry, non-plastic. *0.6m: minor gravel, trace organics, moist.*		
45 / 1.5											
2											
44 / 2.5							PORT HILLS GRAVEL		2.5-2.7m: Clayey GRAVEL, minor cobbles; brown and orange brown. Dense, dry to moist; gravel, fine to coarse, rounded to sub-rounded, unweathered to slightly weathered.		
3									Target depth (TD) - 2.7m		
43 / 3.5											
4											
42 / 4.5											

Hole Depth 3m

Comments:

Operator: Steve
Logged by: SB
Date: 03/03/2026

Contractor: Steve Rolston Limited
Checked by: Sam Buckner

EXCAVATION LOG

Excavation No. TP05

Sheet: 1 of 1

Project: Proposed Subdivision - Garin 11
Project No: 26014
Location: 11 Garin Heights, Nelson

Coordinates: -41.25693 mN, 173.30665 mE
Datum:
Vertical:

Exposure Method:
Dimensions: 0.60m x 4.00m
RL Ground: 49.00m

RL (m) / Length (m)	Water Level (m)	Sampling Method	Blow Diagram (Blows/50mm)	In Situ Test	Strength	Moisture	Geological Unit	Graphic Log	Material Description	Lab Testing	Photo No.
0.5							TOPSOIL		0-0.4m: Clayey SILT, minor gravel, trace organics; dark brown. Very soft, dry to moist, non-plastic.		
48 1							YOUNGER LANDSLIDE DEPOSITS		0.4-0.9m: Gravelly SILT; brown. Stiff, dry to moist, non-plastic; gravel, fine to coarse, rounded to sub-rounded, unweathered to slightly weathered.		
				200					0.9-2m: Silty CLAY, trace gravel; brown and dark reddish brown. Firm to stiff, moist, non-plastic.		
				140							
1.5		MEX		180							
47 2							OLDER LANDSLIDE DEPOSITS		2-2.9m: Clayey SILT, trace organics; grey. Very stiff to hard, moist, non-plastic, blocky with rootlets in fractures.		
2.5									Target depth (TD) - 2.9m		
46 3											
3.5											
45 4											
4.5											

Hole Depth 2.9m

Comments:

Operator: Steve
Logged by: SB
Date: 03/03/2026

Contractor: Steve Rolston Limited
Checked by: Sam Buckner

EXCAVATION LOG

Excavation No. TP06

Sheet: 1 of 1

Project: Proposed Subdivision - Garin 11
Project No: 26014
Location: 11 Garin Heights, Nelson

Coordinates: -41.25660 mN, 173.30629 mE
Datum:
Vertical:

Exposure Method:
Dimensions: 0.60m x 4.00m
RL Ground: 38.50m

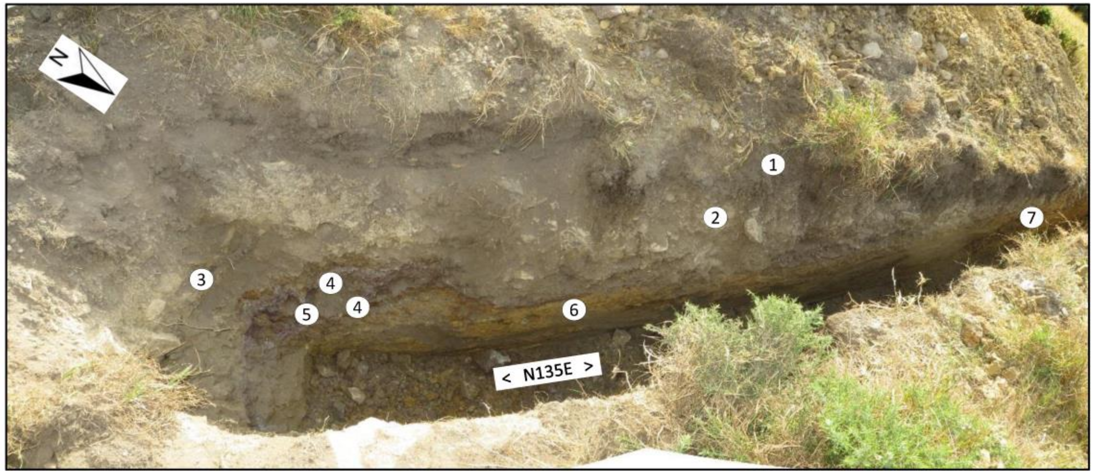
RL (m) / Length (m)	Water Level (m)	Sampling Method	Blow Diagram (Blows/50mm)	In Situ Test	Strength	Moisture	Geological Unit	Graphic Log	Material Description	Lab Testing	Photo No.
38 / 0.5		MEX	0 2 4 6 8 10 12 14 16		VS S F St VSt H / VL L MD D VD	D M W S	TOPSOIL		0-0.4m: Clayey SILT, minor gravel, trace organics; dark brown. Very soft, dry to moist, non-plastic.		
1							YOUNGER LANDSLIDE DEPOSITS		0.4-1.1m: Silty CLAY, some gravel; brown. Stiff, moist, non-plastic.		
37 / 1.5							PORT HILLS GRAVEL		1.1-2m: Clayey GRAVEL, trace cobbles; brown with manganese staining on gravel fractures. Dense, dry to moist; gravel, fine to coarse, rounded to sub-rounded, unweathered to slightly weathered.		
2									Target depth (TD) - 2m		
36 / 2.5											
3											
35 / 3.5											
4											
34 / 4.5											

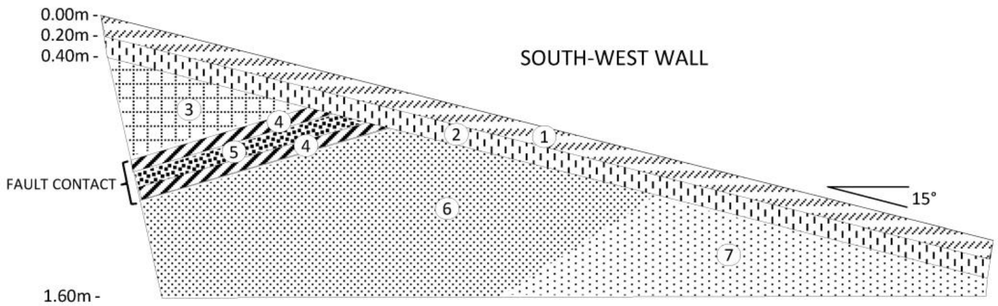
Hole Depth 2m

Comments:

Operator: Steve
Logged by: SB
Date: 03/03/2026

Contractor: Steve Rolston Limited
Checked by: Sam Buckner



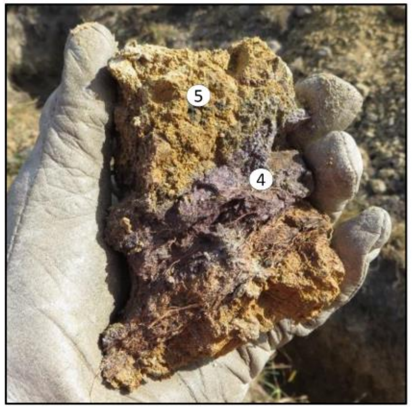


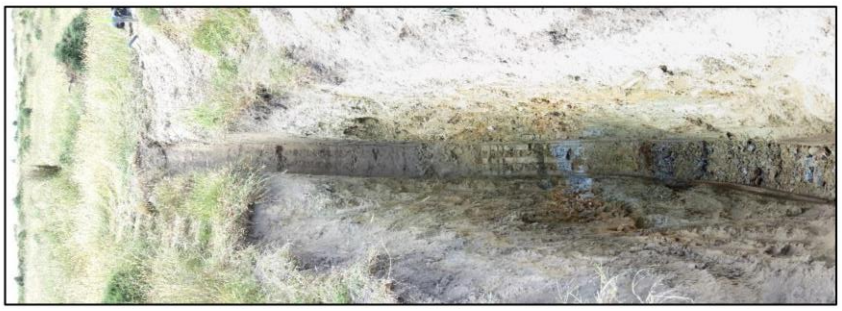
TEST ID: **TR13**

DATE: 12 DEC. 2014

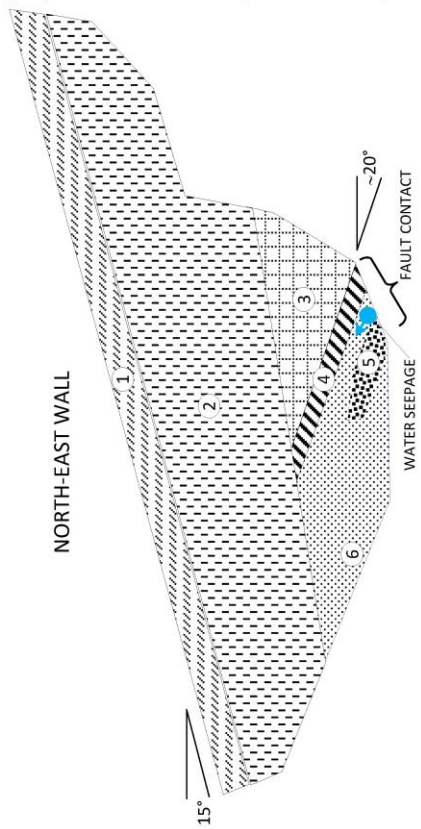
TYPE: FLAXMORE FAULT TRACE EXPOSURE

1. Topsoil
2. Gravelly SILT, light grey (slope debris)
3. MARYBANK FORMATION BRECCIA?
   Densely packed clayey angular GRAVEL, yellowish grey. Hard, dry, slightly plastic
4. FLAXMORE FAULT SHEAR ZONE
   CLAY, dark blueish grey. Very stiff, dry, highly plastic with slickensided faces
5. FLAXMORE FAULT SHEAR ZONE
   Gravelly CLAY, yellowish brown. Stiff, dry, moderately plastic
6. PORT HILLS GRAVEL FORMATION
   Yellowish brown SILTSTONE with fine rounded gravel, weak
7. PORT HILLS GRAVEL FORMATION
   Densely packed rounded GRAVEL with clayey matrix, yellowish brown. Very stiff becoming hard with depth, dry, slightly plastic.





NORTH-EAST WALL



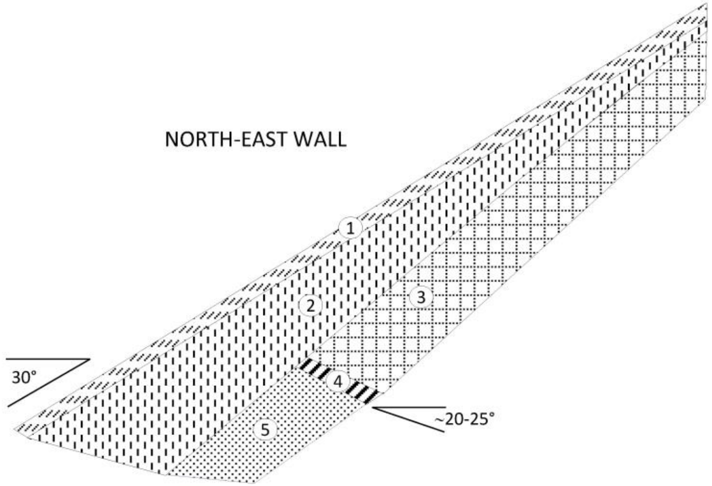
TEST ID: **TR25**

DATE: 10 DEC. 2015

TYPE: FLAXMORE FAULT TRACE EXPOSURE

1. Topsoil
2. SLIP DEBRIS DEPOSIT
   Weathered to highly weathered GRAVEL (rock fragments) with clayey matrix, light brown. Medium dense, dry, moderately plastic matrix
3. MARYBANK FORMATION / BOTANICAL HILL FORMATION
   Densely packed clayey angular GRAVEL (SANDSTONE), yellowish grey. Hard, dry, non plastic (highly weathered in-situ rockmass?)
4. FLAXMORE FAULT SHEAR ZONE
   Silty CLAY, light blueish grey mottled white. Soft, moist, moderately plastic with slickensided faces
5. FLAXMORE FAULT SHEAR ZONE
   Organic CLAY, dark grey to black. Soft, moist, highly plastic
6. PORT HILLS GRAVEL FORMATION
   Sandy SILT with some rounded gravel, light yellowish brown. Stiff to very stiff, dry to moist, non plastic.

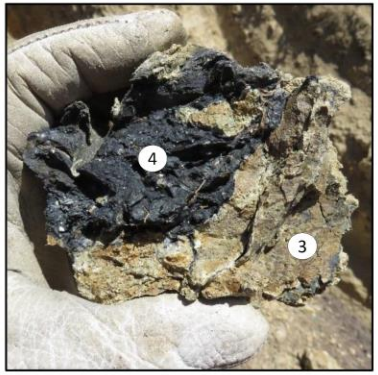
NORTH-EAST WALL



TEST ID: **TR28**

DATE: 09 FEB. 2016

TYPE: FLAXMORE FAULT TRACE EXPOSURE



1. Topsoil
2. SLIP DEBRIS DEPOSIT
   Gravelly CLAY / SILT, yellowish grey. Very stiff, dry, non plastic (slope debris)
3. MARYBANK FORMATION / BOTANICAL HILL FORMATION
   Highly weathered, light brown, grey and white SANDSTONE, weak, dry (highly weathered in-situ rockmass)
4. FLAXMORE FAULT SHEAR ZONE
   Organic CLAY with minor gravel, black. Soft, moist, moderately to highly plastic with slickensided faces
5. PORT HILLS GRAVEL FORMATION
   Clayey SILT with some rounded gravel, yellowish brown. Very stiff, dry, moderately plastic

Geoadvice Limited
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Nelson, New Zealand
Mobile: +64 (0)22 043 2282
Email: Sigfrid@geoadvice.co.nz

TRIAL PIT LOG

Project:	14149	**Date:**	10 December 2015
Address:	Brooklands Way Subdivision, Atawhai	**Tested by:**	SD
Client:	Steve Rolston	**RL:**	-
Weather:	Fine, dry - following long period of dry weather		

Test ID : TP 33 / TP 34

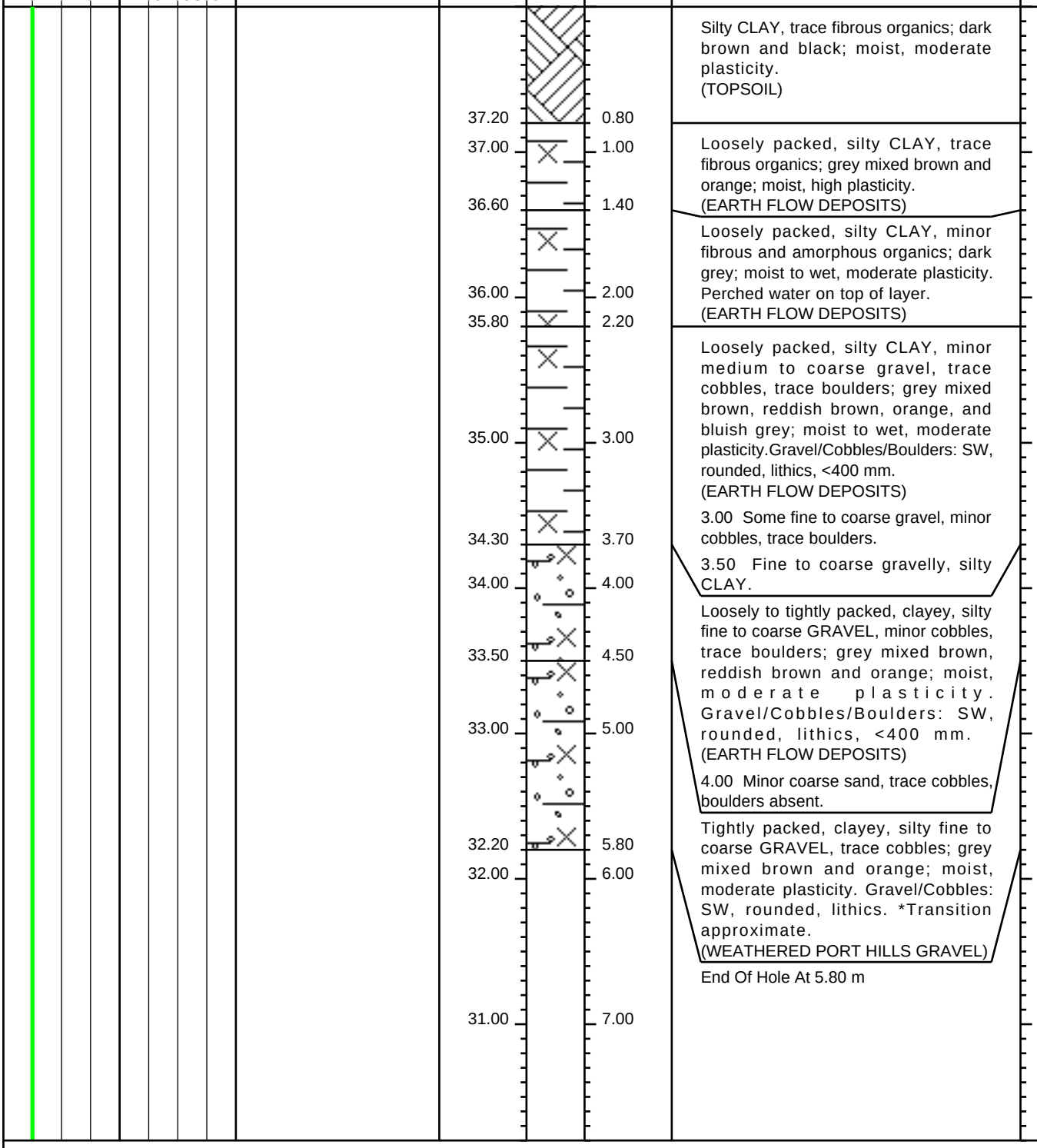
Hand Auger Results

Depth (m)	Geological Unit	Soil Symbol	Soil Description	Shear Strength / Residual corrected (kPa)	Water Level
0.00	Topsoil		0.00m: Topsoil		
0.50	Colluvium		0.50m: Silty CLAY with some gravel, light brown. Firm to stiff, dry, moderately plastic		
1.00	Weathered Port Hills Gravel		1.00m: CLAY / SILT with some rounded gravel, yellowish brown. Stiff to very stiff, dry, moderately plastic		
1.50			1.50m: End of pit TP 33		
2.00					
2.50			2.50m: End of pit TP 234		
3.00					
3.50					
4.00					

Comments:
- Groundwater not encountered
- Hole backfilled with arisings

Notes:
Field Descriptions of Soils and Rocks by NZ Geotechnical Society Dec 2005

CGW Consulting Engineers	Project Title: 11 Garin Heights, Nelson		
	Project Number: 21139	Client: Steve Rolston Building Limited	TP01
	GL (mAOD): 38.00	N Coord: 411523.64	E Coord: 1731824.08
Date: 04/05/2021	Method: Excavator	Logged By: SB	Scale: 1:40 Sheet 1 Of 1



KEY

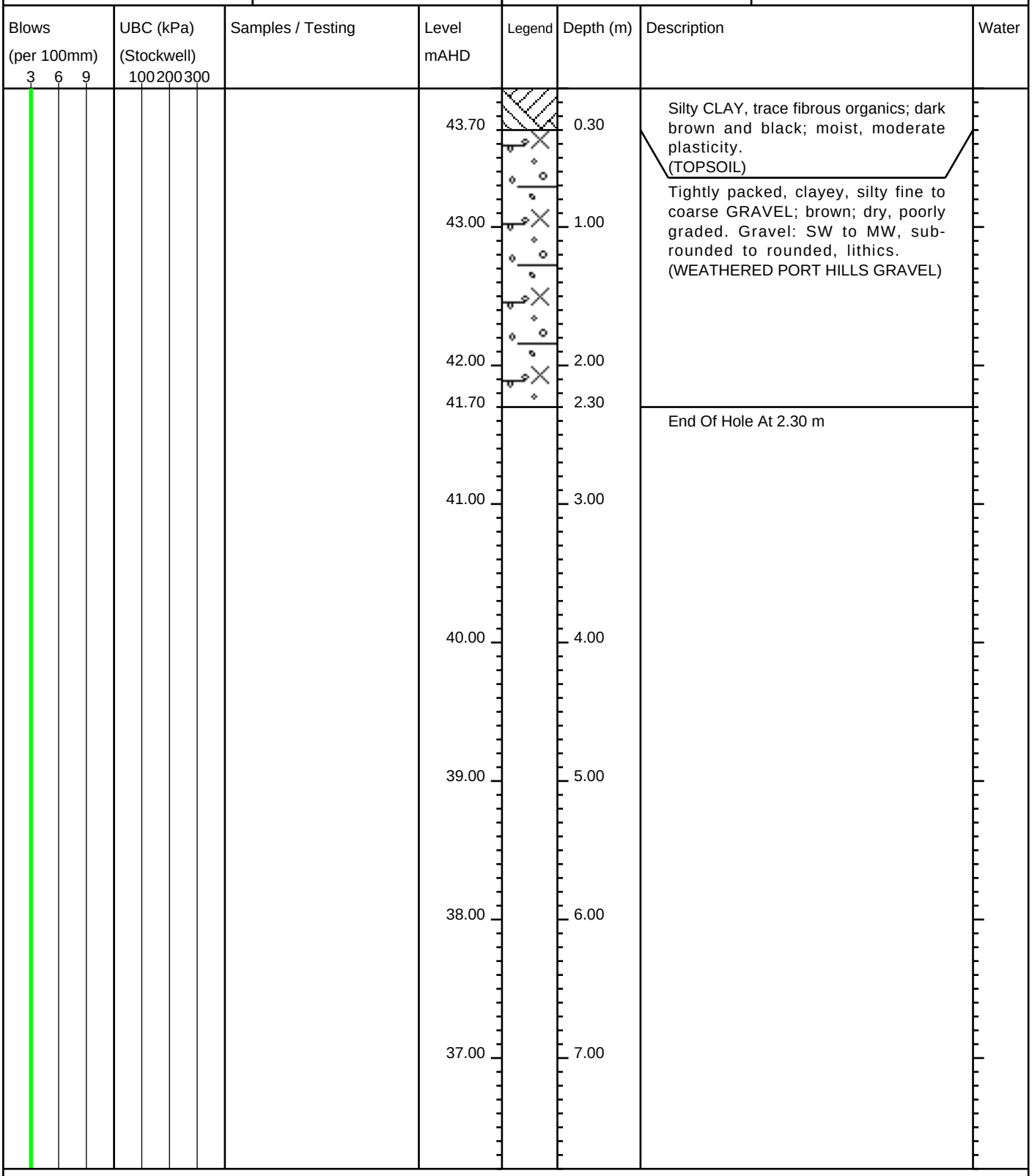
D - Disturbed Sample
B - Bulk Sample
W - Water Sample
V - Hand Shear Vane kPa

▽ - Groundwater Strike
▼ - Groundwater Level

REMARKS

No Groundwater Encountered
Terminated at extent of excavator. Side walls stable.

CGW Consulting Engineers	Project Title: 11 Garin Heights, Nelson		
	Project Number: 21139	Client: Steve Rolston Building Limited	TP02
	GL (mAOD): 44.00	N Coord: 411524.39	E Coord: 1731823.39
Date: 04/05/2021	Method: Excavator	Logged By: SB	Scale: 1:40 Sheet 1 Of 1



KEY

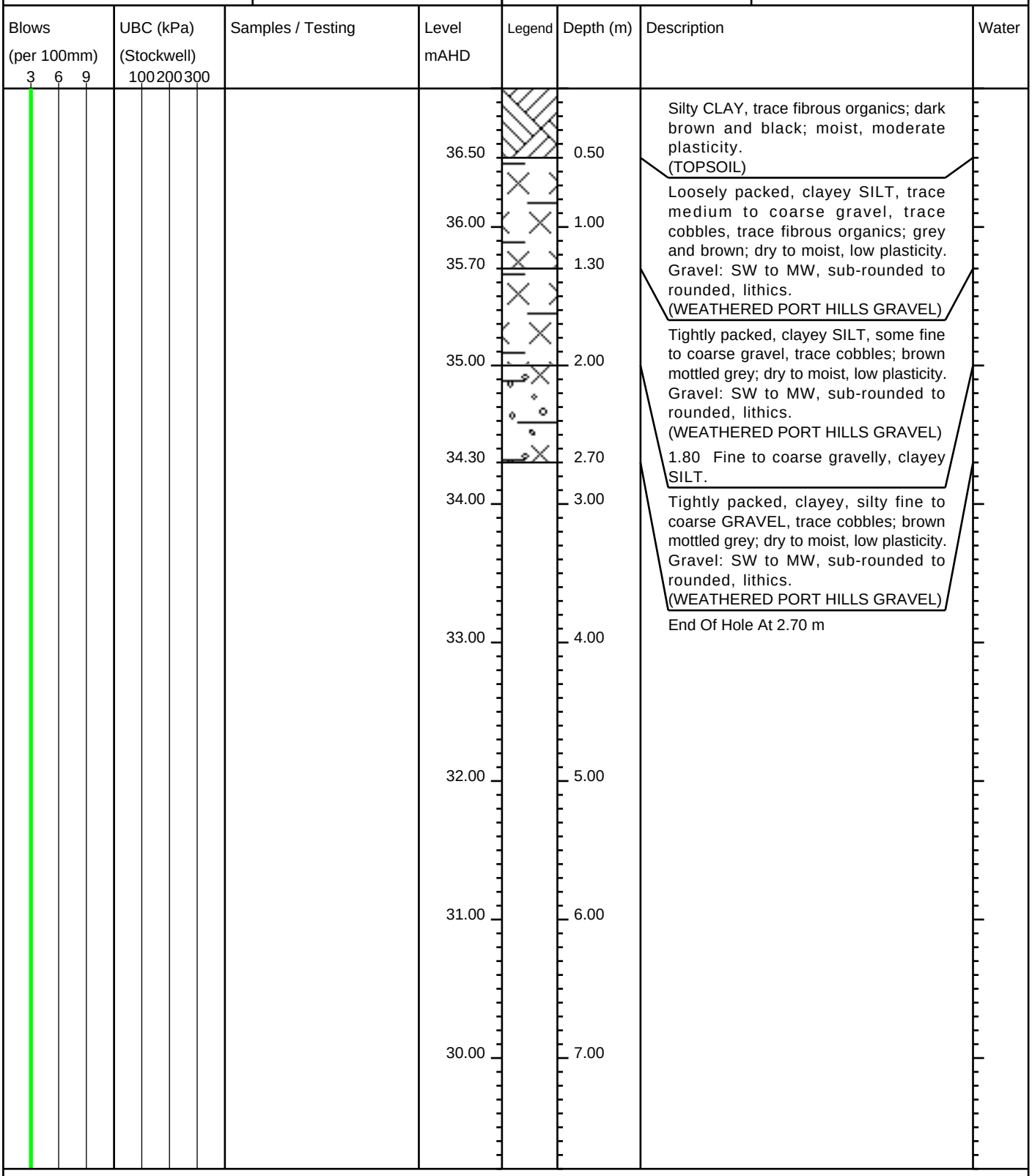
D - Disturbed Sample
B - Bulk Sample
W - Water Sample
V - Hand Shear Vane kPa

▽ - Groundwater Strike
▼ - Groundwater Level

REMARKS

No Groundwater Encountered
Terminated within target material. Side walls stable.

CGW Consulting Engineers	Project Title: 11 Garin Heights, Nelson		
	Project Number: 21139	Client: Steve Rolston Building Limited	TP03
	GL (mAOD): 37.00	N Coord: 411523.56	E Coord: 1731823.24
Date: 04/05/2021	Method: Excavator	Logged By: SB	Scale: 1:40 Sheet 1 Of 1



KEY

D - Disturbed Sample
B - Bulk Sample
W - Water Sample
V - Hand Shear Vane kPa

▽ - Groundwater Strike
▼ - Groundwater Level

REMARKS

No Groundwater Encountered
Terminated at within target material. Side walls stable.

CGW Consulting Engineers	Project Title: 11 Garin Heights, Nelson		
	Project Number: 21139	Client: Steve Rolston Building Limited	TP04
	GL (mAOD): 44.00	N Coord: 411523.92	E Coord: 1731824.89
Date: 04/05/2021	Method: Excavator	Logged By: SB	Scale: 1:40 Sheet 1 Of 1

Blows (per 100mm) 3 6 9	UBC (kPa) (Stockwell) 100 200 300	Samples / Testing	Level mAHD	Legend	Depth (m)	Description	Water
			43.60		0.40	Silty CLAY, trace fibrous organics; dark brown and black; moist, moderate plasticity. (TOPSOIL)	
			43.00		1.00	Loosely packed clayey SILT, trace medium to coarse gravel; grey and brown mottled orange; dry to moist, low plasticity. Gravel: SW, sub-rounded to rounded, lithics. (EARTH FLOW DEPOSITS)	
			42.00		2.00		
			41.30		2.70		
			41.00		3.00	Loosely packed, clayey SILT, some fine to coarse gravel, trace cobbles; brown; moist, poorly graded. Gravel/Cobbles: SW, sub-rounded to rounded, lithics. (EARTH FLOW DEPOSITS)	
			40.80		3.20	Loosely packed, clayey, silty medium to coarse GRAVEL, minor cobbles, trace fine gravel, trace boulders; brown; moist, poorly graded. Gravel/Cobbles: SW, sub-angular to rounded, lithics, <300 mm. (EARTH FLOW DEPOSITS)	
			40.00		4.00		
			39.00		5.00	Loosely packed, clayey, silty fine to coarse GRAVEL, trace cobbles; reddish brown mixed orange, grey, white, and brown; moist to wet, low plasticity, poorly graded. Gravel/Cobbles: MW to CW, angular to sub-rounded, lithics. (EARTH FLOW DEPOSITS)	
			38.70		5.30		
			38.50		5.50	Loosely tightly packed, silty CLAY, trace fibrous organics; grey and dark grey; moist, high plasticity. (EARTH FLOW DEPOSITS)	
			38.10		5.90		
			38.00		6.00	Tightly packed, medium to coarse gravelly, clayey SILT, minor cobbles, trace fibrous organics; grey and brown; moist, low plasticity. Gravel/Cobbles: SW to CW, sub-angular to rounded, lithics. (WEATHERED PORT HILLS GRAVEL)	
			37.00		7.00	End Of Hole At 5.90 m	

KEY

D - Disturbed Sample
B - Bulk Sample
W - Water Sample
V - Hand Shear Vane kPa

▽ - Groundwater Strike
▼ - Groundwater Level

REMARKS

No Groundwater Encountered
Terminated at extent of excavator. Side walls stable.

RISK ASSESSMENT

Per the National Policy Statement for Natural Hazards 2025 (Dec 2025), a risk assessment has been completed for this project (ref. 26014 – 11 Garin Heights).

The risk matrix, definitions and tables used have been taken from the document referenced above. The various natural hazards are discussed in more detail in the main report text, attached.

Proposed Lot 1 BLA - Current Land Use

The natural hazard risk for the Proposed Lot 1 BLA, with the site's current land use, is assessed to be **LOW** – refer risk matrix below.

NPS Natural Hazard	Likelihood Level	Consequence Level	Risk
Flooding			Low (not geotechnical)
Landslips	Possible	Negligible	Low
Coastal Erosion			Low (not geotechnical)
Coastal Inundation			Low (not geotechnical)
Active Faults	Very Rare	Negligible	Low
Liquefaction	Very Rare	Negligible	Low
Tsunami			Low (not geotechnical)

Proposed Lot 1 BLA - Developed Condition

In its developed condition, the risk is also assessed to be **LOW** – refer risk matrix below.

NPS Natural Hazard	Likelihood Level	Consequence Level	Risk
Landslips	Possible	Negligible	Low
Active Faults	Very Rare	Negligible	Low
Liquefaction	Very Rare	Negligible	Low
Landslips: Minor damage to land could occur but suitable and appropriate SID by a GeoProfessional, with potential for inclusion of mitigating works, should ensure that the risk of land damage remains low.			
Flooding, Coastal Erosion, Coastal Inundation & Tsunami: Not assessed. As above, these hazards are not geotechnical in nature, albeit the property is well removed from the coast.			

Likelihood Level

Consequence Level	Almost Certain	Very Likely	Likely	Possible	Unlikely	Rare	Very Rare
ARI (years)	Up to 10	10 to 20	20 to 50	50 to 100	100-500	500-5000	> 5000
AEP	10% or more	10% to 5%	5% to 2%	2% to 1%	1% to 0.2%	0.2% to 0.02%	<0.02%
Catastrophic	Very High	Very High	Very High	High	Medium	Medium	Medium
Major	Very High	Very High	High	High	Medium	Medium	Medium
Moderate	High	High	High	Medium	Medium	Low	Low
Minor	Medium	Medium	Medium	Medium	Low	Low	Low
Negligible	Low	Low	Low	Low	Low	Low	Low

Mitigation measures: Development to be per the recommendations given in the GeoSolutions NZ Ltd Geotechnical Investigation Report ref. 26014, dated 22 April 2026.

Note: Future development of Lot 1 is unlikely to increase slope instability risk to neighbouring properties above current levels, provided that development is undertaken in accordance with the recommendations of the GeoSolutions NZ Ltd Geotechnical Investigation Report ref. 26014, dated 22 April 2026.