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**Project Number 24181.000.001**

**Geotechnical and Natural Hazard  
Assessment**

160 Bangor Road, Darfield, Canterbury

Submitted to:  
Hughes Development Limited  
8 Millbank Lane  
Merivale  
Christchurch

**ENGEO Document Control:**

| Report Title       |          | Geotechnical and Natural Hazard Assessment – 160 Bangor Road, Darfield |                |            |    |
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## 1 Introduction

ENGEO Ltd was requested by Hughes Development Limited to undertake a Geotechnical and Natural Hazard Assessment at 160 Bangor Road, Darfield, (herein referred to as ‘the site’, shown in Figure 1). This work has been carried out in accordance with our signed agreement dated 28 May 2026 (P24181.000.001\_03).

ENGEO previously completed a geotechnical assessment to support the resource consent for the proposed subdivision of the site, dated 13 June 2024. Prior to this, ENGEO undertook an Environmental and Geotechnical Due Diligence Assessment, dated 21 and 26 September 2023 (Ref. 24084.000.001).

We understand that the June 2024 geotechnical investigation report requires updating to address the National Policy Statement for Natural Hazards, which came into effect in January 2026. As a result, this revised report incorporates the additional assessment previously provided and supersedes the earlier report.

This report also includes the subdivision lot plan which was released by Davie Lovell Smith June 2026. This details that the site will be subdivided into 741 residential lots, with associated green spaces and infrastructure.

In addition, a Statement of Professional Opinion has been prepared to support the use of the revised report for subdivision consent purposes.

## 2 Site Description

The property at 160 Bangor Road in Darfield consists of an irregular shaped parcel of land covering an area of ~130 ha and has the legal identifiers of Lot 2 DP 81020 and Section 2 Survey Office Plan 438579.

There is a residential house in the central-western area, a tennis court south of the house, and farm sheds and ancillary structures to the north. Except for the structures in the central-western area, the site is largely undeveloped pasture with areas vegetated with mature trees and hedges. The property is relatively flat to gently sloping ( $< 5^\circ$ ) to the south and is currently used for sheep farming.

Residential lifestyle blocks and agricultural paddocks are located to the north, southeast, and west. West Coast Road is located to the northeast with residential and recreational land use to the east of West Coast Road. Bangor Road is located to the south with residential lifestyle blocks to the south of Bangor Road. The site location is identified in Figure 1.





Base image sourced from LINZ. Not to scale.

**Figure 1: Site Location and Boundary in Red**

### 3 Desktop Assessment

#### 3.1 Existing Reports

We have been provided with a Geo-Environmental Desk Study by URS dated 25 October 2014. This report was prepared to support a private plan change. Based on our review, the key findings are summarised below:

- An underground storage tank is understood to be present to the east of the farm shed, north of the dwelling. Tank vent and dispensing lines are present in the tank area. The age, size, and condition of the tank are not known. The report states that it is understood that the tank is empty and has not been used in ten years (at time of writing).
- A number of offal pits (former and in active use in 2014) are located at the property. The location of three are shown on the Site Layout Plan in Appendix 2 within the URS Report.
- The property was located in the 'low geotechnical risk area' on the Selwyn District Council mapping at the time of reporting.
- A Selwyn District Council water race crosses the property at various locations.
- URS stated that no evidence of geological hazards was observed to have affected the property based on observations of surface geomorphology and review of aerial photography.

## 3.2 Regional Geology

Geological and Nuclear Sciences (GNS) regional mapping indicates that the site is underlain by Late Pleistocene sediments, consisting of un-weathered, brownish-grey, variable mix of gravels, sand, silt, and clay in low river terraces.

## 3.3 Regional Groundwater

### 3.3.1 Ecan Boreholes

Two Environment Canterbury Bores (ECan) Bores with logs are located on, or close to, the site, as shown on the Investigation Location Plan provided in Appendix 2, and within the URS Report. L35/0277 is located on-site in the central-western area and was drilled to 265 m depth in 1985. BX22/0006 is located in the neighbouring property to the north and was drilled to 245 m depth in 2013.

The ground conditions logged in each well generally indicate that layers of gravel and clayey gravel with some sand content are present from the surface to depths in excess of 265 m. Groundwater was recorded in L35/0277 at 105 m depth, and at 135 m depth in BX22/0006. Logging of material strength was not undertaken, however comments on the log include 'hard' and 'very hard' drilling.

## 3.4 Seismicity and Faulting

The site is located in proximity to two active fault systems. The nearest is the Hororata Fault, the mapped Hororata fault avoidance zone situated approximately 3 km northwest of the site (Canterbury Maps). The Greendale Fault is located approximately 12 km to the south and ruptured during the Canterbury Earthquake Sequence (CES). This fault trends generally east-west and experienced a surface rupture length of approximately 28 km during the CES (GNS, 2015).

## 3.5 Historic Aerials

We have reviewed historical aerial photographs of the site available through Canterbury Maps, Retrolens, and Google Earth. These photographs were viewed under the context of identifying changes to landform at the site.

The residential dwelling and vegetated block can be observed in the 1940 aerial photograph. The farm sheds / buildings to the north of the dwelling were constructed between 1955 and 1979. The current tennis court and dog kennels are observed in the 2010–2015 aerial photograph. Two small isolated brown circular features are observed in the paddocks in the centre and the northern-central area adjacent to shelter belts. Based on the sites agricultural uses there is potential these could be manure piles or burial pits; however, it is not clear from the imagery available.

Flow channels can be observed in the south-eastern area of the site in the 1940–1944 Canterbury Maps (Canterbury Maps, 2024) aerial photograph (Figure 3). This is in the same location to the largest mapped flood channel through the site in Canterbury Maps

Aside from the developments and potential burial pits mentioned above, no significant geological, geotechnical, or geomorphological changes were identified in the available photographs.





Image sourced from Canterbury Maps. Not to scale.

**Figure 2: 1940–1944 Aerial Photograph**

## 4 Preliminary Natural Hazard Assessment

The preliminary natural hazards assessment presented below is based on the most recent information available from the Canterbury Maps portal, retrieved in June 2026. This assessment has been undertaken to determine whether additional geotechnical investigation is required to support compliance with the National Policy Statement for Natural Hazards and Section 106A of the Resource Management Act.

**Table 1: Preliminary Hazard Assessment**

| Natural Hazards            |                                  | Potential Hazard for the Site                                                                                                                                                                                                                                                                                                                                    | Further Assessment Required |
|----------------------------|----------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|
| Flooding                   | Inundation from a 200 year event | Considered in hydrological design                                                                                                                                                                                                                                                                                                                                | Yes                         |
| Land Instability           | Landslide                        | The site is relatively flat and a significant distance away from any potential source areas.                                                                                                                                                                                                                                                                     | No                          |
|                            | Rockfall                         | The site is relatively flat and a significant distance away from any potential source areas.                                                                                                                                                                                                                                                                     | No                          |
| Earthquake                 | Liquefaction induced subsidence  | Soil liquefaction and lateral spreading results from loss of strength during cyclic loading, such as imposed by earthquakes. Soils most susceptible to liquefaction are clean, loose, saturated, uniformly graded fine-grained cohesionless materials. Ground water is below 50 m depth; therefore, the risk of liquefaction or lateral spreading is negligible. | No                          |
|                            | Lateral Spreading                |                                                                                                                                                                                                                                                                                                                                                                  | No                          |
|                            | Fault Rupture                    | The nearest active fault (Hororata Fault) is located approximately 3.2 km southeast from the site (GNS Science - Active Faults Database). Therefore, the risk of fault rupture at the site is considered low.                                                                                                                                                    | No                          |
|                            | Tsunami                          |                                                                                                                                                                                                                                                                                                                                                                  | No                          |
| Coastal / Marine Processes | Coastal Erosion                  | The site is a significant distance from the coast.                                                                                                                                                                                                                                                                                                               | No                          |
|                            | Coastal Inundation               |                                                                                                                                                                                                                                                                                                                                                                  | No                          |

As outlined in Table 1, only flood hazard is considered to have the potential to adversely affect the development. A qualitative risk assessment of this hazard in accordance with the NPS-NH and S106A of the Resource Management Act is provided in Section 7 below.

## 5 Site Investigation

### 5.1 Site Walkover

ENGEO visited the site on 13 September 2023 and completed a geotechnical site walkover. The following key observations are shown below:

- The property is relatively level and used predominantly for sheep farming, with the exception of a rectangular eucalyptus forestry block in the central-eastern area of the site, where the dwelling, inground pool, and tennis court is also located. Farm / wool sheds and barns are located north of the dwelling. Outside of the structures, the remainder of the site is predominantly paddocks, farm access tracks, and tree shelter belts.
- Three burn-off areas / burn piles were observed on-site. Two in the general vicinity of the wool shed, and one north of the barn.
- An approximately 3 m deep open offal pit was observed in one of the northern paddocks (Figure 4, Photo 1). Animal carcasses, plastic, and rubbish was observed in the offal pit. A thin layer of gravelly silt can be observed below topsoil in the sidewall of the pit. A gravel layer underlies the silty material, and the pit was free of standing water at the time of our site visit.
- An approximately 0.6 m wide by 0.5 m deep water race was observed between the dwelling and farm buildings and was running generally west to east parallel to a farm access track (Figure 4, Photo 2). A second water race with similar dimensions was observed in the central-southern area of the site running north to south.
- The flood channels described in Sections 3.6.2 and 3.6.3 are difficult to discern on the ground. No areas of swampy / saturated ground or overland flow paths were observed in the landform during the walkover.

**Figure 3: Site Photographs**



Photo 1: Open offal pit. Similar gravelly silt and gravel layers to the test pit investigations can be observed in the side walls.



Photo 2: Water race located adjacent to the track and wool shed.

## 5.2 Test Pit Investigations

ENGEO completed nine test pit excavations (TP01–TP09) in September 2023 as part of the Due Diligence Report. An additional twelve test pit excavations (TP10–TP21) and associated Scala penetrometer (Scala) and shear vane tests were carried out in May 2024.

The test pits were excavated to between 2.5 m and 3.1 m depth. Scala penetrometer testing met refusal on dense gravel between 0.4 m and 1.1 m depth. The excavatability resistance was generally hard from the grounds surface to the base of the test pit. Groundwater was not observed in the test pit investigations and is likely to be present at depth beneath the site.

The test locations are shown on the attached Investigation Location Plan in Appendix 2. All test locations were undertaken from a generally similar elevation. Logs of the test pits are presented in Appendix 3 and are written in accordance with the New Zealand Geotechnical Society field classification guidelines (NZGS, 2005).

## 6 Engineering Ground Model

### 6.1 Summary of Ground Conditions

The ground conditions observed in the test pit investigations is summarised in Table 2 below:

**Table 2: Summary of the Subsurface Conditions Across the Site**

| Unit           | Description                                           | Typical Depth (m bgl)   | Thickness Range (m) | Consistency           |
|----------------|-------------------------------------------------------|-------------------------|---------------------|-----------------------|
| Topsoil / Fill | SILT with minor sand, gravel and trace rootlets       | 0.0 to 0.2 <sup>1</sup> | 0.2 – 0.3           | N/A                   |
| Holocene Loess | SILT to gravelly SILT with minor to some sand         | ~0.5                    | 0.2 – 0.7           | Stiff to hard         |
| Alluvium       | Sandy GRAVEL with trace to minor cobbles and boulders | >0.5                    | Extends to depth    | Medium dense to dense |

<sup>1</sup>Fill within offal pits may be considered deeper but will be localised.

This material is broadly consistent with published mapping. Based on the ECan Wells, the gravel layers continue to at least 265 m depth. The test pits undertaken within the mapped flood channels have little difference in the subsurface profile, particularly in the thickness of the near surface gravelly silt layer, to those undertaken outside of the channels.

Although not encountered in our test pit investigations, we anticipate that (undocumented) fill material may be present beneath existing site structures, where there are historical burial pits and where farm tracks are located.

## 6.2 Groundwater

The ECan regional groundwater depth is interpreted to be present at 50 m depth, however it may be significantly deeper than this. Based on the BX22/0006 bore well the groundwater level was measured within the native gravel deposits at approximately 100 m depth.

## 6.3 Site Soil Class

For the purposes of structural design, a site soil classification of 'Class D – Deep or Soft Soil Site' as per NZS 1170.5:2004 is considered to be appropriate for the site based on soil strength materials to the base of the investigations and our understanding of the geological setting.

# 7 Natural Hazard Assessment

The assessment of natural hazard risk for the proposed development has been undertaken in accordance with the Resource Management Act 1991 (RMA), with particular reference to Section 106A. This has been completed using the risk-based framework outlined in the National Policy Statement for Natural Hazards 2025 (NPS NH). Accordingly, this assessment integrates the NPS NH risk-based approach within the decision-making framework set out under Sections 106A of the RMA.

## 7.1 Flooding

The Canterbury Maps Flood Model Results layer shows several flood channels through the site. All the channels enter the site in the north and flow in a south-eastern direction. One larger channel is mapped in the eastern area of the site and is estimated to have a water depth of up to 0.5 m above current ground level for a 200-year and 500-year rainfall event. Several narrower channels are mapped across the centre and western areas of the site and are estimated to have a water depth of < 0.2 m in the Flood Model. The mapped flood areas are shown in Figure 4.





Image sourced from Canterbury Maps.

**Figure 4: Canterbury Maps Flood Model Results for a 200 – 500 year flood. Property Boundary shown in Red**

We understand through discussions with Davie Lovell-Smith that the following flood mitigation measures are proposed for the development;

- Soakpits will be installed to completely discharge the 2% AEP (50-year rainfall event) rainfall event across the developed site. These soakpits will result in runoff volumes for the developed site in the 1% & 0.5% AEP events of any duration being less than pre-development.
- Modelling will be undertaken to ensure all building platforms are above the 0.5% AEP flood level for the developed site.

We understand that this is a requirement in relation to consent. Therefore, we have adopted a floor level height at least 300 mm above the 0.5% AEP (1 in 200 year) flood level heights, for the purposes of this risk assessment. With these raised floor level heights, we would expect that only minor damage would occur during the flood event, predominantly affecting non-structural elements. We would expect that the repairs could be completed without any loss of use. The consequences outlined in Table 3 below reflects this, in accordance with Appendix 1 of the NPS-NH.



**Table 3: NPS-NH Risk Assessment for Flooding**

| Flood Event    | AEP (%)  | Consequence                                                                              | Risk Level |
|----------------|----------|------------------------------------------------------------------------------------------|------------|
| 200 – 500 year | Unlikely | Minor<br>Minor damage to land and building(s). No loss of use, minimal repairs required. | Low        |

The corresponding risk rating of a 200-to-500-year flood event is low in accordance with the NPS-NH frameworks, conditional on the mitigation measures outlined above.

## 7.2 RMA Section 106 Considerations

For all potential geohazards except flooding, we consider building platforms within the proposed subdivision are not subject to significant risk from the geohazards identified in this report in accordance with the provisions of Section 106 of the Resource Management Act. We do not consider that future residential use of the land is likely to accelerate, worsen, or result in material damage to the land provided that proper engineering practices are followed during any development, including those recommended in this report.

Based on our observations and analyses, we consider the primary hazard to be flood inundation from potential future storm events. However, actual inundation of buildings will depend on the finished floor levels and specific building location and can be mitigated for in their design, either by siting building platforms out of the area of potential inundation, through earthworks or via specifically engineered foundations that allow the finished flood level to be located above the estimated flood depth.

## 8 Geotechnical Recommendations

### 8.1 Flood Mitigation Considerations

Appendix 2 provides an overlay of the flood map on the current proposed distribution of lots. This provides a clear overview of the lots that require mitigation and those that do not. It should be noted that this is based on current topography. Should subdivision earthworks significantly alter ground level elevations then additional overland flow analysis should be undertaken to assess the effects of these changes. It is our understanding from talking with the client that this work is planned and will be completed once final levels are confirmed.

### 8.2 Foundation Bearing Capacity

Based on our assessment of ground conditions at the site, we consider the site to generally meet the “good ground” classification as defined by NZS 3604:2011 either within the Silt, or on top of the underlying gravel. Localised softened or deepened Silt material could occur in some locations and should be assessed on a case-by-case basis during construction.

### 8.3 Plan Review

The proposed future use or development plans were not provided at the time of preparing this report. If future buildings are designed as conventional lightweight structures (i.e., one to two storeys), we do not anticipate significant geotechnical constraints that could not be addressed by specific engineering design of the building foundations and / or remedial earthworks solutions, and shallow foundations are likely to be suitable. However, it is recommended that the final development plans be reviewed prior to building consent application to ensure that our recommendations have been interpreted as intended.

### 8.4 Earthworks Recommendations

During the earthworks operations all topsoil, organic matter, fill and other unsuitable materials should be removed from the construction areas in accordance with the recommendations of NZS 4431:2022.

All fill that is utilised beneath foundations should be placed and compacted in accordance with the recommendations of NZS 4431:2022 and certification should be provided to that effect. The geotechnical professional shall be promptly notified of any areas of the foundation or any layer within the formation that rut excessively, yield, or show signs of distress or instability.

#### 8.4.1 Unsuitable Fill Material

Pre-existing fill was observed in the open offal pit, although not encountered in the test pit investigations throughout the site. Given the limited coverage of this investigation, it is possible that further areas of unsuitable fill are present on-site. Following site clearance, a geotechnical professional should evaluate the stripped subgrade across the site and determine the extent and nature of any pre-existing uncontrolled fill exposed and determine if any fill material is present, and if so is suitable for use, or advise if undercutting and replacement with engineered fill is required.

#### 8.4.2 Tree Removal

Where trees are to be removed within an area of future development it is important that all tree stumps and large roots (greater than thumb-size) are completely removed. Where large areas are to be cleared of vegetation the most effective approach would be to undercut the affected area to remove the large root systems and replace with engineered fill to design levels as required.

#### 8.4.3 Demolition

It is essential that all foundations and building debris from demolition of the existing buildings and retaining walls are completely removed from within the extent of works prior to earthworks commencing.

Where foundations are removed below final ground level, they will need to be backfilled with approved hardfill (e.g. GAP65 or similar approved product) compacted in maximum 200 mm thick layers to ensure a consistent subgrade.

Any existing unsuitable fill uncovered by site clearing work should be inspected by a qualified geotechnical professional to confirm its suitability to remain on-site. A provisional allowance should be included in the construction scope for undercut and removal of existing fill associated with the existing structures and landscaping.

If future redevelopment includes demolition of the current on-site buildings. It is recommended that asbestos surveys be carried out on the buildings to assess their condition before any demolition occurs. This will assist the developer in meeting their obligations under the Health and Safety at Work (Asbestos) 2016 Regulations.

#### 8.4.4 Roading and Pavements

A preliminary California Bearing Ratio (CBR) of 3% can be assumed for the pavement design on native soils below topsoil / fill.

#### 8.5 Stormwater and Wastewater

During construction, measures should be undertaken to control and treat stormwater runoff, with silt and erosion controls complying with local authority guidelines for erosion and sediment control. The control of surface drainage shall be undertaken early in the work so as to limit the introduction of water in the earthworks area. Both cut and fill areas shall be sloped adequately to prevent ponding of stormwater and temporary drainage may be necessary.

Surface cut-off drains or appropriate stormwater flow paths should be maintained upslope of the proposed development area both during and following construction. These drains and impervious surfaces will divert water away from any buildings. Stormwater from paved areas shall be taken in a piped system and disposed of into an approved stormwater system.

#### 8.6 Safety in Design

Safety in Design aims to identify, address, and minimise or eliminate health and safety risks where it is reasonably practicable to do so. Given the relatively level site and the shallow excavations required, the key safety considerations during construction will likely relate to temporary cuts (if applicable), the contractor's construction methodology, and how the public interface with the site is managed. ENGEO can provide safety in design advice as part of the detailed design stages once the remediation strategy and foundation / earthworks requirements have been identified.

### 9 Sustainability

We encourage you to consider sustainability when assessing the options available for your project. Where suitable for the project, we recommend prioritising the use of sustainable building materials (such as timber in favour of concrete or steel), locally sourced (materials readily available to Contractors as opposed to materials requiring import), and installed in an environmentally friendly way (e.g., reduced carbon emissions and minimal contamination). If you would like to discuss these options further, ENGEO staff are available to offer suggestions.

## 10 Limitations

- i. We have prepared this report in accordance with the brief as provided. This report has been prepared for the use of our client, their professional advisors, the relevant territorial authorities, and decision-makers appointed under the Fast-track Approvals Act 2024 in support of the substantive application being made by Hughes Developments Limited for the Bangor Village Project. No liability is accepted for the use of any part of the report for any other purpose or by any other person or entity.
- ii. The recommendations in this report are based on the ground conditions indicated from published sources, site assessments and subsurface investigations described in this report based on accepted normal methods of site investigations. Only a limited amount of information has been collected to meet the specific financial and technical requirements of the client's brief and this report does not purport to completely describe all the site characteristics and properties. The nature and continuity of the ground between test locations has been inferred using experience and judgement and it should be appreciated that actual conditions could vary from the assumed model.
- iii. Subsurface conditions relevant to construction works should be assessed by contractors who can make their own interpretation of the factual data provided. They should perform any additional tests as necessary for their own purposes.
- iv. This Limitation should be read in conjunction with the Engineering NZ / ACENZ Standard Terms of Engagement.
- v. This report is not to be reproduced either wholly or in part without our prior written permission.

We trust that this information meets your current requirements. Please do not hesitate to contact the undersigned on (03) 328 9012 if you require any further information.

## 11 Qualifications Statement

My name is Richard Justice. I am a Principal Engineering Geologist at ENGEO. Although this is not an Environment Court proceeding, I confirm I have read and am familiar with the Environment Court's Code of Conduct for Expert Witnesses, contained in the Environment Court Practice Note 2023, and agree to comply with it. Other than where I state that I am relying on the advice of another person, I confirm that the issues addressed in this assessment are within my area of expertise. I have not omitted to consider material facts known to me that might alter or detract from the opinions that I express. My qualifications as an expert are set out in our Statement of Professional Opinion attached in Appendix 7.

Report prepared by



**Jacinta Palmer**

Engineering Geologist

Report reviewed by



**Richard Justice, CMEngNZ (PEngGeol)**

Principal Engineering Geologist

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We also acknowledge the New Zealand GeoNet project and its sponsors EQC, GNS Science and LINZ, for providing data used in this report.



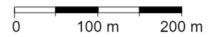


## **Appendix 1:** Investigation Location Plan



Legend

- ENGEO 2024 Test Pit
- ENGEO 2023 Test Pit
- ECan Wells
- Site boundary
- Cross - section A - A'



LINZ CC BY 4.0 © Imagery Basemap contributors, Esri,  
HERE, Garmin, (c) OpenStreetMap contributors

**ENGEO**

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|                                       |               |                    |
|---------------------------------------|---------------|--------------------|
| Title:<br>Investigation Location Plan |               |                    |
| Client: Hughes Developments           |               | Size: A4           |
| Project:<br>160 Bangor Road           | Drawn: BC     | Appendix No.:<br>1 |
| Date: 30-05-2024                      | Checked: RJ   |                    |
| Proj No: 24181                        | Scale: 1:9000 |                    |
|                                       |               | Version: 1.0       |



## **Appendix 2:** Test Pit Logs

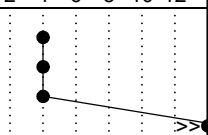
# LOG OF TEST PIT TP01

Geotechnical Investigation

160 Bangor Road  
Darfield, Canterbury  
24181.000.001

Client : Hughes D. L.  
Date : 13-09-2023  
Max Test Pit Depth : 2.6 m  
Digger Type/Size : Bucket Excavator  
Bucket Type/Size : 500 mm

Shear Vane No : 1379  
Logged By : DD  
Reviewed By : LEG  
Latitude : -43.4860629  
Longitude : 172.0850379

| Depth (m) | Material | Excavatability<br>(Relative Scale) | USCS Symbol | DESCRIPTION                                                                                                                                                                                                           | Graphic Symbol                                                                     | Water Level | Moisture Cond. | Consistency/<br>Density Index | Shear Vane<br>Undrained<br>Shear Strength<br>Peak/Remolded<br>(kPa) | Scala Penetrometer<br>Blows per 100mm                                               |
|-----------|----------|------------------------------------|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------|----------------|-------------------------------|---------------------------------------------------------------------|-------------------------------------------------------------------------------------|
|           |          | Easier                             | Harder      |                                                                                                                                                                                                                       |                                                                                    |             |                |                               |                                                                     | 2 4 6 8 10 12                                                                       |
| 0.5       | TS       |                                    | ML          | [TOPSOIL] SILT with some sand, minor gravel, and trace rootlets; dark brown. Low plasticity; sand is fine to medium; gravel is fine, subrounded to rounded, greywacke.                                                |   |             |                | N/A                           |                                                                     |                                                                                     |
|           |          |                                    | ML          | Gravelly SILT with minor sand and trace rootlets; light brown. Low plasticity; sand is fine to medium; gravel is fine to medium, subrounded to rounded.                                                               |   |             |                | St                            | 61/8                                                                |  |
| 1.0       |          |                                    |             | Sandy fine to coarse GRAVEL with minor cobbles and trace rootlets; brown. Well graded; sand is fine to coarse; maximum cobble size is 100mm X 100mm X 150mm; gravel is subrounded to rounded. 1.2 m - rootlets cease. |  |             | M              |                               |                                                                     |                                                                                     |
| 1.5       | ALLUVIUM |                                    | GW          |                                                                                                                                                                                                                       |                                                                                    |             |                | D                             |                                                                     |                                                                                     |
| 2.0       |          |                                    |             |                                                                                                                                                                                                                       |                                                                                    |             |                |                               |                                                                     |                                                                                     |
| 2.5       |          |                                    |             |                                                                                                                                                                                                                       |                                                                                    |             |                |                               |                                                                     |                                                                                     |
| 3.0       |          |                                    |             | Depth of Excavation: 2.6 m<br>Termination Condition: Target depth                                                                                                                                                     |                                                                                    |             |                |                               |                                                                     |                                                                                     |

TEST PIT LOG- SINGLE SITE SKETCH TP01-TP09.GPJ NZ MASTER DATA TEMPLATE.GDT 18/9/23

Test Pit met target depth at 2.6 m.  
Scala Penetrometer met practical refusal at 0.9 m depth.  
Standing groundwater was not encountered.

TS = Topsoil  
N/A = Not Assessed



# LOG OF TEST PIT TP02

Geotechnical Investigation

160 Bangor Road  
Darfield, Canterbury  
24181.000.001

Client : Hughes D. L.  
Date : 13-09-2023  
Max Test Pit Depth : 2.7 m  
Digger Type/Size : Bucket Excavator  
Bucket Type/Size : 500 mm

Shear Vane No : 1379  
Logged By : DD  
Reviewed By : LEG  
Latitude : -43.4803541  
Longitude : 172.0830996

| Depth (m) | Material | Excavatability<br>(Relative Scale) | USCS Symbol | DESCRIPTION                                                                                                                                                                             | Graphic Symbol                                                                     | Water Level | Moisture Cond. | Consistency/<br>Density Index | Shear Vane<br>Undrained<br>Shear Strength<br>Peak/Remolded<br>(kPa) | Scala Penetrometer<br>Blows per 100mm |
|-----------|----------|------------------------------------|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------|----------------|-------------------------------|---------------------------------------------------------------------|---------------------------------------|
|           |          | Easier                             | Harder      |                                                                                                                                                                                         |                                                                                    |             |                |                               |                                                                     | 2 4 6 8 10 12                         |
| 0.5       | TS       |                                    | ML          | [TOPSOIL] SILT with minor sand and gravel and trace rootlets; dark brown. Low plasticity; sand is fine to medium; gravel is fine, subrounded to rounded.                                |   |             |                | N/A                           |                                                                     |                                       |
|           |          |                                    | ML          | Gravelly SILT with minor sand and trace rootlets; light brown. Low plasticity; sand is fine to coarse; gravel is fine to medium, subrounded to rounded.                                 |   |             |                | VSt                           | 150/8                                                               |                                       |
| 1.0       |          |                                    |             | Sandy fine to coarse GRAVEL with trace cobbles and rootlets; brown. Well graded; sand is fine to coarse; maximum cobble size is 100mm X 100mm X 200mm; gravel is subrounded to rounded. |  |             |                |                               |                                                                     |                                       |
| 1.5       |          |                                    |             | 1.3 m - Rootlets cease.                                                                                                                                                                 |                                                                                    |             | M              |                               |                                                                     |                                       |
| 2.0       |          |                                    |             |                                                                                                                                                                                         |                                                                                    |             |                | D*                            |                                                                     |                                       |
| 2.5       |          |                                    |             |                                                                                                                                                                                         |                                                                                    |             |                |                               |                                                                     |                                       |
| 3.0       |          |                                    |             | Depth of Excavation: 2.7 m<br>Termination Condition: Target depth                                                                                                                       |                                                                                    |             |                |                               |                                                                     |                                       |

TEST PIT LOG- SINGLE SITE SKETCH TP01-TP09.GPJ NZ MASTER DATA TEMPLATE.GDT 18/9/23

Test Pit met target depth at 2.7 m.  
Scala Penetrometer testing was not undertaken.  
Standing groundwater was not encountered.

TS = Topsoil  
\*Material strength inferred from excavatability resistance.



# LOG OF TEST PIT TP03

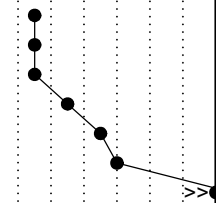
Geotechnical Investigation

160 Bangor Road  
Darfield, Canterbury  
24181.000.001

Client : Hughes D. L.  
Date : 13-09-2023  
Max Test Pit Depth : 2.7 m  
Digger Type/Size : Bucket Excavator  
Bucket Type/Size : 500 mm

Shear Vane No : 1379  
Logged By : DD  
Reviewed By :  
Latitude : -43.4831012  
Longitude : 172.0896108

| Depth (m)                                                         | Material | Excavatability<br>(Relative Scale) | USCS Symbol | DESCRIPTION                                                                                                                                                                                   | Graphic Symbol                                                                     | Water Level | Moisture Cond. | Consistency/<br>Density Index | Shear Vane<br>Undrained<br>Shear Strength<br>Peak/Remolded<br>(kPa) | Scala Penetrometer<br>Blows per 100mm |
|-------------------------------------------------------------------|----------|------------------------------------|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------|----------------|-------------------------------|---------------------------------------------------------------------|---------------------------------------|
|                                                                   |          | Easier                             | Harder      |                                                                                                                                                                                               |                                                                                    |             |                |                               |                                                                     | 2 4 6 8 10 12                         |
| 0.5                                                               | TS       |                                    | ML          | [TOPSOIL] SILT with minor sand, roots (25 mm diameter), and trace rootlets; dark brown. Low plasticity; sand is fine.                                                                         |   |             |                | N/A                           |                                                                     |                                       |
|                                                                   |          |                                    | ML          | Gravelly SILT with minor sand and trace rootlets; light brown. Low plasticity; sand is fine to medium; gravel is fine to medium, subrounded to rounded.                                       |   |             |                | H                             |                                                                     |                                       |
| 1.0                                                               |          |                                    |             | Sandy fine to coarse GRAVEL with minor cobbles and trace rootlets; brown. Well graded; sand is fine to coarse; maximum cobble size is 200mm X 200mm X 250mm; gravel is subrounded to rounded. |  |             | M              |                               |                                                                     |                                       |
| 1.5                                                               | ALLUVIUM |                                    | GW          |                                                                                                                                                                                               |                                                                                    |             |                | D                             |                                                                     |                                       |
| 2.0                                                               |          |                                    |             |                                                                                                                                                                                               |                                                                                    |             |                |                               |                                                                     |                                       |
| 2.5                                                               |          |                                    |             |                                                                                                                                                                                               |                                                                                    |             |                |                               |                                                                     |                                       |
| 3.0                                                               |          |                                    |             |                                                                                                                                                                                               |                                                                                    |             |                |                               |                                                                     |                                       |
| Depth of Excavation: 2.7 m<br>Termination Condition: Target depth |          |                                    |             |                                                                                                                                                                                               |                                                                                    |             |                |                               |                                                                     |                                       |



# LOG OF TEST PIT TP04

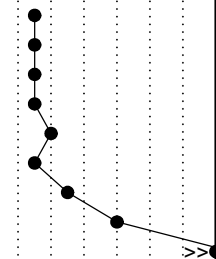
Geotechnical Investigation

160 Bangor Road  
Darfield, Canterbury  
24181.000.001

Client : Hughes D. L.  
Date : 13-09-2023  
Max Test Pit Depth : 2.8 m  
Digger Type/Size : Bucket Excavator  
Bucket Type/Size : 500 mm

Shear Vane No : 1379  
Logged By : DD  
Reviewed By :  
Latitude : -43.4772669  
Longitude : 172.0904812

| Depth (m) | Material | Excavatability<br>(Relative Scale) | USCS Symbol | DESCRIPTION                                                                                                                                                                                   | Graphic Symbol | Water Level | Moisture Cond. | Consistency/<br>Density Index | Shear Vane<br>Undrained<br>Shear Strength<br>Peak/Remolded<br>(kPa) | Scala Penetrometer<br>Blows per 100mm |
|-----------|----------|------------------------------------|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|-------------|----------------|-------------------------------|---------------------------------------------------------------------|---------------------------------------|
|           |          | Easier                             | Harder      |                                                                                                                                                                                               |                |             |                |                               |                                                                     | 2 4 6 8 10 12                         |
| 0.5       | TS       |                                    | ML          | [TOPSOIL] SILT with some sand and trace rootlets; dark brown. Low plasticity; sand is fine.                                                                                                   |                |             |                | N/A                           |                                                                     |                                       |
|           |          |                                    | ML          | SILT with some sand and trace rootlets; light brown. Low plasticity; sand is fine to medium.                                                                                                  |                |             |                | VSt                           | 153/28                                                              |                                       |
| 1.0       |          |                                    |             | Sandy fine to coarse GRAVEL with minor cobbles and trace rootlets; brown. Well graded; sand is fine to coarse; maximum cobble size is 200mm X 200mm X 250mm; gravel is subrounded to rounded. |                |             |                |                               |                                                                     |                                       |
| 1.5       |          |                                    |             | 1.5 m - Rootlets cease.                                                                                                                                                                       |                |             | M              |                               |                                                                     |                                       |
| 2.0       |          |                                    | GW          |                                                                                                                                                                                               |                |             |                | D                             |                                                                     |                                       |
| 2.5       |          |                                    |             |                                                                                                                                                                                               |                |             |                |                               |                                                                     |                                       |
| 3.0       |          |                                    |             | Depth of Excavation: 2.8 m<br>Termination Condition: Target depth                                                                                                                             |                |             |                |                               |                                                                     |                                       |



TEST PIT LOG- SINGLE SITE SKETCH TP01-TP09.GPJ NZ MASTER DATA TEMPLATE.GDT 18/9/23

Test Pit met target depth at 2.8 m.  
Scala Penetrometer met practical refusal at 0.8 m depth.  
Standing groundwater was not encountered.

TS = Topsoil  
N/A = Not Assessed

# LOG OF TEST PIT TP05

Geotechnical Investigation

160 Bangor Road  
Darfield, Canterbury  
24181.000.001

Client : Hughes D. L.  
Date : 13-09-2023  
Max Test Pit Depth : 3 m  
Digger Type/Size : Bucket Excavator  
Bucket Type/Size : 500 mm

Shear Vane No : 1379  
Logged By : DD  
Reviewed By :  
Latitude : -43.4797856  
Longitude : 172.0960559

| Depth (m)                                                       | Material | Excavatability<br>(Relative Scale) | USCS Symbol | DESCRIPTION                                                                                                                                                                                   | Graphic Symbol | Water Level | Moisture Cond. | Consistency/<br>Density Index | Shear Vane<br>Undrained<br>Shear Strength<br>Peak/Remolded<br>(kPa) | Scala Penetrometer<br>Blows per 100mm |
|-----------------------------------------------------------------|----------|------------------------------------|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|-------------|----------------|-------------------------------|---------------------------------------------------------------------|---------------------------------------|
|                                                                 |          | Easier                             | Harder      |                                                                                                                                                                                               |                |             |                |                               |                                                                     | 2 4 6 8 10 12                         |
| 0.5                                                             | TS       |                                    | ML          | [TOPSOIL] SILT with minor sand and trace rootlets; dark brown. Low plasticity; sand is fine.                                                                                                  |                |             |                | N/A                           |                                                                     |                                       |
|                                                                 |          |                                    | ML          | Sandy SILT with trace rootlets; light brown. Low plasticity; sand is fine to medium.                                                                                                          |                |             |                | VSt                           | 159/6                                                               |                                       |
| 1.0                                                             |          |                                    |             | Sandy fine to coarse GRAVEL with minor cobbles and trace rootlets; brown. Well graded; sand is fine to coarse; maximum cobble size is 300mm X 300mm X 350mm; gravel is subrounded to rounded. |                |             |                |                               |                                                                     |                                       |
| 1.5                                                             |          |                                    |             |                                                                                                                                                                                               |                |             |                |                               |                                                                     |                                       |
| 2.0                                                             |          |                                    |             |                                                                                                                                                                                               |                |             |                |                               |                                                                     |                                       |
| 2.5                                                             |          |                                    |             |                                                                                                                                                                                               |                |             |                |                               |                                                                     |                                       |
| 3.0                                                             |          |                                    |             |                                                                                                                                                                                               |                |             |                |                               |                                                                     |                                       |
| Depth of Excavation: 3 m<br>Termination Condition: Target depth |          |                                    |             |                                                                                                                                                                                               |                |             |                |                               |                                                                     |                                       |

TEST PIT LOG- SINGLE SITE SKETCH TP01-TP09.GPJ NZ MASTER DATA TEMPLATE.GDT 18/9/23

Test Pit met target depth at 3 m.  
Scala Penetrometer met practical refusal at 0.5 m depth.  
Standing groundwater was not encountered.

TS = Topsoil  
N/A = Not Assessed

# LOG OF TEST PIT TP06

Geotechnical Investigation

160 Bangor Road  
Darfield, Canterbury  
24181.000.001

Client : Hughes D. L.  
Date : 13-09-2023  
Max Test Pit Depth : 2.5 m  
Digger Type/Size : Bucket Excavator  
Bucket Type/Size : 500 mm

Shear Vane No : 1379  
Logged By : DD  
Reviewed By :  
Latitude : -43.4840346  
Longitude : 172.0948761

| Depth (m) | Material | Excavatability<br>(Relative Scale) | USCS Symbol | DESCRIPTION                                                                                                                                                                                                           | Graphic Symbol | Water Level | Moisture Cond. | Consistency/<br>Density Index | Shear Vane<br>Undrained<br>Shear Strength<br>Peak/Remolded<br>(kPa) | Scala Penetrometer<br>Blows per 100mm |
|-----------|----------|------------------------------------|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|-------------|----------------|-------------------------------|---------------------------------------------------------------------|---------------------------------------|
|           |          | Easier                             | Harder      |                                                                                                                                                                                                                       |                |             |                |                               |                                                                     | 2 4 6 8 10 12                         |
| 0.5       | TS       |                                    | ML          | [TOPSOIL] SILT with minor sand and trace rootlets; dark brown. Low plasticity; sand is fine to medium.                                                                                                                |                |             |                | N/A                           |                                                                     |                                       |
|           |          |                                    | ML          | SILT with some sand and trace rootlets; light brown. Low plasticity; sand is fine to medium.                                                                                                                          |                |             |                | VSt                           | 135/18                                                              |                                       |
| 1.0       |          |                                    |             | Sandy fine to coarse GRAVEL with minor cobbles and trace rootlets; brown. Well graded; sand is fine to coarse; maximum cobble size is 350mm X 200mm X 200mm; gravel is subrounded to rounded. 1.2 m - Rootlets cease. |                |             |                |                               |                                                                     |                                       |
| 1.5       | ALLUVIUM |                                    | GW          |                                                                                                                                                                                                                       |                |             | M              | D                             |                                                                     |                                       |
| 2.0       |          |                                    |             |                                                                                                                                                                                                                       |                |             |                |                               |                                                                     |                                       |
| 2.5       |          |                                    |             | Depth of Excavation: 2.5 m<br>Termination Condition: Target depth                                                                                                                                                     |                |             |                |                               |                                                                     |                                       |
| 3.0       |          |                                    |             |                                                                                                                                                                                                                       |                |             |                |                               |                                                                     |                                       |

TEST PIT LOG- SINGLE SITE SKETCH TP01-TP09.GPJ NZ MASTER DATA TEMPLATE.GDT 18/9/23

Test Pit met target depth at 2.5 m.  
Scala Penetrometer met practical refusal at 0.9 m depth.  
Standing groundwater was not encountered.

TS = Topsoil  
N/A = Not Assessed

# LOG OF TEST PIT TP07

Geotechnical Investigation

160 Bangor Road  
Darfield, Canterbury  
24181.000.001

Client : Hughes D. L.  
Date : 13-09-2023  
Max Test Pit Depth : 2.4 m  
Digger Type/Size : Bucket Excavator  
Bucket Type/Size : 500 mm

Shear Vane No : 1379  
Logged By : DD  
Reviewed By :  
Latitude : -43.4761629  
Longitude : 172.0941465

| Depth (m) | Material | Excavatability<br>(Relative Scale) | USCS Symbol | DESCRIPTION                                                                                                                                                                                                           | Graphic Symbol                                                                     | Water Level | Moisture Cond. | Consistency/<br>Density Index | Shear Vane<br>Undrained<br>Shear Strength<br>Peak/Remolded<br>(kPa) | Scala Penetrometer<br>Blows per 100mm |
|-----------|----------|------------------------------------|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------|----------------|-------------------------------|---------------------------------------------------------------------|---------------------------------------|
|           |          | Easier                             | Harder      |                                                                                                                                                                                                                       |                                                                                    |             |                |                               |                                                                     | 2 4 6 8 10 12                         |
| 0.5       | TS       |                                    | ML          | [TOPSOIL] SILT with minor sand, gravel, and trace rootlets; dark brown. Low plasticity; sand is fine; gravel is fine to medium, subangular to rounded, greywacke.                                                     |   |             |                | N/A                           |                                                                     |                                       |
|           |          |                                    | ML          | Gravelly SILT with some sand and trace rootlets; light brown. Low plasticity; sand is fine to medium; gravel is fine to medium, subrounded to rounded.                                                                |   |             |                | VSt                           | 138/8                                                               |                                       |
| 1.0       |          |                                    |             | Sandy fine to coarse GRAVEL with minor cobbles and trace rootlets; brown. Well graded; sand is fine to coarse; maximum cobble size is 200mm X 200mm X 250mm; gravel is subrounded to rounded. 1.0 m - Rootlets cease. |  |             | M              |                               |                                                                     |                                       |
| 1.5       | ALLUVIUM |                                    | GW          |                                                                                                                                                                                                                       |                                                                                    |             |                | D                             |                                                                     |                                       |
| 2.0       |          |                                    |             |                                                                                                                                                                                                                       |                                                                                    |             |                |                               |                                                                     |                                       |
| 2.5       |          |                                    |             | Depth of Excavation: 2.4 m<br>Termination Condition: Target depth                                                                                                                                                     |                                                                                    |             |                |                               |                                                                     |                                       |
| 3.0       |          |                                    |             |                                                                                                                                                                                                                       |                                                                                    |             |                |                               |                                                                     |                                       |

TEST PIT LOG- SINGLE SITE SKETCH TP01-TP09.GPJ NZ MASTER DATA TEMPLATE.GDT 18/9/23

Test Pit met target depth at 2.4 m.  
Scala Penetrometer met practical refusal at 0.6 m depth.  
Standing groundwater was not encountered.

TS = Topsoil  
N/A = Not Assessed



# LOG OF TEST PIT TP08

Geotechnical Investigation

160 Bangor Road  
Darfield, Canterbury  
24181.000.001

Client : Hughes D. L.  
Date : 13-09-2023  
Max Test Pit Depth : 2.5 m  
Digger Type/Size : Bucket Excavator  
Bucket Type/Size : 500 mm

Shear Vane No : 1379  
Logged By : DD  
Reviewed By :  
Latitude : -43.481371  
Longitude : 172.0907877

| Depth (m) | Material | Excavatability<br>(Relative Scale) | USCS Symbol | DESCRIPTION                                                                                                                                                                                   | Graphic Symbol | Water Level | Moisture Cond. | Consistency/<br>Density Index | Shear Vane<br>Undrained<br>Shear Strength<br>Peak/Remolded<br>(kPa) | Scala Penetrometer<br><br>Blows per 100mm |
|-----------|----------|------------------------------------|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|-------------|----------------|-------------------------------|---------------------------------------------------------------------|-------------------------------------------|
|           |          | Easier                             | Harder      |                                                                                                                                                                                               |                |             |                |                               |                                                                     | 2 4 6 8 10 12                             |
| 0.5       | TS       |                                    | ML          | [TOPSOIL] SILT with some sand and trace rootlets; dark brown. Low plasticity; sand is fine.                                                                                                   |                |             |                | N/A                           |                                                                     |                                           |
|           |          |                                    | ML          | Gravelly SILT with minor sand and trace rootlets; light brown. Low plasticity; sand is fine to medium; gravel is fine to medium, subrounded to rounded.                                       |                |             |                | VSt                           | 150/8                                                               |                                           |
| 1.0       |          |                                    |             | Sandy fine to coarse GRAVEL with minor cobbles and trace rootlets; brown. Well graded; sand is fine to coarse; maximum cobble size is 100mm X 150mm X 150mm; gravel is subrounded to rounded. |                |             |                |                               |                                                                     |                                           |
| 1.5       | ALLUVIUM |                                    | GW          |                                                                                                                                                                                               |                |             | M              | D                             |                                                                     |                                           |
| 2.5       |          |                                    |             | Depth of Excavation: 2.5 m<br>Termination Condition: Target depth                                                                                                                             |                |             |                |                               |                                                                     |                                           |
| 3.0       |          |                                    |             |                                                                                                                                                                                               |                |             |                |                               |                                                                     |                                           |

TEST PIT LOG- SINGLE SITE SKETCH TP01-TP09.GPJ NZ MASTER DATA TEMPLATE.GDT 18/9/23

Test Pit met target depth at 2.5 m.  
Scala Penetrometer met practical refusal at 0.7 m depth.  
Standing groundwater was not encountered.

TS = Topsoil  
N/A = Not Assessed

# LOG OF TEST PIT TP09

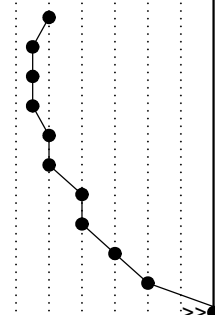
Geotechnical Investigation

160 Bangor Road  
Darfield, Canterbury  
24181.000.001

Client : Hughes D. L.  
Date : 13-09-2023  
Max Test Pit Depth : 2.5 m  
Digger Type/Size : Bucket Excavator  
Bucket Type/Size : 500 mm

Shear Vane No : 1379  
Logged By : DD  
Reviewed By :  
Latitude : -43.4854862  
Longitude : 172.0817903

| Depth (m) | Material | Excavatability<br>(Relative Scale) | USCS Symbol | DESCRIPTION                                                                                                                                                        | Graphic Symbol                                                                     | Water Level | Moisture Cond. | Consistency/<br>Density Index | Shear Vane<br>Undrained<br>Shear Strength<br>Peak/Remolded<br>(kPa) | Scala Penetrometer<br>Blows per 100mm |
|-----------|----------|------------------------------------|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-------------|----------------|-------------------------------|---------------------------------------------------------------------|---------------------------------------|
|           |          | Easier                             | Harder      |                                                                                                                                                                    |                                                                                    |             |                |                               |                                                                     | 2 4 6 8 10 12                         |
| 0.5       | TS       |                                    | ML          | [TOPSOIL] SILT with minor sand and trace rootlets; dark brown. Low plasticity; sand is fine.                                                                       |   |             |                | N/A                           |                                                                     |                                       |
|           |          |                                    | ML          | Sandy SILT with trace rootlets; light brown. Low plasticity; sand is fine to medium.                                                                               |   |             |                | VSt                           | 141/25                                                              |                                       |
| 1.0       |          |                                    | GW          | Silty fine to coarse GRAVEL with minor sand and trace rootlets; light brown. Well graded; sand is fine to coarse; gravel is fine to coarse, subrounded to rounded. |   |             |                |                               |                                                                     |                                       |
| 1.5       | ALLUVIUM |                                    | GW          | Sandy fine to coarse GRAVEL with trace rootlets; brown. Well graded; sand is fine to coarse; gravel is subrounded to rounded.                                      |  |             | M              | D                             |                                                                     |                                       |
| 2.5       |          |                                    |             | 1.5 m - Rootlets cease and minor cobbles encountered; maximum cobble size is 100mm X 100mm X 15 mm.                                                                |                                                                                    |             |                |                               |                                                                     |                                       |
| 3.0       |          |                                    |             | Depth of Excavation: 2.5 m<br>Termination Condition: Target depth                                                                                                  |                                                                                    |             |                |                               |                                                                     |                                       |



TEST PIT LOG- SINGLE SITE SKETCH TP01-TP09.GPJ NZ MASTER DATA TEMPLATE.GDT 18/9/23

Test Pit met target depth at 2.5 m.  
Scala Penetrometer met practical refusal at 1.1 m depth.  
Standing groundwater was not encountered.

TS = Topsoil  
N/A = Not Assessed



## LOG OF TEST PIT TP10

Geotechnical Investigation  
160 Bangor Road  
Darfield, Canterbury  
24181.000.001

Client : Hughes D. L.  
Date : 29-05-2024  
Max Test Pit Depth : 2.7 m  
Digger Type/Size : Bucket Excavator  
Bucket Type/Size : 600mm

Shear Vane No : 1150  
Logged By : DD/BC  
Reviewed By : RJ  
Latitude : -43.4781516  
Longitude : 172.0935809

| Depth (m BGL) | Material | Excavatability<br>(Relative Scale) | Harder | USCS Symbol | DESCRIPTION                                                                                                                                | Graphic Symbol                                                                     | Elevation (mRL) | Water Level | Moisture Cond. | Consistency/<br>Density Index | Shear Vane<br>Peak/Remolded<br>(kPa) | Scala Penetrometer<br><br>Blows per 100mm<br><br>2 4 6 8 10 12 |
|---------------|----------|------------------------------------|--------|-------------|--------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-----------------|-------------|----------------|-------------------------------|--------------------------------------|----------------------------------------------------------------|
|               | TS       |                                    |        | ML          | [TOPSOIL] SILT with minor sand and trace rootlets; brown. Low plasticity; sand is fine.                                                    |   |                 |             | M              | NA                            |                                      |                                                                |
| 0.5           |          |                                    |        |             | Sandy fine to coarse GRAVEL with minor silt; light brown. Well graded; gravel is subrounded to rounded, greywacke; sand is fine to coarse. |   |                 |             | D              | MD-D                          |                                      |                                                                |
| 1.0           |          |                                    |        |             |                                                                                                                                            |                                                                                    |                 |             |                |                               |                                      |                                                                |
| 1.5           |          |                                    |        | GW          | 1.3 m - trace cobbles and boulders encountered.                                                                                            |  |                 |             | M              | Tightly packed                |                                      |                                                                |
| 2.0           |          |                                    |        |             |                                                                                                                                            |                                                                                    |                 |             |                |                               |                                      |                                                                |
| 2.5           |          |                                    |        |             |                                                                                                                                            |                                                                                    |                 |             |                |                               |                                      |                                                                |
| 3.0           |          |                                    |        |             | Depth of Excavation: 2.7 m<br>Termination Condition: met target depth                                                                      |                                                                                    |                 |             |                |                               |                                      |                                                                |
| 3.5           |          |                                    |        |             |                                                                                                                                            |                                                                                    |                 |             |                |                               |                                      |                                                                |

undefined met target depth at 2.7 m depth .  
met practical refusal  
Standing groundwater was not encountered

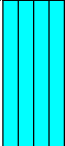
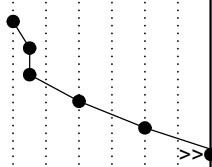


## LOG OF TEST PIT TP11

Geotechnical Investigation  
160 Bangor Road  
Darfield, Canterbury  
24181.000.001

Client : Hughes D. L.  
Date : 29-05-2024  
Max Test Pit Depth : 2.8 m  
Digger Type/Size : Bucket Excavator  
Bucket Type/Size : 600mm

Shear Vane No : 1150  
Logged By : DD/BC  
Reviewed By : RJ  
Latitude : -43.4818578  
Longitude : 172.0981335

| Depth (m BGL) | Material | Excavatability<br>(Relative Scale) | Harder | USCS Symbol | DESCRIPTION                                                                                                                                                                                    | Graphic Symbol                                                                     | Elevation (mRL) | Water Level | Moisture Cond. | Consistency/<br>Density Index | Shear Vane<br>Peak/Remolded<br>(kPa) | Scala Penetrometer<br><br>Blows per 100mm<br><br>2 4 6 8 10 12                      |
|---------------|----------|------------------------------------|--------|-------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-----------------|-------------|----------------|-------------------------------|--------------------------------------|-------------------------------------------------------------------------------------|
|               | TS       |                                    |        | ML          | [TOPSOIL] SILT with minor sand and trace rootlets; brown. Low plasticity; sand is fine.                                                                                                        |   |                 |             |                | NA                            |                                      |                                                                                     |
| 0.5           |          |                                    |        | ML          | SILT with minor sand and trace rootlets; yellow brown with orange mottles. Low plasticity; sand is fine.                                                                                       |   |                 |             |                | H                             | UTP                                  |  |
| 1.0           |          |                                    |        | GW          | Sandy fine to coarse GRAVEL with trace silt, cobbles and boulders; light brown. Well graded; gravel is subrounded to rounded, greywacke; sand is fine to coarse.<br><br>1.3 m - becoming grey. |  |                 |             | M              | Tightly packed                |                                      |                                                                                     |
| 1.5           |          |                                    |        |             |                                                                                                                                                                                                |                                                                                    |                 |             |                |                               |                                      |                                                                                     |
| 2.0           |          |                                    |        |             |                                                                                                                                                                                                |                                                                                    |                 |             |                |                               |                                      |                                                                                     |
| 2.5           |          |                                    |        |             |                                                                                                                                                                                                |                                                                                    |                 |             |                |                               |                                      |                                                                                     |
| 3.0           |          |                                    |        |             | Depth of Excavation: 2.8 m<br>Termination Condition: met target depth                                                                                                                          |                                                                                    |                 |             |                |                               |                                      |                                                                                     |
| 3.5           |          |                                    |        |             |                                                                                                                                                                                                |                                                                                    |                 |             |                |                               |                                      |                                                                                     |

undefined met target depth at 2.8 m depth .  
met practical refusal  
Standing groundwater was not encountered

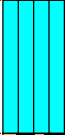
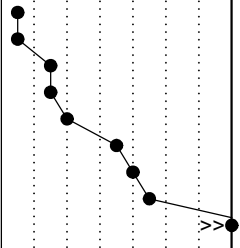


## LOG OF TEST PIT TP12

Geotechnical Investigation  
160 Bangor Road  
Darfield, Canterbury  
24181.000.001

Client : Hughes D. L.  
Date : 29-05-2024  
Max Test Pit Depth : 3.1 m  
Digger Type/Size : Bucket Excavator  
Bucket Type/Size : 600mm

Shear Vane No : 1150  
Logged By : DD/BC  
Reviewed By : RJ  
Latitude : -43.4810682  
Longitude : 172.0933882

| Depth (m BGL) | Material | Excavatability<br>(Relative Scale) | Harder | USCS Symbol | DESCRIPTION                                                                                                                                                | Graphic Symbol                                                                     | Elevation (mRL) | Water Level | Moisture Cond. | Consistency/<br>Density Index | Shear Vane<br>Peak/Remolded<br>(kPa) | Scala Penetrometer<br><br>Blows per 100mm<br><br>2 4 6 8 10 12                      |
|---------------|----------|------------------------------------|--------|-------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|-----------------|-------------|----------------|-------------------------------|--------------------------------------|-------------------------------------------------------------------------------------|
|               | TS       |                                    |        | ML          | [TOPSOIL] SILT with minor sand and trace rootlets; brown. Low plasticity; sand is fine.                                                                    |   |                 |             |                | NA                            |                                      |                                                                                     |
| 0.5           |          |                                    |        | ML          | SILT with minor sand and trace rootlets; yellow brown with orange mottles. Low plasticity; sand is fine.                                                   |   |                 |             |                | H                             | UTP                                  |  |
| 1.0           |          |                                    |        |             | Sandy fine to coarse GRAVEL with trace cobbles and boulders; light brown. Well graded; gravel is subrounded to rounded, greywacke; sand is fine to coarse. |  |                 |             | M              |                               |                                      |                                                                                     |
| 1.5           | ALLUVIUM |                                    |        | GW          |                                                                                                                                                            |                                                                                    |                 |             |                | Tightly packed                |                                      |                                                                                     |
| 2.0           |          |                                    |        |             |                                                                                                                                                            |                                                                                    |                 |             |                |                               |                                      |                                                                                     |
| 2.5           |          |                                    |        |             |                                                                                                                                                            |                                                                                    |                 |             |                |                               |                                      |                                                                                     |
| 3.0           |          |                                    |        |             |                                                                                                                                                            |                                                                                    |                 |             |                |                               |                                      |                                                                                     |
| 3.5           |          |                                    |        |             | Depth of Excavation: 3.1 m<br>Termination Condition: met target depth                                                                                      |                                                                                    |                 |             |                |                               |                                      |                                                                                     |

undefined met target depth at 3.1 m depth .  
met practical refusal  
Standing groundwater was not encountered





## LOG OF TEST PIT TP13

Geotechnical Investigation  
160 Bangor Road  
Darfield, Canterbury  
24181.000.001

Client : Hughes D. L.  
Date : 29-05-2024  
Max Test Pit Depth : 3 m  
Digger Type/Size : Bucket Excavator  
Bucket Type/Size : 600mm

Shear Vane No : 1150  
Logged By : BC  
Reviewed By : RJ  
Latitude : -43.4781224  
Longitude : 172.0878869

| Depth (m BGL) | Material | Excavatability<br>(Relative Scale) | Harder | USCS Symbol | DESCRIPTION                                                                                                                                   | Graphic Symbol | Elevation (mRL) | Water Level | Moisture Cond. | Consistency/<br>Density Index | Shear Vane<br>Peak/Remolded<br>(kPa) | Scala Penetrometer<br><br>Blows per 100mm<br><br>2 4 6 8 10 12 |
|---------------|----------|------------------------------------|--------|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------|----------------|-----------------|-------------|----------------|-------------------------------|--------------------------------------|----------------------------------------------------------------|
| 0.5           | TS       |                                    |        | ML          | [TOPSOIL] SILT with minor sand and trace rootlets; brown. Low plasticity; sand is fine.                                                       |                |                 |             | M              | NA                            | UTP                                  |                                                                |
|               |          |                                    |        | ML          | SILT with minor sand, gravel and trace rootlets; yellow brown. Low plasticity; sand is fine. Gravel is fine to medium; subrounded, greywacke. |                |                 |             |                | H                             |                                      |                                                                |
| 1.0           |          |                                    |        |             | Sandy fine to coarse GRAVEL with trace cobbles; pale brown. Well graded; gravel is subrounded to rounded, greywacke; sand is fine to coarse.  |                |                 |             |                |                               |                                      |                                                                |
| 1.5           | ALLUVIUM |                                    |        | GW          |                                                                                                                                               |                |                 | M           |                | Tightly packed                |                                      |                                                                |
| 2.0           |          |                                    |        |             |                                                                                                                                               |                |                 |             |                |                               |                                      |                                                                |
| 2.5           |          |                                    |        |             |                                                                                                                                               |                |                 |             |                |                               |                                      |                                                                |
| 3.0           |          |                                    |        |             |                                                                                                                                               |                |                 |             |                |                               |                                      |                                                                |
| 3.5           |          |                                    |        |             | Depth of Excavation: 3 m<br>Termination Condition: met target depth                                                                           |                |                 |             |                |                               |                                      |                                                                |

undefined met target depth at 3 m depth .  
met practical refusal  
Standing groundwater was not encountered



## LOG OF TEST PIT TP14

Geotechnical Investigation  
160 Bangor Road  
Darfield, Canterbury  
24181.000.001

Client : Hughes D. L.  
Date : 29-05-2024  
Max Test Pit Depth : 2.8 m  
Digger Type/Size : Bucket Excavator  
Bucket Type/Size : 600mm

Shear Vane No : 1150  
Logged By : BC  
Reviewed By : RJ  
Latitude : -43.4794013  
Longitude : 172.0906512

| Depth (m BGL) | Material | Excavatability<br>(Relative Scale) | Harder | USCS Symbol | DESCRIPTION                                                                                                                                             | Graphic Symbol | Elevation (mRL) | Water Level | Moisture Cond. | Consistency/<br>Density Index | Shear Vane<br>Peak/Remolded<br>(kPa) | Scala Penetrometer<br><br>Blows per 100mm<br><br>2 4 6 8 10 12 |
|---------------|----------|------------------------------------|--------|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|-----------------|-------------|----------------|-------------------------------|--------------------------------------|----------------------------------------------------------------|
|               | TS       |                                    |        | ML          | [TOPSOIL] SILT with minor sand and trace rootlets; brown. Low plasticity; sand is fine.                                                                 |                |                 |             |                | NA                            | UTP                                  |                                                                |
| 0.5           |          |                                    |        | ML          | SILT with minor sand and trace rootlets; yellow brown. Low plasticity; sand is fine.                                                                    |                |                 |             | D              | H                             |                                      |                                                                |
| 1.0           |          |                                    |        |             | Sandy fine to coarse GRAVEL with trace cobbles & boulders; pale brown. Well graded; gravel is subrounded to rounded, greywacke; sand is fine to coarse. |                |                 |             |                | D                             |                                      |                                                                |
| 1.5           | ALLUVIUM |                                    |        | GW          |                                                                                                                                                         |                |                 |             |                |                               |                                      |                                                                |
| 2.0           |          |                                    |        |             |                                                                                                                                                         |                |                 | M           |                | Tightly packed                |                                      |                                                                |
| 2.5           |          |                                    |        |             |                                                                                                                                                         |                |                 |             |                |                               |                                      |                                                                |
| 3.0           |          |                                    |        |             | Depth of Excavation: 2.8 m<br>Termination Condition: met target depth                                                                                   |                |                 |             |                |                               |                                      |                                                                |
| 3.5           |          |                                    |        |             |                                                                                                                                                         |                |                 |             |                |                               |                                      |                                                                |

undefined met target depth at 2.8 m depth .  
met practical refusal  
Standing groundwater was not encountered



## LOG OF TEST PIT TP15

Geotechnical Investigation  
160 Bangor Road  
Darfield, Canterbury  
24181.000.001

Client : Hughes D. L.  
Date : 29-05-2024  
Max Test Pit Depth : 2.9 m  
Digger Type/Size : Bucket Excavator  
Bucket Type/Size : 600mm

Shear Vane No : 1150  
Logged By : BC  
Reviewed By : RJ  
Latitude : -43.4820241  
Longitude : 172.0871795

| Depth (m BGL) | Material | Excavatability<br>(Relative Scale) | Harder | USCS Symbol | DESCRIPTION                                                                                                                                  | Graphic Symbol | Elevation (mRL) | Water Level | Moisture Cond. | Consistency/<br>Density Index | Shear Vane<br>Peak/Remolded<br>(kPa) | Scala Penetrometer<br><br>Blows per 100mm<br><br>2 4 6 8 10 12 |
|---------------|----------|------------------------------------|--------|-------------|----------------------------------------------------------------------------------------------------------------------------------------------|----------------|-----------------|-------------|----------------|-------------------------------|--------------------------------------|----------------------------------------------------------------|
|               | TS       |                                    |        | ML          | [TOPSOIL] SILT with minor sand and trace rootlets; brown. Low plasticity; sand is fine.                                                      |                |                 |             |                | NA                            |                                      |                                                                |
| 0.5           |          |                                    |        | ML          | SILT with minor sand and trace rootlets; yellow brown. Low plasticity; sand is fine.                                                         |                |                 |             |                | H                             | UTP                                  |                                                                |
| 1.0           |          |                                    |        |             | Sandy fine to coarse GRAVEL with trace cobbles; pale brown. Well graded; gravel is subrounded to rounded, greywacke; sand is fine to coarse. |                |                 |             |                |                               |                                      |                                                                |
| 1.5           | ALLUVIUM |                                    |        | GW          |                                                                                                                                              |                |                 |             | M              | Tightly packed                |                                      |                                                                |
| 2.0           |          |                                    |        |             |                                                                                                                                              |                |                 |             |                |                               |                                      |                                                                |
| 2.5           |          |                                    |        |             |                                                                                                                                              |                |                 |             |                |                               |                                      |                                                                |
| 3.0           |          |                                    |        |             | Depth of Excavation: 2.9 m<br>Termination Condition: met target depth                                                                        |                |                 |             |                |                               |                                      |                                                                |
| 3.5           |          |                                    |        |             |                                                                                                                                              |                |                 |             |                |                               |                                      |                                                                |

undefined met target depth at 2.9 m depth .  
met practical refusal  
Standing groundwater was not encountered



## LOG OF TEST PIT TP16

Geotechnical Investigation  
160 Bangor Road  
Darfield, Canterbury  
24181.000.001

Client : Hughes D. L.  
Date : 29-05-2024  
Max Test Pit Depth : 2.9 m  
Digger Type/Size : Bucket Excavator  
Bucket Type/Size : 600mm

Shear Vane No : 1150  
Logged By : DD/BC  
Reviewed By : RJ  
Latitude : -43.4838519  
Longitude : 172.0925528

| Depth (m BGL) | Material | Excavatability<br>(Relative Scale) | Harder | USCS Symbol | DESCRIPTION                                                                                                                                                                    | Graphic Symbol | Elevation (mRL) | Water Level | Moisture Cond. | Consistency/<br>Density Index | Shear Vane<br>Peak/Remolded<br>(kPa) | Scala Penetrometer<br><br>Blows per 100mm<br><br>2 4 6 8 10 12 |
|---------------|----------|------------------------------------|--------|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|-----------------|-------------|----------------|-------------------------------|--------------------------------------|----------------------------------------------------------------|
|               | TS       |                                    |        | ML          | [TOPSOIL] SILT with minor sand and trace rootlets; brown. Low plasticity; sand is fine.                                                                                        |                |                 |             |                | NA                            |                                      |                                                                |
| 0.5           |          |                                    |        | ML          | SILT with minor sand and trace rootlets; yellow brown. Low plasticity; sand is fine.                                                                                           |                |                 |             |                | H                             | UTP                                  |                                                                |
| 1.0           |          |                                    |        |             | Sandy fine to coarse GRAVEL with trace cobbles and rootlets; pale brown with orange staining. Well graded; gravel is subrounded to rounded, greywacke; sand is fine to coarse. |                |                 |             |                |                               |                                      |                                                                |
| 1.5           |          |                                    |        |             | 1.5m - rootlets ceased.                                                                                                                                                        |                |                 |             | M              |                               |                                      |                                                                |
| 2.0           |          |                                    |        | GW          | 1.7m - with minor cobbles.                                                                                                                                                     |                |                 |             |                | Tightly packed                |                                      |                                                                |
| 2.5           |          |                                    |        |             |                                                                                                                                                                                |                |                 |             |                |                               |                                      |                                                                |
| 3.0           |          |                                    |        |             | Depth of Excavation: 2.9 m<br>Termination Condition: met target depth                                                                                                          |                |                 |             |                |                               |                                      |                                                                |
| 3.5           |          |                                    |        |             |                                                                                                                                                                                |                |                 |             |                |                               |                                      |                                                                |

undefined met target depth at 2.9 m depth .  
met practical refusal  
Standing groundwater was not encountered



## LOG OF TEST PIT TP17

Geotechnical Investigation  
160 Bangor Road  
Darfield, Canterbury  
24181.000.001

Client : Hughes D. L.  
Date : 29-05-2024  
Max Test Pit Depth : 2.9 m  
Digger Type/Size : Bucket Excavator  
Bucket Type/Size : 600mm

Shear Vane No : 1150  
Logged By : DD/BC  
Reviewed By : RJ  
Latitude : -43.485489  
Longitude : 172.0867751

| Depth (m BGL) | Material | Excavatability<br>(Relative Scale) | Harder | USCS Symbol | DESCRIPTION                                                                                                                                                                                            | Graphic Symbol | Elevation (mRL) | Water Level | Moisture Cond. | Consistency/<br>Density Index | Shear Vane<br>Peak/Remolded<br>(kPa) | Scala Penetrometer<br><br>Blows per 100mm<br><br>2 4 6 8 10 12 |
|---------------|----------|------------------------------------|--------|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|-----------------|-------------|----------------|-------------------------------|--------------------------------------|----------------------------------------------------------------|
|               | TS       |                                    |        | ML          | [TOPSOIL] SILT with minor sand and trace rootlets; brown. Low plasticity; sand is fine.                                                                                                                |                |                 |             |                | NA                            |                                      |                                                                |
| 0.5           |          |                                    |        |             | Sandy fine to coarse GRAVEL with trace cobbles and rootlets; pale brown with orange staining. Well graded; gravel is subrounded to rounded, greywacke; sand is fine to coarse. 0.7m - rootlets ceased. |                |                 |             |                | H                             |                                      |                                                                |
| 1.0           |          |                                    |        |             |                                                                                                                                                                                                        |                |                 |             |                |                               |                                      |                                                                |
| 1.5           | ALLUVIUM |                                    |        | GW          |                                                                                                                                                                                                        |                |                 |             | M              | Tightly packed                |                                      |                                                                |
| 2.0           |          |                                    |        |             |                                                                                                                                                                                                        |                |                 |             |                |                               |                                      |                                                                |
| 2.5           |          |                                    |        |             |                                                                                                                                                                                                        |                |                 |             |                |                               |                                      |                                                                |
| 3.0           |          |                                    |        |             | Depth of Excavation: 2.9 m<br>Termination Condition: met target depth                                                                                                                                  |                |                 |             |                |                               |                                      |                                                                |
| 3.5           |          |                                    |        |             |                                                                                                                                                                                                        |                |                 |             |                |                               |                                      |                                                                |

undefined met target depth at 2.9 m depth .  
met practical refusal  
Standing groundwater was not encountered



## LOG OF TEST PIT TP18

Geotechnical Investigation  
160 Bangor Road  
Darfield, Canterbury  
24181.000.001

Client : Hughes D. L.  
Date : 29-05-2024  
Max Test Pit Depth : 2.9 m  
Digger Type/Size : Bucket Excavator  
Bucket Type/Size : 600mm

Shear Vane No : 1150  
Logged By : DD/BC  
Reviewed By : RJ  
Latitude : -43.4786989  
Longitude : 172.083777

| Depth (m BGL) | Material | Excavatability<br>(Relative Scale) | Harder | USCS Symbol | DESCRIPTION                                                                                                                                                       | Graphic Symbol | Elevation (mRL) | Water Level | Moisture Cond. | Consistency/<br>Density Index | Shear Vane<br>Peak/Remolded<br>(kPa) | Scala Penetrometer<br><br>Blows per 100mm<br><br>2 4 6 8 10 12 |
|---------------|----------|------------------------------------|--------|-------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|-----------------|-------------|----------------|-------------------------------|--------------------------------------|----------------------------------------------------------------|
|               | TS       |                                    |        | ML          | [TOPSOIL] SILT with minor sand and trace rootlets; brown. Low plasticity; sand is fine.                                                                           |                |                 |             |                | NA                            |                                      |                                                                |
| 0.5           |          |                                    |        | ML          | SILT with minor sand and trace rootlets; yellow brown. Low plasticity; sand is fine.                                                                              |                |                 |             |                | VSt                           | 178/6                                |                                                                |
| 1.0           |          |                                    |        |             | Sandy fine to coarse GRAVEL with trace cobbles; pale brown with orange staining. Well graded; gravel is subrounded to rounded, greywacke; sand is fine to coarse. |                |                 |             |                |                               |                                      |                                                                |
| 1.5           | ALLUVIUM |                                    |        | GW          | 1.7m - rootlets ceased.                                                                                                                                           |                |                 | M           |                | Tightly packed                |                                      |                                                                |
| 2.0           |          |                                    |        |             |                                                                                                                                                                   |                |                 |             |                |                               |                                      |                                                                |
| 2.5           |          |                                    |        |             |                                                                                                                                                                   |                |                 |             |                |                               |                                      |                                                                |
| 3.0           |          |                                    |        |             | Depth of Excavation: 2.9 m<br>Termination Condition: met target depth                                                                                             |                |                 |             |                |                               |                                      |                                                                |
| 3.5           |          |                                    |        |             |                                                                                                                                                                   |                |                 |             |                |                               |                                      |                                                                |

undefined met target depth at 2.9 m depth .  
met practical refusal  
Standing groundwater was not encountered





## LOG OF TEST PIT TP19

Geotechnical Investigation  
160 Bangor Road  
Darfield, Canterbury  
24181.000.001

Client : Hughes D. L.  
Date : 29-05-2024  
Max Test Pit Depth : 3 m  
Digger Type/Size : Bucket Excavator  
Bucket Type/Size : 600mm

Shear Vane No : 1150  
Logged By : DD/BC  
Reviewed By : RJ  
Latitude : -43.4807198  
Longitude : 172.0801285

| Depth (m BGL) | Material | Excavatability<br>(Relative Scale) | Harder | USCS Symbol | DESCRIPTION                                                                                                                                                                                  | Graphic Symbol | Elevation (mRL) | Water Level | Moisture Cond. | Consistency/<br>Density Index | Shear Vane<br>Peak/Remolded<br>(kPa) | Scala Penetrometer<br><br>Blows per 100mm<br><br>2 4 6 8 10 12 |
|---------------|----------|------------------------------------|--------|-------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|-----------------|-------------|----------------|-------------------------------|--------------------------------------|----------------------------------------------------------------|
|               | TS       |                                    |        | ML          | [TOPSOIL] SILT with minor sand and trace rootlets; brown. Low plasticity; sand is fine.                                                                                                      |                |                 |             | M              | NA                            |                                      |                                                                |
| 0.5           |          |                                    |        | ML          | SILT with minor sand and trace rootlets; yellow brown. Low plasticity; sand is fine.                                                                                                         |                |                 |             | D              | H                             |                                      |                                                                |
| 1.0           |          |                                    |        |             | Sandy fine to coarse GRAVEL with trace cobbles; pale brown with orange staining. Well graded; gravel is subrounded to rounded, greywacke; sand is fine to coarse.<br>1.0m - rootlets ceased. |                |                 |             | MD - D         |                               |                                      |                                                                |
| 1.5           | ALLUVIUM |                                    |        | GW          |                                                                                                                                                                                              |                |                 |             | M              | Tightly packed                |                                      |                                                                |
| 2.0           |          |                                    |        |             |                                                                                                                                                                                              |                |                 |             |                |                               |                                      |                                                                |
| 2.5           |          |                                    |        |             |                                                                                                                                                                                              |                |                 |             |                |                               |                                      |                                                                |
| 3.0           |          |                                    |        |             |                                                                                                                                                                                              |                |                 |             |                |                               |                                      |                                                                |
| 3.5           |          |                                    |        |             | Depth of Excavation: 3 m<br>Termination Condition: met target depth                                                                                                                          |                |                 |             |                |                               |                                      |                                                                |

GEOTECH TEST PIT LOG TP10-TP21.GPJ NZ MASTER DATA TEMPLATE.GDT 30/5/24

undefined met target depth at 3 m depth .  
met practical refusal  
Standing groundwater was not encountered



## LOG OF TEST PIT TP20

Geotechnical Investigation  
160 Bangor Road  
Darfield, Canterbury  
24181.000.001

Client : Hughes D. L.  
Date : 29-05-2024  
Max Test Pit Depth : 2.9 m  
Digger Type/Size : Bucket Excavator  
Bucket Type/Size : 600mm

Shear Vane No : 1150  
Logged By : DD/BC  
Reviewed By : RJ  
Latitude : -43.4832702  
Longitude : 172.0836516

| Depth (m BGL) | Material | Excavatability<br>(Relative Scale) | Harder | USCS Symbol | DESCRIPTION                                                                                                                                                                    | Graphic Symbol | Elevation (mRL) | Water Level | Moisture Cond. | Consistency/<br>Density Index | Shear Vane<br>Peak/Remolded<br>(kPa) | Scala Penetrometer<br><br>Blows per 100mm<br><br>2 4 6 8 10 12 |
|---------------|----------|------------------------------------|--------|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|-----------------|-------------|----------------|-------------------------------|--------------------------------------|----------------------------------------------------------------|
|               | TS       |                                    |        | ML          | [TOPSOIL] SILT with minor sand and trace rootlets; brown. Low plasticity; sand is fine.                                                                                        |                |                 |             |                | NA                            |                                      |                                                                |
| 0.5           |          |                                    |        | ML          | SILT with minor sand and trace rootlets; yellow brown. Low plasticity; sand is fine.                                                                                           |                |                 |             |                | H                             |                                      |                                                                |
| 1.0           |          |                                    |        |             | Sandy fine to coarse GRAVEL with trace cobbles and rootlets; pale brown with orange staining. Well graded; gravel is subrounded to rounded, greywacke; sand is fine to coarse. |                |                 |             |                | D                             |                                      |                                                                |
| 1.5           | ALLUVIUM |                                    |        | GW          |                                                                                                                                                                                |                |                 |             | M              | Tightly packed                |                                      |                                                                |
| 2.0           |          |                                    |        |             |                                                                                                                                                                                |                |                 |             |                |                               |                                      |                                                                |
| 2.5           |          |                                    |        |             |                                                                                                                                                                                |                |                 |             |                |                               |                                      |                                                                |
| 3.0           |          |                                    |        |             | Depth of Excavation: 2.9 m<br>Termination Condition: met target depth                                                                                                          |                |                 |             |                |                               |                                      |                                                                |
| 3.5           |          |                                    |        |             |                                                                                                                                                                                |                |                 |             |                |                               |                                      |                                                                |

undefined met target depth at 2.9 m depth .  
met practical refusal  
Standing groundwater was not encountered



## LOG OF TEST PIT TP21

Geotechnical Investigation  
160 Bangor Road  
Darfield, Canterbury  
24181.000.001

Client : Hughes D. L.  
Date : 29-05-2024  
Max Test Pit Depth : 3 m  
Digger Type/Size : Bucket Excavator  
Bucket Type/Size : 600mm

Shear Vane No : 1150  
Logged By : DD/BC  
Reviewed By : RJ  
Latitude : -43.4859695  
Longitude : 172.0908229

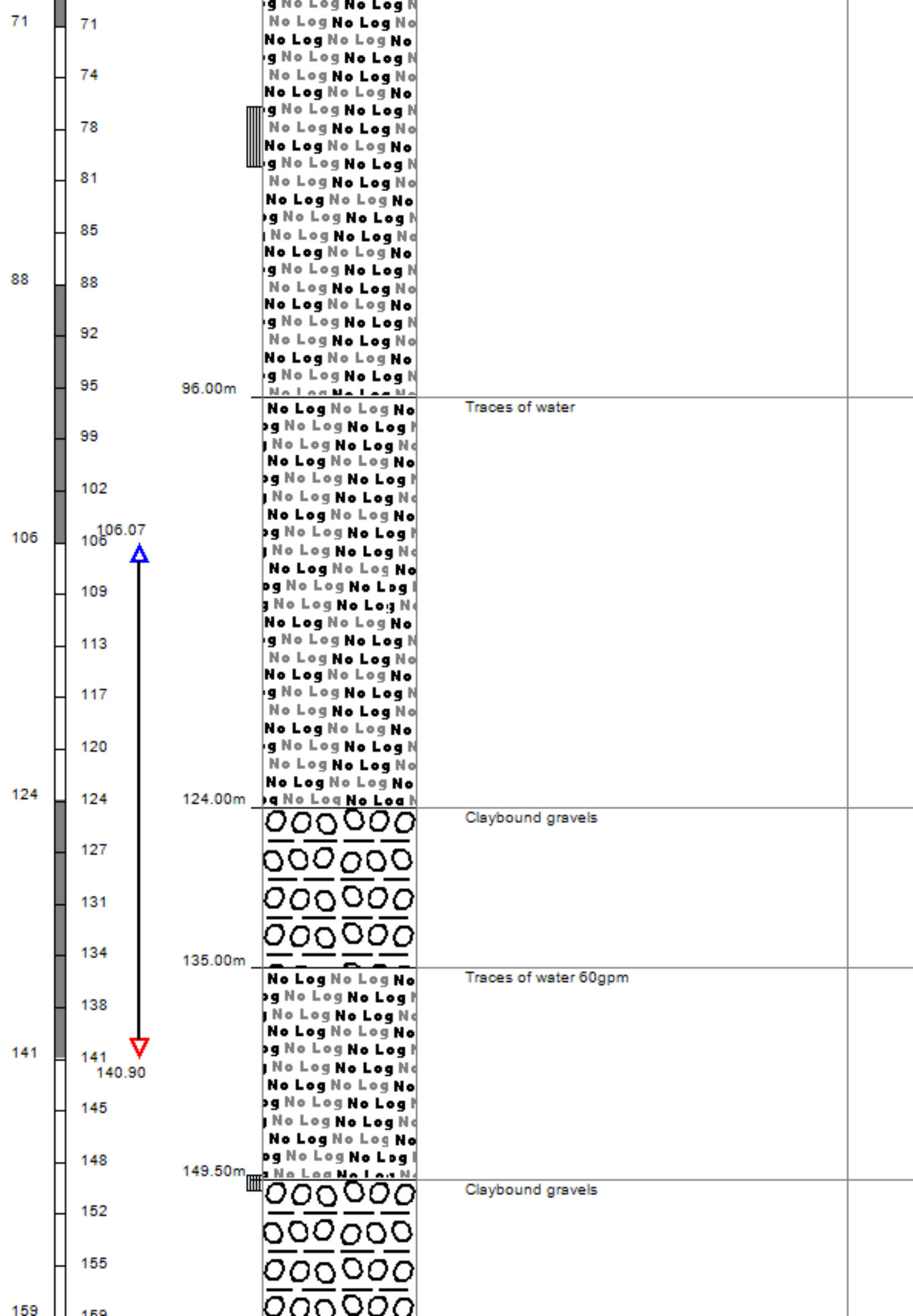
| Depth (m BGL) | Material | Excavatability<br>(Relative Scale) | Harder | USCS Symbol | DESCRIPTION                                                                                                                                                                    | Graphic Symbol | Elevation (mRL) | Water Level | Moisture Cond. | Consistency/<br>Density Index | Shear Vane<br>Peak/Remolded<br>(kPa) | Scala Penetrometer<br><br>Blows per 100mm<br><br>2 4 6 8 10 12 |
|---------------|----------|------------------------------------|--------|-------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|-----------------|-------------|----------------|-------------------------------|--------------------------------------|----------------------------------------------------------------|
|               | TS       |                                    |        | ML          | [TOPSOIL] SILT with minor sand and trace rootlets; brown. Low plasticity; sand is fine.                                                                                        |                |                 |             |                | NA                            |                                      |                                                                |
| 0.5           |          |                                    |        | ML          | Gravelly SILT with minor sand and trace rootlets; yellow brown. Low plasticity; sand is fine. Gravel is fine to medium, subrounded to rounded, greywacke.                      |                |                 |             |                | H                             |                                      |                                                                |
| 1.0           |          |                                    |        |             | Sandy fine to coarse GRAVEL with trace cobbles and boulders; pale brown with orange mottling. Well graded; gravel is subrounded to rounded, greywacke; sand is fine to coarse. |                |                 |             |                | D                             |                                      |                                                                |
| 1.5           | ALLUVIUM |                                    |        | GW          |                                                                                                                                                                                |                |                 | M           |                | Tightly packed                |                                      |                                                                |
| 2.0           |          |                                    |        |             |                                                                                                                                                                                |                |                 |             |                |                               |                                      |                                                                |
| 2.5           |          |                                    |        |             |                                                                                                                                                                                |                |                 |             |                |                               |                                      |                                                                |
| 3.0           |          |                                    |        |             |                                                                                                                                                                                |                |                 |             |                |                               |                                      |                                                                |
| 3.5           |          |                                    |        |             | Depth of Excavation: 3 m<br>Termination Condition: met target depth                                                                                                            |                |                 |             |                |                               |                                      |                                                                |

undefined met target depth at 3 m depth .  
met practical refusal  
Standing groundwater was not encountered

## **Appendix 3:** ECan Boreholes

Grid Reference (NZTM): 1525734 mE, 5185155 mN  
Location Accuracy: 50 - 300m  
Ground Level Altitude: 209.9 m +MSD Accuracy: < 2.5 m  
Driller: McMillan Drilling Ltd  
Drill Method: Rotary Rig  
Borelog Depth: 264.8 m    Drill Date: 12-Feb-1985

| Scale(m) | Water Level | Depth(m) | Full Drillers Description           | Formation Code |
|----------|-------------|----------|-------------------------------------|----------------|
|          |             |          | Hard drilling                       |                |
| 4        |             |          |                                     |                |
| 7        |             |          |                                     |                |
| 11       |             |          |                                     |                |
| 14       |             |          |                                     |                |
| 18       |             |          |                                     |                |
| 21       |             |          |                                     |                |
| 24.00m   |             |          |                                     |                |
| 25       |             |          | Very hard drilling                  |                |
| 27.00m   |             |          |                                     |                |
| 28       |             |          | Water in pipe (Casing broke at 54m) |                |
| 32       |             |          |                                     |                |
| 35       |             |          |                                     |                |
| 35       |             |          |                                     |                |
| 39       |             |          |                                     |                |
| 42       |             |          |                                     |                |
| 46       |             |          |                                     |                |
| 49       |             |          |                                     |                |
| 53       |             |          |                                     |                |
| 53       |             |          |                                     |                |
| 56       |             |          |                                     |                |
| 60       |             |          |                                     |                |
| 64       |             |          |                                     |                |
| 67       |             |          |                                     |                |
| 71       |             |          |                                     |                |
| 71       |             |          |                                     |                |





|     |         |         |                                                                                                                          |  |
|-----|---------|---------|--------------------------------------------------------------------------------------------------------------------------|--|
| 159 | 159     |         |                                                                                                                          |  |
|     | 162     | 163.00m |                                                                                                                          |  |
|     | 166     | 168.00m | Hard driving, some water approx<br>150-200 gpm cable tool taken out, well<br>sorted gravel, wl=117m dd=17m after<br>2hrs |  |
|     | 169     |         | Claybound gravels                                                                                                        |  |
|     | 173     |         |                                                                                                                          |  |
| 177 | 177     |         |                                                                                                                          |  |
|     | 180     |         |                                                                                                                          |  |
|     | 184     |         |                                                                                                                          |  |
|     | 187     |         |                                                                                                                          |  |
|     | 191     |         |                                                                                                                          |  |
| 194 | 194     | 196.00m |                                                                                                                          |  |
|     | 198     |         | Traces of water wl in this                                                                                               |  |
|     | 200.00m |         | Water-bearing zone = 138.5m                                                                                              |  |
|     | 201     |         | Less clay, more and more water, best<br>at 208-210m 'best water'                                                         |  |
|     | 205     |         |                                                                                                                          |  |
|     | 208     |         |                                                                                                                          |  |
| 212 | 212     |         |                                                                                                                          |  |
|     | 215     |         |                                                                                                                          |  |
|     | 219     |         |                                                                                                                          |  |
|     | 222     |         |                                                                                                                          |  |
|     | 226     | 228.00m |                                                                                                                          |  |
| 229 | 229     |         | Water-bearing, 6.8l/s for 11.0m of dd,<br>not screened                                                                   |  |
|     | 233     | 234.00m | Wlo=141.2m                                                                                                               |  |
|     | 237     |         |                                                                                                                          |  |
|     | 240     |         |                                                                                                                          |  |
|     | 244     |         |                                                                                                                          |  |
| 247 | 247     |         |                                                                                                                          |  |

|     |         |                    |                                    |  |
|-----|---------|--------------------|------------------------------------|--|
| 247 |         | No Log No Log No   |                                    |  |
|     | 247     | og No Log No Log   |                                    |  |
|     |         | g No Log No Log No |                                    |  |
|     | 251     | No Log No Log No   |                                    |  |
|     |         | g No Log No Log N  |                                    |  |
|     |         | No Log No Log No   |                                    |  |
|     | 253.70m | No Log No Log No   |                                    |  |
|     | 254     | ○ ○ ○ ○ ○ ○        | Claybound gravel                   |  |
|     | 258     | ○ ○ ○ ○ ○ ○        |                                    |  |
|     | 261     | ○ ○ ○ ○ ○ ○        |                                    |  |
|     | 261.79m | No Log No Log No   | At 264.8m water recovery poor est. |  |
| 265 | 264.79m | og No Log No Log   | 5gpm                               |  |

**Borelog for well BX22/0006**

Grid Reference (NZTM): 1525994 mE 5185659 mN

Grid Reference (NZTM): 152  
Location Accuracy: 10-50m

Ground Level Altitude: 213.4 m +MSD Accuracy:  $\leq 2.5$  m

Ground Level Altitude: 213.4

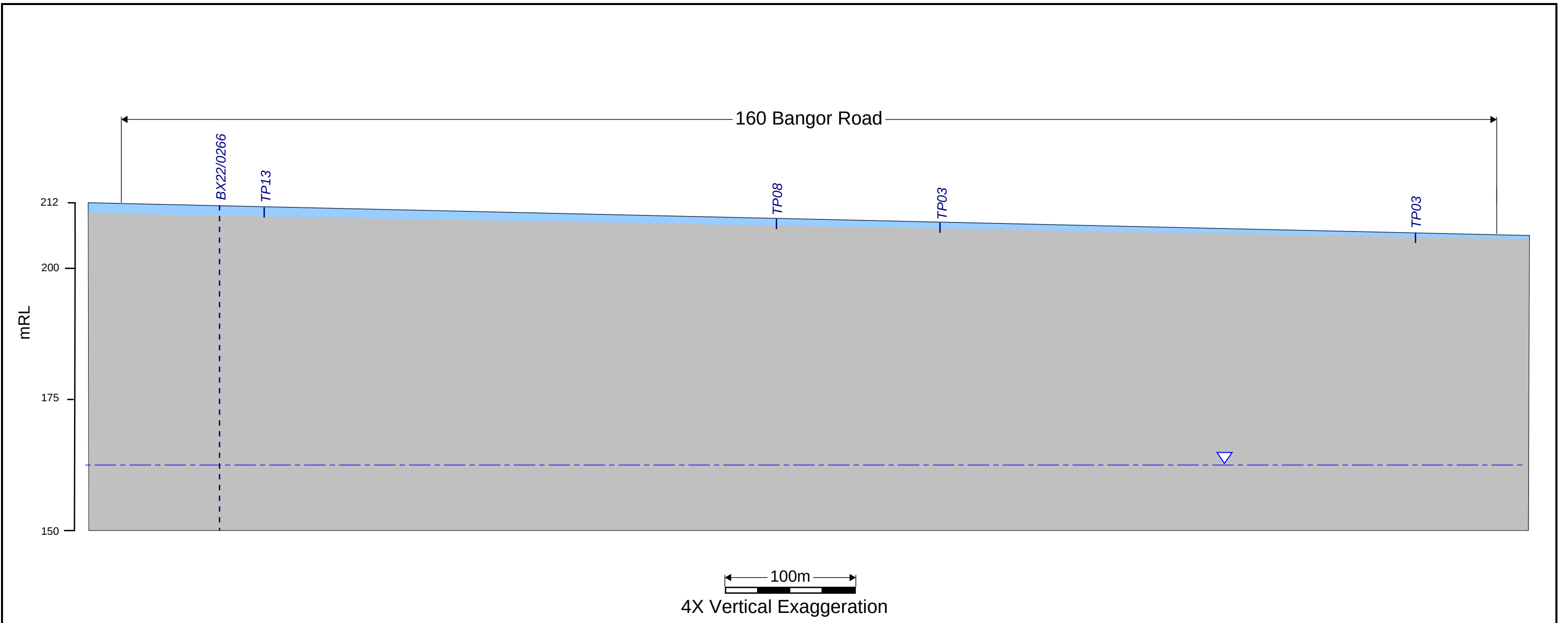
Driller: McMillan Drilling Ltd

Drill Method: Rotary/Percussion

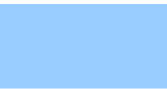


| Scale(m) | Water Level | Depth(m) | Full Drillers Description                                 | Formation Code |
|----------|-------------|----------|-----------------------------------------------------------|----------------|
| 1        |             | 1.00m    | TOPSOIL.                                                  |                |
| 2        |             |          | GRAVEL (2 - 60 MM)..                                      |                |
| 3        |             |          |                                                           |                |
| 4        |             |          |                                                           |                |
| 5        |             |          |                                                           |                |
| 6        |             |          |                                                           |                |
| 7        |             |          |                                                           |                |
| 8        |             |          |                                                           |                |
| 9        |             |          |                                                           |                |
| 10       |             | 10.00m   | clayey GRAVEL (2 - 60 MM)..                               |                |
| 11       |             |          |                                                           |                |
| 12       |             |          |                                                           |                |
| 13       |             |          |                                                           |                |
| 14       |             |          |                                                           |                |
| 15       |             |          |                                                           |                |
| 16       |             |          |                                                           |                |
| 17       |             |          |                                                           |                |
| 18       |             |          |                                                           |                |
| 19       |             |          |                                                           |                |
| 20       |             |          |                                                           |                |
| 21       |             |          |                                                           |                |
| 22       |             |          |                                                           |                |
| 23       |             |          |                                                           |                |
| 24       |             |          |                                                           |                |
| 25       |             |          |                                                           |                |
| 26       |             |          |                                                           |                |
| 27       |             |          |                                                           |                |
| 28       |             |          |                                                           |                |
| 29       |             |          |                                                           |                |
| 30       |             |          |                                                           |                |
| 31       |             |          |                                                           |                |
| 32       |             |          |                                                           |                |
| 33       |             |          |                                                           |                |
| 34       |             | 34.00m   | clayey GRAVEL (2 - 60 MM) with some sand..                |                |
| 35       |             |          |                                                           |                |
| 36       |             |          |                                                           |                |
| 37       |             |          |                                                           |                |
| 38       |             |          |                                                           |                |
| 39       |             | 39.00m   | sandy GRAVEL (2 - 60 MM) with some clay..                 |                |
| 40       |             |          |                                                           |                |
| 41       |             |          |                                                           |                |
| 42       |             |          |                                                           |                |
| 43       |             |          |                                                           |                |
| 44       |             |          |                                                           |                |
| 45       |             |          |                                                           |                |
| 46       |             |          |                                                           |                |
| 47       |             |          |                                                           |                |
| 48       |             |          |                                                           |                |
| 49       |             |          |                                                           |                |
| 50       |             |          |                                                           |                |
| 51       |             |          |                                                           |                |
| 52       |             | 52.00m   | clayey GRAVEL (2 - 60 MM).                                |                |
| 53       |             |          |                                                           |                |
| 54       |             |          |                                                           |                |
| 55       |             |          |                                                           |                |
| 56       |             |          |                                                           |                |
| 57       |             |          |                                                           |                |
| 58       |             |          |                                                           |                |
| 59       |             |          |                                                           |                |
| 60       |             |          |                                                           |                |
| 61       |             |          |                                                           |                |
| 62       |             |          |                                                           |                |
| 63       |             |          |                                                           |                |
| 64       |             |          |                                                           |                |
| 65       |             |          |                                                           |                |
| 66       |             |          |                                                           |                |
| 67       |             |          |                                                           |                |
| 68       |             |          |                                                           |                |
| 69       |             |          |                                                           |                |
| 70       |             |          |                                                           |                |
| 71       |             |          |                                                           |                |
| 72       |             |          |                                                           |                |
| 73       |             |          |                                                           |                |
| 74       |             |          |                                                           |                |
| 75       |             |          |                                                           |                |
| 76       |             |          |                                                           |                |
| 77       |             | 77.50m   | clayey GRAVEL (2 - 60 MM) with some sand..                |                |
| 78       |             |          |                                                           |                |
| 79       |             |          |                                                           |                |
| 80       |             |          |                                                           |                |
| 81       |             |          |                                                           |                |
| 82       |             |          |                                                           |                |
| 83       |             |          |                                                           |                |
| 84       |             |          |                                                           |                |
| 85       |             |          |                                                           |                |
| 86       |             |          |                                                           |                |
| 87       |             |          |                                                           |                |
| 88       |             |          |                                                           |                |
| 89       |             |          |                                                           |                |
| 90       |             |          |                                                           |                |
| 91       |             |          |                                                           |                |
| 92       |             |          |                                                           |                |
| 93       |             |          |                                                           |                |
| 94       |             |          |                                                           |                |
| 95       |             |          |                                                           |                |
| 96       |             |          |                                                           |                |
| 97       |             |          |                                                           |                |
| 98       |             |          |                                                           |                |
| 99       |             |          |                                                           |                |
| 100      |             |          |                                                           |                |
| 101      |             |          |                                                           |                |
| 102      |             |          |                                                           |                |
| 103      |             |          |                                                           |                |
| 104      |             |          |                                                           |                |
| 105      |             |          |                                                           |                |
| 106      |             |          |                                                           |                |
| 107      |             |          |                                                           |                |
| 108      |             | 108.00m  | sandy GRAVEL (2 - 60 MM) with some clay. Moderately sort. |                |
| 109      |             |          |                                                           |                |
| 110      |             |          |                                                           |                |
| 111      |             |          |                                                           |                |
| 112      |             |          |                                                           |                |
| 113      |             |          |                                                           |                |
| 114      |             |          |                                                           |                |
| 115      |             |          |                                                           |                |
| 116      |             |          |                                                           |                |
| 117      |             |          |                                                           |                |
| 118      |             |          |                                                           |                |
| 119      |             |          |                                                           |                |
| 120      |             |          |                                                           |                |
| 121      |             |          |                                                           |                |
| 122      |             |          |                                                           |                |
| 123      |             |          |                                                           |                |
| 124      |             |          |                                                           |                |
| 125      |             |          |                                                           |                |
| 126      |             |          |                                                           |                |
| 127      |             |          |                                                           |                |
| 128      |             |          |                                                           |                |
| 129      |             |          |                                                           |                |
| 130      |             |          |                                                           |                |
| 131      |             |          |                                                           |                |
| 132      |             |          |                                                           |                |
| 133      |             |          |                                                           |                |
| 134      |             |          |                                                           |                |
| 135      |             |          |                                                           |                |
| 136      |             |          |                                                           |                |
| 137      |             |          |                                                           |                |
| 138      |             |          |                                                           |                |
| 139      |             |          |                                                           |                |
| 140      |             | 140.00m  | sandy GRAVEL (2 - 60 MM). Moderately sort.                |                |
| 141      |             |          |                                                           |                |
| 142      |             |          |                                                           |                |

## Appendix 4: Cross Section



LEGEND

-  Stiff to Hard Gravelly SILT
-  Dense to Very Dense Sandy GRAVEL
-  ECan Regional Water Table Depth

Elevation data sourced from LINZ LiDAR 2015 Survey.

|                                                                                    |                                         |                                              |                           |                                  |
|------------------------------------------------------------------------------------|-----------------------------------------|----------------------------------------------|---------------------------|----------------------------------|
|  | Title:<br><br><b>Cross Section A-A'</b> | <b>Client:</b> Hughes Developments Limited   |                           | <b>Appendix:</b><br><br><b>5</b> |
|                                                                                    |                                         | <b>Project:</b><br>160 Bangor Road, Darfield | <b>Date:</b><br>30.5.2024 |                                  |
|                                                                                    |                                         | <b>Project Number:</b> 24181.000.001         |                           |                                  |

## Appendix 5:

### National Policy Statement – Natural Hazard Risk Matrix

# Appendix 1: Risk matrix, likelihood and consequence tables

When undertaking an assessment of natural hazard risk, the following risk matrix and associated tables must be applied to enable assessment of the consequence level and likelihood level and to determine the level of natural hazard risk applicable.

**Figure 1: Risk matrix**

|                   |              | Likelihood Level |             |           |          |            |               |           |
|-------------------|--------------|------------------|-------------|-----------|----------|------------|---------------|-----------|
|                   |              | Almost Certain   | Very Likely | Likely    | Possible | Unlikely   | Rare          | Very Rare |
| Consequence Level | ARI (years)  | up to 10         | 10-20       | 20-50     | 50-100   | 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       |

**Note:** The top end of the likelihood range includes the top end year, that is: Likely = over 20 years and up to and including 50 years.

**Table 1: Likelihood table**

| Likelihood level | Annual exceedance probability (AEP) | Average recurrence interval (ARI) or 'return period' |
|------------------|-------------------------------------|------------------------------------------------------|
| Almost certain   | 10% or more                         | Up to and including 10 years                         |
| Very likely      | 10% to 5%                           | Over 10 and up to and including 20 years             |
| Likely           | 5% to 2%                            | Over 20 and up to and including 50 years             |
| Possible         | 2% to 1%                            | Over 50 and up to and including 100 years            |
| Unlikely         | 1% to 0.2%                          | Over 100 and up to and including 500 years           |
| Rare             | 0.2% to 0.02%                       | Over 500 and up to and including 5,000 years         |
| Very rare        | Less than 0.02%                     | More than 5,000 years                                |

**Table 2: Consequence table**

| Consequence level | Damage to property                                                                                                                                         | Potential for injury or fatalities                                                           |
|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|
| Catastrophic      | Severe damage to land and building(s), potential for collapse or total destruction of structures. Building(s) need to be demolished, rebuilt or relocated. | High threat to life safety, with probable fatalities and/or critical injuries.               |
| Major             | Major damage to land and building(s), including structural damage. Loss of use and substantial repair required.                                            | Unsafe for people, with potential for many injuries, or critical injuries and/or fatalities. |



| Consequence level | Damage to property                                                                                   | Potential for injury or fatalities                                             |
|-------------------|------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------|
| Moderate          | Some damage to land and non-structural damage to building(s). Limited loss of use, repairs required. | Unsafe for people, with potential for injuries, although expected to be minor. |
| Minor             | Minor damage to land and building(s). No loss of use, minimal repairs required.                      | Isolated minor injuries possible.                                              |
| Negligible        | No loss of use, no building repairs required.                                                        | No injuries.                                                                   |

Made at Wellington on 15 December 2025.

Hon Chris Bishop  
For the Minister for the Environment

### Explanatory note

*This note is not part of the National Policy Statement for Natural Hazards but is intended to indicate its general effect.*

This National Policy Statement provides direction under the Resource Management Act 1991 for managing natural hazard risk associated with subdivision, use and development. It must be applied to flooding, landslips, coastal erosion, coastal inundation, active faults, liquefaction, and tsunami, and decision-makers may choose to use the same approach for other hazards.

Poorly located or designed development can increase exposure to natural hazards, creating significant risks for people, property and communities. These risks are expected to change over time, including through the effects of climate change. Consistent national direction helps reduce vulnerability and supports resilience.

The National Policy Statement requires decision-makers to assess risk using a risk matrix and manage it proportionately. Very high risk must be avoided, and other risks managed through mitigation measures. Decisions must be based on the best available information, even where that information is uncertain or incomplete.

This National Policy Statement does not apply to infrastructure (as defined in the Act) or primary production (as defined in the National Planning Standards). Where a conflict exists between the provisions of the New Zealand Coastal Policy Statement 2010 and this Statement, the New Zealand Coastal Policy Statement 2010 prevails. It does not override existing use rights under section 10 of the Act.

This National Policy Statement provides a baseline for managing natural hazard risk through planning. Where councils already have more stringent provisions in place, these should be followed.

Its purpose is to reduce the creation or increase of significant natural hazard risk and support communities to adapt to changing conditions.



## **Appendix 6:**

Subdivision Plan with Flood Map Overlay





## **Appendix 7:**

### Statement of Professional Opinion

# Statement of Professional Opinion on the Suitability of Land for Subdivision

(Appendix I to the Infrastructure Design Standard)

---

Issued by: *ENGEO Ltd*  
(*Geotechnical engineering firm or suitably qualified Geoprofessional*)

To: *Selwyn District Council*  
(*Territorial authority*)

To be supplied to: *Hughes Development Limited*  
(*Owner/Developer*)

In respect of: *160 Bangor Road Development*  
(*Description of proposed infrastructure/land development*)

At: *Lot 2 DP 81020 and Section 2 Survey Office Plan 438579 / 160 Bangor Road Darfield* (Address)

I (*Geoprofessional*) *Richard Justice* on behalf of (*Geotechnical engineering firm*) *ENGEO*

hereby confirm:

1. I am a suitably qualified and experienced Geoprofessional employed by *ENGEO Ltd* and the geotechnical firm named above was retained by the owner/developer as the Geoprofessional on the above proposed development.
2. The geotechnical assessment report, dated *30/06/2026* has been carried out in accordance with the Ministry of Building, Innovation and Employment *Part D - Guidelines for geotechnical investigation and assessment of subdivisions in the Canterbury region: Geotechnical requirements* and includes:
  - (i) Details of and the results of the site investigations.
  - (ii) An assessment of the ground bearing capacity confirming the location and appropriateness of building sites.
  - (iii) Recommendations proposing measures to avoid, remedy or mitigate any potential hazards on the land subject to the application, in accordance with the provisions of Section 106 of the Resource Management Act 1991.
3. In my professional opinion, not to be construed as a guarantee, I consider that Council is justified in granting consent incorporating the following conditions:

*The recommendations as discussed in our ENGEO Geotechnical Natural Hazard Assessment Report (ref: 24181.000.001\_10 are incorporated.*

4. This professional opinion is furnished to the territorial authority and the owner/developer for their purposes alone, on the express condition that it will not be relied upon by any other person and does not remove the necessity for the normal inspection of foundation conditions at the time of erection of any building. It is limited to those items referred to in clause 2 only.
5. This certificate shall be read in conjunction with the geotechnical report referred to in clause 2 above, and shall not be copied or reproduced except in conjunction with the full geotechnical completion report.
6. Liability under this statement accrues to the geotechnical firm only and no liability shall accrue to the individual completing this statement.

7. The geotechnical engineering firm issuing this statement holds a current policy of professional indemnity insurance of no less than \$ 10,000,000

(Minimum amount of insurance shall be commensurate with the current amounts recommended by IPENZ, ACENZ, NZTA, INGENIUM.)



.....  
(Signature of Engineer, for and on behalf of ENGE O Ltd )

Date: 30 June 2026

Qualifications and experience:

CMEngNZ 211093 (PEngGeol)

*This form is to accompany Form 9 – Resource Management Act 1991 (Application for a Resource Consent (Subdivision))*