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GEOTECHNICAL INVESTIGATION REPORT

PROPOSED NEW TWO-STOREY DWELLING

58 TE KAWA ROAD
GREENLANE

AMY XIONG

Reference: GM1557

Prepared: 14th December 2020

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Issued on: 22nd January 2021

GEOTECHNICAL INVESTIGATION REPORT

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AMY XIONG

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ATTACHMENTS:

Drawing Number: GM1557/1

Borehole Logs: HA1 to HA3

1. INTRODUCTION

This report presents the findings of a geotechnical investigation carried out for the proposed new two-storey dwelling at 58 Te Kawa Road, Greenlane.

The purpose of our investigation was to assess subsoil conditions and to provide recommendations for building foundations and the satisfactory development of the property.

This report has been prepared for Amy Xiong in accordance with our proposal letter dated 13th October 2020 and may be used in support of an application to Auckland Council for Resource Consent and/or Building Consent approval in respect of the proposed development as described herein.

2. SITE DESCRIPTION

The subject site (legally described as Lot 77, DP37882) is located on the western side of Te Kawa Road accessed by a concrete driveway. It comprises a rectangular shaped property with an area of 645 m².

The property is near level or gently sloping down toward the north, is currently grass covered and paved and contains a number of medium to large trees.

An existing dwelling is located at the middle of the site and comprises a single storey house. An existing garage is located at the western corner of the site.

Auckland Council GeoMaps indicates that an overland flow path passes through the eastern end of the site.

A site plan is attached, drawing number GM1557/1.

3. GEOLOGY

The Geological Map of Auckland¹ shows the subject site to be underlain by Lapilli Tuff of the Auckland Volcanic Field of the Kerikeri Volcanic Group. These deposits consist of lithic tuff, comprising comminuted pre-volcanic materials with basaltic fragments and unconsolidated ash and lapilli deposits.

The Tuff is inferred to be underlain by basalt lava flows in this area which typically comprise a rubbly upper surface underlain by more competent strong basalt rock.

4. EXISTING GEOTECHNICAL INFORMATION

We are not aware of any previously existing geotechnical information relating to this site.

5. PROPOSED DEVELOPMENT

We have been supplied with PTG Ltd drawings numbered RC001, RC101-104, RC201-203 and RC301-302, revision 2, job number 815, dated 22/10/2020. Based on this information we understand that the proposed development will comprise:

¹ Edbrooke S.W. (compiler) 2001. *Geology of the Auckland Area. Institute of Geological and Nuclear Sciences 1:250 000 Geological Map 3. 1 Sheet + 74p. Lower Hutt, New Zealand: Institute of Geological and Nuclear Sciences limited*

- Construction of a two-storey lightweight timber frame dwelling on concrete foundations and floor slabs located at the approximate centre of the site.
- Construction of two timber decks attached to the east and north sides of the proposed dwelling.
- Construction of a new concrete driveway located at the south eastern corner of the site.

The approximate location of the proposed dwelling is shown on the attached site plan drawing number GM1557/1.

6. SITE PHOTOGRAPHS



Photograph 1:

Looking northwest toward the existing dwelling and driveway from Te Kawa Road.

Photograph taken: 10/12/2020



Photograph 2:

Looking south toward the existing garage from the northern corner of the site.

Photograph taken: 10/12/2020

7. SITE INVESTIGATION

Our site investigation work comprised the following:

- A walk over visual appraisal of the site.
- The drilling of three hand auger boreholes to depths of between 350 mm and 950 mm.
- The conducting of three Scala Penetrometer tests from the base of the boreholes.

- The measurement of groundwater levels in the boreholes.

The approximate locations of the boreholes are shown on our attached site plan drawing number GM1557/1. The borehole logs and Scala Penetrometer test results are also attached. The soil descriptions given on the logs are in general accordance with the New Zealand Geotechnical Society's "Field Description of Soil and Rock." The undrained shear strength values given on the logs are 'Shear Vane Strengths', factored in accordance with the New Zealand Geotechnical Society Guidelines, not direct readings from the shear vane dial. The groundwater levels were measured following drilling and are indicated on the borehole logs.

It is understood that deeper boreholes are being done by others to assess the site capacity for stormwater disposal via soakage into the underlying basalt rock, unfortunately these were not available at the time of writing. If available these logs would add to the ground model for this site.

8. SUBSOIL CONDITIONS

Detailed descriptions of the subsoils encountered in the boreholes are given on the attached borehole logs. The subsoils were generally found to comprise:

- **Topsoil to between 150 mm and 250 mm depth**, overlying:
- **Auckland Volcanic Field Formation Soils to the termination of all boreholes being HA1 (0.55 m), HA2 (0.40 m), HA3 (1.15 m)**, consisting of very stiff to hard dark brown and orange brown clayey silt with some fine sand and volcanic gravel with vane shear strengths of greater than 168 kPa.

Basalt rock is inferred to underly the ash soils at this site.

The Scala Penetrometer tests carried out from the base of the boreholes obtained effective refusal (defined as 10 or more blows per 50 mm penetration) at depths of between 400 mm and 1.15 m below ground level. This is inferred to be on basalt boulders or the surface of massive basalt rock.

Groundwater was not encountered in any of the hand auger boreholes during our time on site. This deeper water level is considered to be representative of typical groundwater conditions beneath the site due to the permeable nature of the volcanic deposits. Groundwater levels may, however, be higher following times of heavy or prolonged rainfall and/or during wetter winter conditions.

9. SITE STABILITY

The site shows no obvious visual signs indicating historical or presently active deep seated instability. The ground surface across the site is level or gently sloping and was found to be underlain by competent subsoils. It is our opinion that the site is currently stable and suitable for construction of the proposed new two-storey dwelling. The proposed development is considered unlikely to adversely affect the existing stability of the site provided that the recommendations provided in this report are followed.

10. RECOMMENDATIONS

10.1 Earthworks

10.1.1 Topsoil, Fill and Unsuitable Soils

All vegetation, topsoil, fill and any soft or otherwise unsuitable material should be removed from the building platform or earthworks area. The topsoil layer was found to depths of 150 mm to 250 mm at our

test locations, but depths may vary elsewhere across the property. No fill or otherwise unsuitable soils were encountered in any of our boreholes but there may be deposits outside of our test locations.

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

10.1.2 Excavatability

Due to the relatively shallow depth to the basalt boulder or rock surface (400 mm to 1.15 m) due consideration should be given to minimising cut depths at the design stage to limit / avoid possible difficult excavation of basalt rock. Typically, the upper rubbly and fractured surface of the basalt can be ripped with a hydraulic excavator bucket. Less fractured rock however may require rock breaking machinery. The investigation depths give an indication of the depth of surficial soils.

10.1.3 Cuts and Fills

The site is near level and it is anticipated that no significant cut or fill earthworks are proposed at the property. If earthworks are required that involves additional cuts and/or fills greater than 600 mm depth the matter should be referred back to Geoconsult for specific recommendations.

10.2 Foundations

10.2.1 General

The substrata at this site was found to comprise 150 mm to 250 mm of topsoil, over a layer of 400 mm to 1.15 mm of natural volcanic soils, over inferred basalt rock or boulders. The natural soil and rock beneath the topsoil layer have adequate bearing capacity, are of relatively low compressibility and are considered suitable foundation soils for the proposed units. The natural volcanic soils are considered to be slightly expansive however, given the shallow depth to rock, parts of the dwelling foundations are likely to be founded directly on the basalt or boulder strata.

Waffle raft floor systems would be appropriate due to the shallow depth to basalt rock encountered on this site, the raft system minimising the excavated depths required.

Shallow foundations are considered appropriate for the proposed deck sections.

Specific recommendations are outlined below.

10.2.2 Waffle Raft Slabs

Waffle raft slabs should be designed for slightly expansive soils in accordance with the requirements of AS2870:2011.

The following bearing capacities are considered appropriate for raft floor slab design:

Ultimate Bearing Capacity	300 kPa
Allowable Bearing Pressure (F.O.S = 3)	100 kPa
Dependable Bearing Capacity ($\Phi = 0.5$)	150 kPa

10.2.3 Shallow Footings – Deck Foundation

Conventional shallow pad and strip footings, generally in accordance with the requirements of NZS3604:2011, should be embedded a minimum depth of 450 mm below cleared ground level into stiff natural soils or founded directly on the basalt or boulder strata.

The following bearing capacities are considered appropriate for foundation design:

Ultimate Bearing Capacity	300 kPa
Allowable Bearing Pressure (F.O.S = 3)	100 kPa
Dependable Bearing Capacity ($\Phi = 0.5$)	150 kPa

10.3 Retaining Walls

We understand that no specifically designed retaining walls are anticipated for the proposed development. If retaining walls requiring engineering design are proposed the matter should be referred back to Geoconsult for further recommendations.

10.4 Seismic Subsoil Classification

The sites subsoil classification has been assessed based on our site investigation results and the known geology of the area, in accordance with New Zealand Standard for Structural Design Actions NZS1170.5:2004. The site subsoil classification is considered to be Class C – shallow site soils.

10.5 Specific Structural Design

A suitably qualified structural engineer, familiar with the contents of this report, should be engaged to design the foundations and floor slab for the proposed development.

10.6 Vegetation

Any newly planted trees should be kept well clear of the foundations of the new dwelling to avoid the potential for settlement that can occur due to the localised ground shrinkage possible as high water demand tree species mature.

10.7 Stormwater Control

The Council GIS does not show any reticulated stormwater network in this area and it is understood that the stormwater is generally disposed of to ground via rockbore type soakage devices into the underlying basalt aquifer. Maps in the Auckland Council soakage design guide² infer that this site is within an area of medium soakage probability at the edge of the basalt lava flow.

We understand some soakage tests have been carried out by others but the tests were not available to us at the time of writing.

Stormwater from paved areas, roofs, tank overflows and all other sources should be collected in sealed pipes and discharged to a rockbore soakhole if practical or an otherwise safe disposal point away from the development area. Concentrated stormwater flows should not be allowed to discharge onto or into the ground close to the dwelling as this would be detrimental to foundation conditions.

A site-specific stormwater disposal assessment is recommended.

² Strayton, G and Lillis, M (2013). Stormwater disposal via soakage in the Auckland region. Prepared by Pattle Delamore Partners Ltd for Auckland Council. Auckland Council technical report, TR2013/040

10.8 Site Inspections during Construction

It is recommended that Geoconsult is engaged to inspect all foundation excavations during construction. This is to confirm expected ground conditions and to ensure compliance with the recommendations contained in this report.

Council are likely to require geotechnical inspections during construction, and receipt of a Producer Statement - Geotechnical Review (PS4), as a condition of Building Consent.

It is the Client's responsibility to ensure that we are notified of any required inspections and that we are given adequate notice to carry out the inspections (at least 24 hours).

We will issue a Producer Statement - Geotechnical Review (PS4) upon successful completion of the inspected works. The inspections and preparation of the Producer Statement will be at additional cost to that of preparing this report.

11. LIMITATIONS

The recommendations and opinions contained in this report are based on the subsoils encountered at discrete test locations. We have made assumptions about the nature of the ground conditions across the site based on this limited subsoil information and actual ground conditions may vary from those assumed in this report. If any variations from the assumed ground conditions are found to exist during construction the matter should be referred back to Geoconsult.

This report has been prepared solely for the benefit of Amy Xiong as our client and their nominated agents for the purposes of the specific brief as stated in this report. Geoconsult accepts no liability in respect to any matters arising from the use of the information given in this report by any other person or organisation or for any other purpose except that it may be relied upon by Auckland Council in support of an application for Resource Consent and/or Building Consent approval for the proposed development as described herein.

GEOCONSULT

Author: **Vahid Nikouei**
Geotechnical Engineer

Signed: 

Reviewed: **Kevin Pearson**
Senior Geotechnical Engineer

Signed: 





Authorised: **Phil Williams**
Geotechnical Team Leader

Signed: 

Notes:

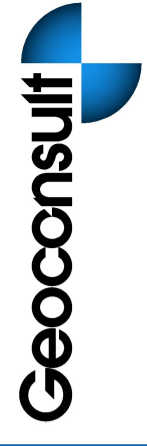
1. LOCATIONS OF ALL FEATURES ARE APPROXIMATE ONLY.
2. THIS DRAWING IS BASED ON AUCKLAND COUNCIL GIS PHOTOGRAPHY AND A SITE PLAN PROVIDED BY PTG ARCHITECTURE LTD., DRAWING NUMBER RC101, REVISION 2, JOB NUMBER 815 "58 TE KAWA ROAD, GREENLANE 1061" AND DATED 22/10/2020.
3. DRAWING NOT TO BE USED FOR CONSTRUCTION PURPOSES.

Key:

	HAND AUGER BOREHOLE LOCATION
	PROPOSED DWELLING
	PROPOSED DECK
	PROPOSED NEW CONCRETE DRIVEWAY

REV:	DESCRIPTION:	BY:	DATE:

STATUS: NOT FOR CONSTRUCTION



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PROJECT:
 AMI XIONG
 PROPOSED NEW DWELLING

SITE:
 58 TE KAWA ROAD
 GREENLANE

TITLE:
 SITE PLAN

SCALE AT A3:	DATE:	DRAWN:	CHECKED:
1 : 200	DEC 2020	VN	PW

SHEET NO:	DRAWING NO:	REVISION:
1 OF 1	GM1557/1	-



BOREHOLE LOG

Borehole No

HA1

Sheet 1 of 1

Project:	Proposed New Two-Storey Dwelling	Project No:	GM1557	Drilled:	VN
Location:	58 Te Kawa Road, Greenlane	Date Drilled:	10-12-2020	Logged:	VN
Client:	Amy Xiong	Hole Type:	HA	Checked:	VN
Coords:	1760164.10 - 5914465.10	Level:	69.60 m AOD	Hole Diameter:	50mm
				Scale	1:25

Depth (m)	Legend	Soil Description	Depth (m)	Groundwater	RL (m AOD)	Vane Shear Strength (kPA)			Scala Penetrometer (blows per 50mm)				Depth (m)	
						Peak	Remould	Soil Sensitivity	0	5	10	15		20
		TOPSOIL.												
		Clayey SILT, trace fine sand, dark brown mottled black. Very stiff, moist, high plasticity. [Auckland Volcanic Field]	0.15		69.45									
		0.3-0.4m some fine basalt gravel. End of borehole at 0.40 m	0.40		69.20	UTP								
1														
2														
3														
4														

Remarks: Coordinates and levels are derived from Auckland Council GIS and are considered approximate only.
 No groundwater encountered.
 End of borehole, refusal on inferred basalt boulder or rock surface.





BOREHOLE LOG

Borehole No

HA2

Sheet 1 of 1

Project: Proposed New Two-Storey Dwelling	Project No: GM1557	Drilled: FDR
Location: 58 Te Kawa Road, Greenlane	Date Drilled: 10-12-2020	Logged: FDR
Client: Amy Xiong	Hole Type: HA	Checked: VN
Coords: 1760153.80 - 5914477.70	Level: 69.25 m AOD	Hole Diameter: 50mm
		Scale: 1:25

Depth (m)	Legend	Soil Description	Depth (m)	Groundwater	RL (m AOD)	Vane Shear Strength (kPA)			Scala Penetrometer (blows per 50mm)				Depth (m)	
						Peak	Remould	Soil Sensitivity	0	5	10	15		20
		TOPSOIL.												
		SILT, reddish brown. Very stiff, dry, friable. [Auckland Volcanic Field]	0.25		69.00									
		End of borehole at 0.35 m	0.35		68.90	UTP								
1														
2														
3														
4														

Remarks: Coordinates and levels are derived from Auckland Council GIS and are considered approximate only.
 No groundwater encountered.
 End of borehole, refusal on inferred basalt boulder or rock surface.



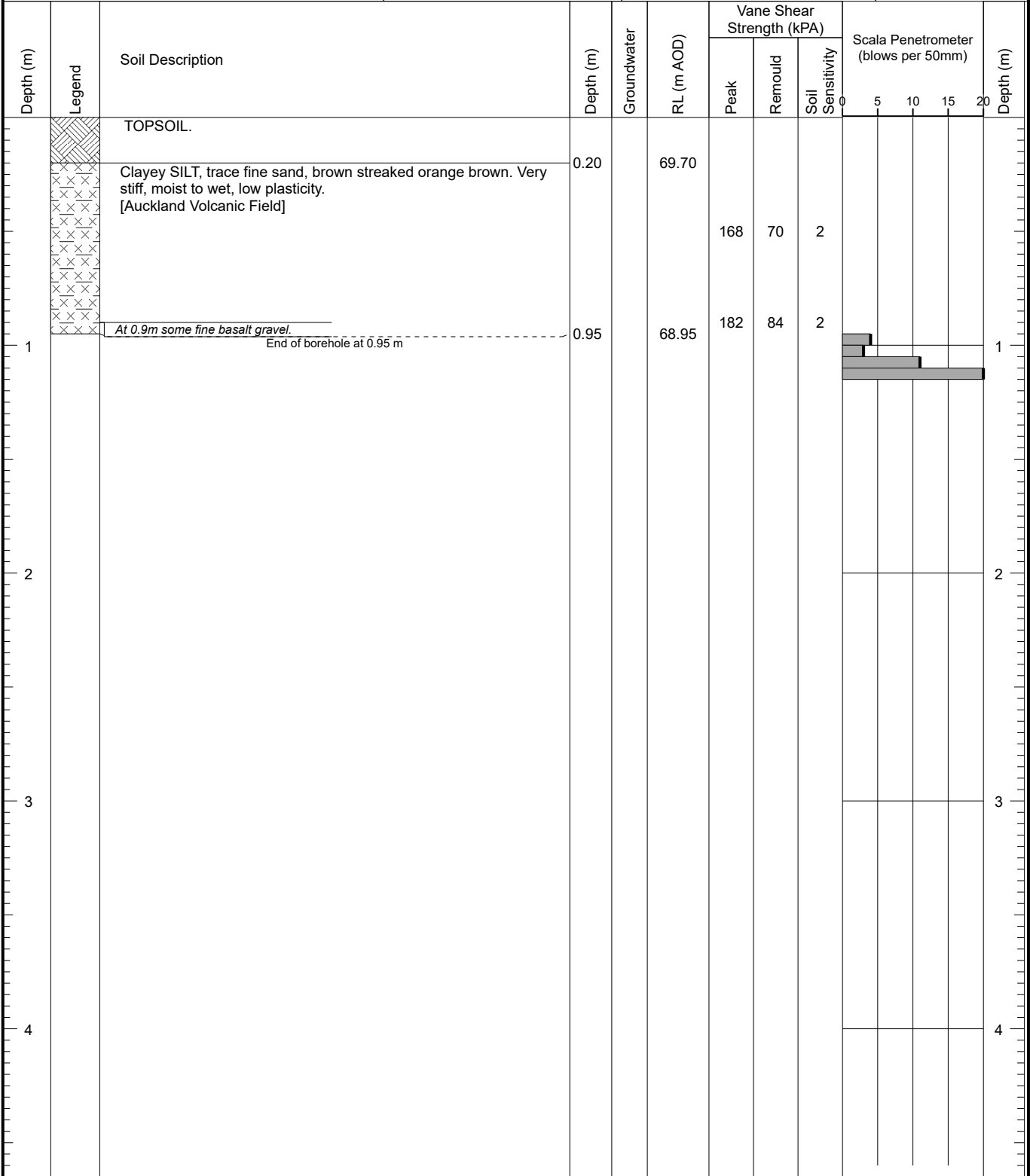
BOREHOLE LOG

Borehole No

HA3

Sheet 1 of 1

Project:	Proposed New Two-Storey Dwelling	Project No:	GM1557	Drilled:	VN
Location:	58 Te Kawa Road, Greenlane	Date Drilled:	10-12-2020	Logged:	VN
Client:	Amy Xiong	Hole Type:	HA	Checked:	VN
Coords:	1760139.90 - 5914479.40	Level:	69.90 m AOD	Hole Diameter:	50mm
				Scale	1:25



Remarks: Coordinates and levels are derived from Auckland Council GIS and are considered approximate only.
 No groundwater encountered.
 End of borehole, refusal on inferred basalt boulder or rock surface.

