07 August 2024

Luke Griffiths
35 Woven Stone Way
Ohau
Levin

Dear Luke,

Project Reference: 24074
Ground Investigation for Proposed New Dwelling at 35 Woven Stone Way, Ohau, Levin

1.0 Introduction

StrucD Limited was commissioned by Luke Griffiths to undertake a ground investigation for a proposed new dwelling at 35 Woven Stone Way, Ohau, Levin. The purpose of this investigation is to assess ground conditions and appropriate foundations to support the proposed dwelling including specifically designed foundations, if required. In addition, we have provided preliminary comments on site liquefaction potential.

2.0 Ground Investigation

A shallow ground investigation was carried out on 17 July 2024 under the direction of a geotechnical engineer from our office and comprised the following scope of works:

- Six (6) penetrometer probes to depths of between 0.5 and 0.9 metres below ground level.
- Three (3) hand augers to depths of between 0.3 and 0.6 metres below ground level.

The location of the testing is shown on the attached investigation location plan presented in Appendix 1 together with the probe results presented in Appendix 2. Site photographs are presented in Appendix 3.

3.0 Site Conditions

The site is currently undeveloped and is relatively level and grass covered with easy access off Woven Stone Way Road.

4.0 Subsoil Conditions

A single hand auger extended to a depth of 0.6 metres below ground level and encountered clay silt with some gravel that extended to the depth explored. The probe results to a degree were consistent indicating stiff to very stiff fine-grained soils. There was generally a significant improvement in strength/density of the subsoils between 0.3 and 0.6 metres below ground level. The increased penetration resistant is likely influenced by the presence of gravel within the inferred gravelly silt matrix.

5.0 Engineering Recommendations

5.1 General

Recommendations given in this report are based on limited subsoil data from discrete test locations and the nature and continuity of subsoil conditions away from the test location are made but it must be appreciated that actual conditions may vary from the assumed profiles.

The proposed dwelling comprises a single storey building have lightweight framing, cladding, and roofing. The dwelling will have a concrete slab on grade.

The focus of the report is the assessment of foundations to support the proposed dwelling. Actual foundations will be governed by soil type strength and density. Settlement of foundations has also been considered together with the slab-on grade and a preliminary assessment of site liquefaction potential. These aspects are discussed in the following sections.

5.2 Foundation Solution

Based on the penetrometer probes we infer that the penetration resistance offered at 200mm depth equates to an undrained shear strength of Su>100kPa. This value results in an ultimate bearing capacity of Qult>300 kPa. Therefore, the strength of the foundation soils complies with the requirement of NZS3604:2011 in that foundations may be non-specifically designed.

The inferred fine-grained soils are sensitive to moulding and loss of strength if reworked or wetted. We therefore recommend that all excavations be carried out using a smooth edge bucket operating outside of the building footprint. Therefore, we recommend that subgrade soils be protected as soon as possible following inspection and approval by the Council.

5.3 Settlement of Foundation

Serviceabiity loads for a lightweight dwelling are expected to be relatively low. The penetration resistance of the subsoil indicate that these soils are typically over consolidated with pre-consolidation pressures well in excess of the likely imposed serviceability loads. This means that elastic settlements will be relatively small and well within the tolerance levels for a lightweight dwelling.

For dwellings having composite construction we recommend that settlements be confirmed. If inspection indicates that any soft spots are exposed over footing alignments, then these should be sub-excavated appropriately.

5.4 Slab-on-Grade

All topsoil and any soft compressible soils over the proposed dwelling footprint should be removed to expose a sound subgrade. It is imperative to ensure that an undisturbed subgrade be achieved and that it does not soften a result of wet weather. It may be that a nominal depth of base course be placed over the subgrade to achieve design levels. Assuming that a competent subgrade is exposed

we anticipate that only a nominal concrete slab thickness will be required, and this aspect must be confirmed by the Council.

6.0 Site Liquefaction Potential

Factors which affect the potential for liquefaction include soil type, relative soil density, initial confining pressures, intensity, and duration of ground shaking. Soils most susceptible to liquefaction are loose uniformly graded fine sands and to a lesser extent, silt mixtures encountered below the groundwater level.

Published literature indicates that the site is underlain with very stiff soils that likely extend below that depth explored. We would concur that based on subsoil profiles from other sites in the vicinity that deeper sediments may comprise gravelly silts and gravels. Our preliminary assessment indicates that these soils are not particularly susceptible to liquefaction and therefore conclude that there is a perceived low risk of site liquefaction under design earthquake shaking.

7.0 Conclusion

The investigation has shown that the subsoil conditions appear reasonably consistent at the points explored and that the inferred very stiff fine-grained subsoils are suitable to support non-specifically designed shallow foundation. Settlements are assessed as relatively low for nominally loaded foundations.

Based on a desktop study site liquefaction potential is considered to be low risk.

8.0 Limitations

We have prepared this report in accordance with the brief as provided. This report has been prepared for the use of our client, Luke Griffiths, their professional advisers, and the relevant Territorial Authorities in relation to the specified project brief described in this report. No liability is accepted for the use of any part of the report for any other purpose or by any other person or entity. 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.

This report does not cover potential liquefaction issues in detail.

This report is not to be reproduced either wholly or in part without our prior written permission. It is not to be relied upon or used out of context by any other person without reference to StrucD Limited.

The reliance by other parties on the information or opinions contained in this report shall, without prior review and agreement in writing, be at such party's sole risk.

Yours sincerely,

Prepared By

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StrucD Limited

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StrucD Limited

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APPENDIX 1

Site Plan

Room 2, The Woolstore Business Centre, 20 Parumoana Street, Porirua, 5022
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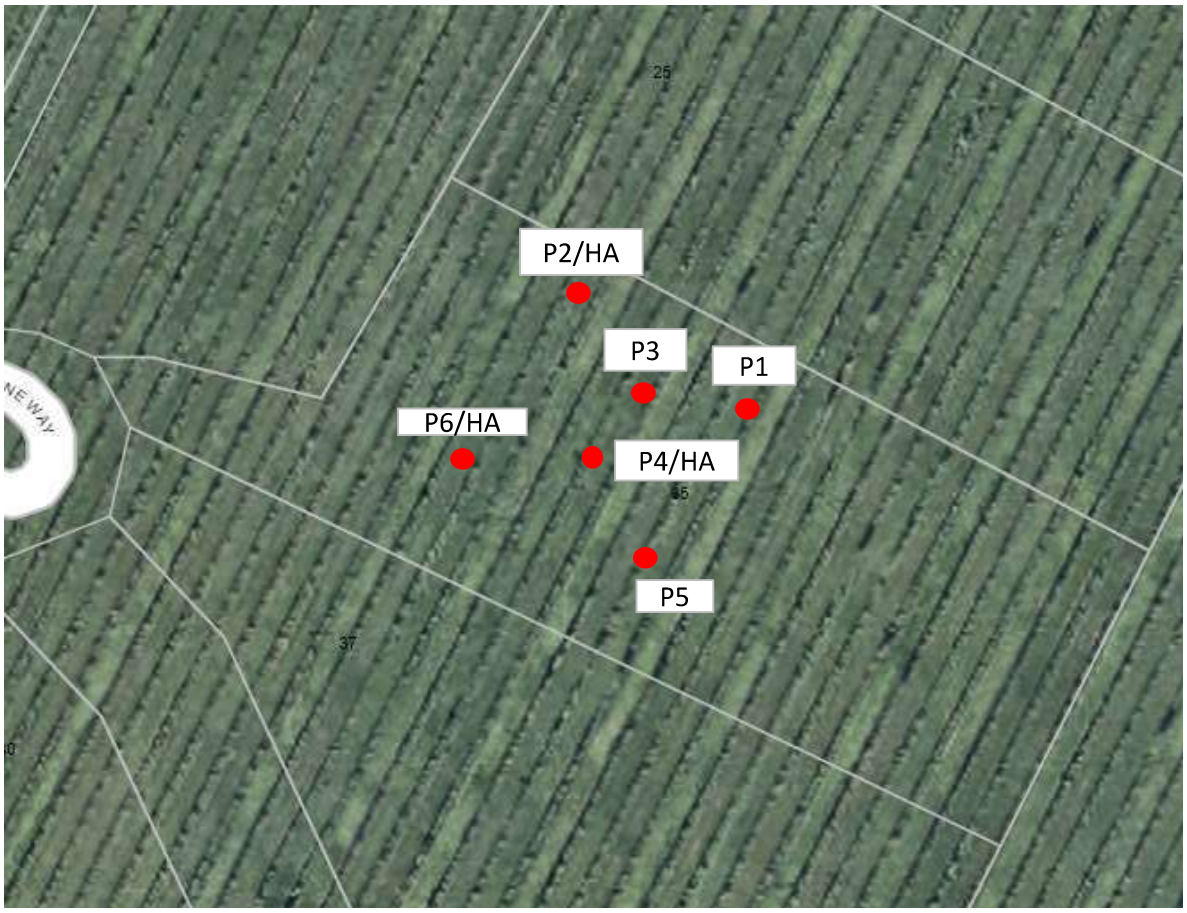

Investigation Location Plan

Key

- Penetrometer Probe

Room 2, The Woolstore Business Centre, 20 Parumoana Street, Porirua, 5022
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APPENDIX 2

Scala Penetrometer and Hand Auger Results

Room 2, The Woolstore Business Centre, 20 Parumoana Street, Porirua, 5022
Mobile: 021 633 375
Email: strucdeng@gmail.com

StrucD Limited Consulting Structural Engineers	Project No.	24074	Page	P1
	Project Name	35 Woven Stone Way, Levin		
	By	TG/LP	Date	17/07/2024
	Scala Tests			
				Rev A

Penetrometer Probe 1				
Probe Results		**Shear Vane**		**Hand Auger**
Depth (mm)	**Blows per 100mm**	**Shear Strength (kPa)**		**Soil Composition (Hand Auger)**
		Peak	**Residual**	
100	2			
200	3			
300	7			
400	10			
500	5			
600	8			
700	8			
800	15			
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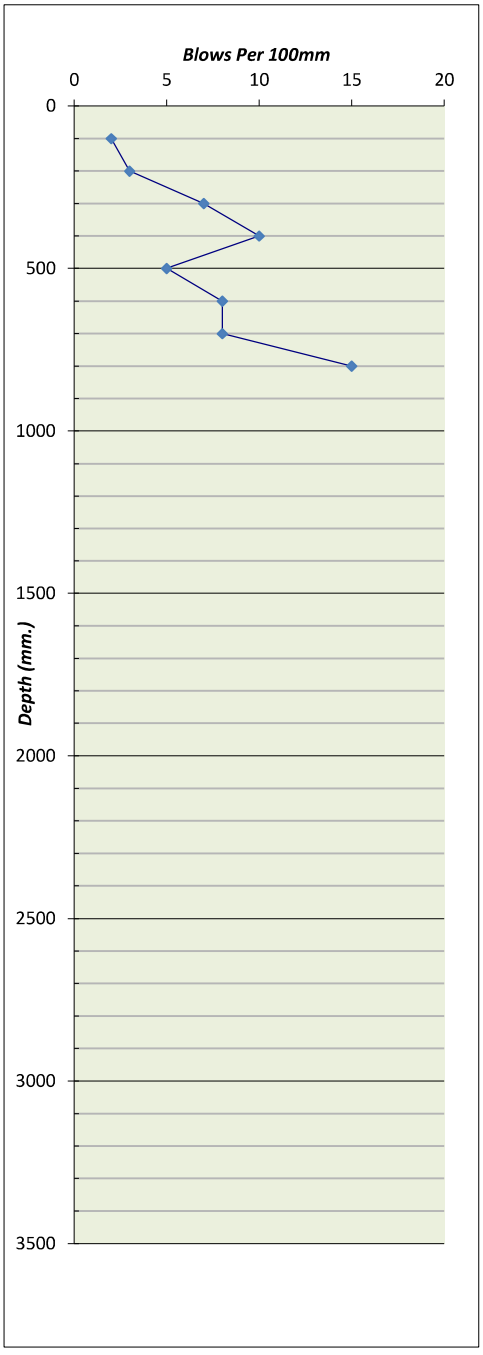

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	Scala Tests			
				Rev A

Penetrometer Probe 2				
Probe Results		Shear Vane		Hand Auger
Depth (mm)	Blows per 100mm	Shear Strength (kPa)		Soil Composition (Hand Auger)
		Peak	Residual	
100	2			Top soil with large gravels
200	6			Silty soil with large gravels
300	5			
400	6			
500	7			
600	3			
700	4			
800	11			
900	15			
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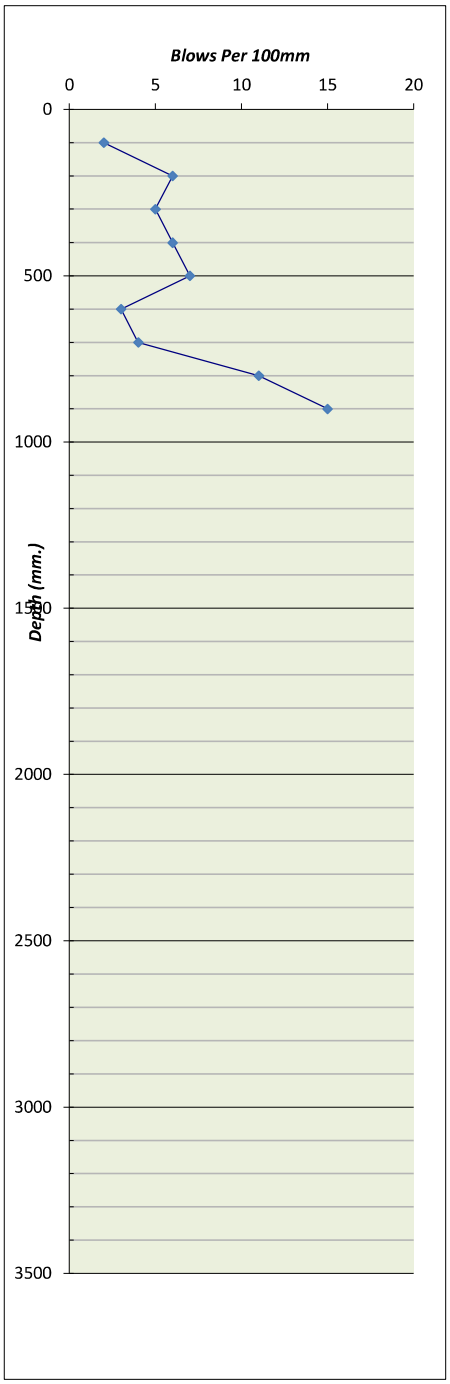

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	Project Name	35 Woven Stone Way, Levin		
	By	TG/LP	Date	17/07/2024
	Scala Tests			
				Rev A

Penetrometer Probe 3				
Probe Results		**Shear Vane**		**Hand Auger**
Depth (mm)	**Blows per 100mm**	**Shear Strength (kPa)**		**Soil Composition (Hand Auger)**
		Peak	**Residual**	
100	4			
200	5			
300	6			
400	5			
500	6			
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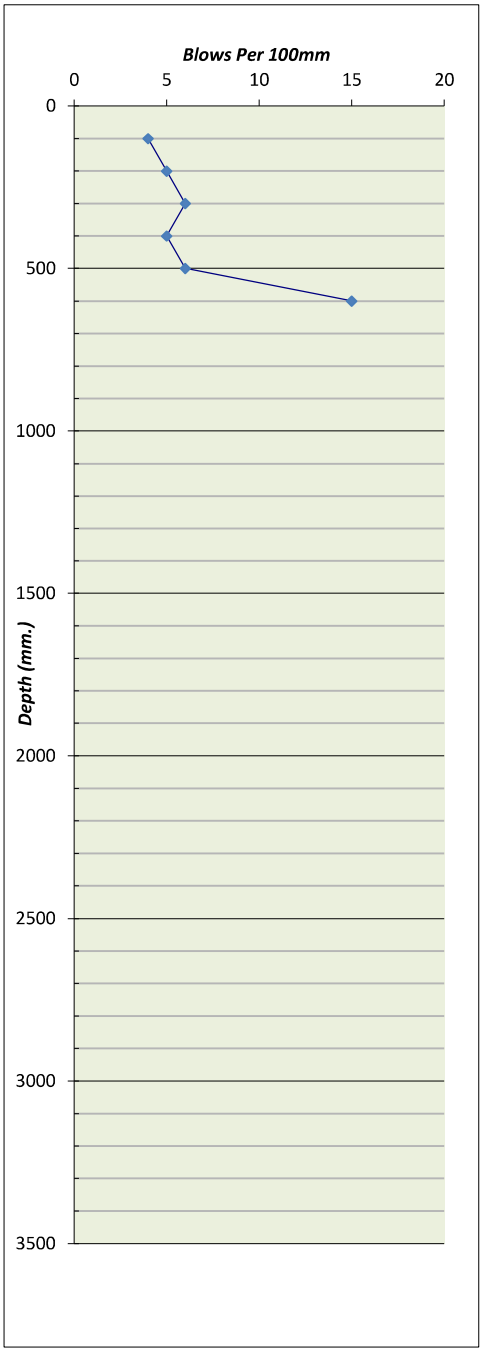

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	Scala Tests			
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Penetrometer Probe 4				
Probe Results		**Shear Vane**		**Hand Auger**
Depth (mm)	**Blows per 100mm**	**Shear Strength (kPa)**		**Soil Composition (Hand Auger)**
		Peak	**Residual**	
100	1			Top soil with gravels
200	2			Silty clay, moist with large gravels, change in colour
300	4			
400	4			
500	8			
600	6			
700	15			
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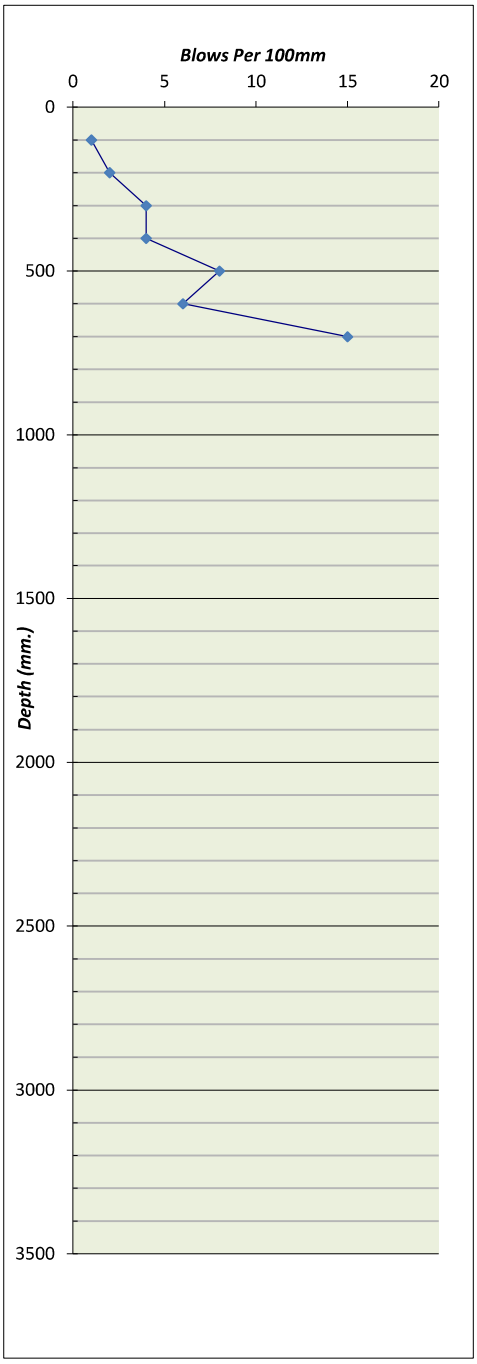

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	Project Name	35 Woven Stone Way, Levin		
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	Scala Tests			
				Rev A

Penetrometer Probe 5				
Probe Results		Shear Vane		Hand Auger
Depth (mm)	Blows per 100mm	Shear Strength (kPa)		Soil Composition (Hand Auger)
		Peak	Residual	
100	1			
200	4			
300	6			
400	11			
500	15			
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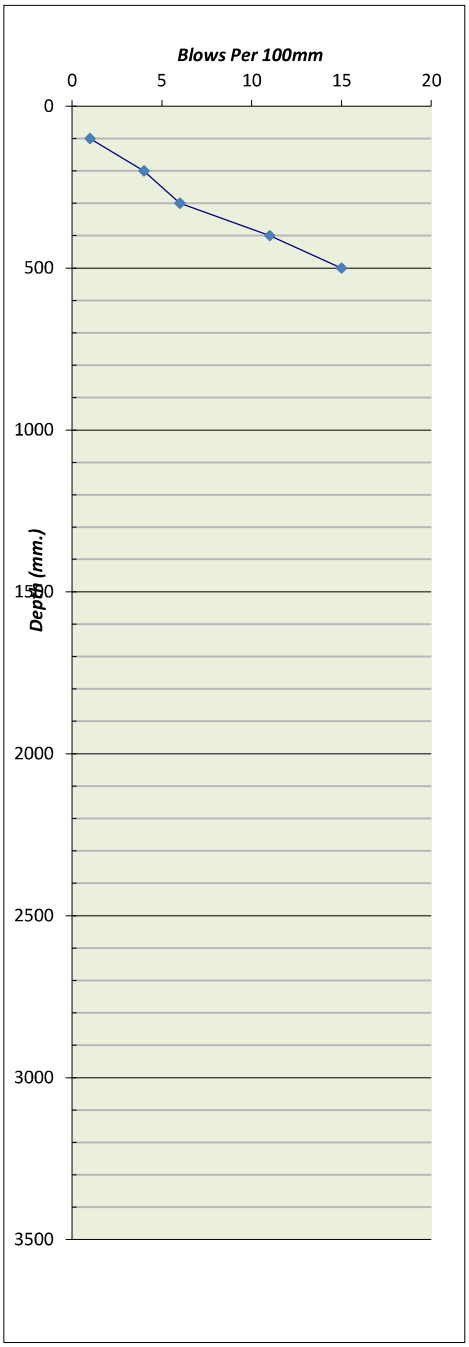

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	Project Name	35 Woven Stone Way, Levin		
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	Scala Tests			
				Rev A

Penetrometer Probe 6				
Probe Results		**Shear Vane**		**Hand Auger**
Depth (mm)	**Blows per 100mm**	**Shear Strength (kPa)**		**Soil Composition (Hand Auger)**
		Peak	**Residual**	
100	2			Top soil, large gravels
200	3			
300	7			
400	8			
500	15			
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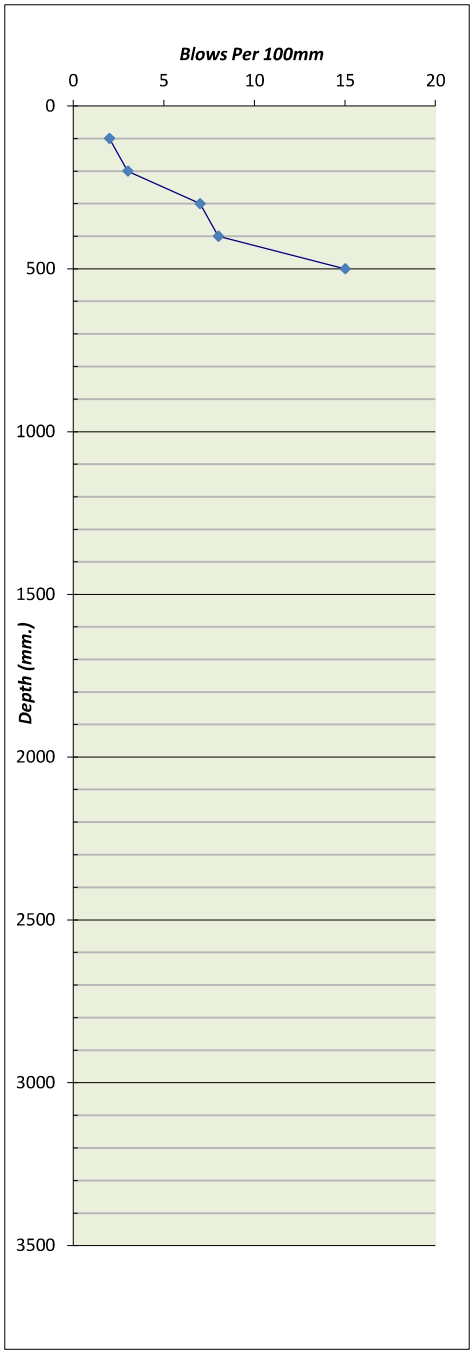

APPENDIX 3

Site Photos

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