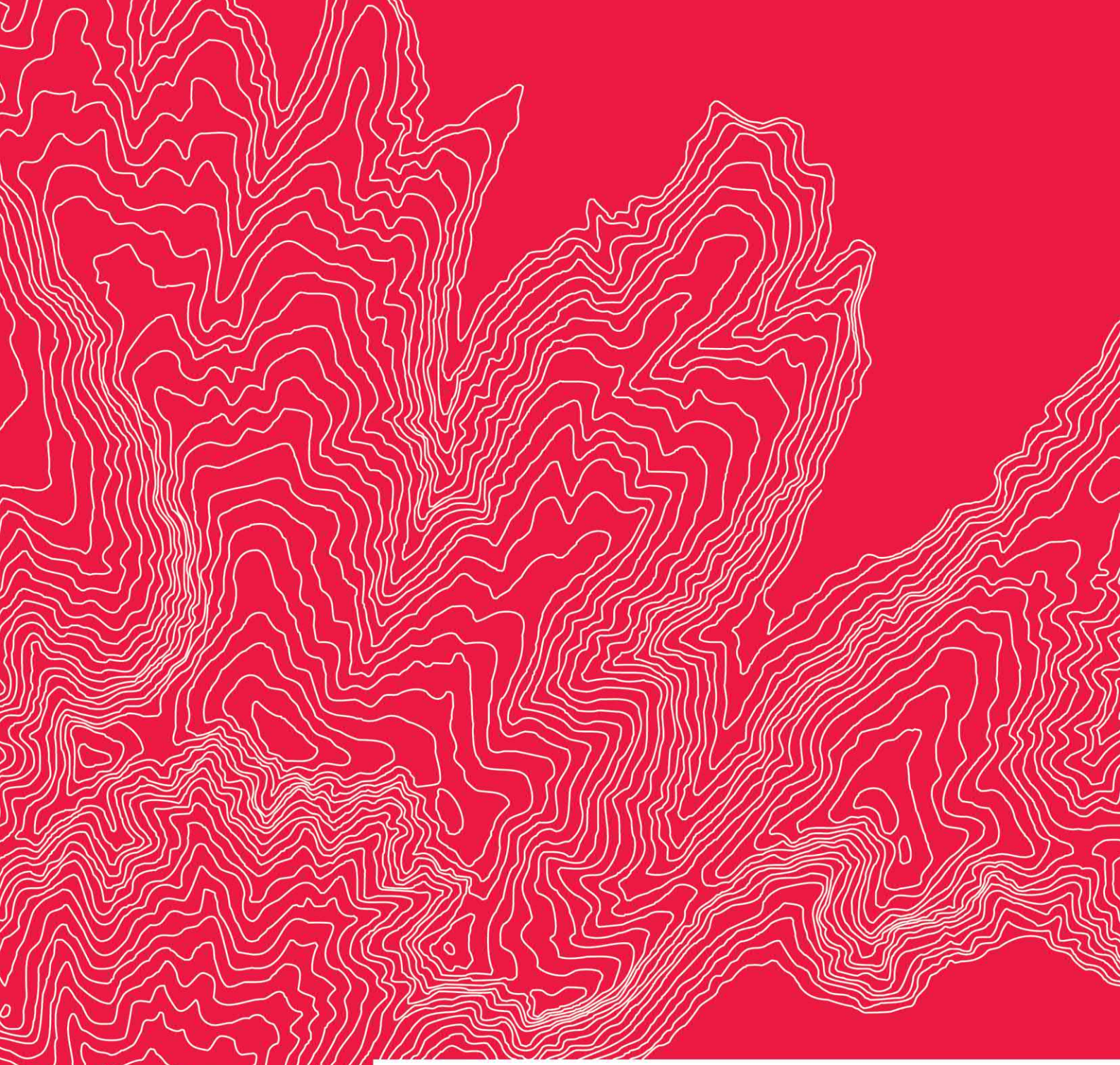


Subdivision Suitability Report

eliot sinclair

Section 41 SO 13711

Prepared for Tauranga Bay Holdings Ltd

510322

Subdivision Suitability Report

Section 41 SO 13711

Prepared for Tauranga Bay Holdings Ltd

510322

Quality Control Certificate

Eliot Sinclair & Partners Limited

eliotsinclair.co.nz

Action	Name	Signature	Date
Prepared by:	Emily Wilson Civil Engineer BE(Hons) Civil MEM		6 May 2022
Directed, reviewed, and approved for release by:	Stuart Challenger Civil Engineer | Branch Manager, Hokitika BE NatRes BSc CMEngNZ CPEng		15 June 2022
Status:	Final		
Release date:	16 June 2022		
Reference no:	510322		
Distributed to:	Tauranga Bay Holdings Ltd		

Contents

1. Introduction

1.1. Scope of Works

Eliot Sinclair has been engaged by Tauranga Bay Holdings Ltd to undertake a geotechnical investigation on Section 41 SO 13711, Tauranga Bay Road, Cape Foulwind. The purpose of the investigation was to:

- Assess the site's environmental hazards to determine site suitability for subdivision and ensure future dwellings would be safe from hazards, and.
- Investigate the shallow ground conditions to determine minimum foundation requirements for future dwellings.

2. Site Description

2.1. Legal Description

The legal description of the site is Section 41 SO 13711 and is around 10.48Ha in area. This site is located on the south-eastern side of Wilsons Lead Road almost 500m south of the Wilsons Lead Road intersection with Tauranga Bay Road. The site is in Cape Foulwind, which is roughly 14km west of Westport. Figure 1 below illustrates an overview of the site location.

Figure 1. Figure showing location of site (Eliot Sinclair, 2022)

2.2. Proposed Subdivision

We understand the scheme plan for the proposed subdivision is yet to be finalised. The site is proposed to be subdivided into many lots. Fifteen areas were investigated geotechnically to identify potential building sites for the proposed subdivision. Figure 2 below indicates the fifteen areas which were investigated across the site, labelled A - O.

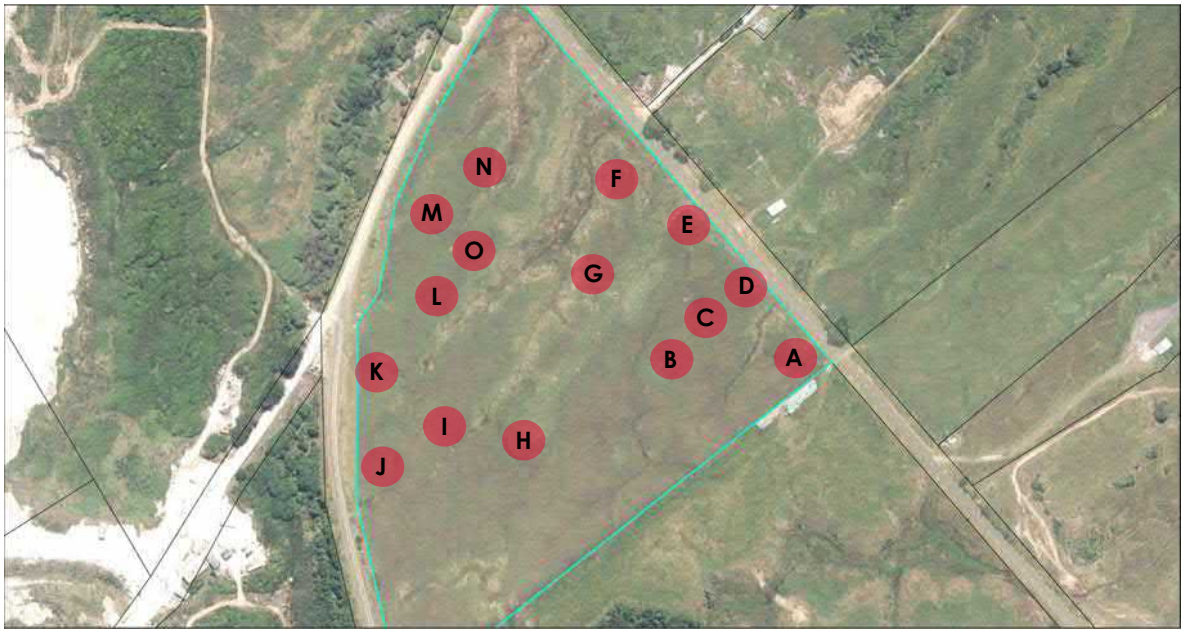


Figure 2. Aerial of the site indicating the areas investigated (Eliot Sinclair, 2022).

Table 1. Approximate GPS location of each test area

Area	Northings	Eastings
A	5375564	1473580
B	5375564	1473491
C	5375593	1473505
D	5375629	1473544
E	5375671	1473494
F	5375706	1473439
G	5375630	1473423
H	5375501	1473367
I	5375515	1473307
J	5375479	1473257
K	5375560	1473245
L	5375614	1473297
M	5375678	1473298
N	5375716	1473338
O	5375651	1473327

2.3. Geology

Geological mapping[1] of the area notes the site is underlain with Late Pleistocene shoreline deposits (Q5b) consisting of marine sand and gravel.

The GNS database[2] indicates the closest active fault is the Lower Buller Fault, which lies approximately 13.5km south-east of the site. The area is in the NZS3604: 2011 Zone 3 earthquake rating zone.

2.4. Topography

The site is extensive at around 10.49Ha in area. It has been cleared and has natural undulations across the site of drainage channels and shallow gullies. There is a drainage channel with sitting water to the south of area J, and adjacent to Tauranga Bay Road.

3. Geotechnical Investigation

On 3rd May 2022 we undertook our geotechnical site investigation which consisted of a site walkover, sixteen scala penetrometer tests, and the inspection of twelve machine dug test pits. The full Site Investigation Records can be found in Appendix B. Our testing was undertaken in fifteen locations, labelled A – O and illustrated in Figure 2, and through the following four figures.

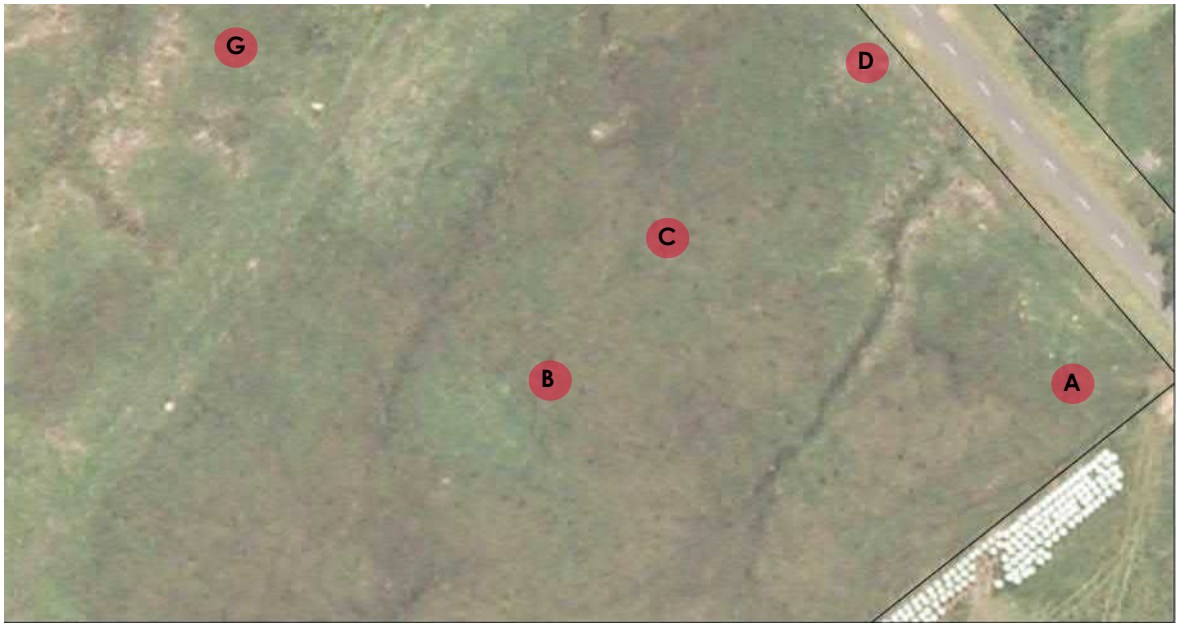


Figure 3. Test location areas investigated (Eliot Sinclair, 2022)

[1] Nathan, S., Rattenbury, M.S., Suggate, R.P. (compliers) 2002. Geology of the Greymouth area. Institute of Geological and Nuclear Sciences 1: 250 000 geological map 12. 1 sheet + 58p. Lower Hutt, New Zealand. Institute of Geological and Nuclear Sciences Limited

[2] https://data.gns.cri.nz/af/

Figure 4. Test location areas investigated (Eliot Sinclair, 2022)

Figure 5. Test location areas investigated (Eliot Sinclair, 2022)

Figure 6. Test location areas investigated (Eliot Sinclair, 2022)

3.1. Geotechnical Summary

3.1.1. Iron pan

From our geotechnical investigation we confirm the presence of shallow iron pan underlies the site which was encountered at each of the fifteen locations investigated. The iron pan was encountered at depths ranging between 0.2m – 1.55m below the existing ground level. Under the iron pan layer was dense sand which can provide strong bearing capacity more than "Good Ground" requirements as defined in NZS3604: 2011.

3.1.2. Groundwater

Test pits ranged in depths of between 1.4m and 2.9m below the existing ground level and groundwater was not encountered in any of the test pits.

3.1.3. Uncertified fill

Uncertified fill was encountered in two areas investigated: areas E and K. Area E is located around halfway along the boundary adjacent to Wilsons Lead Road. The test pit in this area, at test location 07, encountered around 1.2m of fill over iron pan. This test area was next to an existing accessway from Wilsons Lead Road into the site, and it appears the uncertified fill may be overlying soft silt which was removed in the construction of the accessway.

Area K also had uncertified fill overlying the site. Test pit 12 done in this area encountered around 1.55m of uncertified silt with some peat, sand, and organics. Below this was iron pan.

3.2. Geotechnical overview by Area

Table 2. Summary of depth to iron pan encountered in each area investigated

Area	Test no.	Test pit depth to iron pan	Scala depth to iron pan	Depth of test pit
A	01, 02	0.6m	0.7m – 0.9m	2.2m
B	03, 04	0.45m	0.4m – 0.6m	2.4m
C	05	-	0.6m	-
D	06	0.2m	-	2m
E	07	1.2m	1.2m	2.3
F	08	0.2m	0.25m	1.4
G	09	0.3m	0.3m	2.2
H	10	0.35m	0.4m	2.2
I	11	0.5m	0.45m	2.2
J	12	1.55m	1.5m	2.9
K	13	0.8m	0.6m	2.2
L	14	0.4m	0.4m	2
M	15	0.3m	0.25m	2
N	16	-	0.55m	-
O	17	-	0.3m	-

4. Suitability for Subdivision

Council can refuse subdivision consent if there is a significant risk from natural hazards. To determine whether there is a significant risk from natural hazards, decision-makers are guided by the requirements of RMA Section 106(1A). This requires a combined assessment of:

- The likelihood of natural hazards occurring (whether individual or in combination);
- The material damage that would result from natural hazards to land where the consent is sought, neighbouring land, or structures;
- Any likely subsequent use of the land where the consent is sought that would accelerate, worsen, or result in material damage of the kind referred to in the previous point.

Decision-makers are required to consider the magnitude of risk of natural hazards, including natural hazards that have a high impact but low probability of occurrence. This aligns the assessment with the definition of '*effect*' Section 3 of the RMA.

The RMA defines natural hazards as: *Any atmospheric or earth or water related occurrence (including earthquake, tsunami, erosion, volcanic and geothermal activity, landslip, subsidence, sedimentation, wind, drought, fire, or flooding) the action of which adversely affects or may adversely affect human life, property, or other aspects of the environment.*

Hazard identification is a key component of any site-specific risk assessment. The risk assessment for relevant natural hazards at the site is presented below, which considers the likelihood and

consequences of the hazard at the site in the context of the proposed activity (rural residential subdivision) as compared against the current site context.

We have considered the risk of subsidence, falling debris, erosion, tsunami, land slippage, sedimentation, wind, drought, fire, geothermal activity, climate change, sea level rise, and volcanic activity and conclude these are very unlikely to pose an unacceptable risk to life at this site.

In relation to other potential natural hazards, we comment as follows;

4.1. Earthquake Shaking

NZ is a seismically active country. New buildings and infrastructure will be designed, consented, and built to acceptable industry standards and New Zealand Building Code requirements and as such will be designed for any likely shaking as detailed in the current design codes, which will address the risk.

4.2. Earthquake Fault Rupture

There are no recorded active fault traces across the site. The site is not located within a fault hazard area or fault avoidance zone. The closest active fault is the Lower Buller Fault, which lies approximately 13.5km south-east of the site.

4.3. Liquefaction

The site is classified in the West Coast Regional Liquefaction Assessment[3] as being in an area where liquefaction damage is unlikely. The site is underlain with Late Pleistocene shoreline deposits (Q5b) consisting of marine sand and gravel. This composition, which was confirmed onsite during our geotechnical investigation, are not susceptible to liquifying and therefore we consider there to be negligent risk of damage caused by liquefaction from a seismic event.

5. Foundation Recommendations

Based on our geotechnical investigation, we consider the shallow iron pan can provide bearing capacity in excess of that required for "Good Ground" as defined in NZS3604: 2011. Our testing confirms the fifteen areas we undertook our testing are appropriate building areas. The iron pan layer in these areas investigated was encountered between 0.2m and 1.55m below the existing ground level.

For each of the fifteen areas we investigated; A – O, we recommend That foundations in accordance with NZS3604: 2011 be used. We do not recommend the use of driven timber piles because of the iron pan layer, which may stop the piles reaching the required minimum depth, plus Area J (test 12) did not meet the requirements for driven timber piles.

Where the iron pan was encountered within the top 600mm from the surface, we consider foundations which extend into the Good Ground we consider the iron pan layer be used. We anticipate this to be the case for areas B, C, D, F, G, H, I, L, M, N, and O.

In the areas where the iron pan layer was encountered deeper than 600mm from the existing ground level, we recommend a gravel raft into which NZS3604: 2011 foundations can be used. Excavation to the iron pan will be required and backfilled with compacted clean sandy gravels. We anticipate this to be the case for areas A, E, J, and K.

[3] Beca Limited. West Coast Regional Liquefaction Assessment, 1 November 2021

We have included a copy of our Excavation and Backfill Specification in Appendix C which states excavation and backfill methodology, compaction standards, and required engineering inspections.

Table 3. List of anticipated foundation treatments for the fifteen sites investigated.

Area	Test numbers	Anticipated depth to Good Ground/iron pan	Foundation Recommendation
A	01, 02	0.6m – 0.9m	Gravel raft with NZS3604: 2011 foundations
B	03, 04	0.4m – 0.6m	NZS3604: 2011 foundations into the good ground
C	05	0.6m	Gravel raft with NZS3604: 2011 foundations
D	06	0.2m	NZS3604: 2011 foundations into the good ground
E	07	1.2m	Gravel raft with NZS3604: 2011 foundations
F	08	0.2m – 0.25m	NZS3604: 2011 foundations into the good ground
G	09	0.3m	NZS3604: 2011 foundations into the good ground
H	10	0.35m – 0.4m	NZS3604: 2011 foundations into the good ground
I	11	0.45m – 0.5m	NZS3604: 2011 foundations into the good ground
J	12	1.5m – 1.55m	Gravel raft with NZS3604: 2011 foundations
K	13	0.6m – 0.8m	Gravel raft with NZS3604: 2011 foundations
L	14	0.4m	NZS3604: 2011 foundations into the good ground
M	15	0.25m – 0.3m	NZS3604: 2011 foundations into the good ground
N	16	0.55m	NZS3604: 2011 foundations into the good ground
O	17	0.3m	NZS3604: 2011 foundations into the good ground

6. Infrastructure Requirements

6.1. Potable Water

There is no Council reticulated water available to the site. Rainwater tanks will be required for water supply. We recommend a minimum of 45 cubic meters of water storage onsite to allow for residential firefighting purposes. It is also recommended that a leaf diverter and a first flush diverter be installed.

6.2. Wastewater

There is no Council sewer available to the site. Onsite wastewater treatment and disposal will be required. Even though our test pits did not encounter groundwater within 3.0m of the ground surface,

the firm iron pan and sandstone underlying layers create a limiting layer with little to no infiltration capacity. We recommend for new dwellings on the sites the implementation of secondary wastewater treatment systems discharged by a dripper line to a land application bed. The design of these systems will need to be undertaken once the number of bedrooms is known so the septic tank and land application field can be sized appropriately. From our observations, we consider the overlying silty topsoil with some sand to have some infiltration and treatment capacity and we would classify the soil as category 3 sandy loam. We consider that with an appropriately designed wastewater system is at least 50m from any drainage channel then the sites will comply with Rule 79 of the West Coast Regional Council Land and Water Plan Rule 79. The design of the wastewater system should be done at the building consent stage when the number of bedrooms is known. If the wastewater system and land application field is within 50m from any drainage channel then resource consent from the West Coast Regional Council will be required.

6.3. Stormwater

There are no Council storm water drains in the local area, stormwater overflow from the rainwater tank will need to be discharged appropriately without causing erosion or ponding. If onsite stormwater disposal is required, the underlying iron pan and sandstone is a limiting infiltration layer and will need to be considered appropriately.

6.4. Vehicle Access

There is currently access to the site from Wilsons Lead Road.

7. Conclusion

Based on our geotechnical investigation, we consider Section 41 SO 13711 Wilsons Lead Road suitable for subdivision. The subdivision scheme is yet to be finalised; however, we have identified fifteen appropriate building locations which we have confirmed to be appropriate for the construction of new residential dwellings. We recommend that new building foundations be in accordance with NZS3604: 2011 and extend into the Good Ground either with deep foundations or in conjunction with a gravel raft as specified in Table 4 below, with anticipated depth of excavation shown in Table 3. We do not consider the proposed Lots will be subject to any natural hazards and will not create any hazards once developed.

Table 4. Recommended foundation by area.

Foundation type	Area
Gravel raft with NZS3604: 2011 foundations	A, E, J, K,
NZS3604: 2011 foundations, with the foundations extending down to the good ground	B, C, D, F, G, H, I, L, M, N, O

If a building is proposed to be located outside of the areas investigated, a site specific geotechnical investigation will be required to determine the most appropriate foundation type.

Disclaimer

Comments made in this geotechnical report are based on Eliot Sinclair's visual inspection and shallow soil investigations of the site on 3rd May 2022 comprising shallow Dynamic Cone Penetration (DCP) testing, and the inspection of machine dug test pits, and the most recent version of the Ministry of Business, Innovation and Employment Guidelines.

Whilst every care was taken during our investigation and interpretation of subsurface conditions, there is a risk there could be subsoil strata or features at depth that we are unaware of. Additionally, on-going seismicity in the general area may lead to deterioration or additional ground settlement that could not have been anticipated at time of writing of this report.

At time of foundation excavation, should the exposed soil conditions vary from those described in this report then Eliot Sinclair & Partners Ltd should be contacted to advise if the recommendations of this report remain valid. Further, should the requirements of MBIE's guidelines, NZ Standards or the NZBC that relate to foundations and floors be updated, then Eliot Sinclair should be contacted to advise if the recommendations of this report remain valid.

This report has been prepared for the benefit of Tauranga Bay Holdings Ltd, and the Buller District Council.

No liability is accepted by this company, or any employee of this company, with respect to the use of this report by any other party or for any purpose other than what is described in Section 1 of this report.

Appendix A. Site Photographs

Figure 1. Facing north-east across from area C.

Figure 2. Gully by area G.

Figure 3. Facing north-west towards Tauranga Bay by area I.

Figure 4. Drainage adjacent to Tauranga Bay Road by area J

Figure 5. Gully south-east of area L

Figure 6. Facing north from area N across a gully towards the Wilson Lead Road and Tauranga Bay Rd intersection.

Figure 7. Test pit in area A.

Figure 8. Dense sand encountered in area B.

Figure 9. Test pit in area D

Figure 10. Test pit in area E

Figure 11. Test pit in area F

Figure 12. Test pit in area G

Figure 13. Test pit in area I

Figure 14. Test pit in area J

Appendix B. Site Investigation Records

Site Investigation Record

Client: Tauranga Bay Holdings Ltd

Site: Section 41 SO 13711, Tauranga Bay Road, Westport

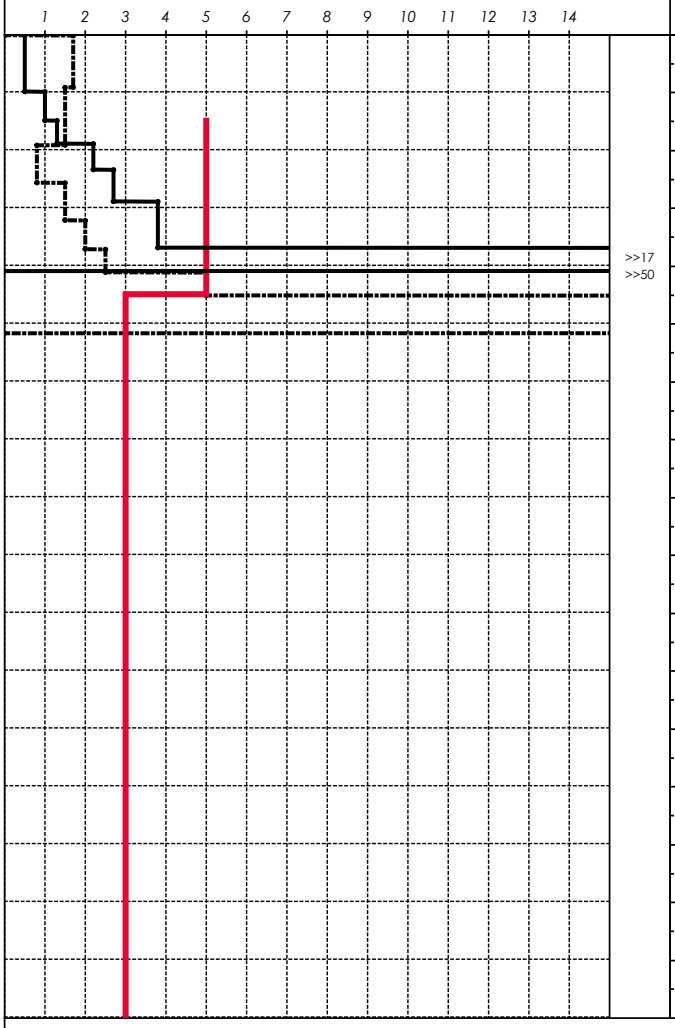
Technical Category:

Lot: Section 41 **D.P.:** SO 13711

Date Tested: 3-May-2022

Log Sheet No.: 1 of 1 **Project No.:** 510322

Dynamic Cone Penetrometer (DCP) Test Results



01 02

Minimum penetration resistance (based on 300mm wide footing founded at 300mm depth) required for 'Good Ground' as defined in the Acceptable Solutions and Verification Methods for NZBC Clause B1 Structure.

Soil Profile

Test Location 01

	Water
TOPSOIL & SILT; brown.	Groundwater Not Encountered
SAND; orange. Iron pan.	
SAND; orange brown.	
SAND; orange light brown.	
EOH: 2.2m - Target Depth.	

Site Plan: (Not to Scale)

Comments:

Field Staff:	Prepared By:	Soil Profile From:
SHJ & EAW	EAW	☑ Hand Auger
Job Manager:	**Approved By:**	☐ Spade Hole
SCC	SCC	☐ Test Pit

Note: This record identifies the geotechnical conditions encountered at the noted test location(s) only. It is possible that ground conditions could be different away from the point(s) of testing.

Site Investigation Record

Client: Tauranga Bay Holdings Ltd

Site: Section 41 SO 13711, Tauranga Bay Road, Westport

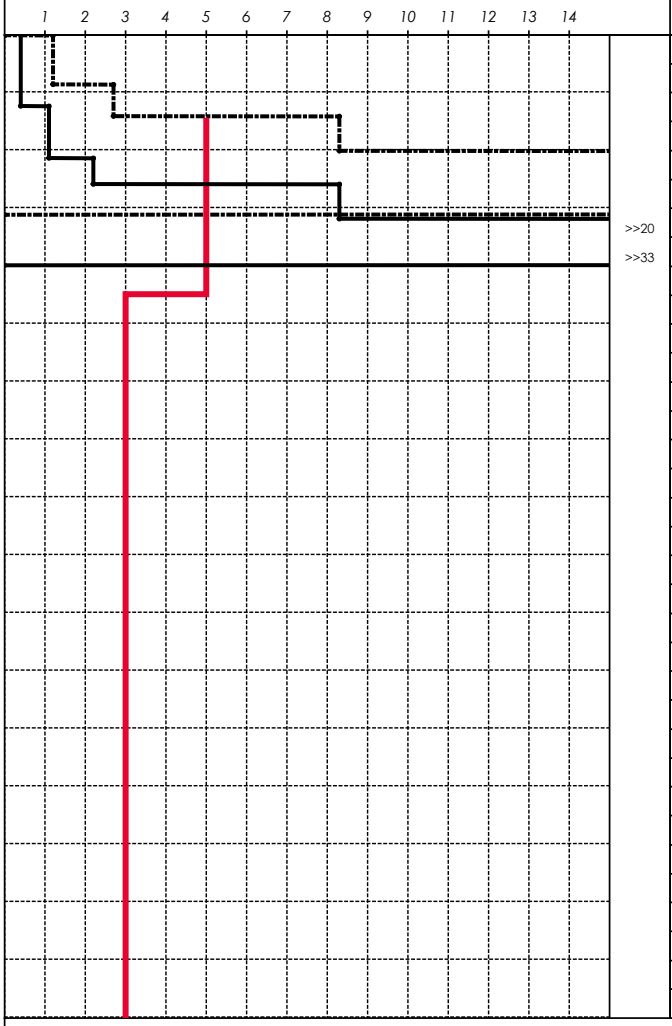
Technical Category:

Lot: Section 41 **D.P.:** SO 13711

Date Tested: 3-May-2022

Log Sheet No.: 1 of 1 **Project No.:** 510322

Dynamic Cone Penetrometer (DCP) Test Results



03 04

Minimum penetration resistance (based on 300mm wide footing founded at 300mm depth) required for 'Good Ground' as defined in the Acceptable Solutions and Verification Methods for NZBC Clause B1 Structure.

Soil Profile

Test Location 03

Water

Groundwater Not Encountered

TS
T
TS

TOPSOIL & SILT, with some sand; brown.

SAND; orange. Iron pan.

SAND; orange brown.

EOH: 2.4m

Site Plan: (Not to Scale)

Comments:

Field Staff:	Prepared By:	Soil Profile From:
SHJ & EAW	EAW	☑ Hand Auger
Job Manager:	**Approved By:**	☐ Spade Hole
SCC	SCC	☐ Test Pit

Note: This record identifies the geotechnical conditions encountered at the noted test location(s) only. It is possible that ground conditions could be different away from the point(s) of testing.

Site Investigation Record

Client: Tauranga Bay Holdings Ltd

Site: Section 41 SO 13711, Tauranga Bay Road, Westport

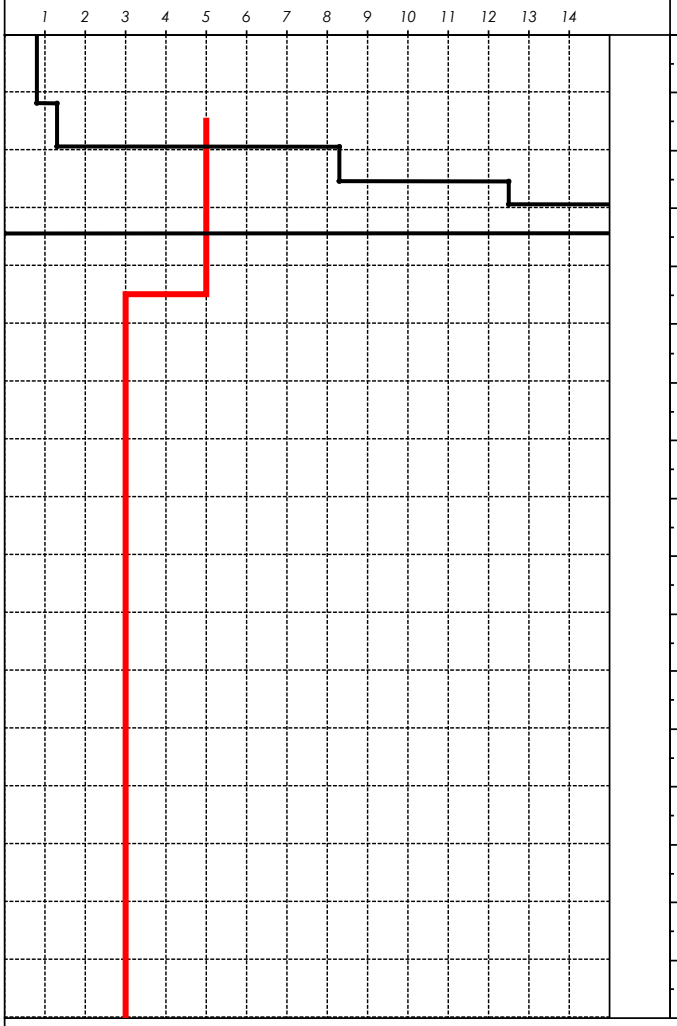
Technical Category:

Lot: Section 41 **D.P.:** SO 13711

Date Tested: 3-May-2022

Log Sheet No.: 1 of 1 **Project No.:** 510322

Dynamic Cone Penetrometer (DCP) Test Results



05

Minimum penetration resistance (based on 300mm wide footing founded at 300mm depth) required for 'Good Ground' as defined in the Acceptable Solutions and Verification Methods for NZBC Clause B1 Structure.

Soil Profile

Test Location 06

Depth (m)	Soil Profile
0.2	TS TOPSOIL & SILT, with some sand; brown.
0.4	SAND; orange. Iron pan.
0.6	SAND; orange brown.
0.8	SAND; greyish brown.
2.0	EOH: 2m - Target Depth.

Water: Groundwater Not Encountered

Comments:

Site Plan: (Not to Scale)

Field Staff:	Prepared By:	Soil Profile From:
SHJ & EAW	EAW	☐ Hand Auger
Job Manager:	**Approved By:**	☐ Spade Hole
SCC	SCC	☑ Test Pit

Note: This record identifies the geotechnical conditions encountered at the noted test location(s) only. It is possible that ground conditions could be different away from the point(s) of testing.

Site Investigation Record

Client: Tauranga Bay Holdings Ltd

Site: Section 41 SO 13711, Tauranga Bay Road, Westport

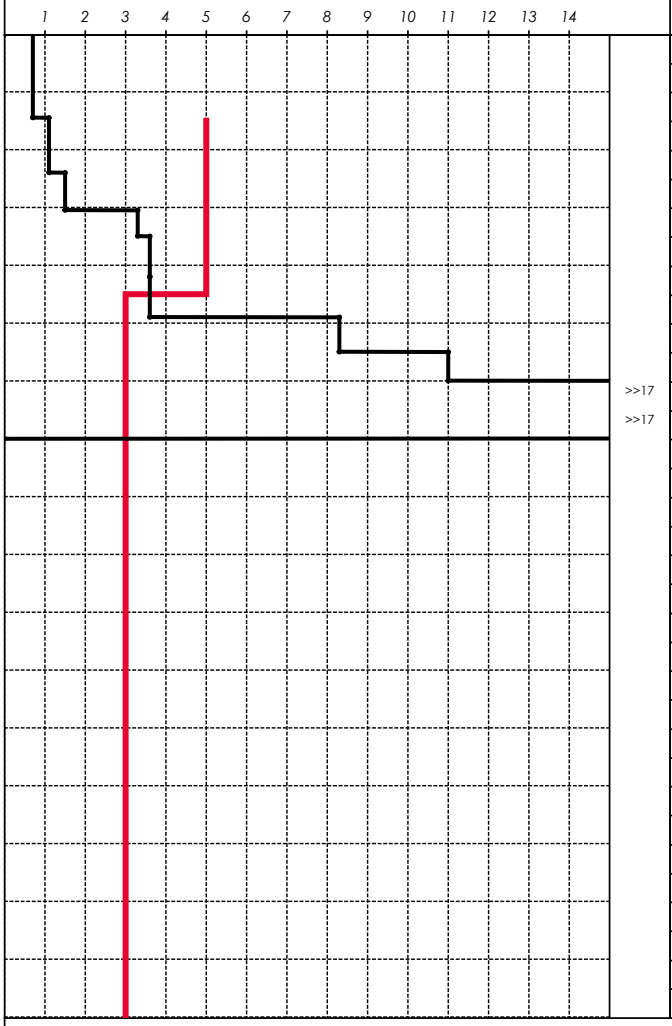
Technical Category:

Lot: Section 41 **D.P.:** SO 13711

Date Tested: 3-May-2022

Log Sheet No.: 1 of 1 **Project No.:** 510322

Dynamic Cone Penetrometer (DCP) Test Results



Depth (m)

0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0 2.2 2.4 2.6 2.8 3.0 3.2

Soil Profile

Test Location 07

Depth (m)	Soil Profile
0.2	TOPSOIL & SILT, with some sand; dark brown.
1.2	SILT, with some sand, with minor organics, wood; brown.
1.4	SAND; orange. Iron pan.
2.2	SAND; orange.
2.4	EOH: 2.3m - Target Depth.

Water

Groundwater Not Encountered

07

Minimum penetration resistance (based on 300mm wide footing founded at 300mm depth) required for 'Good Ground' as defined in the Acceptable Solutions and Verification Methods for NZBC Clause B1 Structure.

Site Plan: (Not to Scale)

Comments:

Field Staff:	Prepared By:	Soil Profile From:
SHJ & EAW	EAW	☑ Hand Auger
Job Manager:	**Approved By:**	☐ Spade Hole
SCC	SCC	☐ Test Pit

Produced with CORE-GS Report Published: 6/05/2022 9:21:41 am

Note: This record identifies the geotechnical conditions encountered at the noted test location(s) only. It is possible that ground conditions could be different away from the point(s) of testing.

Site Investigation Record

Client: Tauranga Bay Holdings Ltd

Site: Section 41 SO 13711, Tauranga Bay Road, Westport

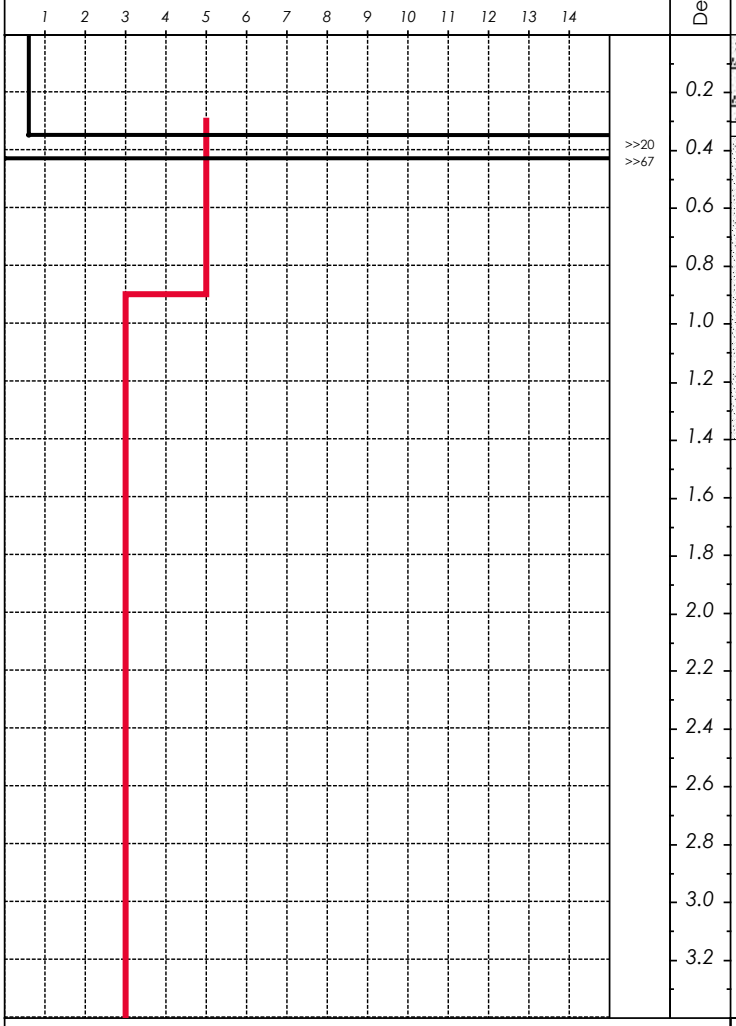
Technical Category:

Lot: Section 41 **D.P.:** SO 13711

Date Tested: 3-May-2022

Log Sheet No.: 1 of 1 **Project No.:** 510322

Dynamic Cone Penetrometer (DCP) Test Results



08

Minimum penetration resistance (based on 300mm wide footing founded at 300mm depth) required for 'Good Ground' as defined in the Acceptable Solutions and Verification Methods for NZBC Clause B1 Structure.

Soil Profile

Test Location 08

Water

TS T TOPSOIL & SILT, with some sand; brown.

Orange. Iron pan.

SAND; orange brown.

EOH: 1.4m - Target Depth.

Site Plan: (Not to Scale)

Comments:

Field Staff:	Prepared By:	Soil Profile From:
SHJ & EAW	EAW	☑ Hand Auger
Job Manager:	**Approved By:**	☐ Spade Hole
SCC	SCC	☐ Test Pit

Note: This record identifies the geotechnical conditions encountered at the noted test location(s) only. It is possible that ground conditions could be different away from the point(s) of testing.

Produced with CORE-GS Report Published: 6/05/2022 9:21:41 am

eliot sinclair

Site Investigation Record

Client: Tauranga Bay Holdings Ltd

Site: Section 41 SO 13711, Tauranga Bay Road, Westport

Technical Category:

Lot: Section 41 **D.P.:** SO 13711

Date Tested: 3-May-2022

Log Sheet No.: 1 of 1 **Project No.:** 510322

Dynamic Cone Penetrometer (DCP) Test Results

Number of Blows per 100mm

1 2 3 4 5 6 7 8 9 10 11 12 13 14

>>17
>>29

Depth (m)

0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0 2.2 2.4 2.6 2.8 3.0 3.2

Soil Profile

Test Location 09

Water

TS T

TOPSOIL & SILT, with minor sand; brown.

SAND; orange. Iron pan.

SAND; orange brownish. Firm.

EOH: 2.2m - Target Depth.

09

Minimum penetration resistance (based on 300mm wide footing founded at 300mm depth) required for 'Good Ground' as defined in the Acceptable Solutions and Verification Methods for NZBC Clause B1 Structure.

Site Plan: (Not to Scale)

Comments:

Field Staff:	Prepared By:	Soil Profile From:
SHJ & EAW	EAW	☑ Hand Auger
Job Manager:	**Approved By:**	☐ Spade Hole
SCC	SCC	☐ Test Pit

Note: This record identifies the geotechnical conditions encountered at the noted test location(s) only. It is possible that ground conditions could be different away from the point(s) of testing.

Produced with CORE-GS Report Published: 6/05/2022 9:21:41 am

Site Investigation Record

Client: Tauranga Bay Holdings Ltd

Site: Section 41 SO 13711, Tauranga Bay Road, Westport

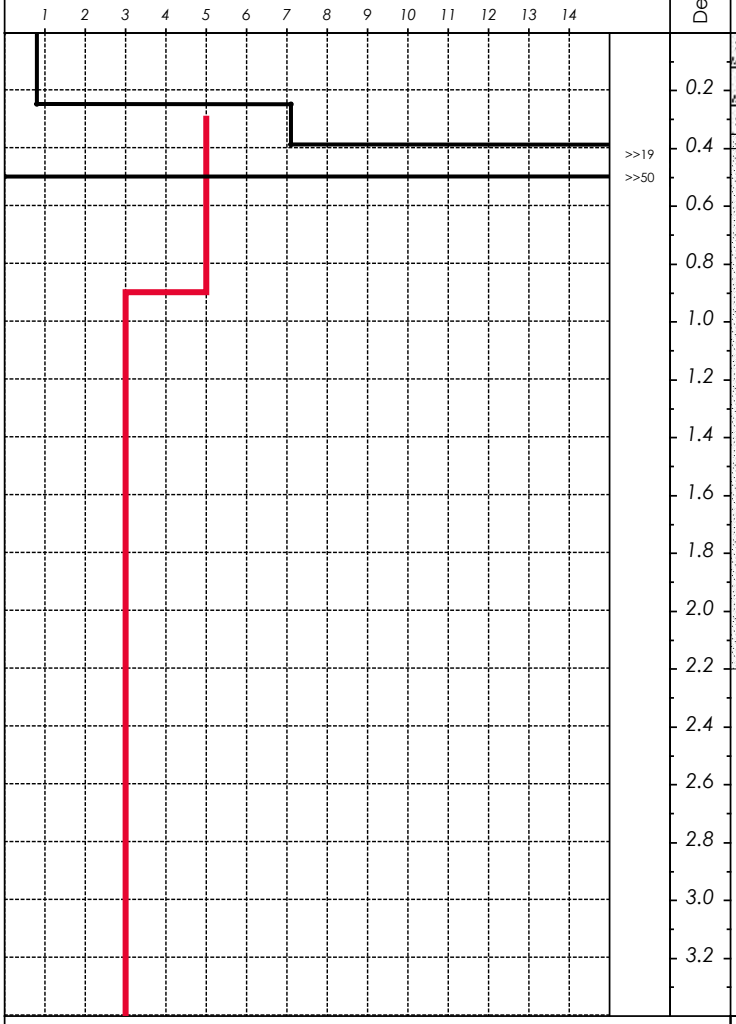
Technical Category:

Lot: Section 41 **D.P.:** SO 13711

Date Tested: 3-May-2022

Log Sheet No.: 1 of 1 **Project No.:** 510322

Dynamic Cone Penetrometer (DCP) Test Results



10

Minimum penetration resistance (based on 300mm wide footing founded at 300mm depth) required for 'Good Ground' as defined in the Acceptable Solutions and Verification Methods for NZBC Clause B1 Structure.

Soil Profile

Test Location 10

Water

Groundwater Not Encountered

TOPSOIL & SILT, with some sand; brown.

SAND; orange. Iron pan.

SAND; orange brown.

EOH: 2.2m - Target Depth.

Site Plan: (Not to Scale)

Comments:

Field Staff:	Prepared By:	Soil Profile From:
SHJ & EAW	EAW	☑ Hand Auger
Job Manager:	**Approved By:**	☐ Spade Hole
SCC	SCC	☐ Test Pit

Note: This record identifies the geotechnical conditions encountered at the noted test location(s) only. It is possible that ground conditions could be different away from the point(s) of testing.

Site Investigation Record

Client: Tauranga Bay Holdings Ltd

Site: Section 41 SO 13711, Tauranga Bay Road, Westport

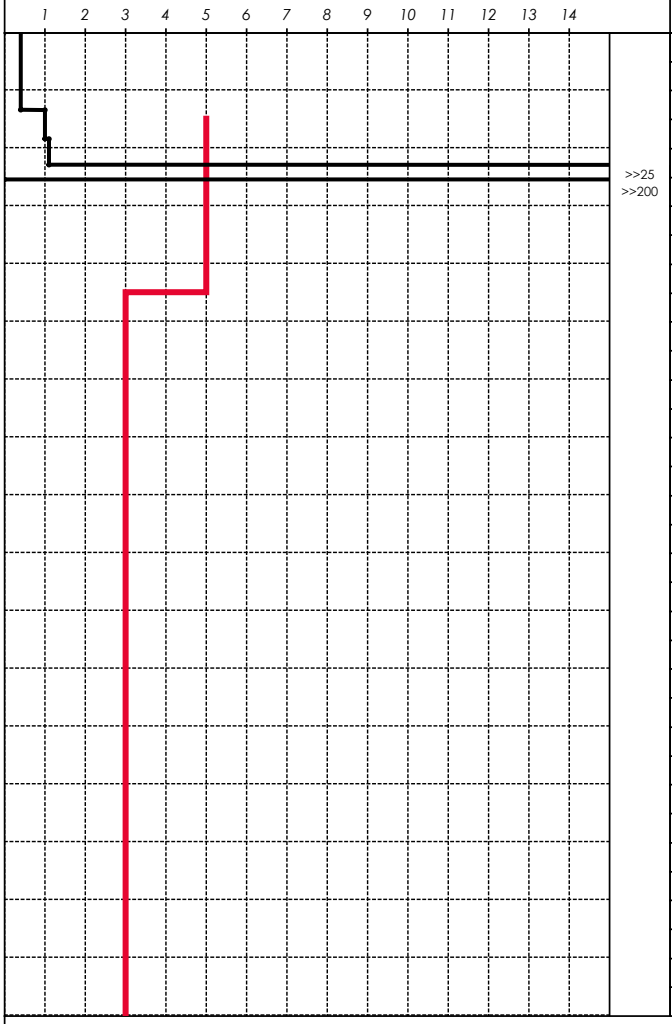
Technical Category:

Lot: Section 41 **D.P.:** SO 13711

Date Tested: 3-May-2022

Log Sheet No.: 1 of 1 **Project No.:** 510322

Dynamic Cone Penetrometer (DCP) Test Results



Depth (m)

0.2 0.4 0.6 0.8 1.0 1.2 1.4 1.6 1.8 2.0 2.2 2.4 2.6 2.8 3.0 3.2

Soil Profile

Test Location 11

Depth (m)	Description
0.0 – 0.5	TOPSOIL & SILT, with some sand; brown.
0.5	SAND; orange. Iron pan.
0.5 – 1.1	SAND; orange brown.
1.1 – 1.6	SAND; orange light brown.
1.6 – 2.2	SAND; orange brown.
2.2	EOH: 2.2m - Target Depth.

Water

Groundwater Not Encountered

11

Minimum penetration resistance (based on 300mm wide footing founded at 300mm depth) required for 'Good Ground' as defined in the Acceptable Solutions and Verification Methods for NZBC Clause B1 Structure.

Site Plan: (Not to Scale)

Comments:

Field Staff:	Prepared By:	Soil Profile From:
SHJ & EAW	EAW	☑ Hand Auger
Job Manager:	**Approved By:**	☐ Spade Hole
SCC	SCC	☐ Test Pit

Produced with CORE-GS Report Published: 6/05/2022 9:21:41 am

Note: This record identifies the geotechnical conditions encountered at the noted test location(s) only. It is possible that ground conditions could be different away from the point(s) of testing.

Site Investigation Record

Client: Tauranga Bay Holdings Ltd

Site: Section 41 SO 13711, Tauranga Bay Road, Westport

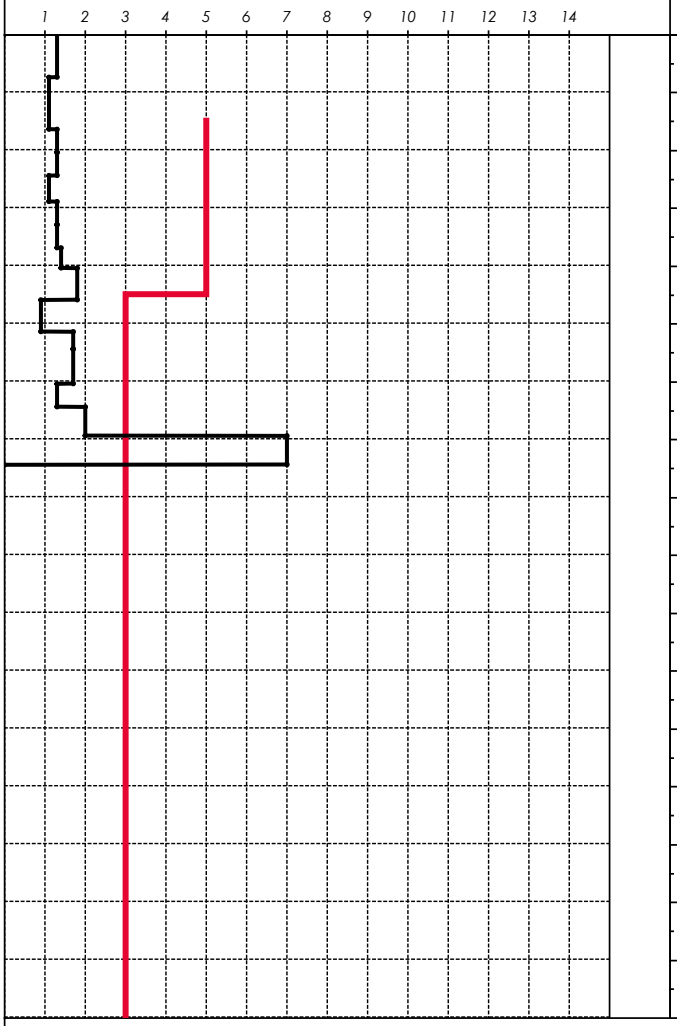
Technical Category:

Lot: Section 41 **D.P.:** SO 13711

Date Tested: 3-May-2022

Log Sheet No.: 1 of 1 **Project No.:** 510322

Dynamic Cone Penetrometer (DCP) Test Results



12

Minimum penetration resistance (based on 300mm wide footing founded at 300mm depth) required for 'Good Ground' as defined in the Acceptable Solutions and Verification Methods for NZBC Clause B1 Structure.

Soil Profile

Test Location 12

Depth (m)	Description
0.2	TOPSOIL & SILT, with some sand; brown.
1.6	FILL: SILT, with some peat (fibrous) and sand; brown. Organics.
2.9	SAND; orange. Iron pan.
	SAND; orange brown.
	EOH: 2.9m - Target Depth.

Water: Groundwater Not Encountered

Comments:

Site Plan: (Not to Scale)

Field Staff:	Prepared By:	Soil Profile From:
SHJ & EAW	EAW	☑ Hand Auger
Job Manager:	**Approved By:**	☐ Spade Hole
SCC	SCC	☐ Test Pit

Produced with CORE-GS Report Published: 6/05/2022 9:21:41 am

Note: This record identifies the geotechnical conditions encountered at the noted test location(s) only. It is possible that ground conditions could be different away from the point(s) of testing.

Site Investigation Record

Client: Tauranga Bay Holdings Ltd

Site: Section 41 SO 13711, Tauranga Bay Road, Westport

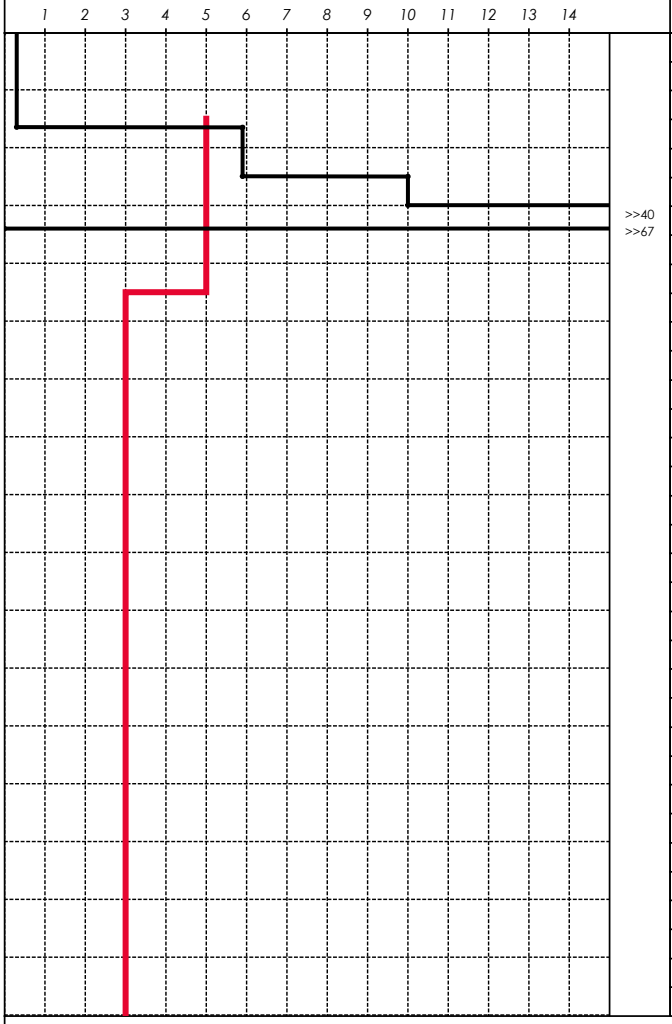
Technical Category:

Lot: Section 41 **D.P.:** SO 13711

Date Tested: 3-May-2022

Log Sheet No.: 1 of 1 **Project No.:** 510322

Dynamic Cone Penetrometer (DCP) Test Results



13

Minimum penetration resistance (based on 300mm wide footing founded at 300mm depth) required for 'Good Ground' as defined in the Acceptable Solutions and Verification Methods for NZBC Clause B1 Structure.

Soil Profile

Test Location 13

0.0 – 0.8	TOPSOIL & SILT, with some sand; brown. SILT, with minor sand; brown.
0.8 – 1.0	SAND; orange. Iron pan.
1.0 – 2.2	SAND; orange brown. SAND; orange light brown.
2.2	EOH: 2.2m - Target Depth.

Water

Groundwater Not Encountered

Comments:

Field Staff:	Prepared By:	Soil Profile From:
SHJ & EAW	EAW	☑ Hand Auger
Job Manager:	**Approved By:**	☐ Spade Hole
SCC	SCC	☐ Test Pit

Site Plan: (Not to Scale)

Report Published: 6/05/2022 9:21:41 am

Produced with CORE-GS

Note: This record identifies the geotechnical conditions encountered at the noted test location(s) only. It is possible that ground conditions could be different away from the point(s) of testing.

Site Investigation Record

Client: Tauranga Bay Holdings Ltd

Site: Section 41 SO 13711, Tauranga Bay Road, Westport

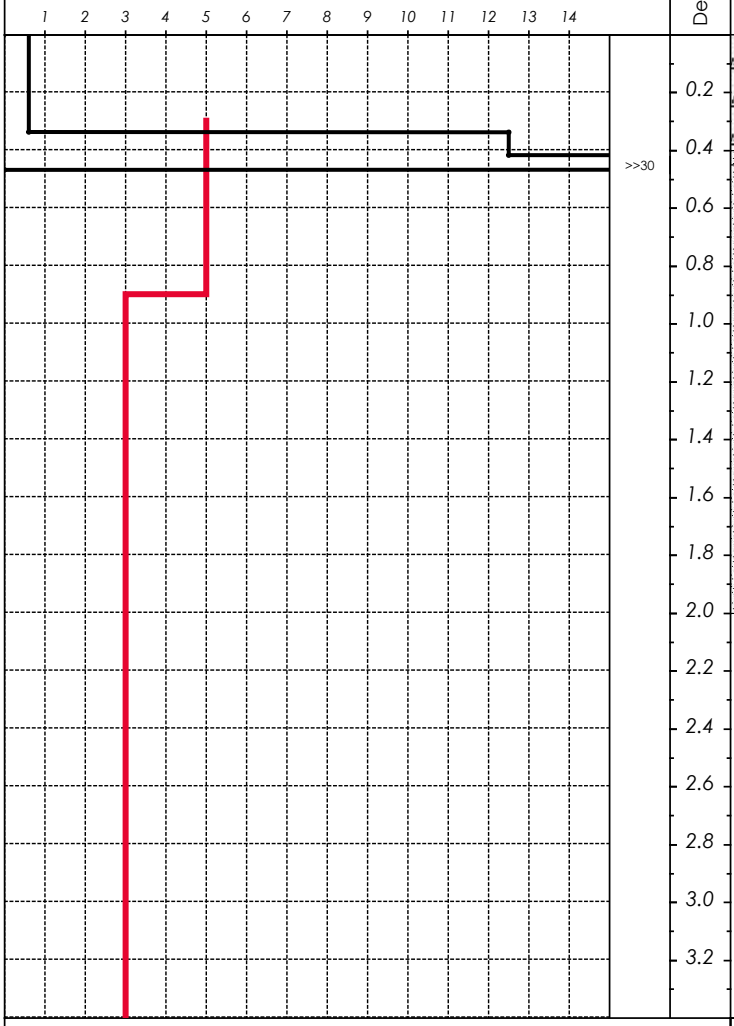
Technical Category:

Lot: Section 41 **D.P.:** SO 13711

Date Tested: 3-May-2022

Log Sheet No.: 1 of 1 **Project No.:** 510322

Dynamic Cone Penetrometer (DCP) Test Results



14

Minimum penetration resistance (based on 300mm wide footing founded at 300mm depth) required for 'Good Ground' as defined in the Acceptable Solutions and Verification Methods for NZBC Clause B1 Structure.

Soil Profile

Test Location 14

Water

TS T TS

SandyTOPSOIL & SILT; brown.

SAND; orange. Iron pan.

SAND; orange brown.

EOH: 2m - Target Depth.

Site Plan: (Not to Scale)

Comments:

Field Staff:	Prepared By:	Soil Profile From:
SHJ & EAW	EAW	☑ Hand Auger
Job Manager:	**Approved By:**	☐ Spade Hole
SCC	SCC	☐ Test Pit

Note: This record identifies the geotechnical conditions encountered at the noted test location(s) only. It is possible that ground conditions could be different away from the point(s) of testing.

Site Investigation Record

Client: Tauranga Bay Holdings Ltd

Site: Section 41 SO 13711, Tauranga Bay Road, Westport

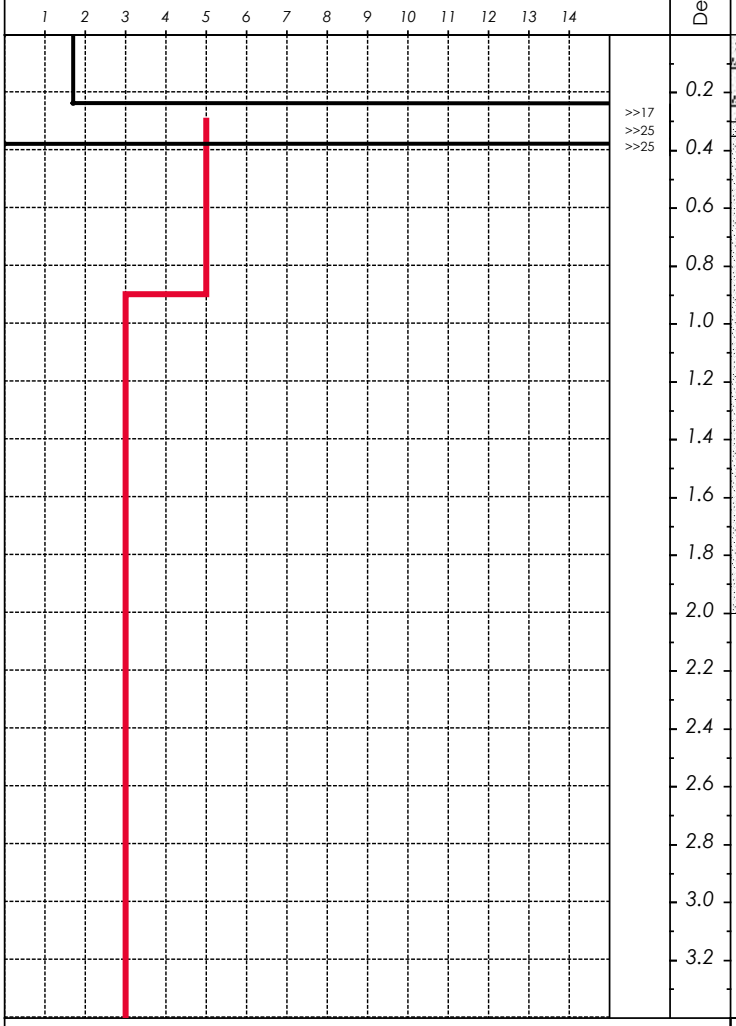
Technical Category:

Lot: Section 41 **D.P.:** SO 13711

Date Tested: 3-May-2022

Log Sheet No.: 1 of 1 **Project No.:** 510322

Dynamic Cone Penetrometer (DCP) Test Results



15

Minimum penetration resistance (based on 300mm wide footing founded at 300mm depth) required for 'Good Ground' as defined in the Acceptable Solutions and Verification Methods for NZBC Clause B1 Structure.

Soil Profile

Test Location 15

Water

TS
T

SandyTOPSOIL & SILT; brown.

SAND; orange. Iron pan.

SAND; orange brown.

EOH: 2m - Target Depth.

Site Plan: (Not to Scale)

Comments:

Field Staff:	Prepared By:	Soil Profile From:
SHJ & EAW	EAW	☑ Hand Auger
Job Manager:	**Approved By:**	☐ Spade Hole
SCC	SCC	☐ Test Pit

Note: This record identifies the geotechnical conditions encountered at the noted test location(s) only. It is possible that ground conditions could be different away from the point(s) of testing.

Site Investigation Record

Client: Tauranga Bay Holdings Ltd

Site: Section 41 SO 13711, Tauranga Bay Road, Westport

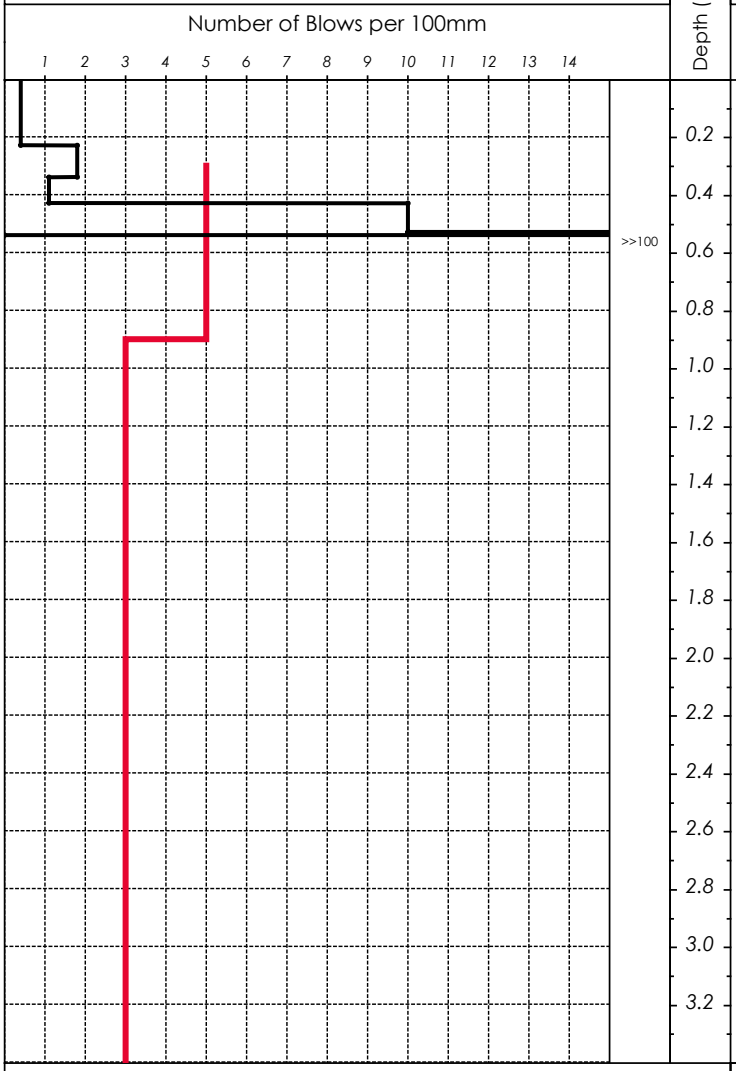
Technical Category:

Lot: Section 41 **D.P.:** SO 13711

Date Tested: 3-May-2022

Log Sheet No.: 1 of 1 **Project No.:** 510322

Dynamic Cone Penetrometer (DCP) Test Results



16

Minimum penetration resistance (based on 300mm wide footing founded at 300mm depth) required for 'Good Ground' as defined in the Acceptable Solutions and Verification Methods for NZBC Clause B1 Structure.

Soil Profile

Water

Site Plan: (Not to Scale)

Comments:

Field Staff:	Prepared By:	Soil Profile From:
SHJ & EAW	EAW	☐ Hand Auger
Job Manager:	**Approved By:**	☐ Spade Hole
SCC	SCC	☐ Test Pit

Note: This record identifies the geotechnical conditions encountered at the noted test location(s) only. It is possible that ground conditions could be different away from the point(s) of testing.

Site Investigation Record

Client: Tauranga Bay Holdings Ltd

Site: Section 41 SO 13711, Tauranga Bay Road, Westport

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Lot: Section 41 **D.P.:** SO 13711

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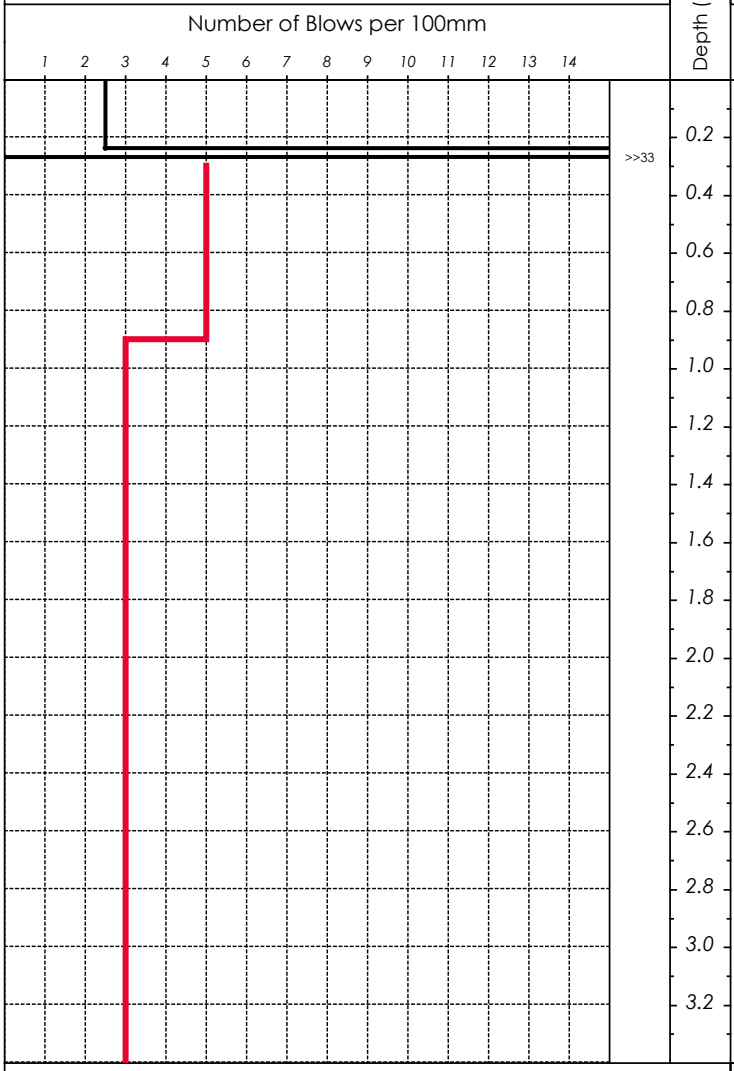
Log Sheet No.: 1 of 1 **Project No.:** 510322

Dynamic Cone Penetrometer (DCP) Test Results



17

Minimum penetration resistance (based on 300mm wide footing founded at 300mm depth) required for 'Good Ground' as defined in the Acceptable Solutions and Verification Methods for NZBC Clause B1 Structure.

Soil Profile

Water

Site Plan: (Not to Scale)

Comments:

Field Staff:	Prepared By:	Soil Profile From:
SHJ & EAW	EAW	☐ Hand Auger
Job Manager:	**Approved By:**	☐ Spade Hole
SCC	SCC	☐ Test Pit

Note: This record identifies the geotechnical conditions encountered at the noted test location(s) only. It is possible that ground conditions could be different away from the point(s) of testing.

Appendix C. Excavate and Backfill Specification

Excavation and Backfill Specification

- The excavation is to be down to firm gravels below the building platform and extend beyond the building platform by either 1m or the depth to firm ground, whichever is greatest.
- The base of the excavation shall be clear of any loose material and if necessary, shall be benched and compacted.
- The sides of the excavation are to be no steeper than 2 vertical to 1 horizontal.
- The backfill shall consist of clean pit run or river gravel 65mm down, with no organic matter.
- If the excavation base is sloping, it shall be benched to create level platforms, prior to placing any backfill.
- The backfill shall be placed in layers with a maximum un-compacted thickness of 200mm and a minimum thickness of 150mm.
- If the backfill material has not been tested within the previous 3 months, the Contractor shall have a 25kg sample of the backfill material tested at an accredited laboratory for maximum dry density and optimum moisture content. The test results shall be supplied to the engineer for approval at least 24 hours prior to starting backfilling.
- When the fill is to be brought above the surrounding ground level, the fill shall be battered at least 1.0m from the building foundation and at a slope no steeper than 1 in 3 (1 vertical to 3 horizontal).
- Each layer shall be compacted to a minimum density of 92% and an average of no less than 95% of the maximum dry density achieved in the laboratory tests before the subsequent layer is placed. The test method is the vibrating hammer compaction (NZS 4402: 1988 – Test 4.1.3)

The following inspections are required:

1. Completed excavation prior to backfilling;
2. Following 2 layers of compacted gravels (400mm maximum lift), with either Nuclear Density Testing or Clegg Impact Hammer testing or Scala Penetrometer – 7 blows per 100mm; and
3. Completion of the final compacted gravel layer with Nuclear Density Testing.

The contractor is to contact the engineer 72 hours before they start the excavation so we can arrange the inspections.

The Engineers Contact details are:

Eliot Sinclair & Partners Ltd
Como House 51 Tancred Street,
PO Box 298
Hokitika 7842

Phone 03 755 8184 cell 027 224 2635

Email cushla.stone@eliotsinclair.co.nz or stuart.challenger@eliotsinclair.co.nz

Appendix D. Statement of Professional Opinion

SCHEDULE 2A

STATEMENT OF PROFESSIONAL OPINION ON SUITABILITY OF LAND FOR BUILDING CONSTRUCTION

Development 15-lot subdivision.....

Developer Tauranga Bay Holdings Ltd.....

Location Section 41 SO 13711.....

I Stuart Charles Challenger..... of Eliot Sinclair and Partners Ltd.....

(Full name) (Name and address of firm)

Hereby confirm that:

1. I am a geo—professional as defined in clause 1.2.2 of NZS 4404:2010 and was retained by the developer as the geo-professional on the above development.

~~2.~~ The extent of my preliminary investigations are described in my Report(s) number 510322, dated 16 June 2022, and the conclusions and recommendations of that/those document(s) have been re-evaluated in the preparation of this report. ~~The extent of my inspections during construction, and the results of all tests and/or re-evaluations carried out are as described in my geotechnical completion report dated .....~~

3. In my professional opinion, not to be construed as a guarantee, I consider that (delete as appropriate):

~~a) The earth fills shown on the attached Plan No..... have been placed in compliance with the requirements of the ..... Council and my specification~~

~~b) The completed works take into account land slope and foundation stability considerations, subject to the appended foundation recommendations and earthworks restrictions, (which should be read in conjunction with the appended final site contour plan).~~

c) Subject to 3(a) and 3(b) of this Schedule, the original ground not affected by filling is suitable for the erection of buildings designed according to NZS 3604 provided that:

   i) Buildings are founded on the underlying good ground.

   ii) ……

~~d) Subject to 3(a) and 3(b) of this Schedule, the filled ground is suitable for the erection of buildings designed according to NZS 3604 provided that:~~

   i) ……

   ii) ……

e) The original ground not affected by filling and the filled ground are not subject to erosion, subsidence, or slippage in accordance with the provisions of section 106 of the Resource Management Act 1991 provided that:

   i) Buildings are founded on the underlying good ground.

   ii) ……

NOTE —~ These subclauses may be deleted or added to as appropriate, to include such considerations as expansive soils where excluded from NZS 3604, and site seismic characteristics as covered in clause 3.1.3 of NZS 1170.5.

4. This professional opinion is furnished to the TA and the 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.

5. This certificate shall be read in conjunction with my geotechnical report referred to in clause 2 above and shall not be copied or reproduced except in conjunction with the full geotechnical completion report.

Signed ..... Date 16 June 2022

Stuart Challenger

Branch Manager, Hokitika

BE BSc CMEngNZ (171997) CPEng

(Name, title, and professional qualifications)