7.4.1 Service Pipes

All service pipes, stormwater structures should be designed and constructed to ensure adequate capacity, strength, and water tightness to prevent leakage into the platform through blockage, running under pressure, or structural failure.

All service pipes installed within any fill should be flexible, or flexibly joined, so that they may deflect without breaking if the ground settles.

A record should be kept of the position, type, and size of all subsoil drains, and in particular of their outlets.

7.5 Trees and Shrubs

There are trees within the vicinity scattered across the property which might potentially cause damage through heaving as a result of root growth and/or settlement resulting from soil shrinkage from the moisture uptake of the roots. To reduce the chance of damage to the foundations, we recommend one of the following options:

- Any Trees/ plants that at their mature high will not be a minimum of that height away from the foundation should be removed including its major root structure.
- A root barrier should be designed and installed between the offending plant and the structure.
- Foundation should be taken to a depth no less than 1.0m where damage from the roots of a plant is unlikely.

If new trees, shrubs, or gardens are established near the structure, care should be taken to ensure:

- The vegetation does not interfere with any subfloor ventilation or services to the structure.
- Over-watering of the vegetation does not saturate the ground near the foundations.
- Trees or shrubs with the potential to develop significant root systems should be planted a minimum distance equal to the mature height of the plant away from the foundations.

8 SUSTAINABILITY

Considering sustainability as early as possible in a project's development, could lead to significant project opportunities and wider positive outcomes. Geotechnical opportunities for increased sustainability for this project include:

- Striping and stocking topsoil for reuse (dependant on presence/ levels of contaminants).
- Designing for cut and fill balance where possible.
- Reuse of site won materials, or using materials won from other sites including use of recycled crushed concrete aggregate for hard fill.
- Contributing site investigation data to the New Zealand Geotechnical Database (NZGD) to help reduce the site investigations needed in the future.

- Using local consultants and contractors to reduce transport related emissions.

9 CONCLUSIONS

Following development of the site in accordance with our recommendations, we consider that: -

a) The land in respect of which a consent is sought, or any structure on the land built in accordance with our recommendations, is unlikely to be subject to material damage by erosion, falling debris, subsidence, slippage, or inundation from any source; and

b) Any subsequent use that is likely to be made of the land is unlikely to accelerate, worsen, or result in material damage to the land, other land, or structure by erosion, falling debris, subsidence, slippage, or inundation from any source; and

c) Sufficient provision has been made for physical access to each allotment to be created by the subdivision.

10 PLAN REVIEW

Prior to an application for Building Consent, it is important we are given the opportunity to review the final development drawings to ensure the recommendations contained within this report have been followed and interpreted correctly. Following successful review of the development drawings, we are able to update this report to support an application for Building Consent.

11 VERIFICATION

Verification requirements will be provided once the form of the foundations has been determined.

12 LIMITATIONS

This report should be read and reproduced in its entirety including the limitations to understand the context of the opinions and recommendations given.

This report has been prepared exclusively for NZHG Gisborne Limited in accordance with the brief given to us or the agreed scope and they will be deemed the exclusive owner on full and final payment of the invoice. Information, opinions, and recommendations contained within this report can only be used for the purposes with which it was intended. LDE accepts no liability or responsibility whatsoever for any use or reliance on the report by any party other than the owner or parties working for or on behalf of the owner, such as local authorities, and for purposes beyond those for which it was intended.

This report was prepared in general accordance with current standards, codes and best practice at the time of this report. These may be subject to change.

Opinions given in this report are based on visual methods and subsurface investigations at discrete locations designed to the constraints of the project scope to provide the best assessment of the environment. It must be appreciated that the nature and continuity of the subsurface materials between these locations are inferred and that actual conditions could vary from that described herein. We should be contacted immediately if the conditions are found to differ from those described in this report.

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14 GLOSSARY

Compressible Soils:	Compressible soils are those that will undergo a reduction in volume under an imposed load, such as the weight of fill or a structure. This occurs firstly as a result of the expulsion of air and water from the soil void spaces (primary settlement) and secondly due to a restructuring of the soil skeleton to take the load (secondary settlement).
Cyclic Softening:	Cyclic-softening is a related condition to liquefaction can also affect clay soils when subjected to cyclic-loading. Clay soils may significantly soften and led to bearing capacity failure, in addition to post-earthquake consolidation settlements may occur as a result of the earthquake shaking.
Expansive Soils:	Cohesive soils containing significant proportions of certain clay minerals can be subject to appreciable volume change caused by variations in soil moisture content, most notably between seasons or from the uptake of water through the root systems of trees and shrubs. This is also often referred to as soil reactivity or shrink-swell behaviour.
Lateral Spread:	Lateral spread of liquefied soils is the lateral displacement of blocks of land moving laterally towards a free edge (for example a riverbank) or within sloping ground. More lateral movement tends to occur closest to the edge with less movement further back. Lateral spreading may result in large permanent ground displacements including cracks, fissures, vertical officesets and overall settlement of the ground.
Lateral Stretch:	Lateral stretch is the amount of differential extension that a portion of land may experience during an episode of lateral spreading. The lateral stretch across a foundation is a main factor in foundation damage due to liquefaction and lateral spreading because of a large earthquake.
LiDAR	Light Detection and Ranging (LiDAR) is a method of remote sensing topographical survey.
Limit States:	Seismic design criteria for performance-based design. SLS, SLS2 & ULS are prescribed in NZS1170.5 (Standards New Zealand Te Mana Tautikanga O Aotearoa, 2004) • **Serviceability Limit State (SLS):** Functional requirements for the serviceability limit state are assumed to be met if the structure or part can continue to be used as originally intended without the need for repair (SLS1) or can remain operational or continue to be occupied as appropriate (SLS2). SLS earthquakes are considered highly likely to occur during the lifetime of the structure. • **Ultimate Limit State (ULS):** Functional requirements for the ultimate limit state are assumed to be met if: a) People within, and adjacent to the structure are not endangered by the structure or part.

	b) Displacements of the structure are such that there is no contact between any parts of a structure for which contact is not intended, or between separate structures on the same site, if such contact would damage the structures or parts to the extent that persons would be endangered, or detrimentally alter the response of the structure(s) or parts, or reduce the strength of structural elements below the required strength. c) The structure does not deflect beyond a site boundary adjacent to which other structures can be built or collision between the structure and any adjacent existing structures cannot occur. d) There is no loss of structural integrity in either the structure or part. • **Intermediate Limit State (ILS):** ILS is an intermediate seismic event between SLS & ULS although is not a code requirement. The behaviour of soils and geotechnical systems under earthquake shaking may be highly non-linear and even exhibit a pronounced 'step change' in performance with increasing intensity of shaking. For such cases, only considering performance at the SLS and ULS levels of shaking would fail to identify potentially poor and unacceptable performance at intermediate return periods of shaking.
Liquefaction:	Liquefaction is the term used to describe the temporary, but substantial, loss of strength and stiffness which can occur in saturated, unconsolidated soils that are subjected to strong shaking. In addition to near-total strength loss, liquefaction may also result in the expulsion of sediment and water at the surface, ground and structure settlement, and in lateral (spreading) displacement of the ground.
LPI	Liquefaction potential index is a liquefaction damage index. LPI ranges between 0 and 100 and sites with an LPI of 5 indicate a high liquefaction risk and sites with LPI greater than 15 indicate very high risk (Iwasaki et al, 1982). Not to be used as a precise measure of liquefaction-induced ground damage but as an indicator of the general level of liquefaction severity.
LSN	Liquefaction Severity Number is a liquefaction damage index. LSN varies from 0 (representing no liquefaction vulnerability) to more than 100 (representing very high liquefaction vulnerability (van Ballegooy et al, 2013). LSN places greater importance (than LPI) on the thickness of the non-liquefied crust when the groundwater table is close to the ground surface. Not to be used as a precise measure of liquefaction-induced ground damage but as an indicator of the general level of liquefaction severity. LNS was developed based on the observations/ investigations from the Canterbury earthquake sequence
PGA:	Peak Ground Acceleration (PGA) is the maximum ground acceleration during an earthquake as a proportion of gravity.
Punch Through Failure:	Punch through failure occurs when a foundation punches through a crust of non-liquefiable material due to underlying liquefaction occurring and can lead to potential damage to foundations and/ or large settlements.

Technical Category:

Following the 2010 -2011 Canterbury earthquake sequence the Ministry of Business Innovation and Employment (MBIE) assigned three technical categories (TC1, TC2, TC3) across the residential 'green zone' for foundation investigation and design guidance focusing on one and two storey timber-framed dwellings. These categories are broadly defined as below:

- **TC1:** Liquefaction damage is unlikely in future large earthquakes. Standard residential foundation assessment and construction is appropriate.
- **TC2:** Liquefaction damage is possible in future large earthquakes. Standard enhanced foundation repair and rebuild options in accordance with MBIE guidance are suitable to mitigate against this possibility.
- **TC3:** Liquefaction damage is possible in future large earthquakes. Individual engineering assessment is required to select the appropriate foundation repair or rebuild option.
- **TC2/ TC3 Hybrid:** A site that straddles liquefaction settlement limits of TC2 and TC3 where the SLS settlements are assessed as being less than 50 mm but the ULS settlements are assessed at greater than 100mm.

Whilst this guidance is intended for residential buildings in the Canterbury region, they have been widely adopted to convey liquefaction vulnerability across New Zealand.

The Modules:

The New Zealand Geotechnical Society (NZGS) and MBIE jointly published a series of guidelines for Earthquake Geotechnical Engineering Practice. Revision 1 of the Modules was published in November 2021 and they provide guidance under section 175 of the Building Act 2004 to assist parties to comply with their obligations under the Building Act 2004. The following modules currently form the collection:

- **Module 1:** Overview of the guidelines
- **Module 2:** Geotechnical investigation for earthquake engineering
- **Module 3:** Identification, assessment, and mitigation of liquefaction hazards
- **Module 4:** Earthquake resistant foundation design
- **Module 5:** Ground improvement
- **Module 5A:** Specification of ground improvement for residential properties in the Canterbury region
- **Module 6:** Retaining walls

APPENDIX A

SITE PLAN

LEGEND

Project Data

🟨	Proposed Lots Boundary
🟥	Proposed Building Platform
—	Proposed Accessway
●	Hand Auger + DCP
▽	CPT (Due Diligence)

0 6 12 18 24 m

SCALE A3: 1:350

NOTES

1. Aerial basemap and property boundaries sourced from LINZ Data Service (CC-BY 4.0).
2. Investigation locations shown approximately only.

CLIENT

NZHG Gisborne Limited

PROJECT

Geotechnical Investigation for proposed subdivision
556-560 Aberedeen Road, Te Hapara
Gisborne

DRAWING TITLE

Geotechnical Investigation Plan

PROJECT REF	DRAWING REF	REVISION
24477	GIP	A
DATE	**PREPARED BY**	**CHECKED BY**
29/09/2023	SS	RH

FILE PATH

M:\FILES\LDE - Projects\77008-24477\Geo QGIS Zip Folder (ID 79084)\24477 QGIS Site Maps\24477 Aberdeen Rd.qgz

APPENDIX B

HAND AUGER TEST LOGS

Hand Auger Borehole Log

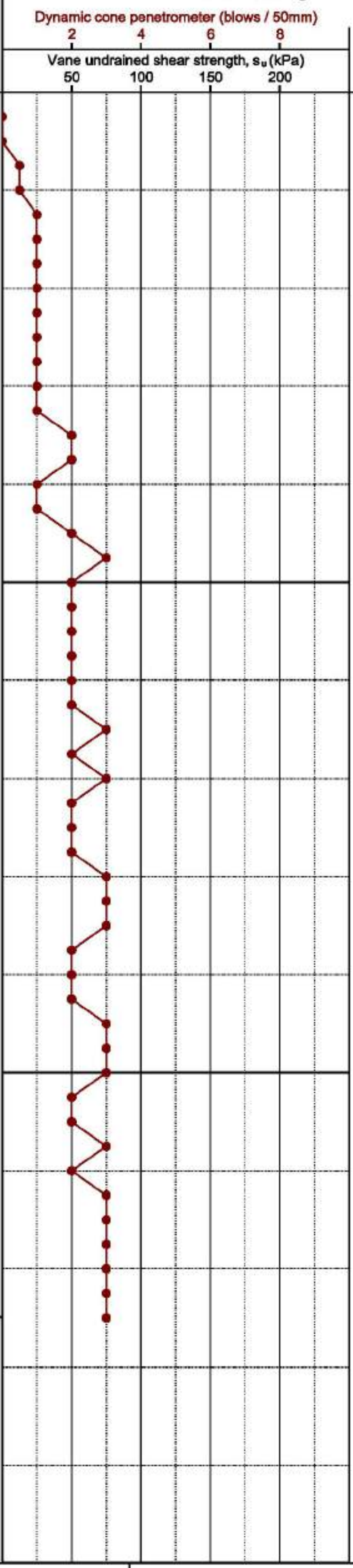
Method: 50mm Hand Auger

Test ID: HA01
Project ID: 24477
Sheet: 1 of 1

Client: NZHG
Project: Geotechnical Investigation
Location: 556-560 Abeerdeen Rd, Gisborne
Test Site: Refer to geotechnical investigation plan

Coordinates: 5709871mN, 2036134mE
System: NZTM
Elevation: 6.5m (NZVD2016)
Located By: Site plan/map

Test Date: 12/09/2023
Logged By: SS
Prepared By: SS
Checked By: RH



Depth (m)	Geology	Graphic Log	Material Description	Water	Values Vane ID: N/A peak / residual (sensitivity)	RL (m)
	TS		SAND, with trace rootlets and silt; dark brown. Very loose; moist; sand, fine to medium.			
	Holocene Beach Deposits		SAND; brown. Loose; moist; sand, fine to medium. 1.80m: Light grey. 2.20m: Grey with orange mottles. 2.40m: Wet.	Groundwater not encountered		
0.5						6.0
1.0						5.5
1.5						5.0
2.0						4.5
2.5						4.0

Hole Depth: 2.50m
Termination: TARGET DEPTH

Remarks:

Materials are described in general accordance with NZGS 'Field Description of Soil and Rock' (2005).
No correlation is implied between shear vane and DCP values.

● Vane peak	▼ Standing water level
○ Vane residual	◁ Groundwater inflow
◆ Vane UTP	▷ Groundwater outflow

UTP = Unable to Penetrate

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Hand Auger Borehole Log

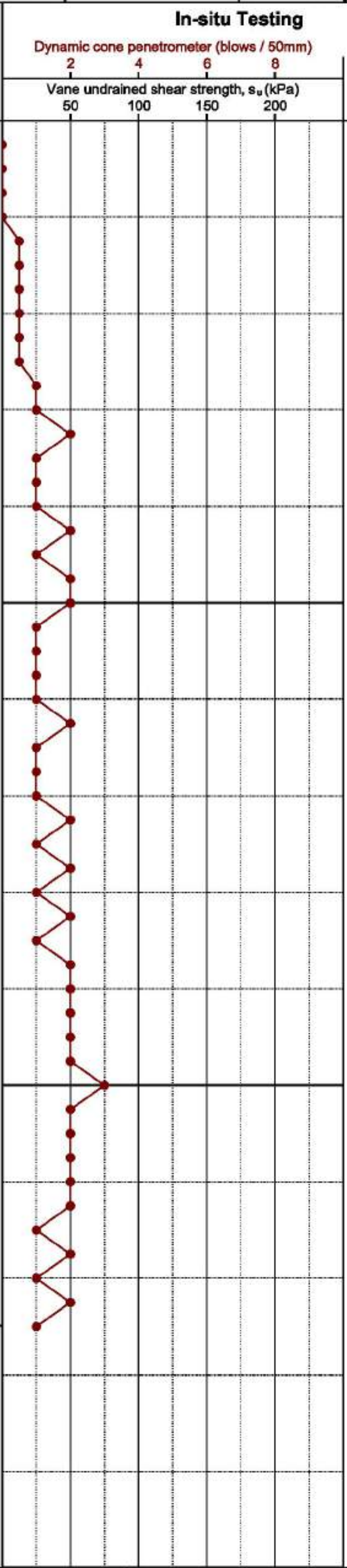
Method: 50mm Hand Auger

Test ID:	**HA02**
Project ID:	24477
Sheet:	1 of 1

Client:	NZHG	**Coordinates:**	5709864mN, 2036136mE	**Test Date:**	12/09/2023
Project:	Geotechnical Investigation	**System:**	NZTM	**Logged By:**	SS
Location:	556-560 Abeerdeen Rd, Gisborne	**Elevation:**	6.5m (NZVD2016)	**Prepared By:**	SS
Test Site:	Refer to geotechnical investigation plan	**Located By:**	Site plan/map	**Checked By:**	RH

Depth (m)	Geology	Material Description	Water	RL (m)
0.0 – 0.5	TS	SAND, with minor silt, with trace rootlets; dark brown. Very loose; moist; sand, fine to medium.	Groundwater not encountered	6.5 – 6.0
0.5 – 2.5	Holocene Beach Deposits	SAND; brown. Loose; moist; sand, fine to medium. 1.50m: Grey with orange mottles. 1.70m: Light grey. 2.40m: Wet.		6.0 – 4.0

In-situ Testing



Values

Vane ID: N/A

peak / residual (sensitivity)

Hole Depth: 2.50m

Termination: TARGET DEPTH

Remarks:

Materials are described in general accordance with NZGS 'Field Description of Soil and Rock' (2005).
No correlation is implied between shear vane and DCP values.

● Vane peak
○ Vane residual
◆ Vane UTP
▼ Standing water level
◁ Groundwater inflow
▷ Groundwater outflow

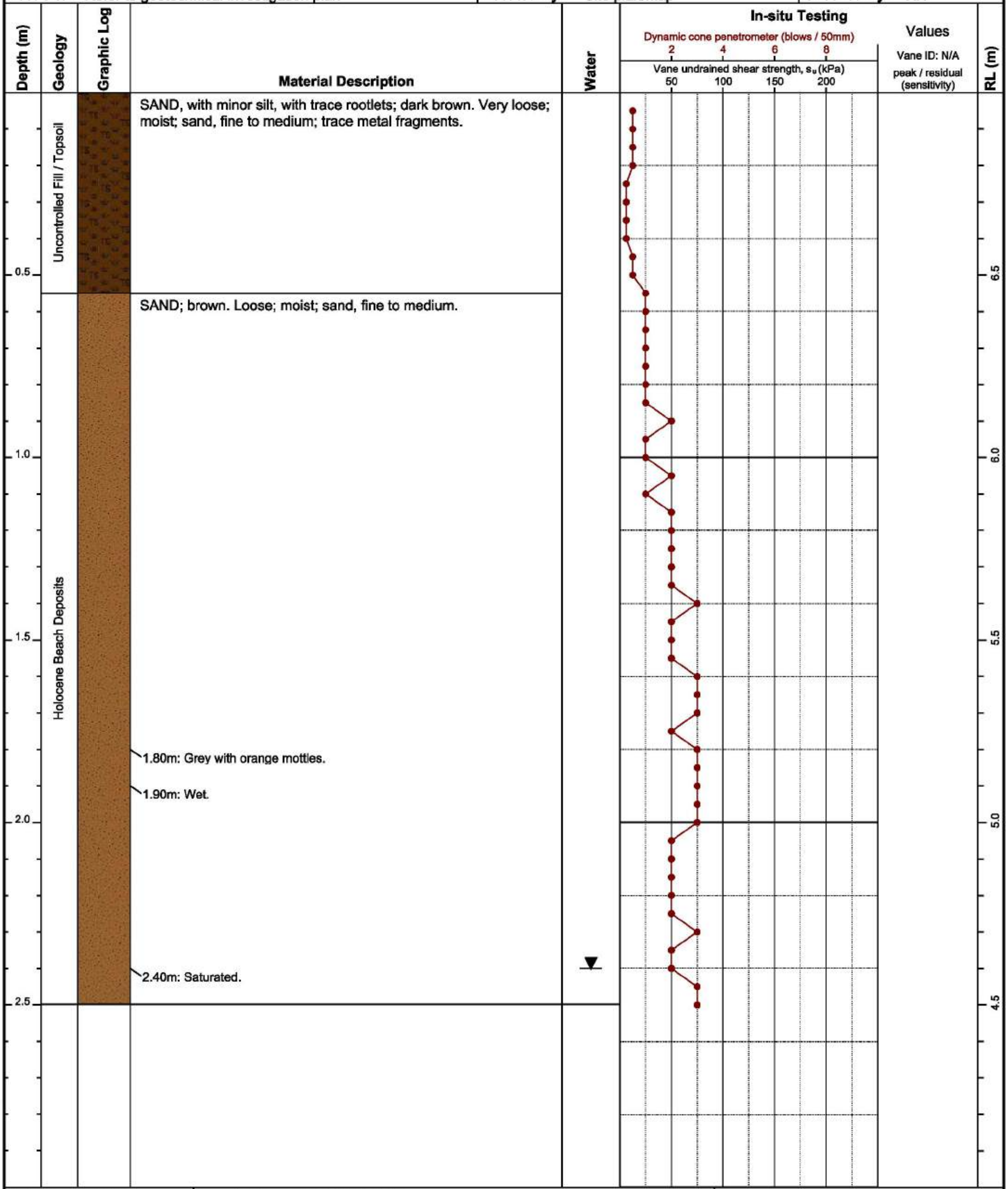
UTP = Unable to Penetrate

Hand Auger Borehole Log

Method: 50mm Hand Auger

Test ID:	HA03
Project ID:	24477
Sheet:	1 of 1

Client:	NZHG	**Coordinates:**	5709847mN, 2036129mE	**Test Date:**	12/09/2023
Project:	Geotechnical Investigation	**System:**	NZTM	**Logged By:**	SS
Location:	556-560 Abeerdeen Rd, Gisborne	**Elevation:**	7m (NZVD2016)	**Prepared By:**	SS
Test Site:	Refer to geotechnical investigation plan	**Located By:**	Site plan/map	**Checked By:**	RH



SAND, with minor silt, with trace rootlets; dark brown. Very loose; moist; sand, fine to medium; trace metal fragments.

SAND; brown. Loose; moist; sand, fine to medium.

1.80m: Grey with orange mottles.

1.90m: Wet.

2.40m: Saturated.

Hole Depth: 2.50m

Termination: TARGET DEPTH

Remarks:

● Vane peak	▼ Standing water level
○ Vane residual	◁ Groundwater inflow
◆ Vane UTP	▷ Groundwater outflow

UTP = Unable to Penetrate

Materials are described in general accordance with NZGS 'Field Description of Soil and Rock' (2005).
No correlation is implied between shear vane and DCP values.

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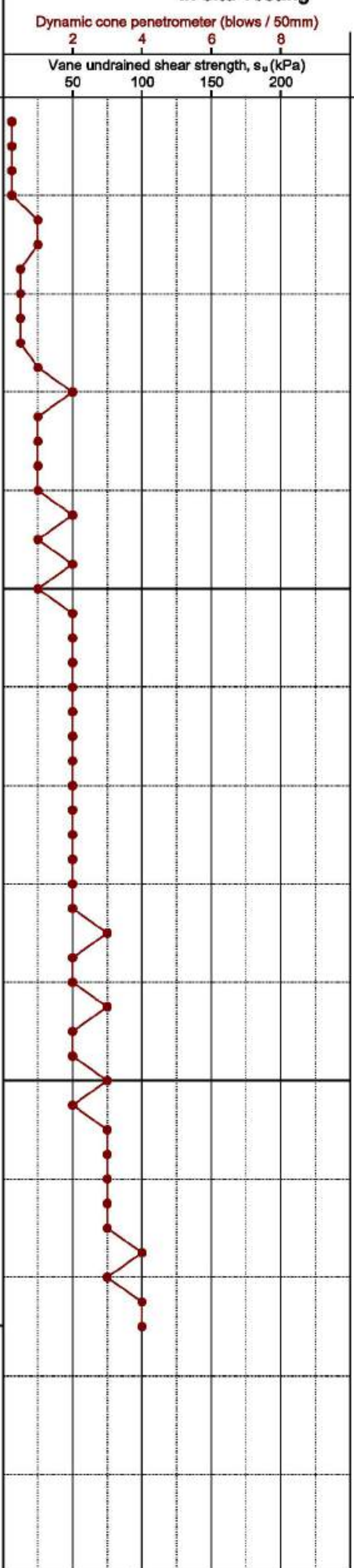
Hand Auger Borehole Log

Method: 50mm Hand Auger

Test ID:	**HA04**		
Project ID:	24477		
Sheet:	1 of 1		
Client:	NZHG	**Coordinates:**	5709842mN, 2036126mE
Project:	Geotechnical Investigation	**System:**	NZTM
Location:	556-560 Abeerdeen Rd, Gisborne	**Elevation:**	7m (NZVD2016)
Test Site:	Refer to geotechnical investigation plan	**Located By:**	Site plan/map
Test Date:	12/09/2023		
Logged By:	SS		
Prepared By:	SS		
Checked By:	RH		

Depth (m)	Geology	Material Description	Water	RL (m)
0.0–0.40	TS	SAND, with minor silt, with trace rootlets; dark brown. Loose; moist; sand, fine to medium.		
0.40–2.50	Holocene Beach Deposits	SAND; brown. Loose; moist; sand, fine to medium. 1.90m: Wet. 2.20m: Saturated.	▼ (2.20)	
0.5				6.5
1.0				6.0
1.5				5.5
2.0				5.0
2.5				4.5

In-situ Testing



Values
Vane ID: N/A
peak / residual
(sensitivity)

Hole Depth: 2.50m **Termination:** TARGET DEPTH

Remarks:

Materials are described in general accordance with NZGS 'Field Description of Soil and Rock' (2005).
No correlation is implied between shear vane and DCP values.

● Vane peak	▼ Standing water level
○ Vane residual	◁ Groundwater inflow
◆ Vane UTP	▷ Groundwater outflow

UTP = Unable to Penetrate

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Hand Auger Borehole Log

LDE LAND DEVELOPMENT & ENGINEERING

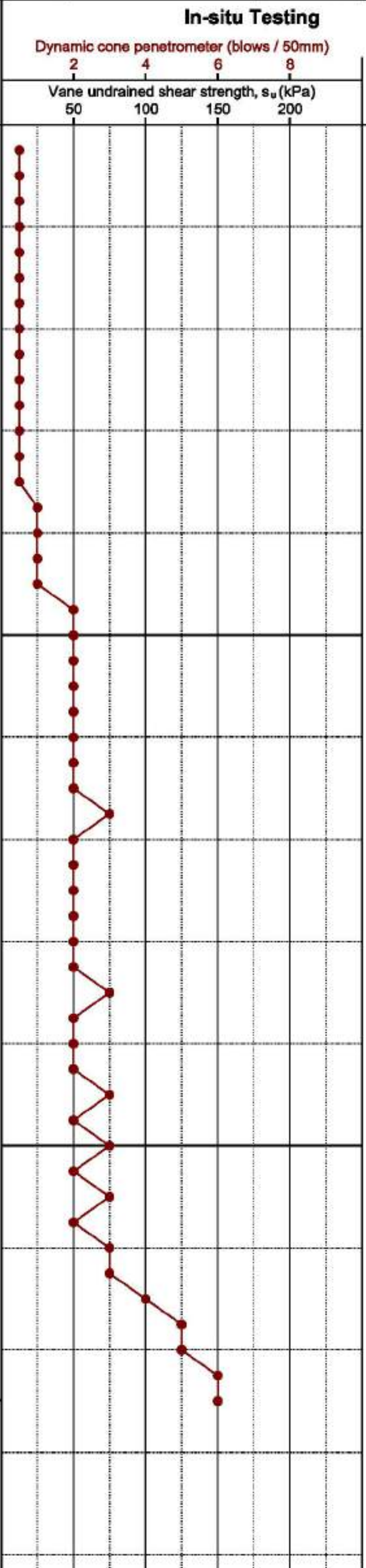
Method: 50mm Hand Auger

Test ID: HA05
Project ID: 24477
Sheet: 1 of 1

Client:	NZHG	**Coordinates:**	5709846mN, 2036121mE	**Test Date:**	12/09/2023
Project:	Geotechnical Investigation	**System:**	NZTM	**Logged By:**	SS
Location:	556-560 Abeerdeen Rd, Gisborne	**Elevation:**	7m (NZVD2016)	**Prepared By:**	SS
Test Site:	Refer to geotechnical investigation plan	**Located By:**	Site plan/map	**Checked By:**	RH

Depth (m)	Geology	Material Description	Water	RL (m)
0.0 – 0.5	Uncontrolled Fill / Topsoil	SAND, with minor silt, with trace rootlets and gravel; dark brown. Loose; moist; sand, fine to medium; gravel, fine to medium, subrounded to subangular.		
0.5	Holocene Beach Deposits	SAND; brown. Loose; moist; sand, fine to medium.		6.5
1.0				6.0
1.5				5.5
1.80		1.80m: Brownish grey.		
1.90		1.90m: Wet.		
2.0				5.0
2.40		2.40m: Saturated.	▼	
2.5				4.5

In-situ Testing



Values
Vane ID: N/A
peak / residual (sensitivity)

Hole Depth: 2.50m **Termination:** TARGET DEPTH

Remarks:

Materials are described in general accordance with NZGS 'Field Description of Soil and Rock' (2005).
No correlation is implied between shear vane and DCP values.

● Vane peak	▼ Standing water level
○ Vane residual	◁ Groundwater inflow
◆ Vane UTP	▷ Groundwater outflow

UTP = Unable to Penetrate

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Hand Auger Borehole Log

Method: 50mm Hand Auger

Test ID:	**HA06**
Project ID:	24477
Sheet:	1 of 1

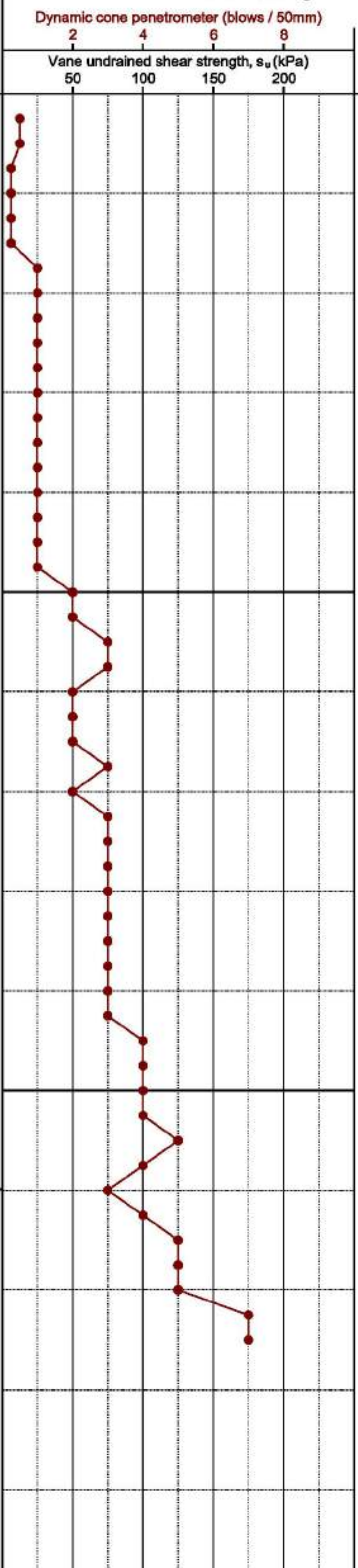
Client:	NZHG	**Coordinates:**	5709835mN, 2036107mE	**Test Date:**	12/09/2023
Project:	Geotechnical Investigation	**System:**	NZTM	**Logged By:**	SS
Location:	556-560 Abeerdeen Rd, Gisborne	**Elevation:**	6.2m (NZVD2016)	**Prepared By:**	SS
Test Site:	Refer to geotechnical investigation plan	**Located By:**	Site plan/map	**Checked By:**	RH

Depth (m)	Geology	Material Description	Water
0.0 – 0.3	Uncontrolled Fill / Topsoil	SAND, with minor silt, with trace rootlets and gravel; dark brown. Very loose; moist; sand, fine to medium; gravel, fine, subangular.	
0.3 – 2.2	Holocene Beach Deposits	SAND; brownish orange. Loose; moist; sand, fine to medium. 1.60m: Wet. 1.80m: Heavy orange mottling. 1.90m: Brownish grey. Saturated. 2.00m: Brownish grey with orange mottles. Poor recovery > 50%.	▼ (1.9)

Depth (m): 0.5, 1.0, 1.5, 2.0, 2.5

RL (m): 6.0, 5.5, 5.0, 4.5, 4.0, 3.5

In-situ Testing



Values

Vane ID: N/A

peak / residual (sensitivity)

Hole Depth: 2.20m **Termination:** HOLE COLLAPSE

Remarks:

Materials are described in general accordance with NZGS 'Field Description of Soil and Rock' (2005).
No correlation is implied between shear vane and DCP values.

● Vane peak	▼ Standing water level
○ Vane residual	◁ Groundwater inflow
◆ Vane UTP	▷ Groundwater outflow

UTP = Unable to Penetrate

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Hand Auger Borehole Log

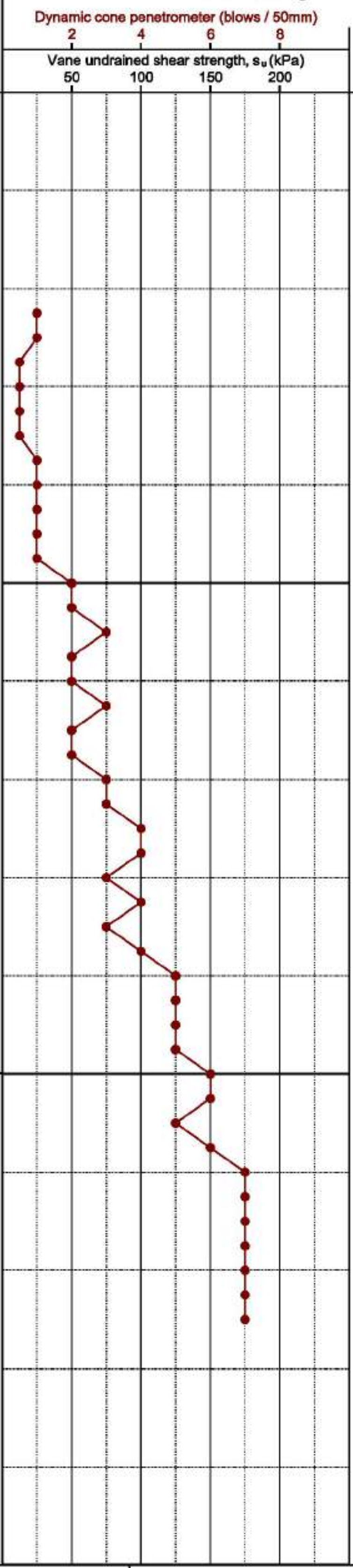
Method: 50mm Hand Auger

Test ID:	HA07
Project ID:	24477
Sheet:	1 of 1

Client:	NZHG	**Coordinates:**	5709824mN, 2036090mE	**Test Date:**	12/09/2023
Project:	Geotechnical Investigation	**System:**	NZTM	**Logged By:**	SS
Location:	556-560 Abeerdeen Rd, Gisborne	**Elevation:**	6m (NZVD2016)	**Prepared By:**	SS
Test Site:	Refer to geotechnical investigation plan	**Located By:**	Site plan/map	**Checked By:**	RH

Depth (m)	Geology	Material Description	Water	RL (m)
0.0 – 0.80	Uncontrolled Fill / Topsoil	SILT, with minor sand, with trace rootlets; dark brown. Stiff; moist; non-plastic; sand, fine to medium; trace charcoal. 0.40m: Sandy. Sand, fine to medium.		
0.5				5.5
0.80 – 2.00	Holocene Beach Deposits	SAND; light brown with orange mottles. Loose; moist; sand, fine to medium. 1.00m: Brownish grey with orange streaks. 1.20m: Wet. 1.50m: Saturated. 1.70m: Poor recovery > 30%.		
1.0				5.0
1.5			▼	4.5
2.0				4.0
2.5				3.5

In-situ Testing



Values

Vane ID: N/A

peak / residual (sensitivity)

Hole Depth: 2.00m	**Termination:** HOLE COLLAPSE

Remarks:

Materials are described in general accordance with NZGS 'Field Description of Soil and Rock' (2005).
No correlation is implied between shear vane and DCP values.

● Vane peak	▼ Standing water level
○ Vane residual	◁ Groundwater inflow
◆ Vane UTP	▷ Groundwater outflow

UTP = Unable to Penetrate

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LDE LAND DEVELOPMENT & ENGINEERING

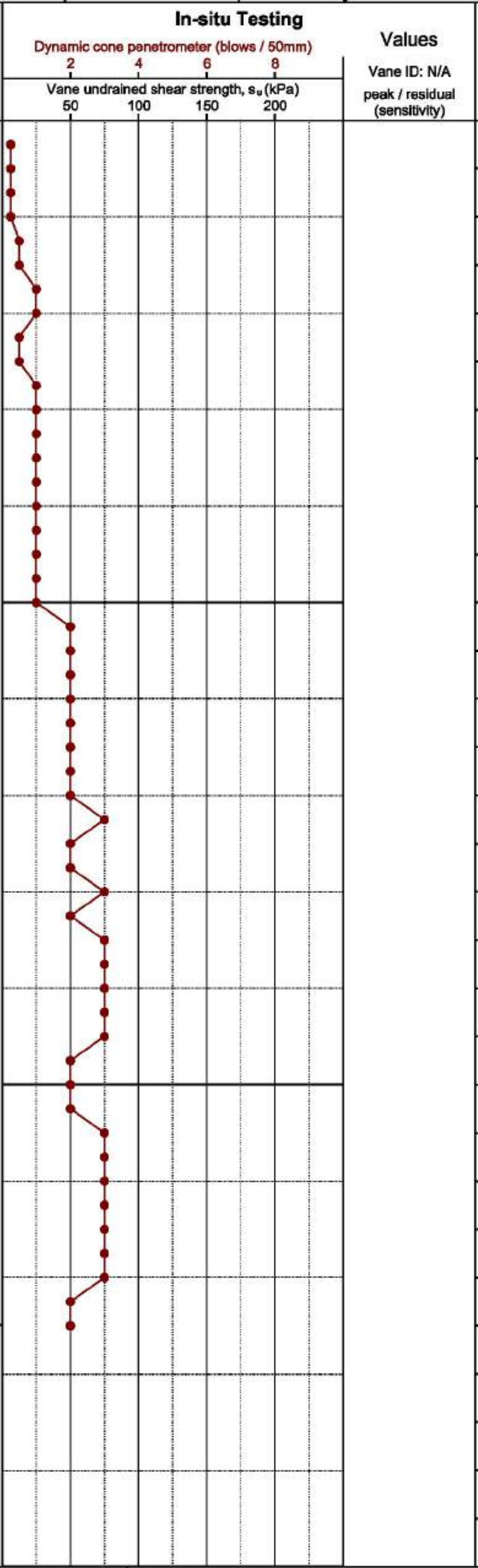
Hand Auger Borehole Log

Method: 50mm Hand Auger

Test ID:	HA08
Project ID:	24477
Sheet:	1 of 1

Client:	NZHG	**Coordinates:**	5709850mN, 2036087mE	**Test Date:**	12/09/2023
Project:	Geotechnical Investigation	**System:**	NZTM	**Logged By:**	SS
Location:	556-560 Abeerdeen Rd, Gisborne	**Elevation:**	6.5m (NZVD2016)	**Prepared By:**	SS
Test Site:	Refer to geotechnical investigation plan	**Located By:**	Site plan/map	**Checked By:**	RH

Geology	Material Description	Water
Topsoil	SAND, with minor silt, with trace rootlets; dark brown. Very loose; moist; sand, fine to medium.	
Holocene Beach Deposits	SAND; light brown. Loose; moist; sand, fine to medium. 1.60m: Brownish grey. 1.80m: Brownish grey orange streaks. 2.00m: Dark brown. Wet. 2.30m: Brownish grey. 2.40m: Saturated.	▼



Hole Depth: 2.50m **Termination:** TARGET DEPTH

Remarks:

Materials are described in general accordance with NZGS 'Field Description of Soil and Rock' (2005).
No correlation is implied between shear vane and DCP values.

●	Vane peak	▼	Standing water level
○	Vane residual	◁	Groundwater inflow
◆	Vane UTP	▷	Groundwater outflow

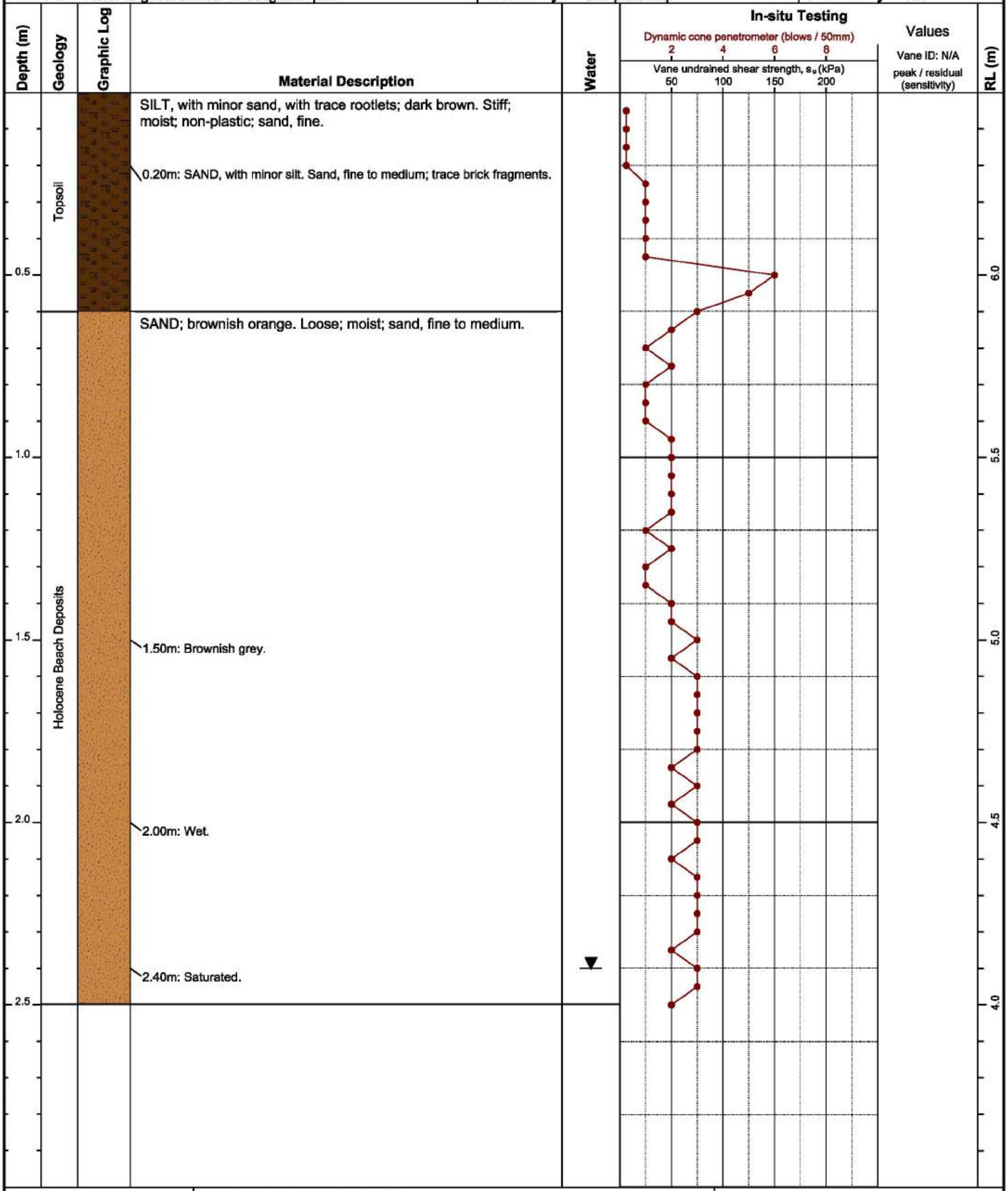
UTP = Unable to Penetrate

Hand Auger Borehole Log

Method: 50mm Hand Auger

Test ID:	HA09
Project ID:	24477
Sheet:	1 of 1

Client:	NZHG	**Coordinates:**	5709853mN, 2036094mE	**Test Date:**	12/09/2023
Project:	Geotechnical Investigation	**System:**	NZTM	**Logged By:**	SS
Location:	556-560 Abeerdeen Rd, Gisborne	**Elevation:**	6.5m (NZVD2016)	**Prepared By:**	SS
Test Site:	Refer to geotechnical investigation plan	**Located By:**	Site plan/map	**Checked By:**	RH



SILT, with minor sand, with trace rootlets; dark brown. Stiff; moist; non-plastic; sand, fine.

0.20m: SAND, with minor silt. Sand, fine to medium; trace brick fragments.

SAND; brownish orange. Loose; moist; sand, fine to medium.

1.50m: Brownish grey.

2.00m: Wet.

2.40m: Saturated.

Hole Depth: 2.50m	**Termination:** TARGET DEPTH

Remarks:

Materials are described in general accordance with NZGS 'Field Description of Soil and Rock' (2005).
No correlation is implied between shear vane and DCP values.

● Vane peak	▼ Standing water level
○ Vane residual	◁ Groundwater inflow
◆ Vane UTP	▷ Groundwater outflow

UTP = Unable to Penetrate

Hand Auger Borehole Log

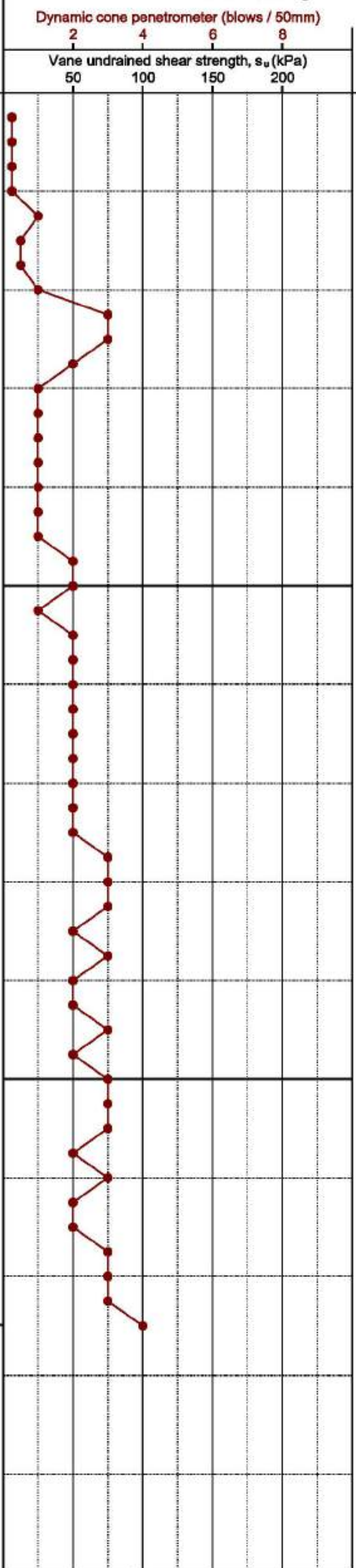
Method: 50mm Hand Auger

Test ID:	**HA10**
Project ID:	24477
Sheet:	1 of 1

Client:	NZHG	**Coordinates:**	5709860mN, 2036093mE	**Test Date:**	12/09/2023
Project:	Geotechnical Investigation	**System:**	NZTM	**Logged By:**	SS
Location:	556-560 Abeerdeen Rd, Gisborne	**Elevation:**	6.5m (NZVD2016)	**Prepared By:**	SS
Test Site:	Refer to geotechnical investigation plan	**Located By:**	Site plan/map	**Checked By:**	RH

Depth (m)	Geology	Material Description	Water	RL (m)
0.0–0.7	Topsoil	SILT, with minor sand, with trace rootlets; dark brown. Stiff; moist; non-plastic; sand, fine. 0.20m: SAND. Sand, fine to medium.		
0.5				6.0
0.7–2.5	Holocene Beach Deposits	SAND; brownish orange. Loose; moist; sand, fine to medium.		
1.0				5.5
1.5				5.0
		1.70m: Brownish grey.		
2.0		2.00m: Wet.		4.5
		2.40m: Dark brown. Saturated.	▼	
2.5				4.0

In-situ Testing



Values
Vane ID: N/A
peak / residual (sensitivity)

Hole Depth: 2.50m **Termination:** TARGET DEPTH

Remarks:

Materials are described in general accordance with NZGS 'Field Description of Soil and Rock' (2005).
No correlation is implied between shear vane and DCP values.

● Vane peak	▼ Standing water level
○ Vane residual	◁ Groundwater inflow
◆ Vane UTP	▷ Groundwater outflow

UTP = Unable to Penetrate

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Hand Auger Borehole Log

Method: 50mm Hand Auger

Test ID: HA11
Project ID: 24477
Sheet: 1 of 1

Client: NZHG
Project: Geotechnical Investigation
Location: 556-560 Abeerdeen Rd, Gisborne
Test Site: Refer to geotechnical investigation plan

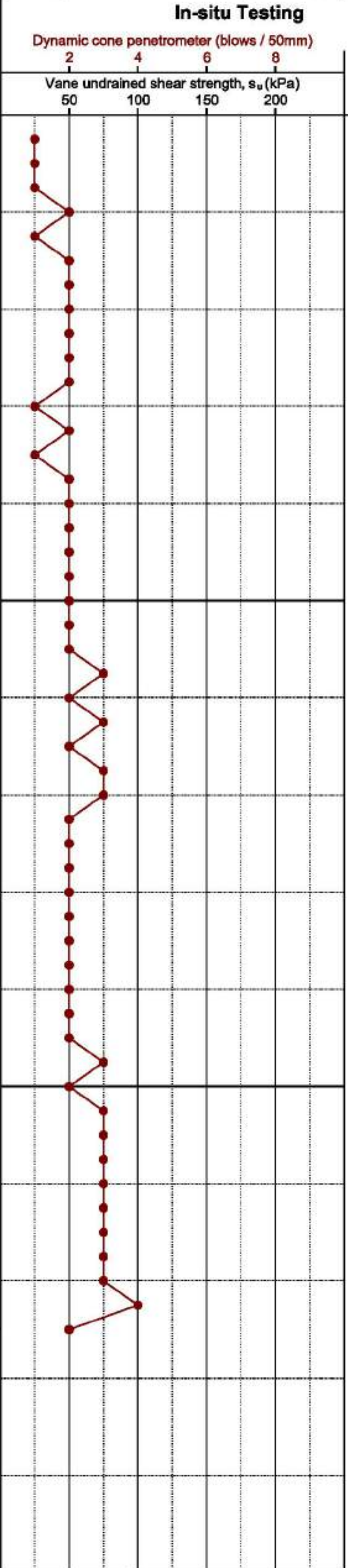
Coordinates: 5709865mN, 2036106mE
System: NZTM
Elevation: 7m (NZVD2016)
Located By: Site plan/map

Test Date: 12/09/2023
Logged By: SS
Prepared By: SS
Checked By: RH

Depth (m)	Geology	Material Description	Water
	Uncontrolled Fill / Topsoil	SAND, with trace silt and gravel; dark brown. Loose; moist; sand, fine to medium; gravel, fine to medium, subrounded to subangular.	Groundwater not encountered
0.5 1.0 1.5 2.0 2.5	Holocene Beach Deposits	SAND; brownish orange. Medium dense; moist; sand, fine to medium. 2.30m: Wet.	

Graphic Log

In-situ Testing



Values
Vane ID: N/A
peak / residual (sensitivity)

RL (m)
6.5
6.0
5.5
5.0
4.5

Hole Depth: 2.50m
Termination: TARGET DEPTH
Remarks:

Materials are described in general accordance with NZGS 'Field Description of Soil and Rock' (2005).
No correlation is implied between shear vane and DCP values.

● Vane peak	▼ Standing water level
○ Vane residual	◁ Groundwater inflow
◆ Vane UTP	▷ Groundwater outflow

UTP = Unable to Penetrate

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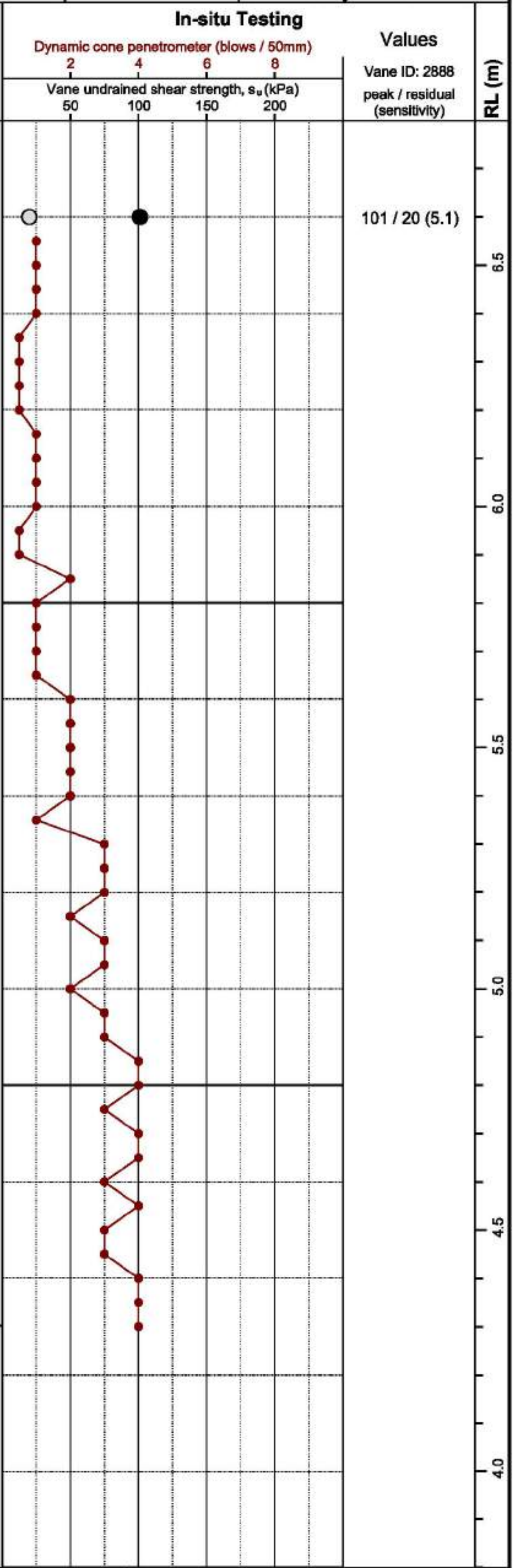
Hand Auger Borehole Log

Method: 50mm Hand Auger

Test ID:	**HA12**
Project ID:	24477
Sheet:	1 of 1

Client:	NZHG	**Coordinates:**	5709880mN, 2036108mE	**Test Date:**	12/09/2023
Project:	Geotechnical Investigation	**System:**	NZTM	**Logged By:**	SS
Location:	556-560 Abeerdeen Rd, Gisborne	**Elevation:**	6.8m (NZVD2016)	**Prepared By:**	SS
Test Site:	Refer to geotechnical investigation plan	**Located By:**	Site plan/map	**Checked By:**	RH

Depth (m)	Geology	Material Description	Water	Values (Vane ID: 2888, peak / residual (sensitivity))
0.0 – 0.5	Topsoil	SILT, with minor sand, with trace rootlets; dark brown. Stiff; moist; non-plastic; sand, fine. 0.30m: SAND, with minor silt. Sand, fine to medium. 0.40m: Black.		101 / 20 (5.1)
0.5 – 2.5	Holocene Beach Deposits	SAND; brownish orange. Very loose; moist; sand, fine to medium. 2.00m: Wet. 2.50m: Saturated.	▼ 2.5	



Hole Depth: 2.50m **Termination:** TARGET DEPTH

Remarks:

Materials are described in general accordance with NZGS 'Field Description of Soil and Rock' (2005).
No correlation is implied between shear vane and DCP values.

● Vane peak	▼ Standing water level
○ Vane residual	◁ Groundwater inflow
◆ Vane UTP	▷ Groundwater outflow

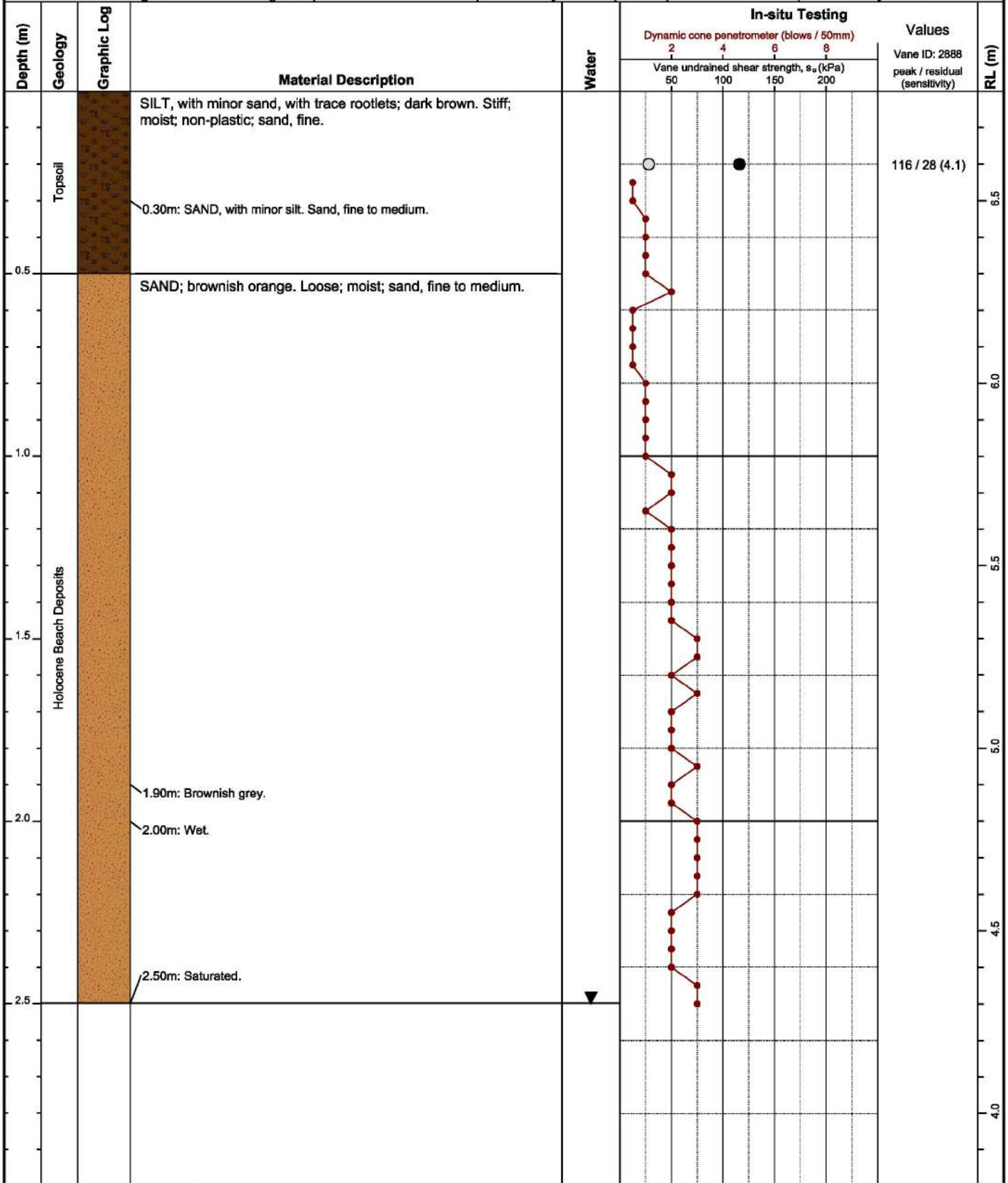
UTP = Unable to Penetrate

Hand Auger Borehole Log

Method: 50mm Hand Auger

Test ID:	**HA13**
Project ID:	24477
Sheet:	1 of 1

Client:	NZHG	**Coordinates:**	5709882mN, 2036101mE	**Test Date:**	12/09/2023
Project:	Geotechnical Investigation	**System:**	NZTM	**Logged By:**	SS
Location:	556-560 Abeerdeen Rd, Gisborne	**Elevation:**	6.8m (NZVD2016)	**Prepared By:**	SS
Test Site:	Refer to geotechnical investigation plan	**Located By:**	Site plan/map	**Checked By:**	RH



SILT, with minor sand, with trace rootlets; dark brown. Stiff; moist; non-plastic; sand, fine.

0.30m: SAND, with minor silt. Sand, fine to medium.

SAND; brownish orange. Loose; moist; sand, fine to medium.

1.90m: Brownish grey.

2.00m: Wet.

2.50m: Saturated.

116 / 28 (4.1)

Hole Depth: 2.50m **Termination:** TARGET DEPTH

Remarks:

● Vane peak ▼ Standing water level
○ Vane residual ◁ Groundwater inflow
◆ Vane UTP ▷ Groundwater outflow
UTP = Unable to Penetrate

Materials are described in general accordance with NZGS 'Field Description of Soil and Rock' (2005).
No correlation is implied between shear vane and DCP values.

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Hand Auger Borehole Log

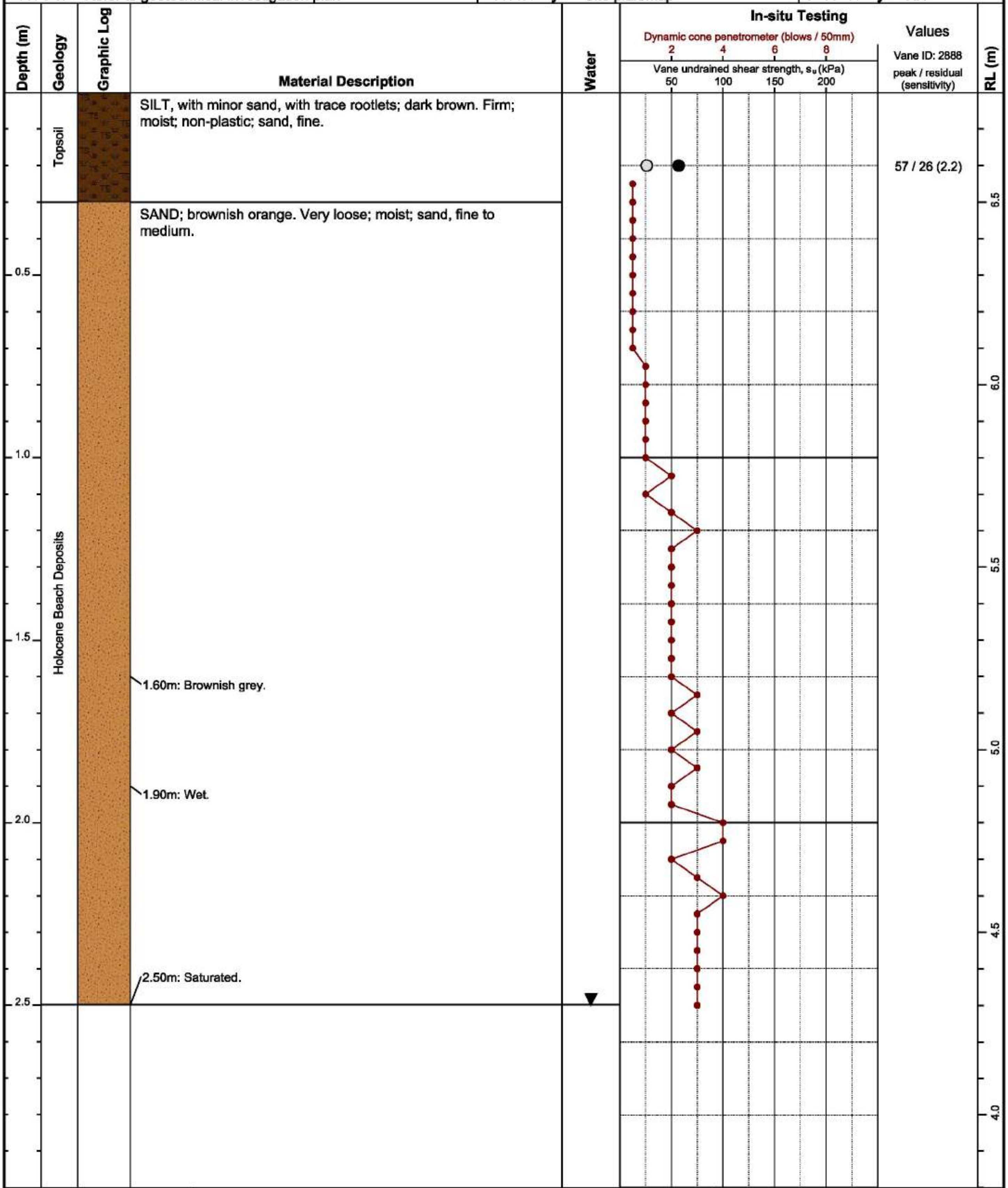
Method: 50mm Hand Auger

Test ID: HA14
Project ID: 24477
Sheet: 1 of 1

Client: NZHG
Project: Geotechnical Investigation
Location: 556-560 Abeerdeen Rd, Gisborne
Test Site: Refer to geotechnical investigation plan

Coordinates: 5709887mN, 2036103mE
System: NZTM
Elevation: 6.8m (NZVD2016)
Located By: Site plan/map

Test Date: 12/09/2023
Logged By: SS
Prepared By: SS
Checked By: RH



Depth (m)	Geology	Material Description	Water	Values
0.0–0.3	Topsoil	SILT, with minor sand, with trace rootlets; dark brown. Firm; moist; non-plastic; sand, fine.		57 / 26 (2.2)
0.3–2.5	Holocene Beach Deposits	SAND; brownish orange. Very loose; moist; sand, fine to medium. 1.60m: Brownish grey. 1.90m: Wet. 2.50m: Saturated.	▼ (2.5)	

Hole Depth: 2.50m **Termination:** TARGET DEPTH

Remarks:

Materials are described in general accordance with NZGS 'Field Description of Soil and Rock' (2005).
No correlation is implied between shear vane and DCP values.

● Vane peak
○ Vane residual
◆ Vane UTP
▼ Standing water level
◁ Groundwater inflow
▷ Groundwater outflow
UTP = Unable to Penetrate

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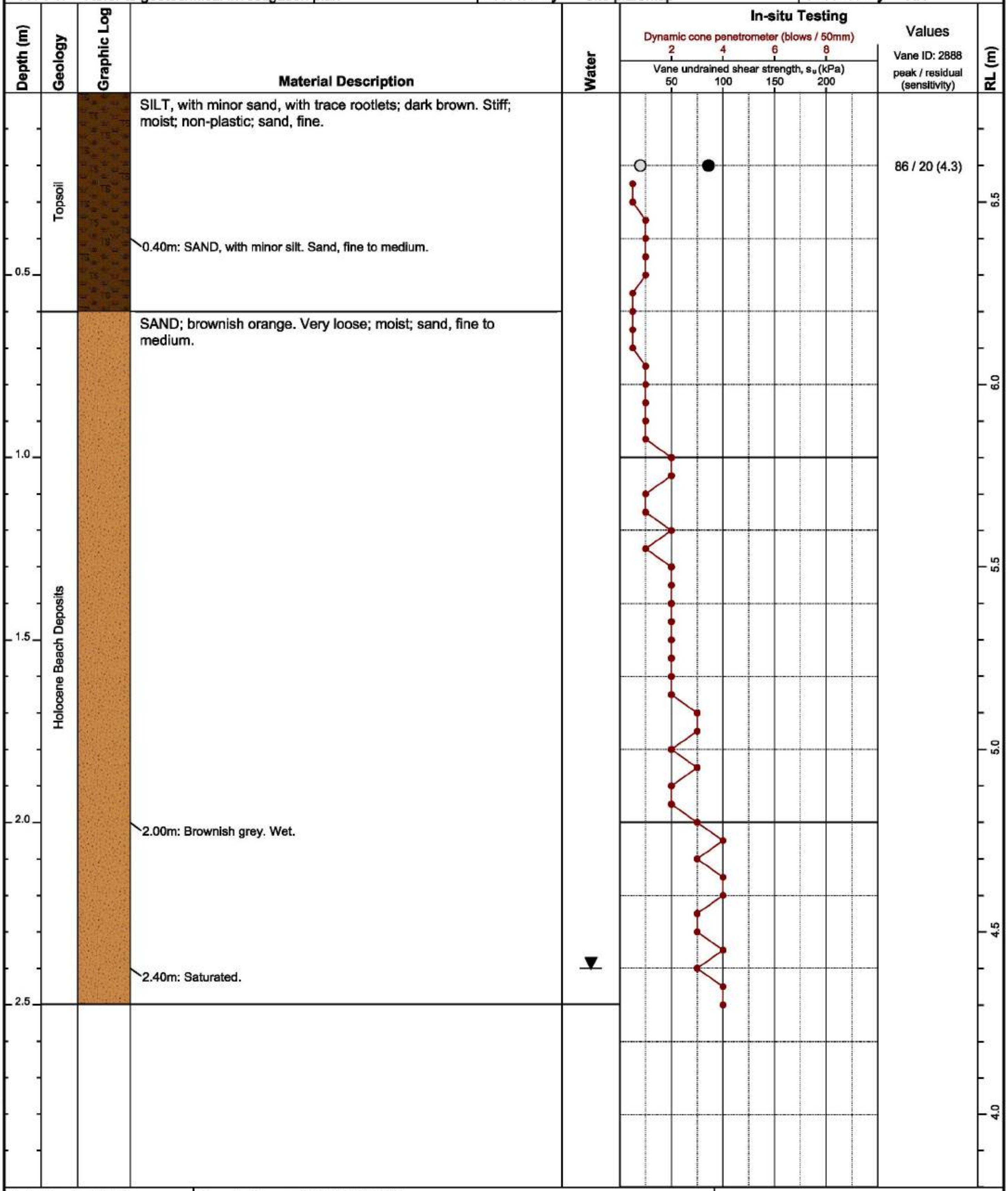
Hand Auger Borehole Log

Method: 50mm Hand Auger

Test ID:	**HA15**
Project ID:	24477
Sheet:	1 of 1

Client:	NZHG	**Coordinates:**	5709885mN, 2036111mE	**Test Date:**	12/09/2023
Project:	Geotechnical Investigation	**System:**	NZTM	**Logged By:**	SS
Location:	556-560 Abeerdeen Rd, Gisborne	**Elevation:**	6.8m (NZVD2016)	**Prepared By:**	SS
Test Site:	Refer to geotechnical investigation plan	**Located By:**	Site plan/map	**Checked By:**	RH



SILT, with minor sand, with trace rootlets; dark brown. Stiff; moist; non-plastic; sand, fine.

0.40m: SAND, with minor silt. Sand, fine to medium.

SAND; brownish orange. Very loose; moist; sand, fine to medium.

2.00m: Brownish grey. Wet.

2.40m: Saturated.

Hole Depth: 2.50m **Termination:** TARGET DEPTH

Remarks:

● Vane peak ▼ Standing water level
○ Vane residual ◁ Groundwater inflow
◆ Vane UTP ▷ Groundwater outflow
UTP = Unable to Penetrate

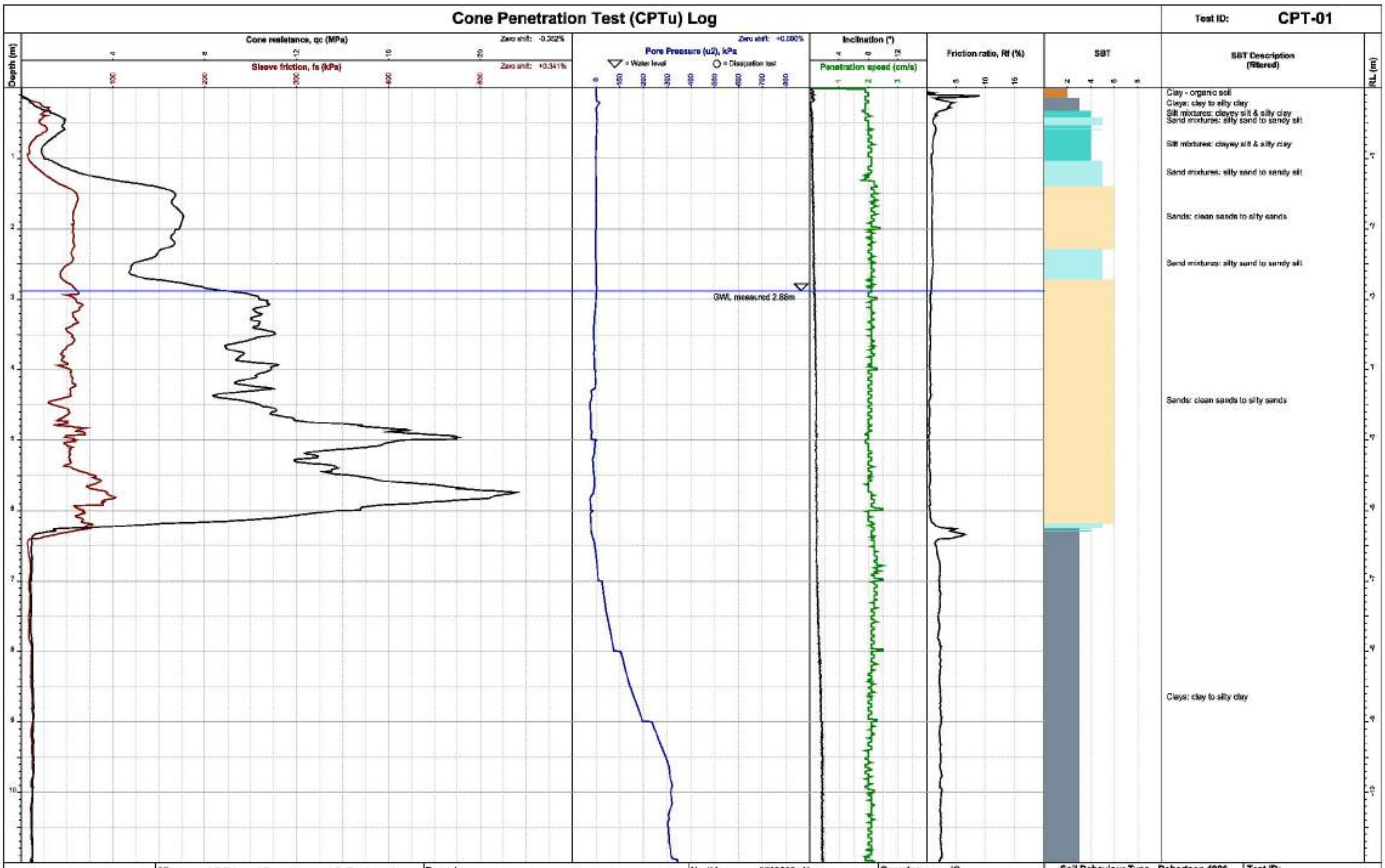
Materials are described in general accordance with NZGS 'Field Description of Soil and Rock' (2005).
No correlation is implied between shear vane and DCP values.

APPENDIX C

CONE PENETRATION TEST LOGS

Cone Penetration Test (CPTu) Log

Test ID: CPT-01



LDE LAND DEVELOPMENT & ENGINEERING

Client: LDE Land Development & Engineering

Project: geotechnical Investigation

Location: 556-560 Abeerdeen Rd, Gisborne

Remarks:
Ground water level located at 2.88m
Test according to ISO 22476-1:12 (Class 2)

Termination Reason:
Target depth

Northing:	5709883mN
Easting:	2036106mE
System:	NZTM
Elevation:	Ground
Located By:	Phone GPS
Location:	As per site plan

Operator:	JC
Rig:	Pagani TG63-150
Cone ID:	Mks1042
Type:	Comp. piezo cone
Cone Area:	10 cm²
Sleeve Area:	150 cm²
Area Ratio:	0.8

Soil Behaviour Type - Robertson 1986

0	Undefined	5	Sand mixtures: silty sand to sandy silt
1	Sensitive fine-grained	6	Sands: clean sands to silty sands
2	Clay - organic soil	7	Dense sand to gravelly sand
3	Clays: clay to silty clay	8	Stiff sand to clayey sand
4	Silt mixtures: clayey silt & silty clay	9	Stiff fine-grained

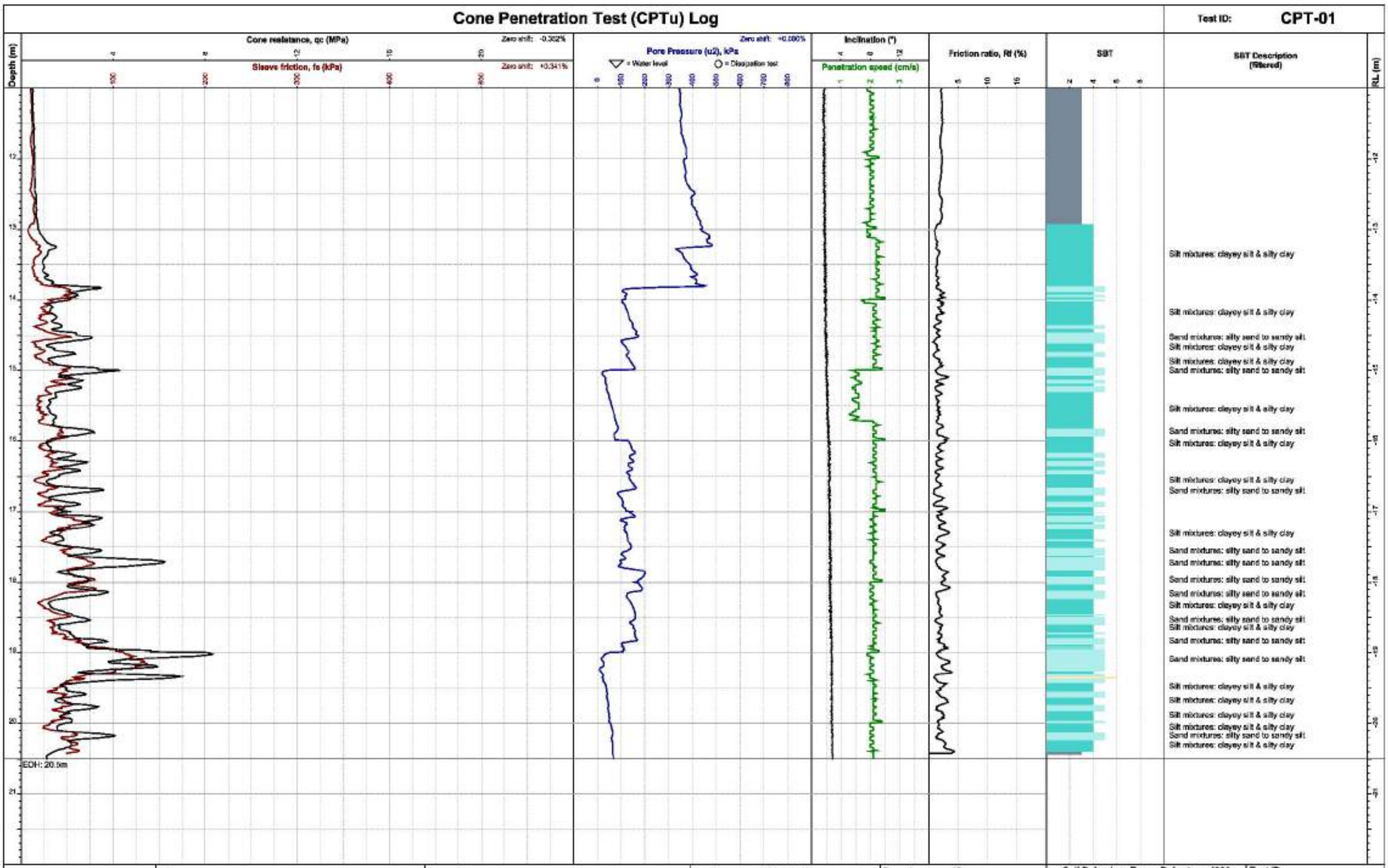
Test ID: CPT-01

Project ID:	24477
Depth:	20.5m
Sheet:	1 of 2
Date:	30/05/2023

Generated with CORE-GS by Geroc - CPT Combined A3 v2 - 31/05/2023 9:14:04 am

Cone Penetration Test (CPTu) Log

Test ID: CPT-01



Client:	LDE Land Development & Engineering
Project:	geotechnical Investigation
Location:	556-560 Abeerdeen Rd, Gisborne

Remarks:
Ground water level located at 2.88m
Test according to ISO 22476-1:12 (Class 2)

Termination Reason:
Target depth

Northing:	5709883mN
Easting:	2036106mE
System:	NZTM
Elevation:	Ground
Located By:	Phone GPS
Location:	As per site plan

Operator:	JC
Rig:	Pagani TG63-150
Cone ID:	Mks1042
Type:	Comp. piezo cone
Cone Area:	10 cm²
Sleeve Area:	150 cm²
Area Ratio:	0.8

Soil Behaviour Type - Robertson 1986

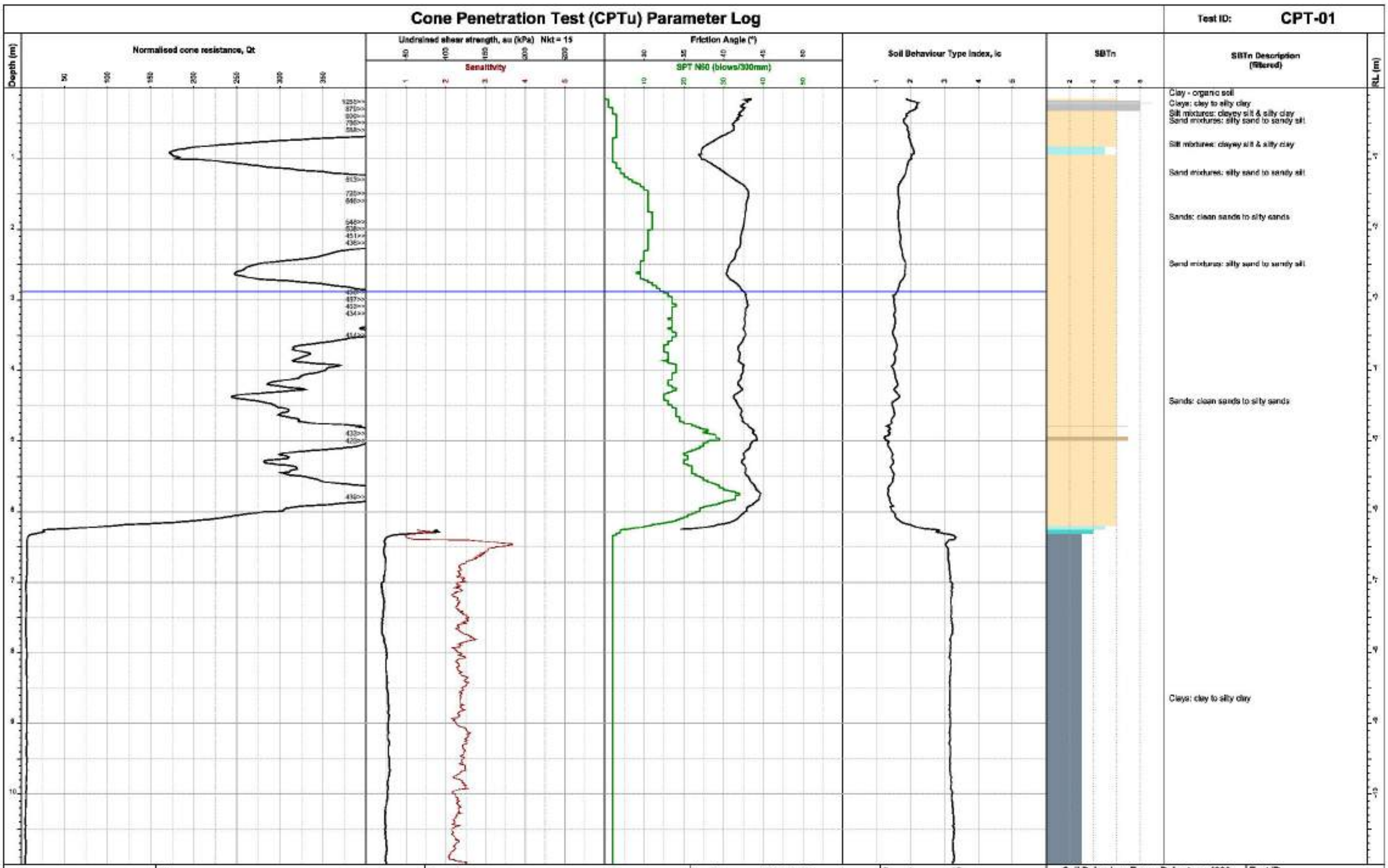
0	Undefined	5	Sand mixtures: silty sand to sandy silt
1	Sensitive fine-grained	6	Sands: clean sands to silty sands
2	Clay - organic soil	7	Dense sand to gravelly sand
3	Clays: clay to silty clay	8	Stiff sand to clayey sand
4	Silt mixtures: clayey silt & silty clay	9	Stiff fine-grained

Test ID: CPT-01

Project ID:	24477
Depth:	20.5m
Sheet:	2 of 2
Date:	30/05/2023

Cone Penetration Test (CPTu) Parameter Log

Test ID: CPT-01



LDE LAND DEVELOPMENT & ENGINEERING

Client: LDE Land Development & Engineering

Project: geotechnical Investigation

Location: 556-560 Abeerdeen Rd, Gisborne

Remarks:
Ground water level located at 2.88m
Test according to ISO 22476-1:12 (Class 2)

Termination Reason:
Target depth

Northing: 5709883mN
Easting: 2036106mE
System: NZTM
Elevation: Ground
Located By: Phone GPS
Location: As per site plan

Operator: JC
Rig: Pagani TG63-150
Cone ID: Mks1042
Type: Comp. piezo cone
Cone Area: 10 cm²
Sleeve Area: 150 cm²
Area Ratio: 0.8

Soil Behaviour Type - Robertson 1986

0	Undefined	5	Sand mixtures: silty sand to sandy silt
1	Sensitive fine-grained	6	Sands: clean sands to silty sands
2	Clay - organic soil	7	Dense sand to gravelly sand
3	Clays: clay to silty clay	8	Stiff sand to clayey sand
4	Silt mixtures: clayey silt & silty clay	9	Stiff fine-grained

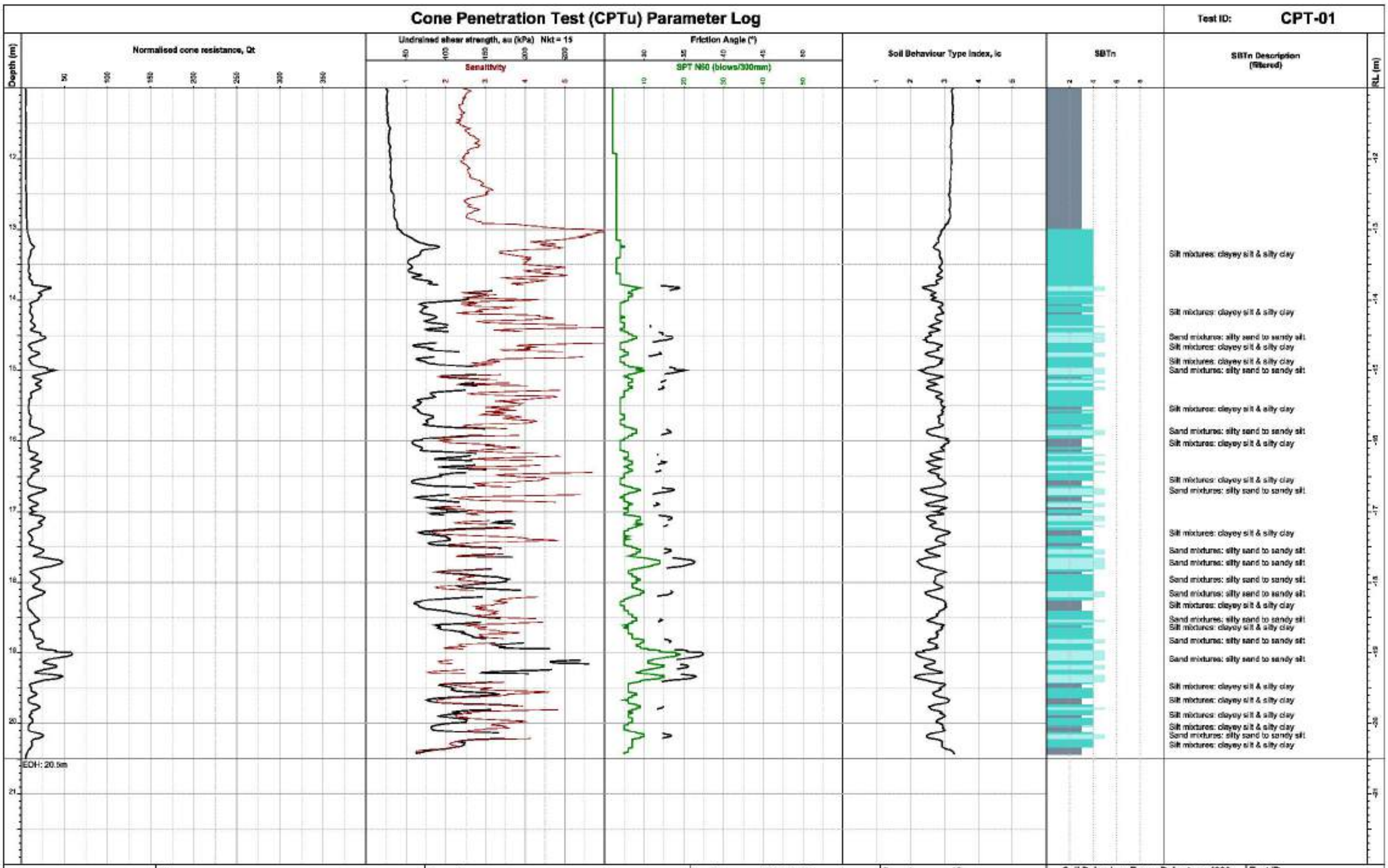
Test ID: CPT-01

Project ID: 24477
Depth: 20.5m
Sheet: 1 of 2
Date: 30/05/2023

Generated with CORE-GS by Geroc - CPT Combined A3 v2 - 31/05/2023 9:14:04 am

Cone Penetration Test (CPTu) Parameter Log

Test ID: CPT-01



Generated with CORE GS by Geroc - CPT Combined A3 v2 - 31/05/2023 9:14:26 am

LAND DEVELOPMENT & ENGINEERING

Client: LDE Land Development & Engineering
Project: geotechnical Investigation
Location: 556-560 Abeerdeen Rd, Gisborne

Remarks:
Ground water level located at 2.88m
Test according to ISO 22476-1:12 (Class 2)

Termination Reason:
Target depth

Northing:	5709883mN
Easting:	2036106mE
System:	NZTM
Elevation:	Ground
Located By:	Phone GPS
Location:	As per site plan

Operator:	JC
Rig:	Pagani TG63-150
Cone ID:	Mks1042
Type:	Comp. piezo cone
Cone Area:	10 cm²
Sleeve Area:	150 cm²
Area Ratio:	0.8

Soil Behaviour Type - Robertson 1986

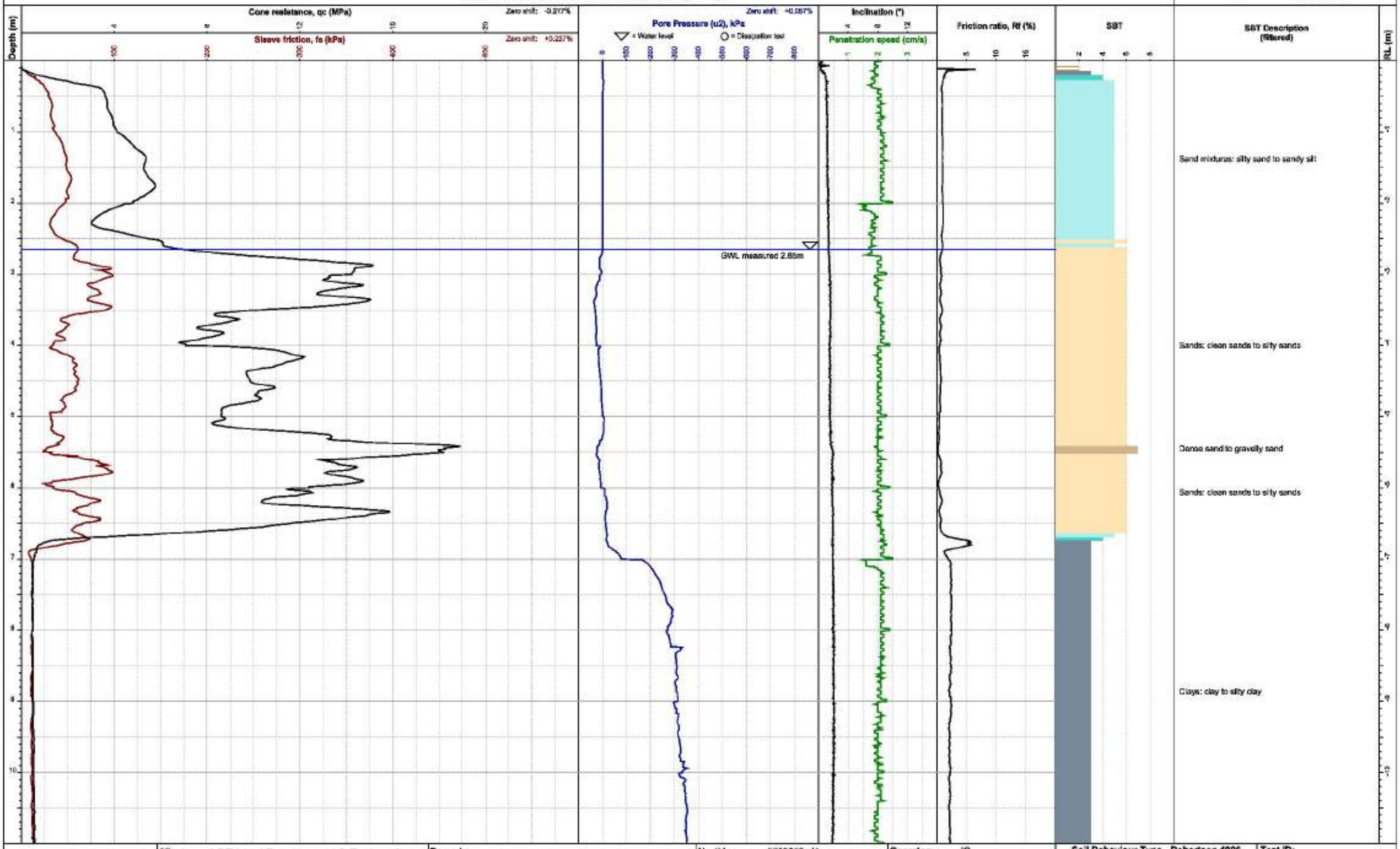
0	Undefined	5	Sand mixtures: silty sand to sandy silt
1	Sensitive fine-grained	6	Sands: clean sands to silty sands
2	Clay - organic soil	7	Dense sand to gravelly sand
3	Clays: clay to silty clay	8	Stiff sand to clayey sand
4	Silt mixtures: clayey silt & silty clay	9	Stiff fine-grained

Test ID:
CPT-01

Project ID:	24477
Depth:	20.5m
Sheet:	2 of 2
Date:	30/05/2023

Cone Penetration Test (CPTu) Log

Test ID: CPT-02



Generated with CORE-GS by Geroc - CPT Combined A3 v2 - 31/05/2023 9:14:06 am

Client: LDE Land Development & Engineering
Project: geotechnical Investigation
Location: 556-560 Abeerdeen Rd, Gisborne

Remarks:
Ground water level located at 2.65m
Test according to ISO 22476-1:12 (Class 2)

Termination Reason:
Target depth

Northing: 5709858mN
Easting: 2036112mE
System: NZTM
Elevation: Ground
Located By: Phone GPS
Location: As per site plan

Operator: JC
Rig: Pagani TG63-150
Cone ID: Mks1042
Type: Comp. piezo cone
Cone Area: 10 cm²
Sleeve Area: 150 cm²
Area Ratio: 0.8

Soil Behaviour Type - Robertson 1986

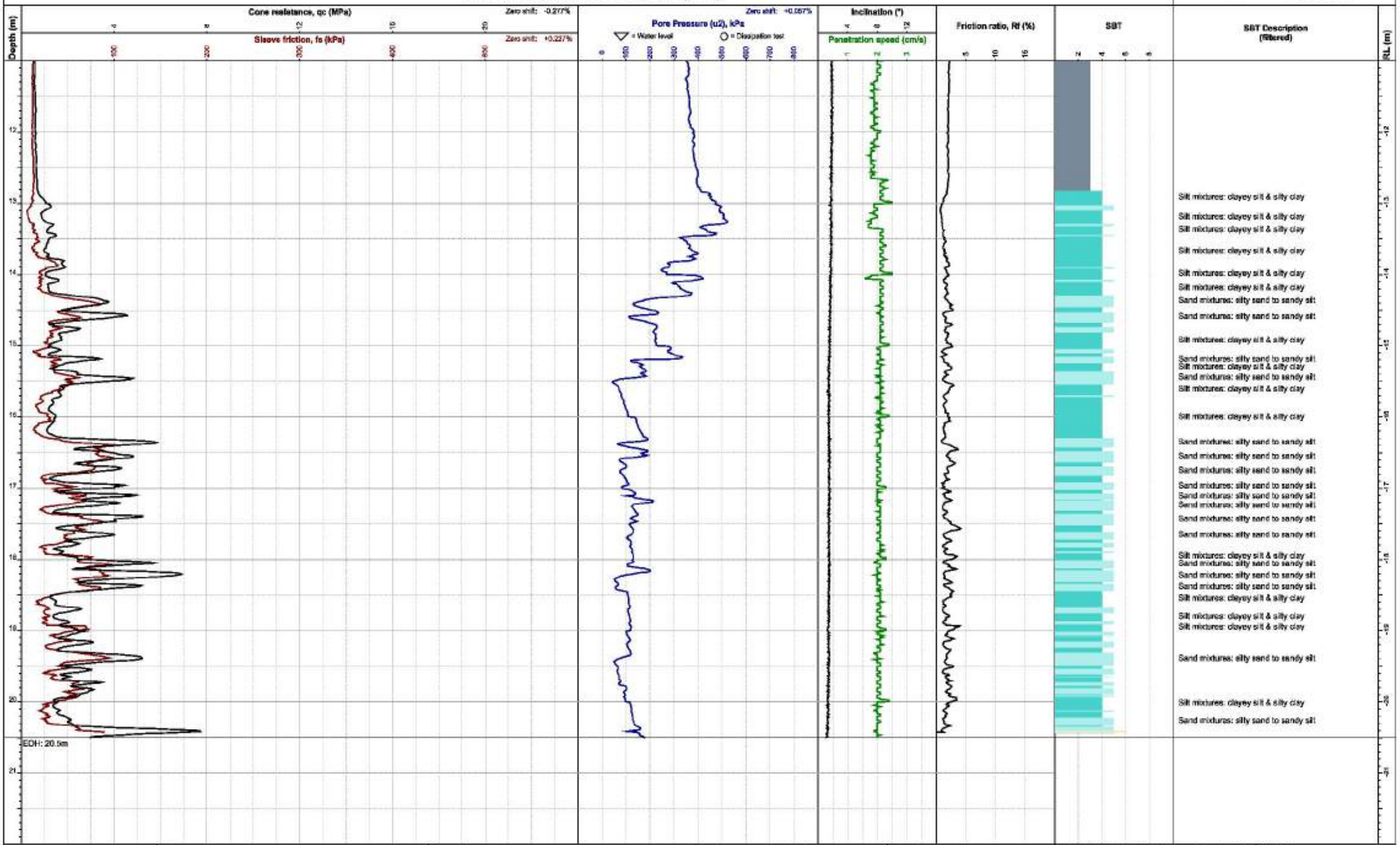
0	Undefined	5	Sand mixtures: silty sand to sandy silt
1	Sensitive fine-grained	6	Sands: clean sands to silty sands
2	Clay - organic soil	7	Dense sand to gravelly sand
3	Clays: clay to silty clay	8	Stiff sand to clayey sand
4	Silt mixtures: clayey silt & silty clay	9	Stiff fine-grained

Test ID:
CPT-02

Project ID: 24477
Depth: 20.5m
Sheet: 1 of 2
Date: 30/05/2023

Cone Penetration Test (CPTu) Log

Test ID: CPT-02



LDE LAND DEVELOPMENT & ENGINEERING

Client: LDE Land Development & Engineering
Project: geotechnical Investigation
Location: 556-560 Abeerdeen Rd, Gisborne

Remarks:
Ground water level located at 2.65m
Test according to ISO 22476-1:12 (Class 2)

Termination Reason:
Target depth

Northing: 5709858mN
Easting: 2036112mE
System: NZTM
Elevation: Ground
Located By: Phone GPS
Location: As per site plan

Operator: JC
Rig: Pagani TG63-150
Cone ID: Mks1042
Type: Comp. piezo cone
Cone Area: 10 cm²
Sleeve Area: 150 cm²
Area Ratio: 0.8

Soil Behaviour Type - Robertson 1986

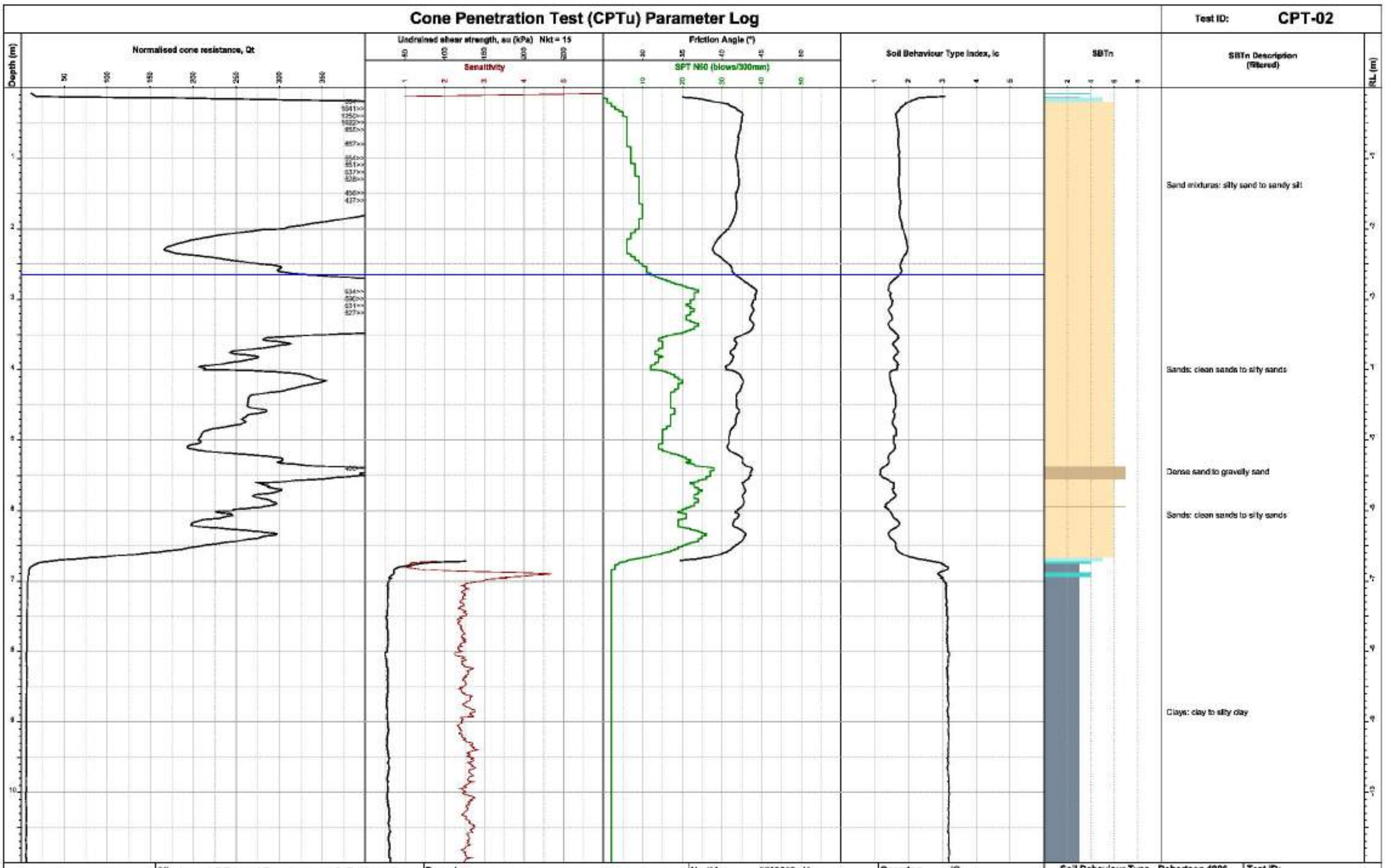
0	Undefined	5	Sand mixtures: silty sand to sandy silt
1	Sensitive fine-grained	6	Sands: clean sands to silty sands
2	Clay - organic soil	7	Dense sand to gravelly sand
3	Clays: clay to silty clay	8	Stiff sand to clayey sand
4	Silt mixtures: clayey silt & silty clay	9	Stiff fine-grained

Test ID: CPT-02
Project ID: 24477
Depth: 20.5m
Sheet: 2 of 2
Date: 30/05/2023

Generated with CORE-GS by Geroc - CPT Combined A3 v2 - 31/05/2023 9:14:07 am

Cone Penetration Test (CPTu) Parameter Log

Test ID: CPT-02



Client:	LDE Land Development & Engineering	**Remarks:**	Ground water level located at 2.65m Test according to ISO 22476-1:12 (Class 2)
Project:	geotechnical Investigation	**Termination Reason:**	Target depth
Location:	556-560 Aberdeen Rd, Gisborne		

Northing:	5709858mN
Easting:	2036112mE
System:	NZTM
Elevation:	Ground
Located By:	Phone GPS
Location:	As per site plan

Operator:	JC
Rig:	Pagani TG63-150
Cone ID:	Mks1042
Type:	Comp. piezo cone
Cone Area:	10 cm²
Sleeve Area:	150 cm²
Area Ratio:	0.8

Soil Behaviour Type - Robertson 1986

- 0 Undefined
- 1 Sensitive fine-grained
- 2 Clay - organic soil
- 3 Clays: clay to silty clay
- 4 Silt mixtures: clayey silt & silty clay
- 5 Sand mixtures: silty sand to sandy silt
- 6 Sands: clean sands to silty sands
- 7 Dense sand to gravelly sand
- 8 Stiff sand to clayey sand
- 9 Stiff fine-grained

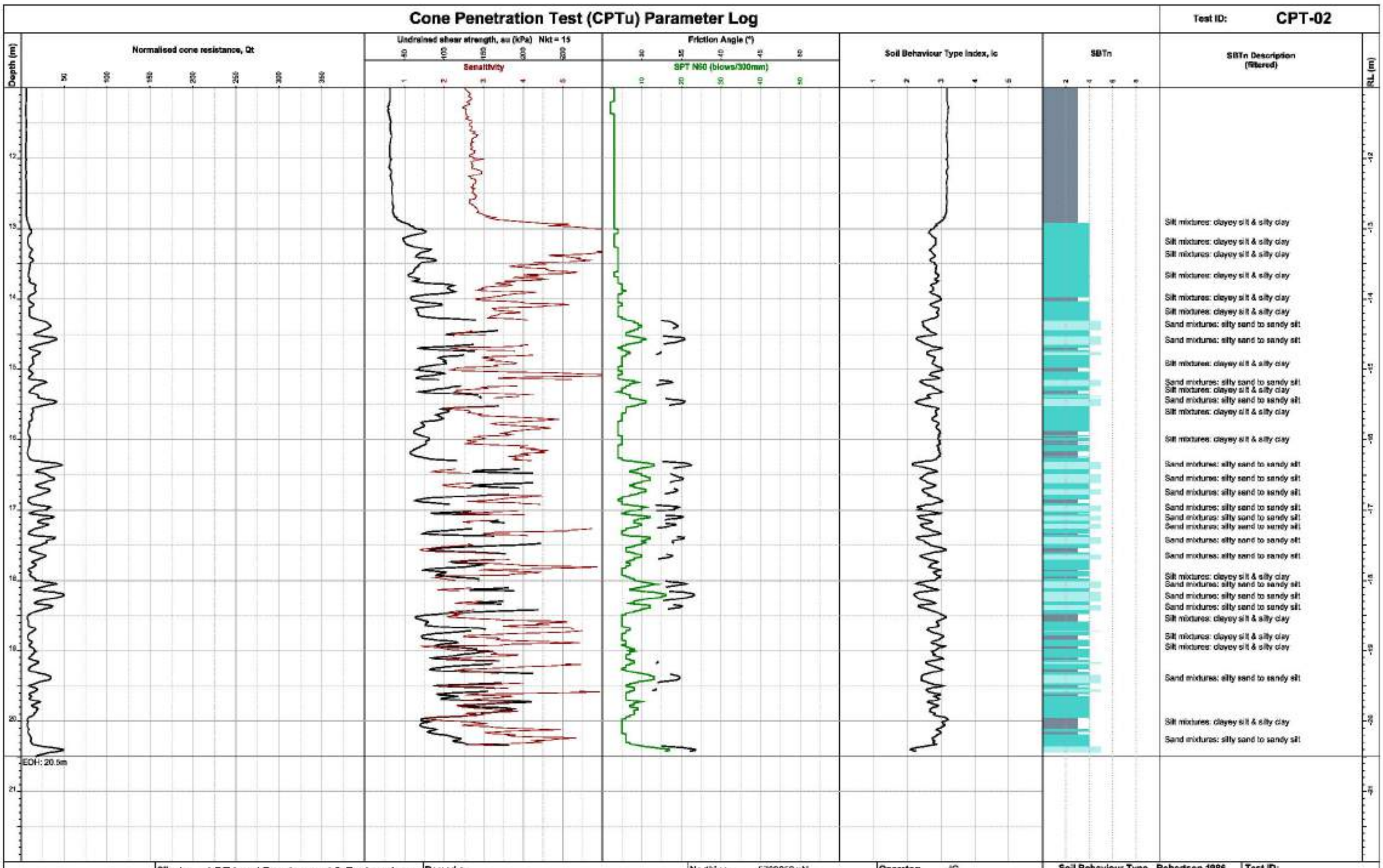
Test ID: CPT-02

Project ID:	24477
Depth:	20.5m
Sheet:	1 of 2
Date:	30/05/2023

Generated with CORE-GS by Geroc - CPT Combined A3 v2 - 31/05/2023 9:14:07 am

Cone Penetration Test (CPTu) Parameter Log

Test ID: **CPT-02**



Generated with CORE-GS by Geroc - CPT Combined A3 v2 - 31/05/2023 9:14:07 am

LAND DEVELOPMENT & ENGINEERING

Client:	LDE Land Development & Engineering
Project:	geotechnical Investigation
Location:	556-560 Abeerdeen Rd, Gisborne

Remarks:
Ground water level located at 2.65m
Test according to ISO 22476-1:12 (Class 2)

Termination Reason:
Target depth

Northing:	5709858mN
Easting:	2036112mE
System:	NZTM
Elevation:	Ground
Located By:	Phone GPS
Location:	As per site plan

Operator:	JC
Rig:	Pagani TG63-150
Cone ID:	Mks1042
Type:	Comp. piezo cone
Cone Area:	10 cm²
Sleeve Area:	150 cm²
Area Ratio:	0.8

Soil Behaviour Type - Robertson 1986

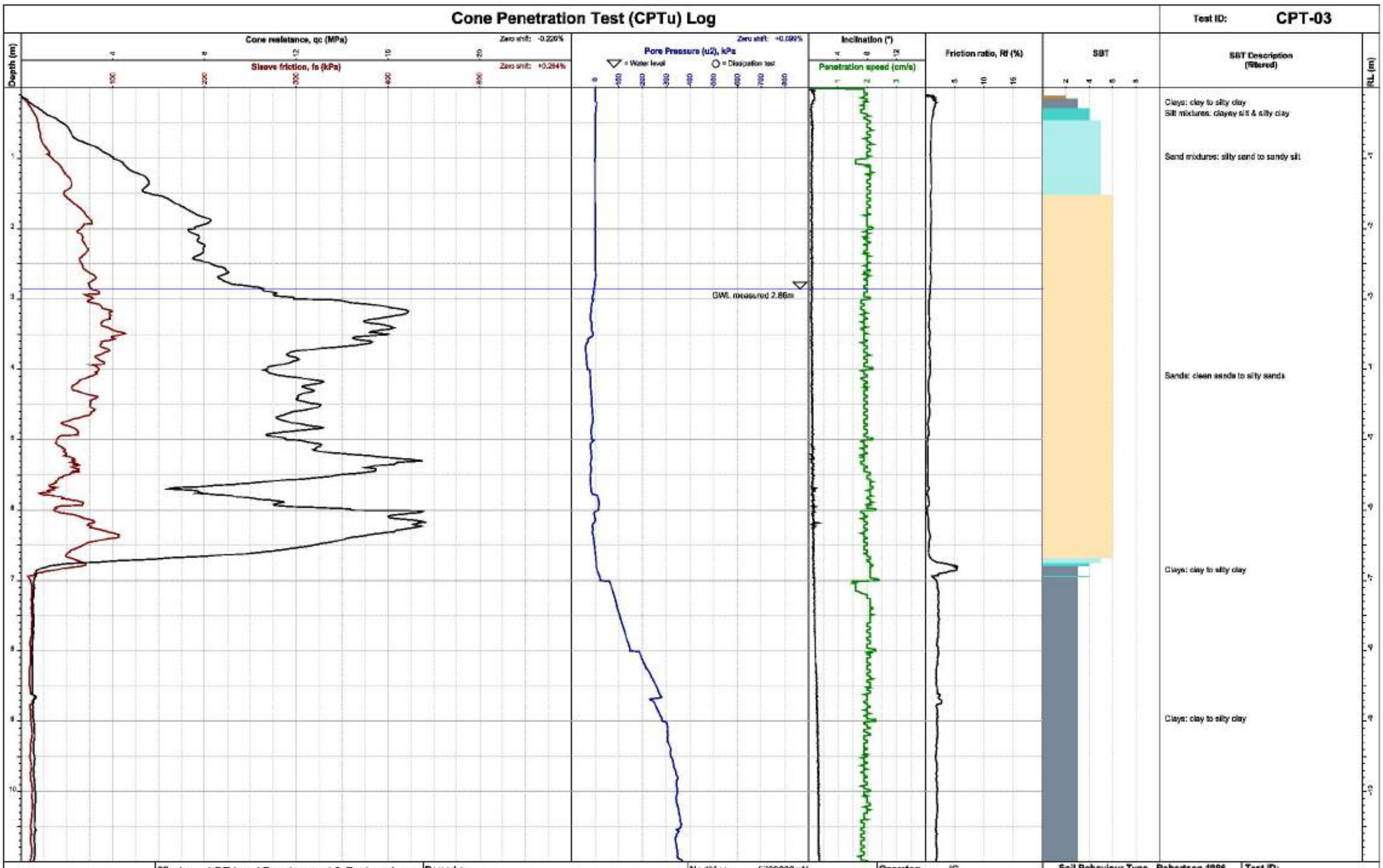
0	Undefined	5	Sand mixtures: silty sand to sandy silt
1	Sensitive fine-grained	6	Sands: clean sands to silty sands
2	Clay - organic soil	7	Dense sand to gravelly sand
3	Clays: clay to silty clay	8	Stiff sand to clayey sand
4	Silt mixtures: clayey silt & silty clay	9	Stiff fine-grained

Test ID:
CPT-02

Project ID:	24477
Depth:	20.5m
Sheet:	2 of 2
Date:	30/05/2023

Cone Penetration Test (CPTu) Log

Test ID: **CPT-03**



Generated with CORE-GS by Geroc - CPT Combined A3 v2 - 31/05/2023 9:14:29 am

LDE LAND DEVELOPMENT & ENGINEERING

Client: LDE Land Development & Engineering

Project: geotechnical Investigation

Location: 556-560 Abeerdeen Rd, Gisborne

Remarks:
Ground water level located at 2.86m
Test according to ISO 22476-1:12 (Class 2)

Termination Reason:
Target depth

Northing:	5709866mN
Easting:	2036135mE
System:	NZTM
Elevation:	Ground
Located By:	Phone GPS
Location:	As per site plan

Operator:	JC
Rig:	Pagani TG63-150
Cone ID:	Mks1042
Type:	Comp. piezo cone
Cone Area:	10 cm²
Sleeve Area:	150 cm²
Area Ratio:	0.8

Soil Behaviour Type - Robertson 1986

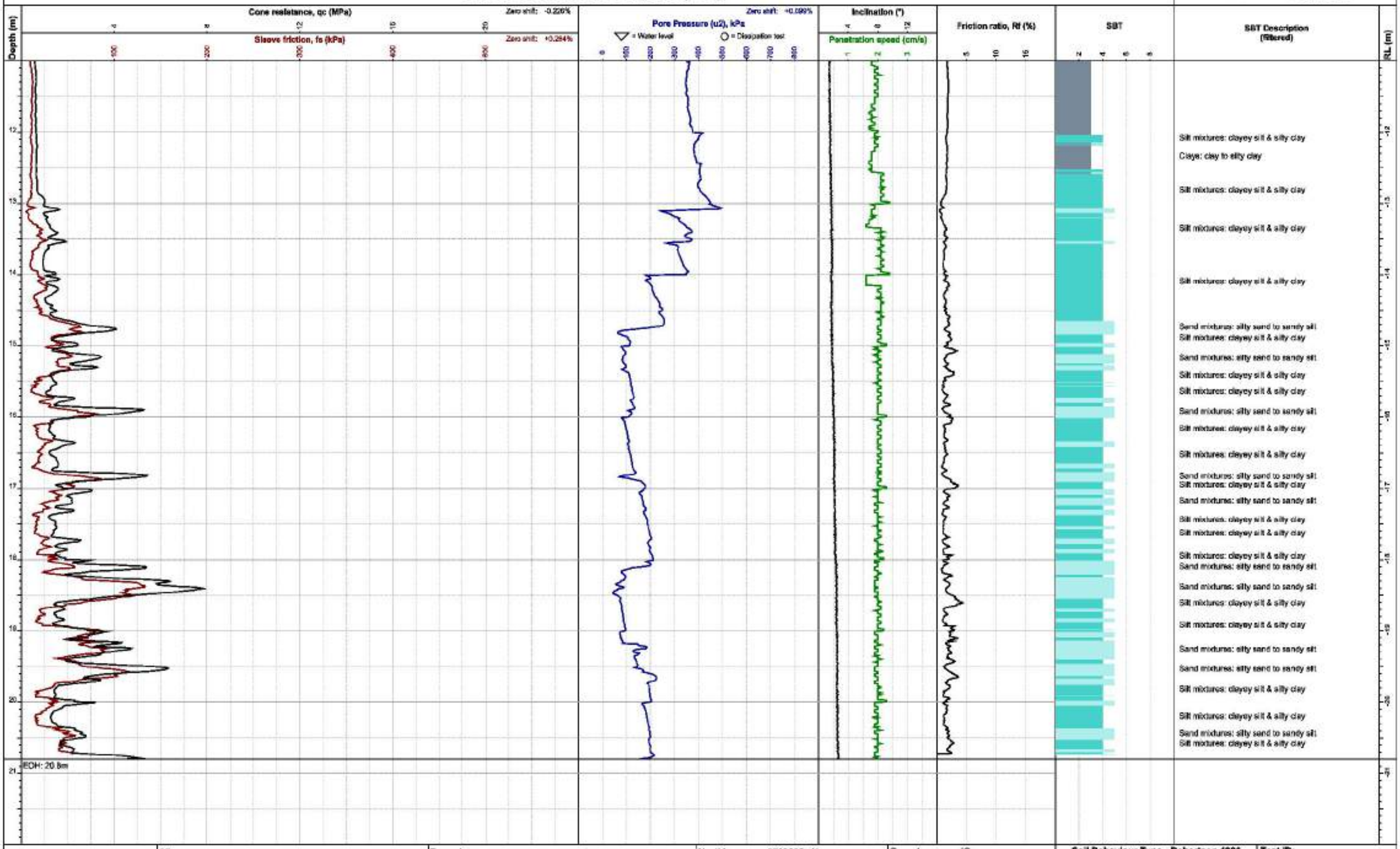
0	Undefined	5	Sand mixtures: silty sand to sandy silt
1	Sensitive fine-grained	6	Sands: clean sands to silty sands
2	Clay - organic soil	7	Dense sand to gravelly sand
3	Clays: clay to silty clay	8	Stiff sand to clayey sand
4	Silt mixtures: clayey silt & silty clay	9	Stiff fine-grained

Test ID: **CPT-03**

Project ID:	24477
Depth:	20.8m
Sheet:	1 of 2
Date:	30/05/2023

Cone Penetration Test (CPTu) Log

Test ID: CPT-03



LDE LAND DEVELOPMENT & ENGINEERING

Client: LDE Land Development & Engineering
Project: geotechnical Investigation
Location: 556-560 Abeerdeen Rd, Gisborne

Remarks:
Ground water level located at 2.86m
Test according to ISO 22476-1:12 (Class 2)

Termination Reason:
Target depth

Northing:	5709866mN
Easting:	2036135mE
System:	NZTM
Elevation:	Ground
Located By:	Phone GPS
Location:	As per site plan

Operator:	JC
Rig:	Pagani TG63-150
Cone ID:	Mks1042
Type:	Comp. piezo cone
Cone Area:	10 cm²
Sleeve Area:	150 cm²
Area Ratio:	0.8

Soil Behaviour Type - Robertson 1986

0	Undefined	5	Sand mixtures: silty sand to sandy silt
1	Sensitive fine-grained	6	Sands: clean sands to silty sands
2	Clay - organic soil	7	Dense sand to gravelly sand
3	Clays: clay to silty clay	8	Stiff sand to clayey sand
4	Silt mixtures: clayey silt & silty clay	9	Stiff fine-grained

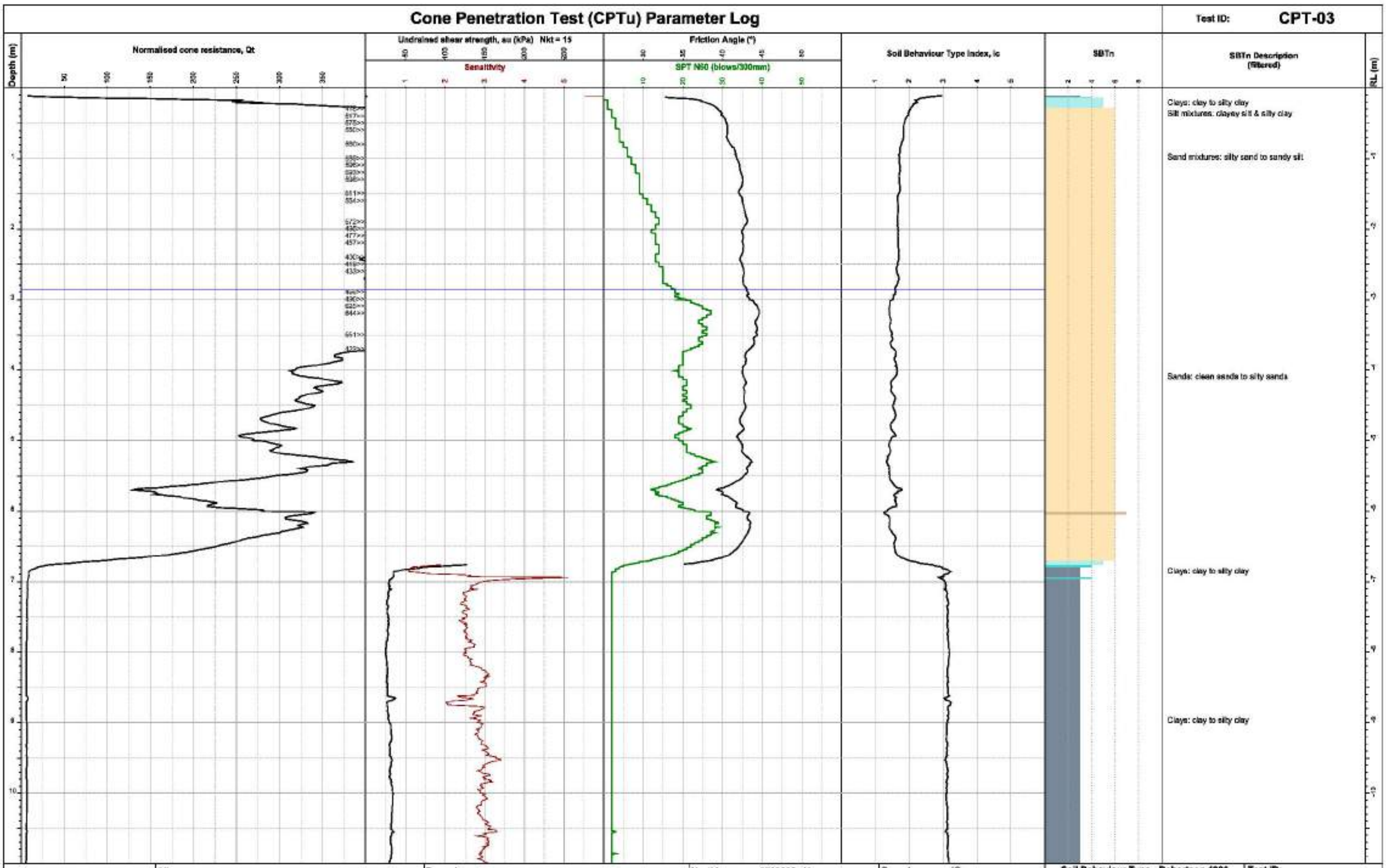
Test ID: CPT-03

Project ID:	24477
Depth:	20.8m
Sheet:	2 of 2
Date:	30/05/2023

Generated with CORE-GS by Geroc - CPT Combined A3 v2 - 31/05/2023 9:14:10 am

Cone Penetration Test (CPTu) Parameter Log

Test ID: CPT-03



Client:	LDE Land Development & Engineering
Project:	geotechnical Investigation
Location:	556-560 Abeerdeen Rd, Gisborne

Remarks:
Ground water level located at 2.86m
Test according to ISO 22476-1:12 (Class 2)

Termination Reason:
Target depth

Northing:	5709866mN
Easting:	2036135mE
System:	NZTM
Elevation:	Ground
Located By:	Phone GPS
Location:	As per site plan

Operator:	JC
Rig:	Pagani TG63-150
Cone ID:	Mks1042
Type:	Comp. piezo cone
Cone Area:	10 cm²
Sleeve Area:	150 cm²
Area Ratio:	0.8

Soil Behaviour Type - Robertson 1986

0	Undefined	5	Sand mixtures: silty sand to sandy silt
1	Sensitive fine-grained	6	Sands: clean sands to silty sands
2	Clay - organic soil	7	Dense sand to gravelly sand
3	Clays: clay to silty clay	8	Stiff sand to clayey sand
4	Silt mixtures: clayey silt & silty clay	9	Stiff fine-grained

Test ID:

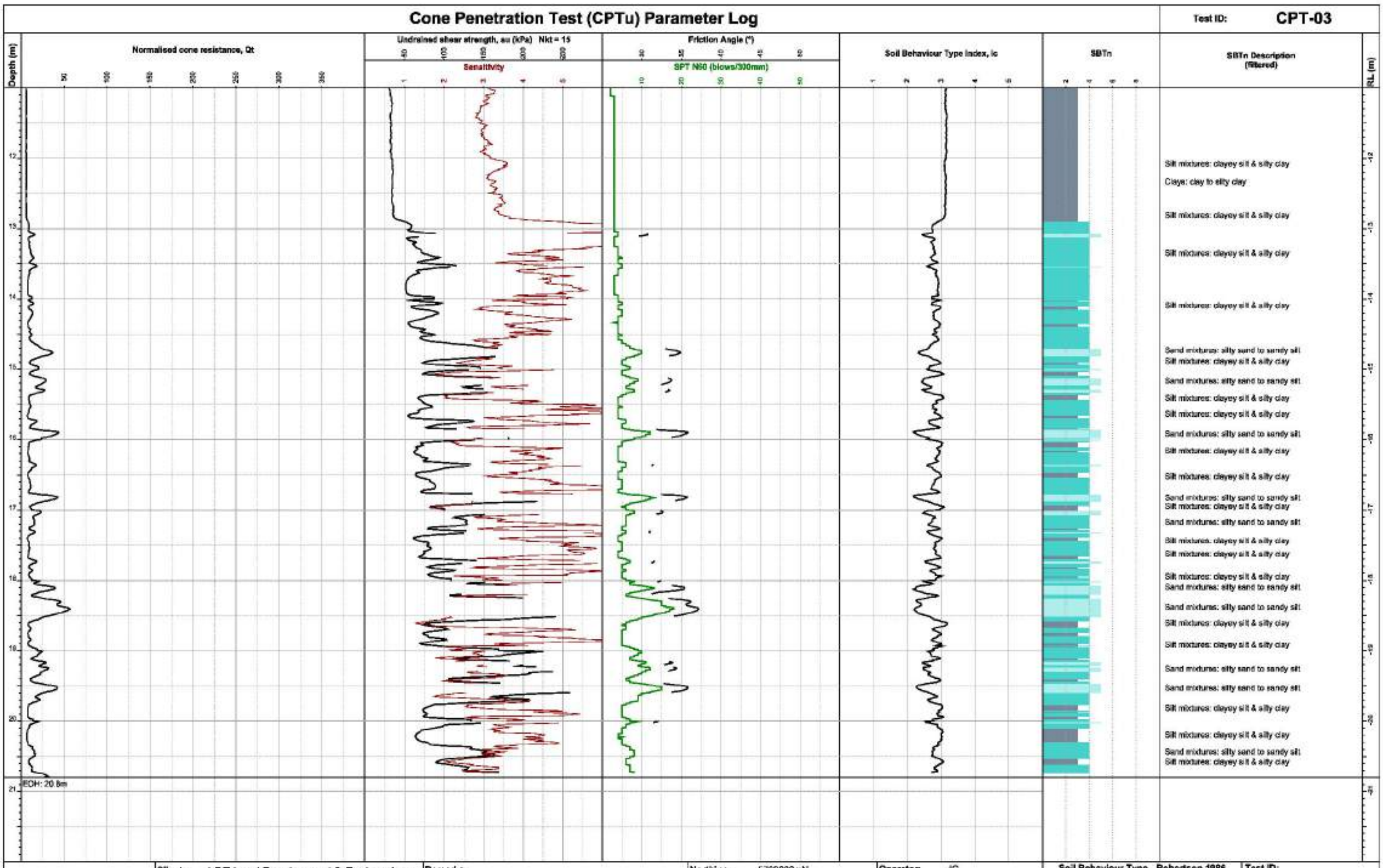
CPT-03

Project ID:	24477
Depth:	20.8m
Sheet:	1 of 2
Date:	30/05/2023

Generated with CORE GS by Geroc - CPT Combined A3 v2 - 31/05/2023 9:14:10 am

Cone Penetration Test (CPTu) Parameter Log

Test ID: CPT-03



Generated with CORE-GS by Geroc - CPT Combined A3 v2 - 31/05/2023 9:14:10 am

LDE LAND DEVELOPMENT & ENGINEERING

Client: LDE Land Development & Engineering
Project: geotechnical Investigation
Location: 556-560 Abeerdeen Rd, Gisborne

Remarks:
Ground water level located at 2.86m
Test according to ISO 22476-1:12 (Class 2)

Termination Reason:
Target depth

Northing: 5709866mN
Easting: 2036135mE
System: NZTM
Elevation: Ground
Located By: Phone GPS
Location: As per site plan

Operator: JC
Rig: Pagani TG63-150
Cone ID: Mks1042
Type: Comp. piezo cone
Cone Area: 10 cm²
Sleeve Area: 150 cm²
Area Ratio: 0.8

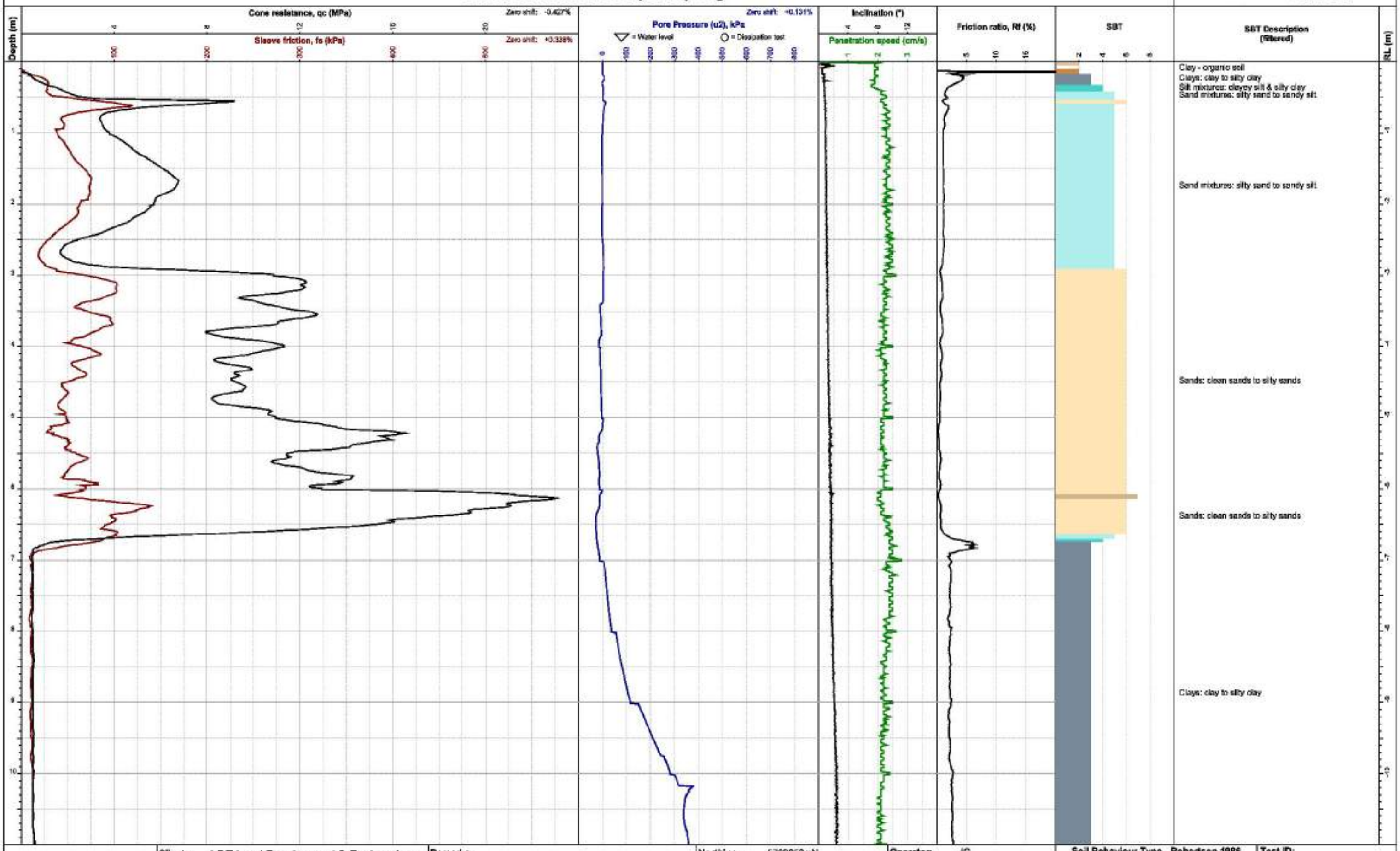
Soil Behaviour Type - Robertson 1986

0	Undefined	5	Sand mixtures: silty sand to sandy silt
1	Sensitive fine-grained	6	Sands: clean sands to silty sands
2	Clay - organic soil	7	Dense sand to gravelly sand
3	Clays: clay to silty clay	8	Stiff sand to clayey sand
4	Silt mixtures: clayey silt & silty clay	9	Stiff fine-grained

Test ID: CPT-03
Project ID: 24477
Depth: 20.8m
Sheet: 2 of 2
Date: 30/05/2023

Cone Penetration Test (CPTu) Log

Test ID: CPT-04



LDE LAND DEVELOPMENT & ENGINEERING

Client:	LDE Land Development & Engineering
Project:	geotechnical Investigation
Location:	556-560 Abeerdeen Rd, Gisborne

Remarks:
Ground water level located at 2.34m
Test according to ISO 22476-1:12 (Class 2)

Termination Reason:
Target depth

Northing:	5709856mN
Easting:	2036093mE
System:	NZTM
Elevation:	Ground
Located By:	Phone GPS
Location:	As per site plan

Operator:	JC
Rig:	Pagani TG63-150
Cone ID:	Mks1042
Type:	Comp. piezo cone
Cone Area:	10 cm²
Sleeve Area:	150 cm²
Area Ratio:	0.8

Soil Behaviour Type - Robertson 1986

0 Undefined	5 Sand mixtures: silty sand to sandy silt
1 Sensitive fine-grained	6 Sands: clean sands to silty sands
2 Clay - organic soil	7 Dense sand to gravelly sand
3 Clays: clay to silty clay	8 Stiff sand to clayey sand
4 Silt mixtures: clayey silt & silty clay	9 Stiff fine-grained

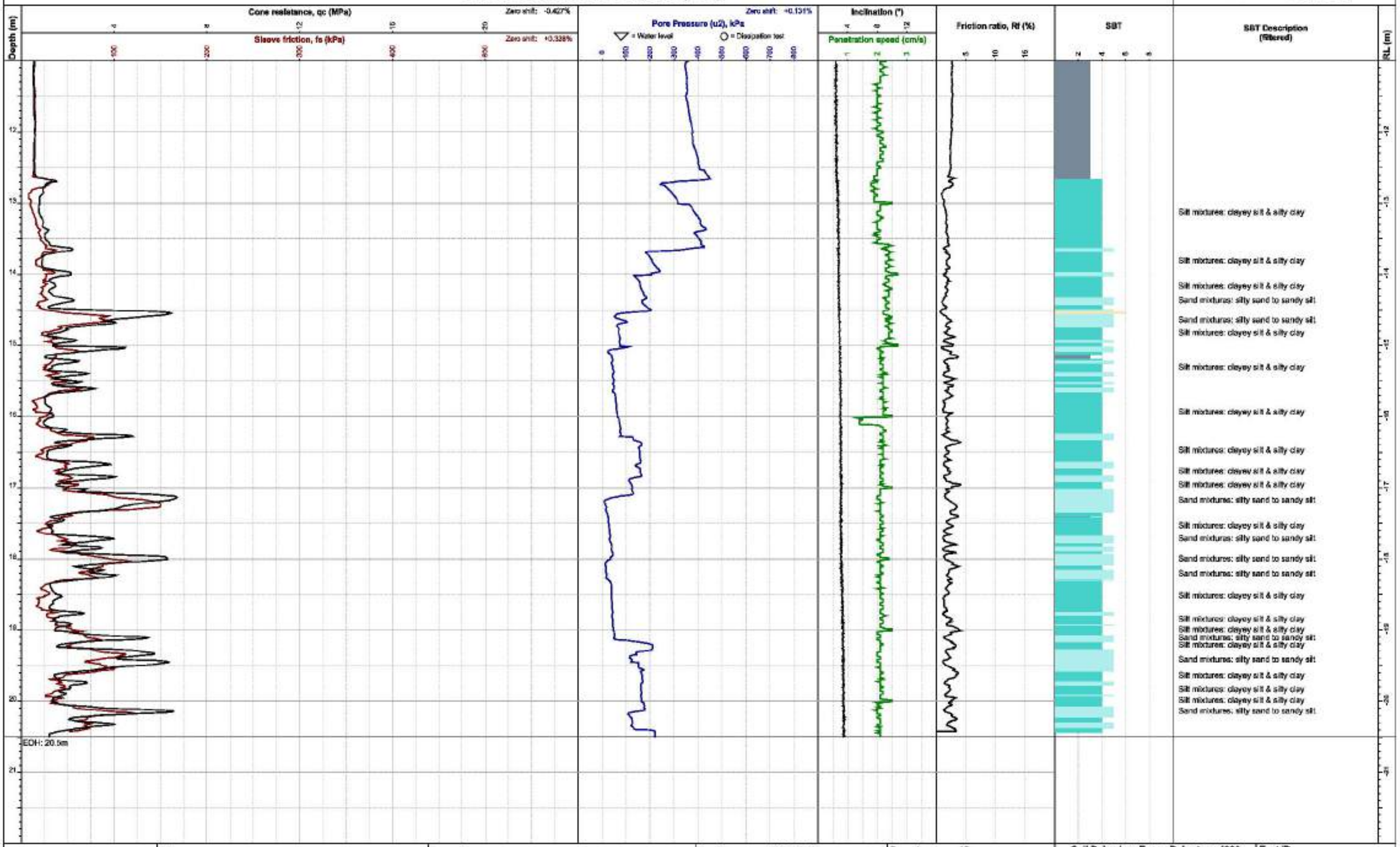
Test ID: CPT-04

Project ID:	24477
Depth:	20.5m
Sheet:	1 of 2
Date:	30/05/2023

Generated with CORE-GS by Geroc - CPT Combined A3 v2 - 31/05/2023 9:14:12 am

Cone Penetration Test (CPTu) Log

Test ID: CPT-04



Generated with CORE-GS by Geroc - CPT Combined A3 v2 - 31/05/2023 9:14:12 am

LDE LAND DEVELOPMENT & ENGINEERING

Client: LDE Land Development & Engineering
Project: geotechnical Investigation
Location: 556-560 Abeerdeen Rd, Gisborne

Remarks:
Ground water level located at 2.34m
Test according to ISO 22476-1:12 (Class 2)

Termination Reason:
Target depth

Northing: 5709856mN
Easting: 2036093mE
System: NZTM
Elevation: Ground
Located By: Phone GPS
Location: As per site plan

Operator: JC
Rig: Pagani TG63-150
Cone ID: Mks1042
Type: Comp. piezo cone
Cone Area: 10 cm²
Sleeve Area: 150 cm²
Area Ratio: 0.8

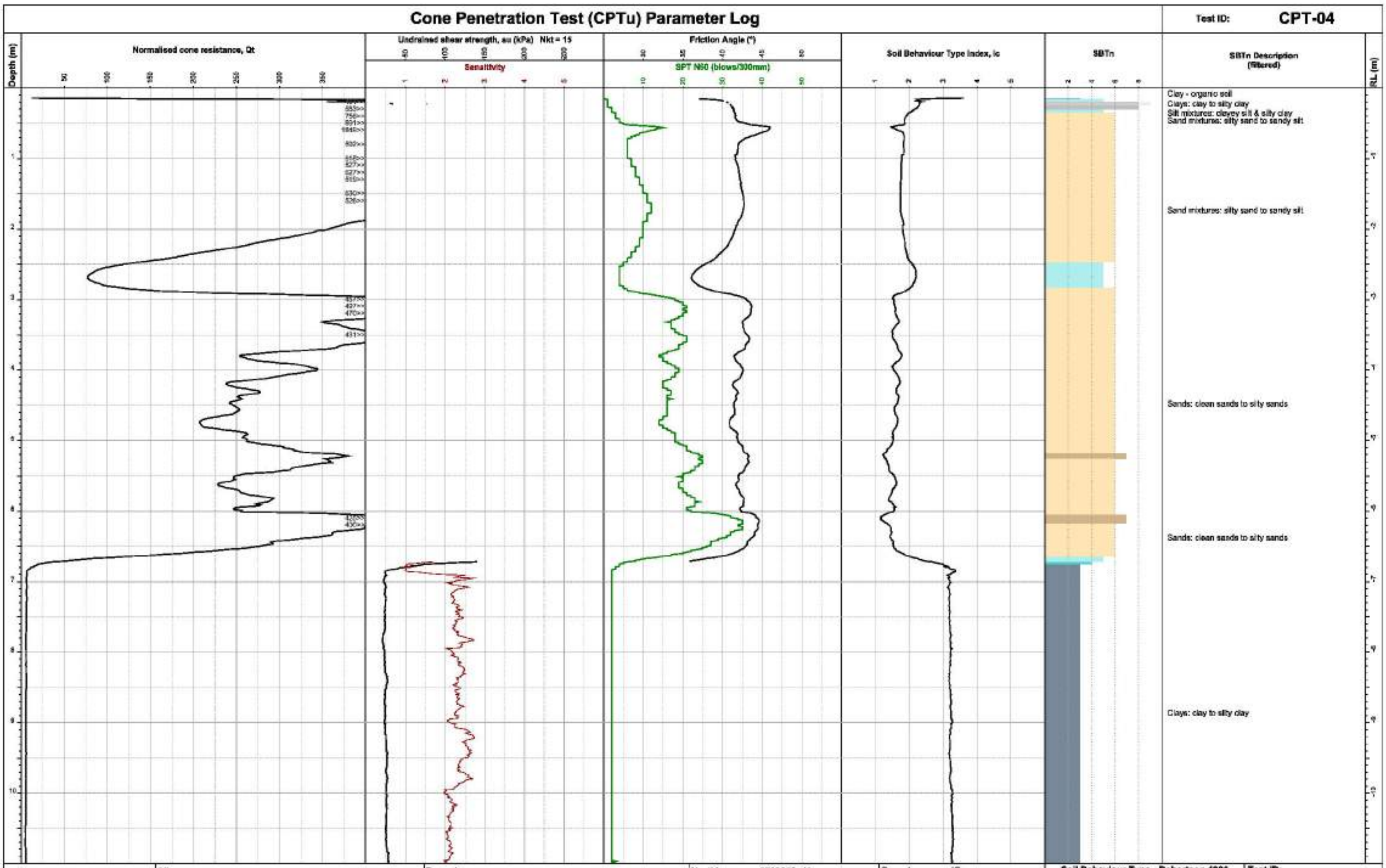
Soil Behaviour Type - Robertson 1986

0	Undefined	5	Sand mixtures: silty sand to sandy silt
1	Sensitive fine-grained	6	Sands: clean sands to silty sands
2	Clay - organic soil	7	Dense sand to gravelly sand
3	Clays: clay to silty clay	8	Stiff sand to clayey sand
4	Silt mixtures: clayey silt & silty clay	9	Stiff fine-grained

Test ID: CPT-04
Project ID: 24477
Depth: 20.5m
Sheet: 2 of 2
Date: 30/05/2023

Cone Penetration Test (CPTu) Parameter Log

Test ID: CPT-04



Client:	LDE Land Development & Engineering
Project:	geotechnical Investigation
Location:	556-560 Abeerdeen Rd, Gisborne

Remarks:
Ground water level located at 2.34m
Test according to ISO 22476-1:12 (Class 2)

Termination Reason:
Target depth

Northing:	5709856mN
Easting:	2036093mE
System:	NZTM
Elevation:	Ground
Located By:	Phone GPS
Location:	As per site plan

Operator:	JC
Rig:	Pagani TG63-150
Cone ID:	Mks1042
Type:	Comp. piezo cone
Cone Area:	10 cm²
Sleeve Area:	150 cm²
Area Ratio:	0.8

Soil Behaviour Type - Robertson 1986

0	Undefined	5	Sand mixtures: silty sand to sandy silt
1	Sensitive fine-grained	6	Sands: clean sands to silty sands
2	Clay - organic soil	7	Dense sand to gravelly sand
3	Clays: clay to silty clay	8	Stiff sand to clayey sand
4	Silt mixtures: clayey silt & silty clay	9	Stiff fine-grained

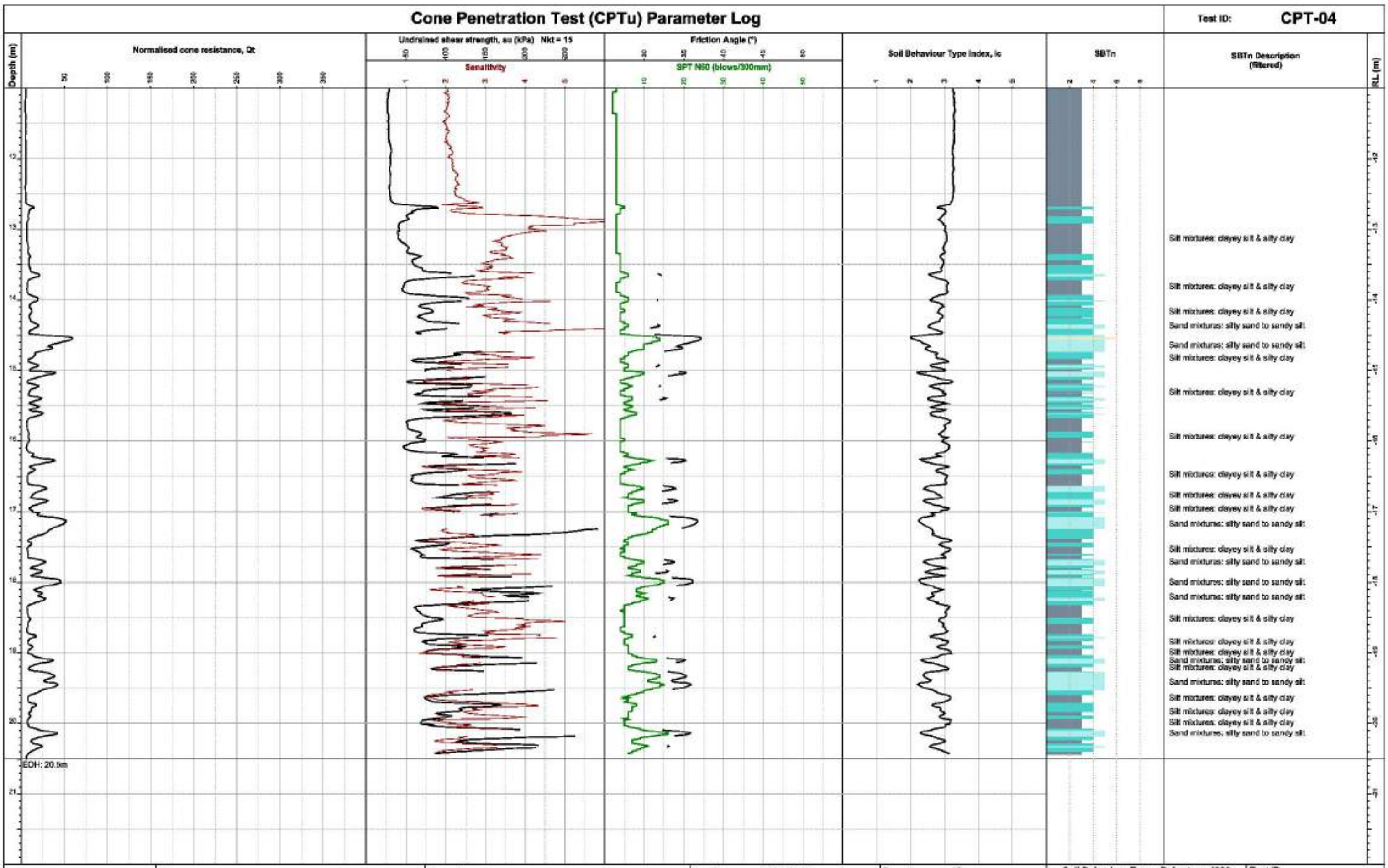
Test ID: CPT-04

Project ID:	24477
Depth:	20.5m
Sheet:	1 of 2
Date:	30/05/2023

Generated with CORE-GS by Geroc - CPT Combined A3 v2 - 31/05/2023 9:14:12 am

Cone Penetration Test (CPTu) Parameter Log

Test ID: **CPT-04**



Client: LDE Land Development & Engineering
Project: geotechnical Investigation
Location: 556-560 Abeerdeen Rd, Gisborne

Remarks:
Ground water level located at 2.34m
Test according to ISO 22476-1:12 (Class 2)

Termination Reason:
Target depth

Northing: 5709856mN
Easting: 2036093mE
System: NZTM
Elevation: Ground
Located By: Phone GPS
Location: As per site plan

Operator: JC
Rig: Pagani TG63-150
Cone ID: Mks1042
Type: Comp. piezo cone
Cone Area: 10 cm²
Sleeve Area: 150 cm²
Area Ratio: 0.8

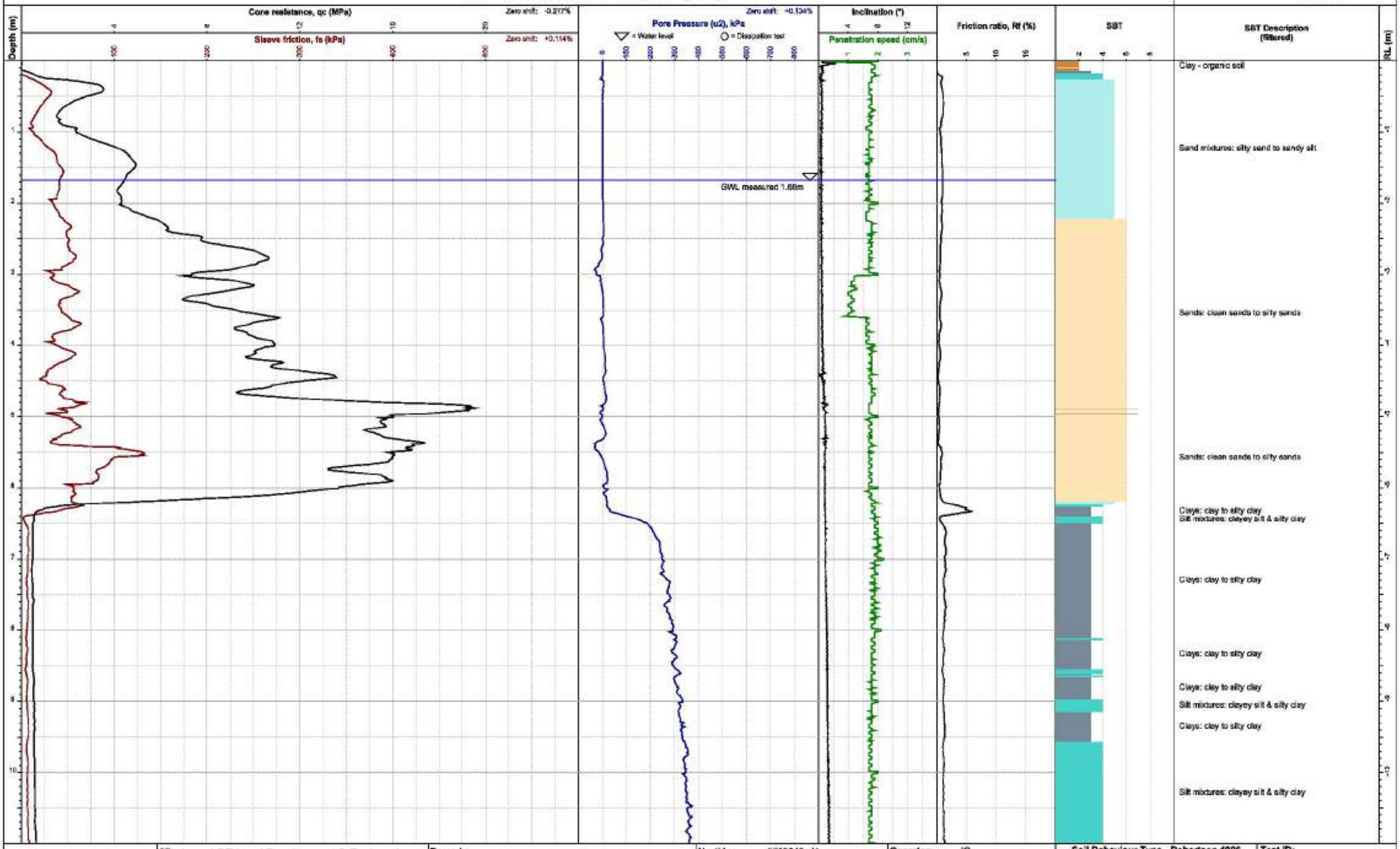
Soil Behaviour Type - Robertson 1986

0	Undefined	5	Sand mixtures: silty sand to sandy silt
1	Sensitive fine-grained	6	Sands: clean sands to silty sands
2	Clay - organic soil	7	Dense sand to gravelly sand
3	Clays: clay to silty clay	8	Stiff sand to clayey sand
4	Silt mixtures: clayey silt & silty clay	9	Stiff fine-grained

Test ID: **CPT-04**
Project ID: 24477
Depth: 20.5m
Sheet: 2 of 2
Date: 30/05/2023

Cone Penetration Test (CPTu) Log

Test ID: CPT-05



Client: LDE Land Development & Engineering

Project: geotechnical Investigation

Location: 556-560 Abeerdeen Rd, Gisborne

Remarks:
Ground water level located at 1.68m
Test according to ISO 22476-1:12 (Class 2)

Termination Reason:
Target depth

Northing:	5709840mN
Easting:	2036107mE
System:	NZTM
Elevation:	Ground
Located By:	Phone GPS
Location:	As per site plan

Operator:	JC
Rig:	Pagani TG63-150
Cone ID:	Mks1042
Type:	Comp. piezo cone
Cone Area:	10 cm²
Sleeve Area:	150 cm²
Area Ratio:	0.8

Soil Behaviour Type - Robertson 1986

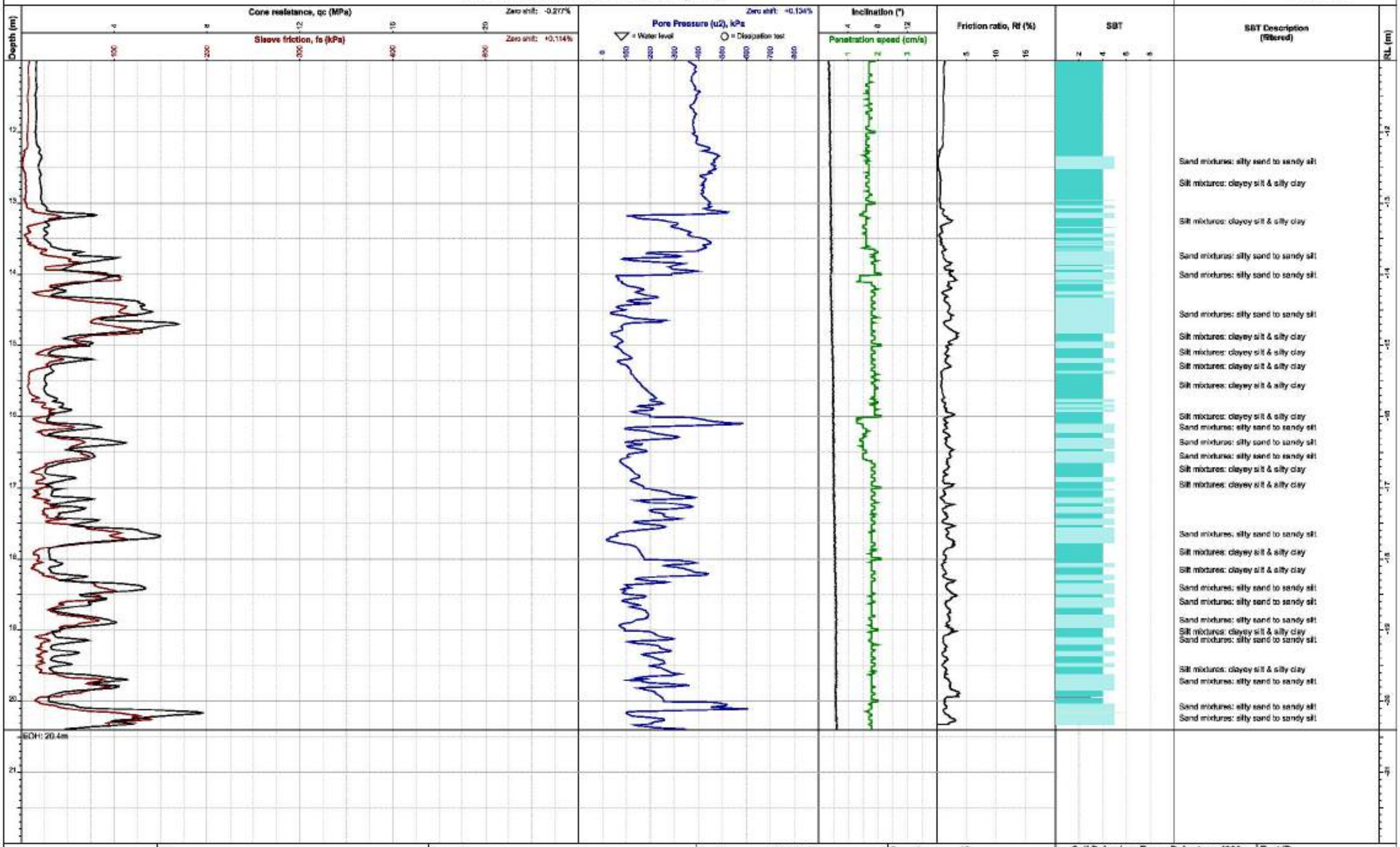
0	Undefined	5	Sand mixtures: silty sand to sandy silt
1	Sensitive fine-grained	6	Sands: clean sands to silty sands
2	Clay - organic soil	7	Dense sand to gravelly sand
3	Clays: clay to silty clay	8	Stiff sand to clayey sand
4	Silt mixtures: clayey silt & silty clay	9	Stiff fine-grained

Test ID: CPT-05

Project ID:	24477
Depth:	20.4m
Sheet:	1 of 2
Date:	30/05/2023

Cone Penetration Test (CPTu) Log

Test ID: CPT-05



LAND DEVELOPMENT & ENGINEERING

Client: LDE Land Development & Engineering

Project: geotechnical Investigation

Location: 556-560 Abeerdeen Rd, Gisborne

Remarks:
Ground water level located at 1.68m
Test according to ISO 22476-1:12 (Class 2)

Termination Reason:
Target depth

Northing: 5709840mN
Easting: 2036107mE
System: NZTM
Elevation: Ground
Located By: Phone GPS
Location: As per site plan

Operator: JC
Rig: Pagani TG63-150
Cone ID: Mks1042
Type: Comp. piezo cone
Cone Area: 10 cm²
Sleeve Area: 150 cm²
Area Ratio: 0.8

Soil Behaviour Type - Robertson 1986

0	Undefined	5	Sand mixtures: silty sand to sandy silt
1	Sensitive fine-grained	6	Sands: clean sands to silty sands
2	Clay - organic soil	7	Dense sand to gravelly sand
3	Clays: clay to silty clay	8	Stiff sand to clayey sand
4	Silt mixtures: clayey silt & silty clay	9	Stiff fine-grained

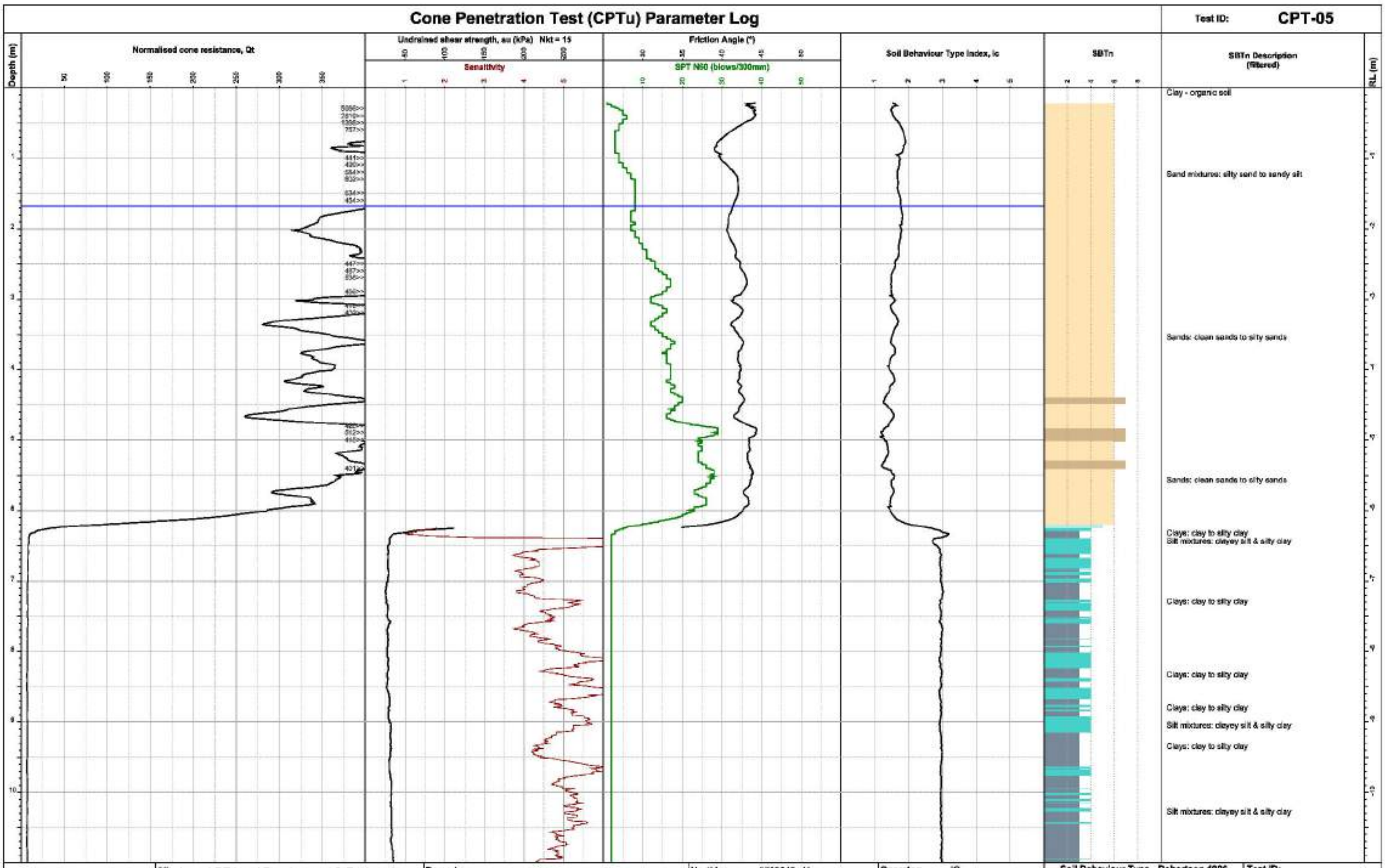
Test ID:
CPT-05

Project ID: 24477
Depth: 20.4m
Sheet: 2 of 2
Date: 30/05/2023

Generated with CORE GS by Geroc - CPT Combined A3 v2 - 31/05/2023 9:14:18 am

Cone Penetration Test (CPTu) Parameter Log

Test ID: CPT-05



LDE LAND DEVELOPMENT & ENGINEERING

Client: LDE Land Development & Engineering
Project: geotechnical Investigation
Location: 556-560 Abeerdeen Rd, Gisborne

Remarks:
Ground water level located at 1.68m
Test according to ISO 22476-1:12 (Class 2)

Termination Reason:
Target depth

Northing:	5709840mN
Easting:	2036107mE
System:	NZTM
Elevation:	Ground
Located By:	Phone GPS
Location:	As per site plan

Operator:	JC
Rig:	Pagani TG63-150
Cone ID:	Mks1042
Type:	Comp. piezo cone
Cone Area:	10 cm²
Sleeve Area:	150 cm²
Area Ratio:	0.8

Soil Behaviour Type - Robertson 1986

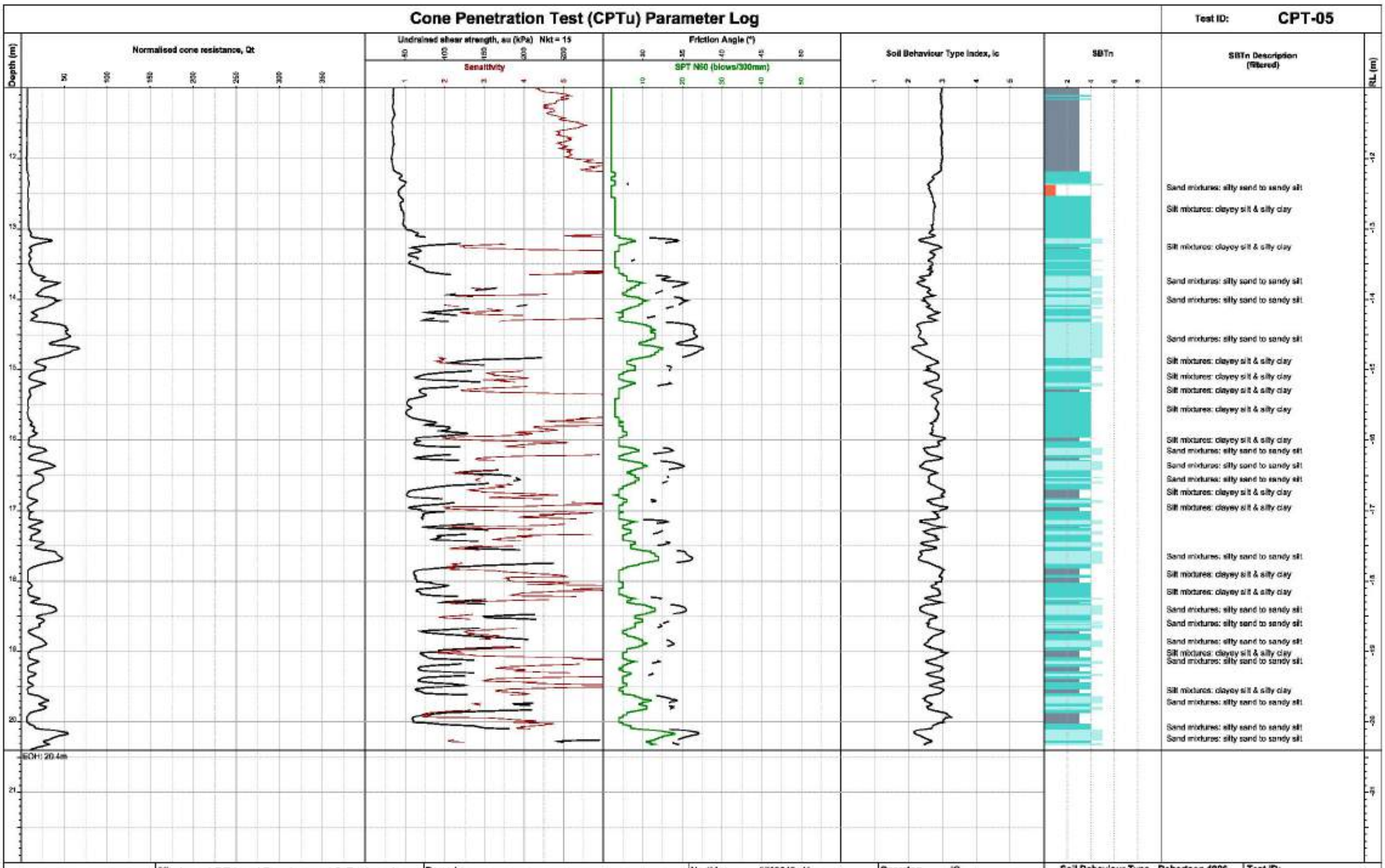
0	Undefined	5	Sand mixtures: silty sand to sandy silt
1	Sensitive fine-grained	6	Sands: clean sands to silty sands
2	Clay - organic soil	7	Dense sand to gravelly sand
3	Clays: clay to silty clay	8	Stiff sand to clayey sand
4	Silt mixtures: clayey silt & silty clay	9	Stiff fine-grained

Test ID: CPT-05

Project ID:	24477
Depth:	20.4m
Sheet:	1 of 2
Date:	30/05/2023

Cone Penetration Test (CPTu) Parameter Log

Test ID: CPT-05



Generated with CORE-GS by Geroc - CPT Combined A3 v2 - 31/05/2023 9:14:16 am

LDE LAND DEVELOPMENT & ENGINEERING

Client: LDE Land Development & Engineering
Project: geotechnical Investigation
Location: 556-560 Abeerdeen Rd, Gisborne

Remarks:
Ground water level located at 1.68m
Test according to ISO 22476-1:12 (Class 2)

Termination Reason:
Target depth

Northing:	5709840mN
Easting:	2036107mE
System:	NZTM
Elevation:	Ground
Located By:	Phone GPS
Location:	As per site plan

Operator:	JC
Rig:	Pagani TG63-150
Cone ID:	Mks1042
Type:	Comp. piezo cone
Cone Area:	10 cm²
Sleeve Area:	150 cm²
Area Ratio:	0.8

Soil Behaviour Type - Robertson 1986

0	Undefined	5	Sand mixtures: silty sand to sandy silt
1	Sensitive fine-grained	6	Sands: clean sands to silty sands
2	Clay - organic soil	7	Dense sand to gravelly sand
3	Clays: clay to silty clay	8	Stiff sand to clayey sand
4	Silt mixtures: clayey silt & silty clay	9	Stiff fine-grained

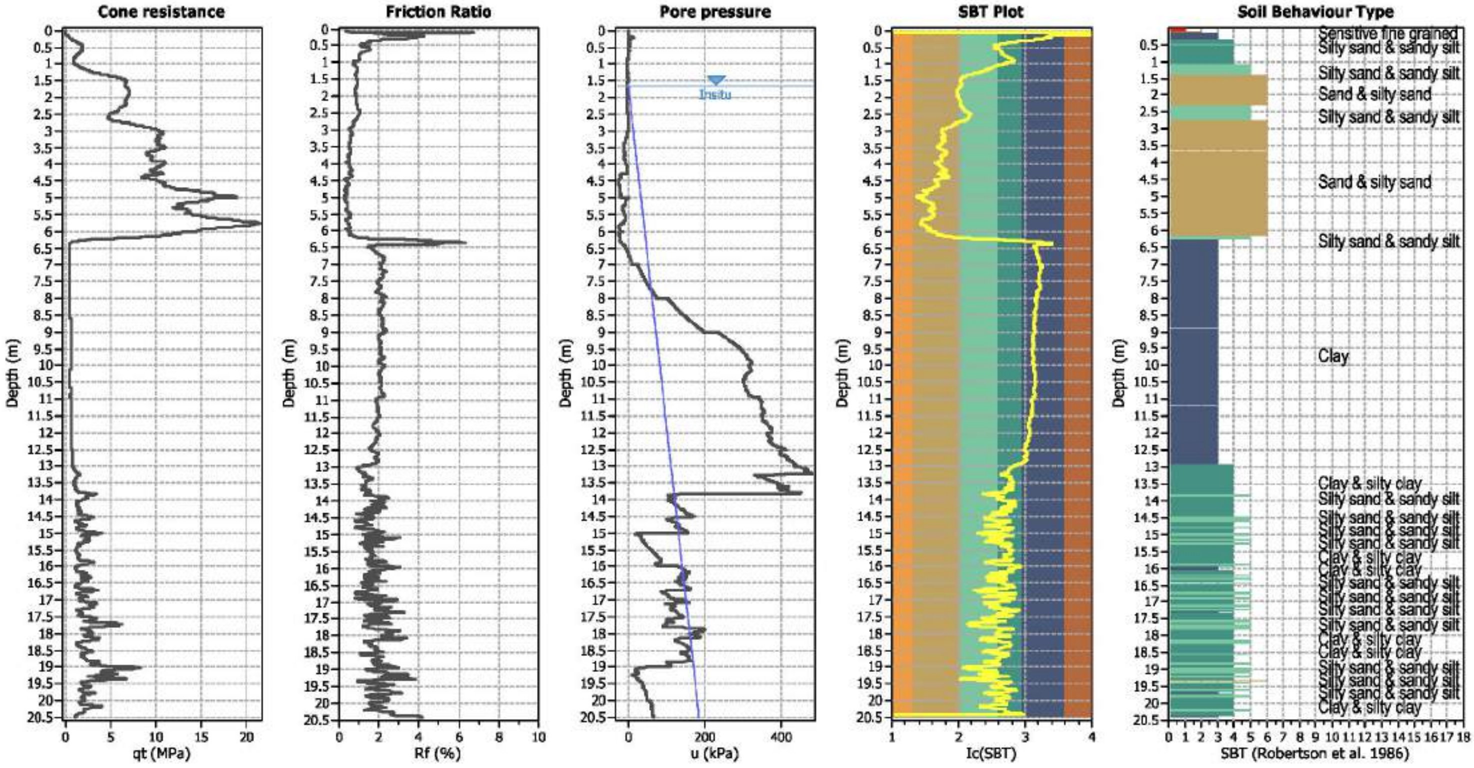
Test ID: CPT-05

Project ID:	24477
Depth:	20.4m
Sheet:	2 of 2
Date:	30/05/2023

APPENDIX D

LIQUEFATION ANALYSIS RESULTS

CPT basic interpretation plots



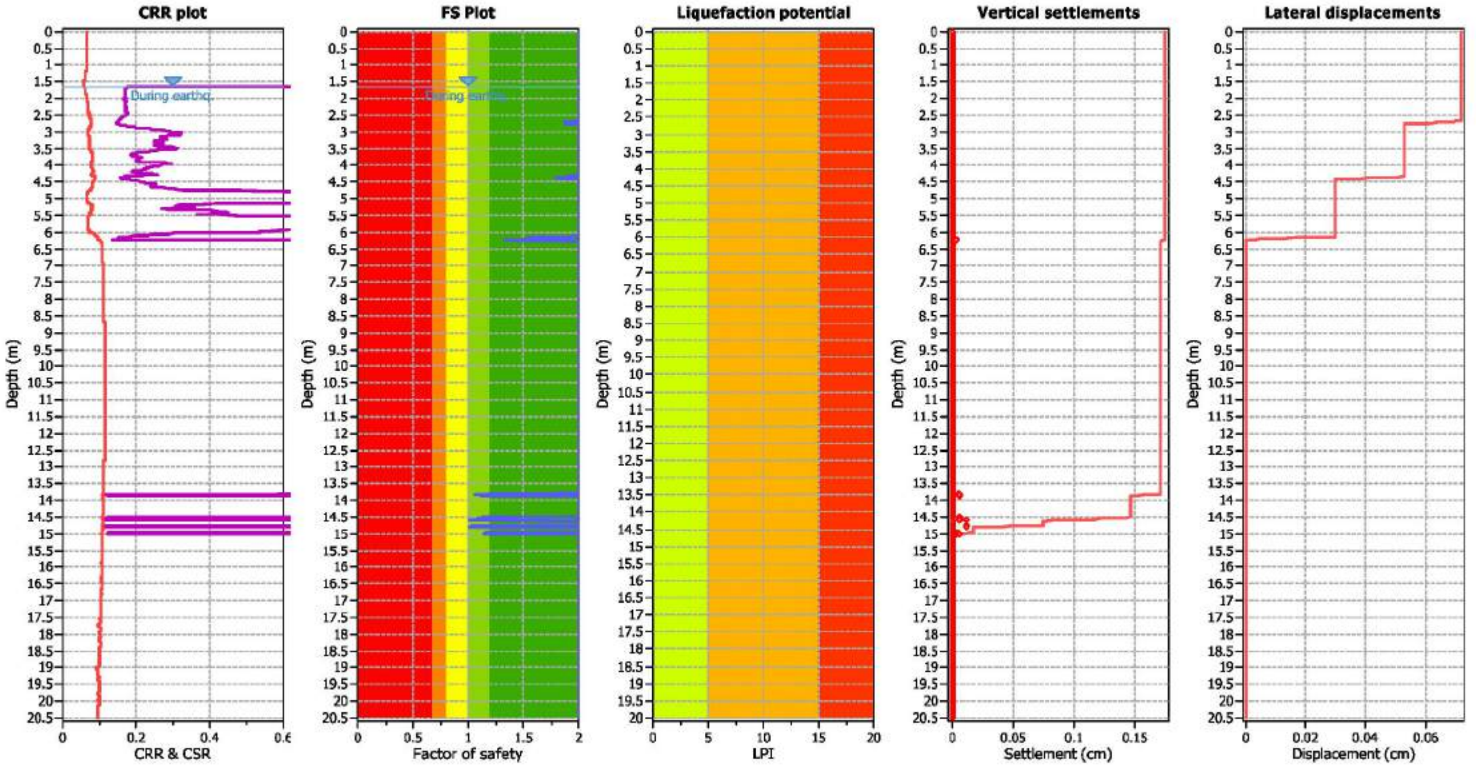
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.30	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.12	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	15.00 m

SBT legend

🟥	1. Sensitive fine grained	🟩	4. Clayey silt to silty	🟧	7. Gravely sand to sand
🟫	2. Organic material	🟩	5. Silty sand to sandy silt	⬛	8. Very stiff sand to
🟦	3. Clay to silty clay	🟨	6. Clean sand to silty sand	⬜	9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.30	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.12	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	15.00 m

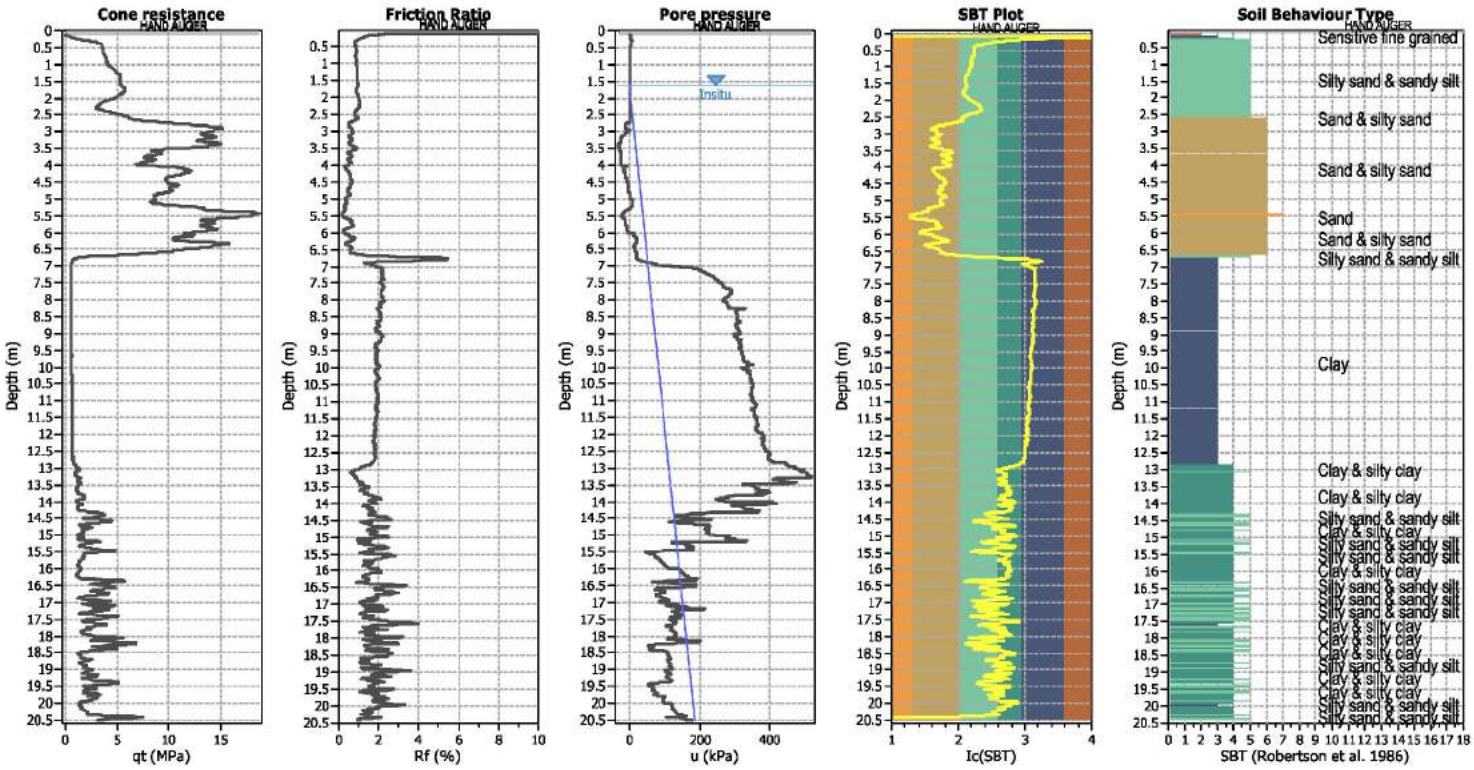
F.S. color scheme

- 🟥 Almost certain it will liquefy
- 🟧 Very likely to liquefy
- 🟨 Liquefaction and no liq. are equally likely
- 🟩 Unlike to liquefy
- 🟩 Almost certain it will not liquefy

LPI color scheme

- 🟥 Very high risk
- 🟧 High risk
- 🟩 Low risk

CPT basic interpretation plots



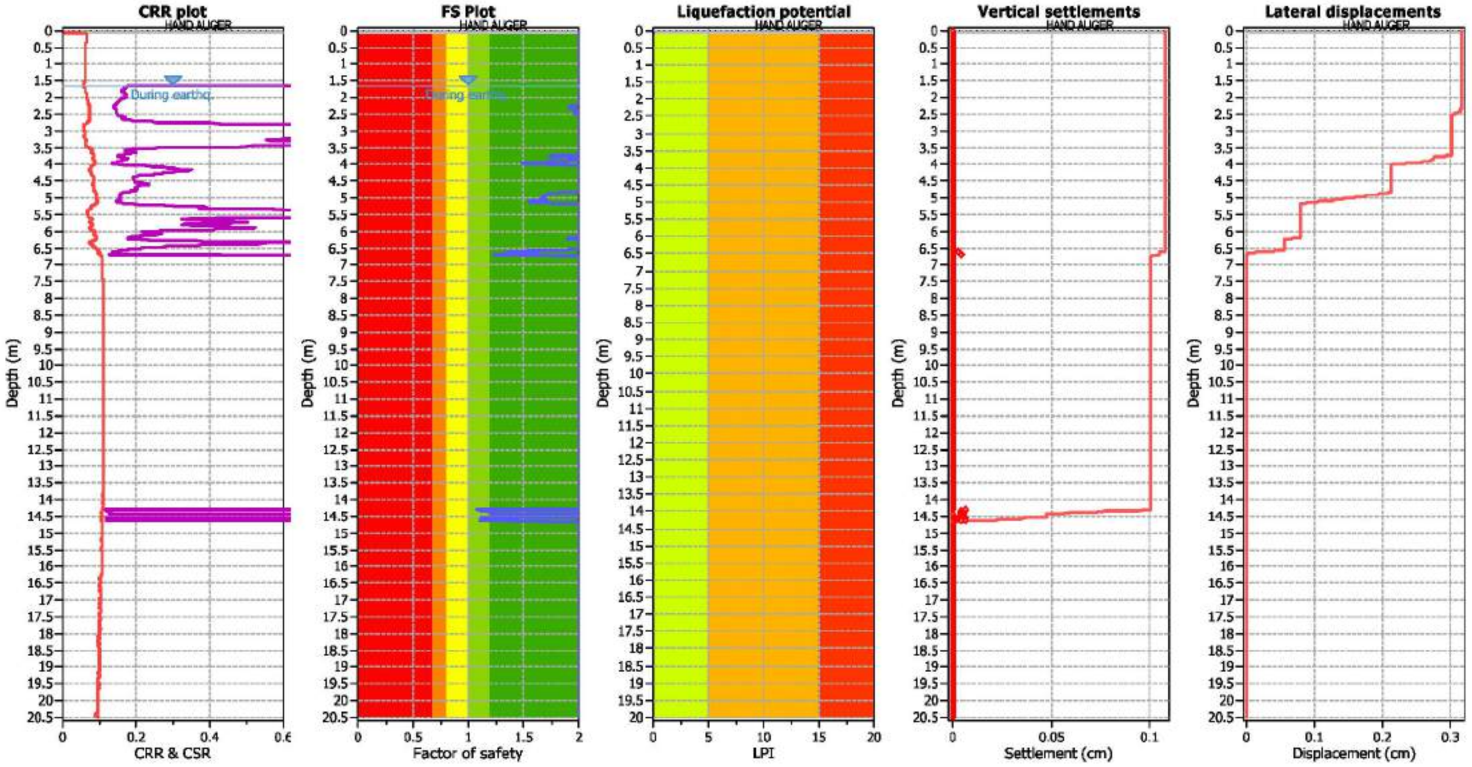
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.30	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.12	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	15.00 m

SBT legend

🟥 1. Sensitive fine grained	🟩 4. Clayey silt to silty	🟧 7. Gravely sand to sand
🟫 2. Organic material	🟩 5. Silty sand to sandy silt	⬛ 8. Very stiff sand to
🟦 3. Clay to silty clay	🟨 6. Clean sand to silty sand	⬜ 9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.30	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.12	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	15.00 m

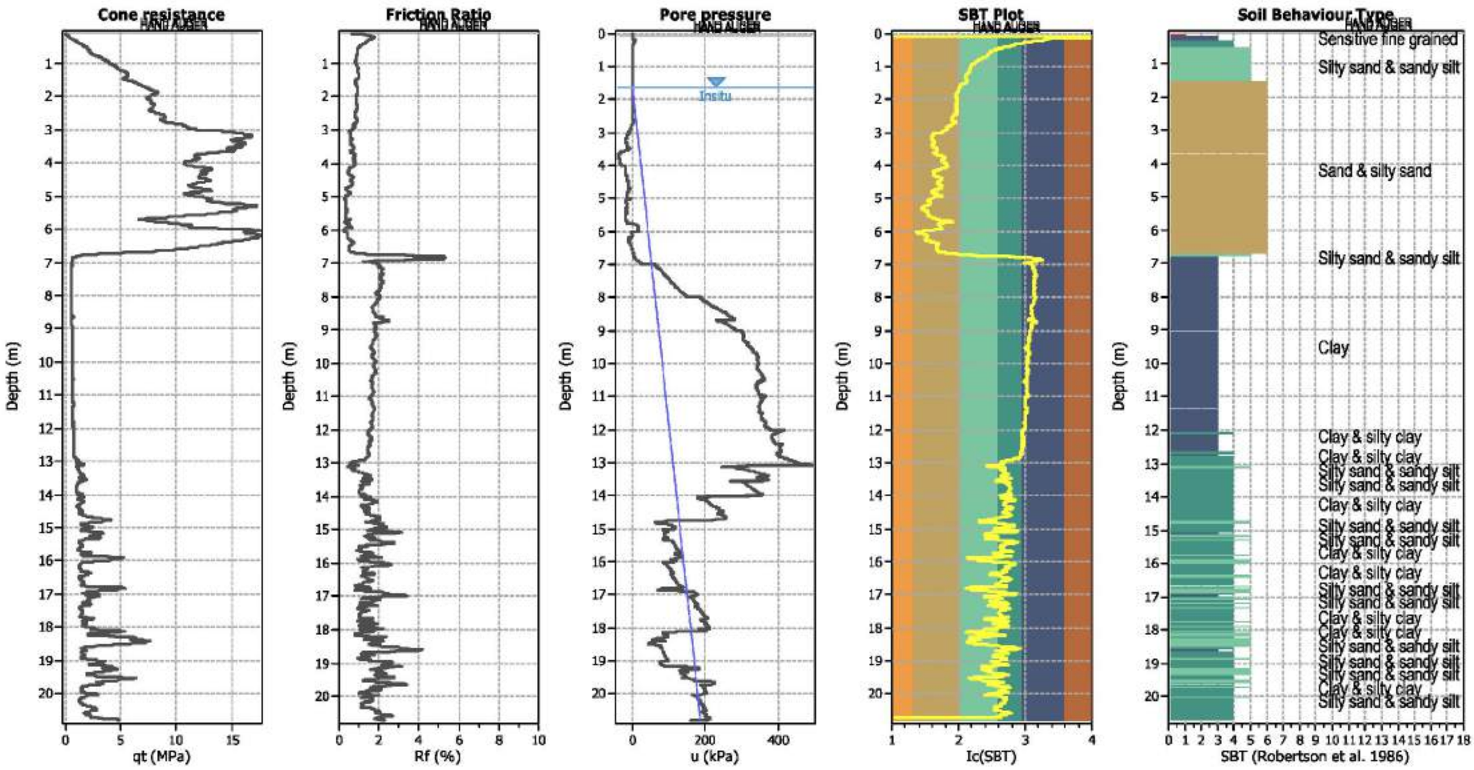
F.S. color scheme

- 🟥 Almost certain it will liquefy
- 🟧 Very likely to liquefy
- 🟨 Liquefaction and no liq. are equally likely
- 🟩 Unlike to liquefy
- 🟩 Almost certain it will not liquefy

LPI color scheme

- 🟥 Very high risk
- 🟧 High risk
- 🟨 Low risk

CPT basic interpretation plots



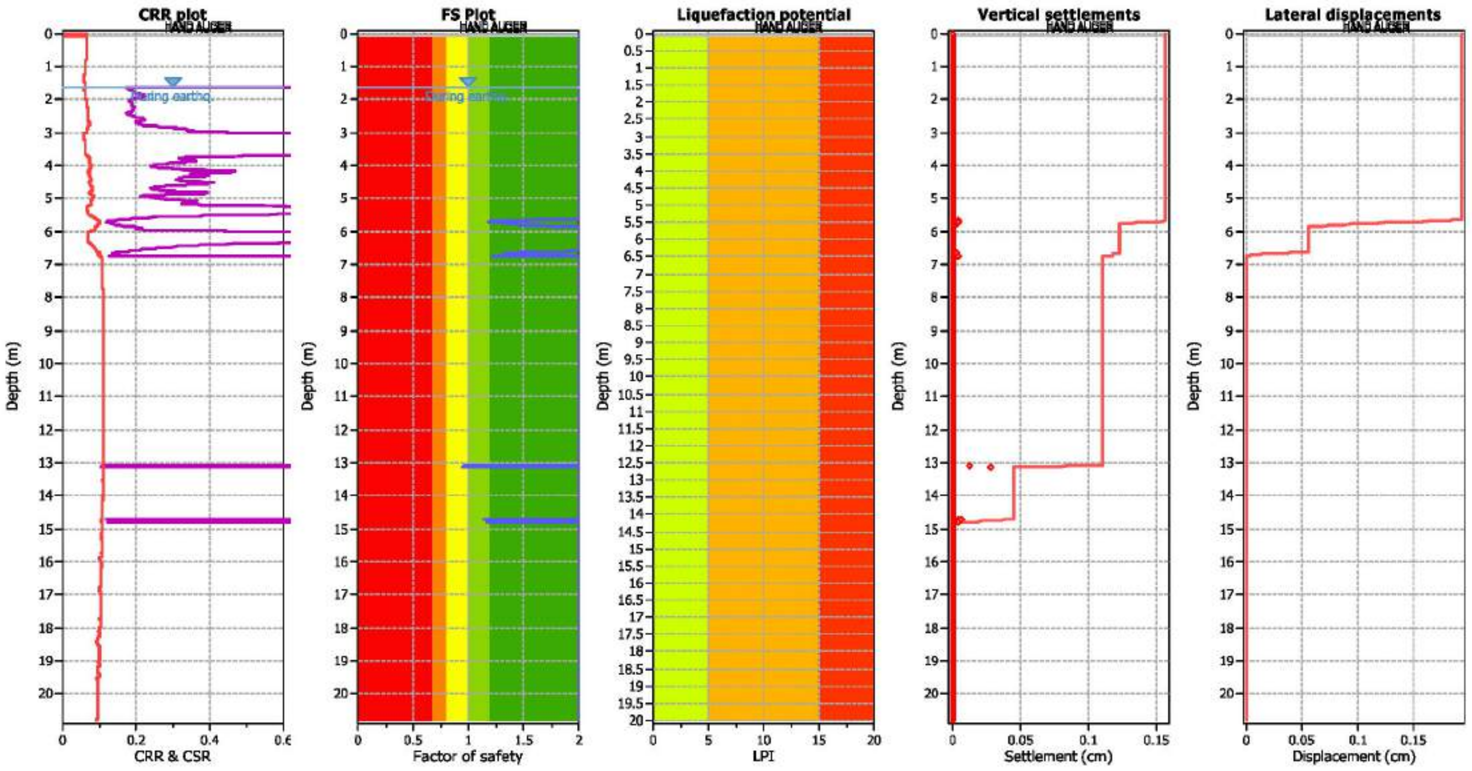
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.30	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.12	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	15.00 m

SBT legend

🟥 1. Sensitive fine grained	🟩 4. Clayey silt to silty	🟧 7. Gravely sand to sand
🟫 2. Organic material	🟩 5. Silty sand to sandy silt	⬛ 8. Very stiff sand to
🟦 3. Clay to silty clay	🟨 6. Clean sand to silty sand	⬜ 9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.30	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.12	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	15.00 m

F.S. color scheme

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LPI color scheme

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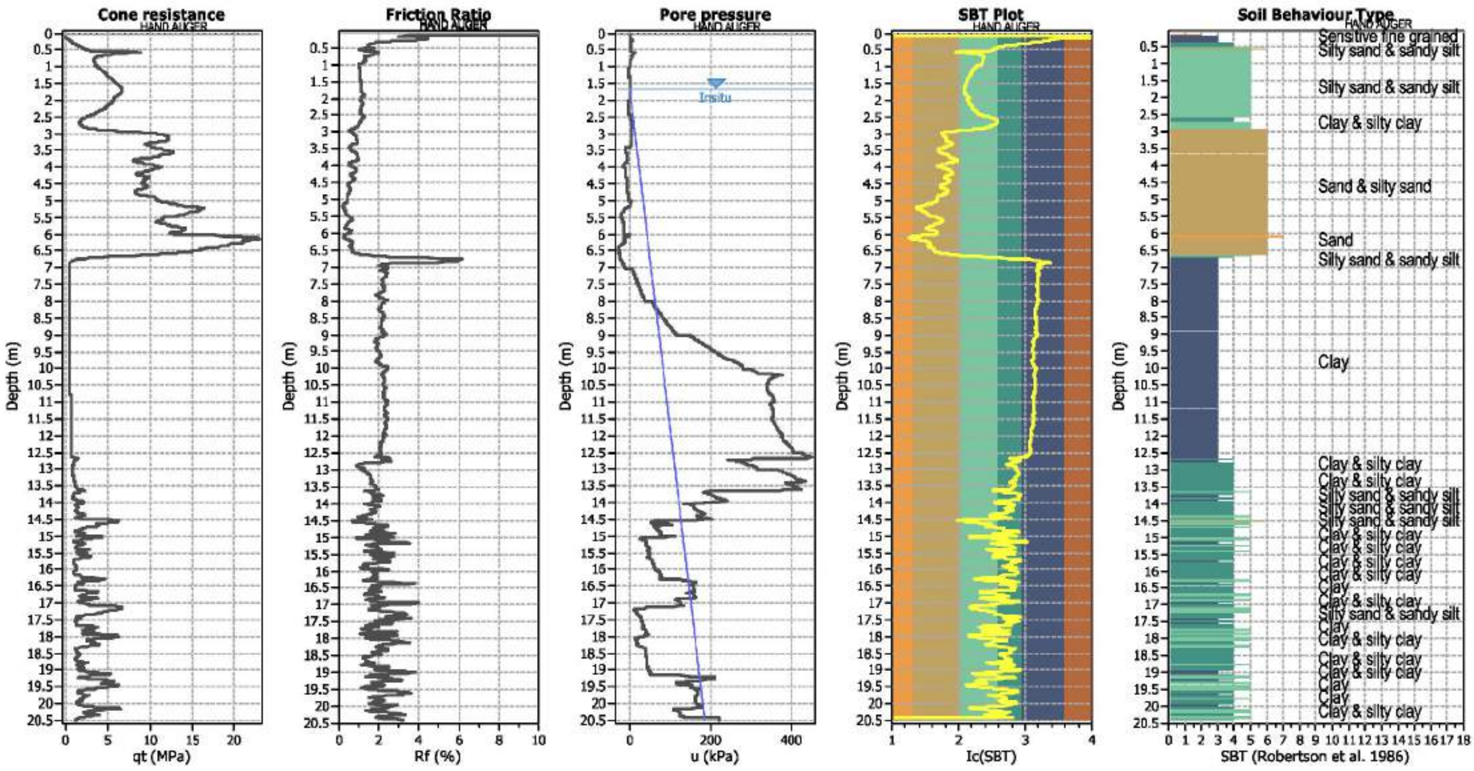
CPT basic interpretation plots



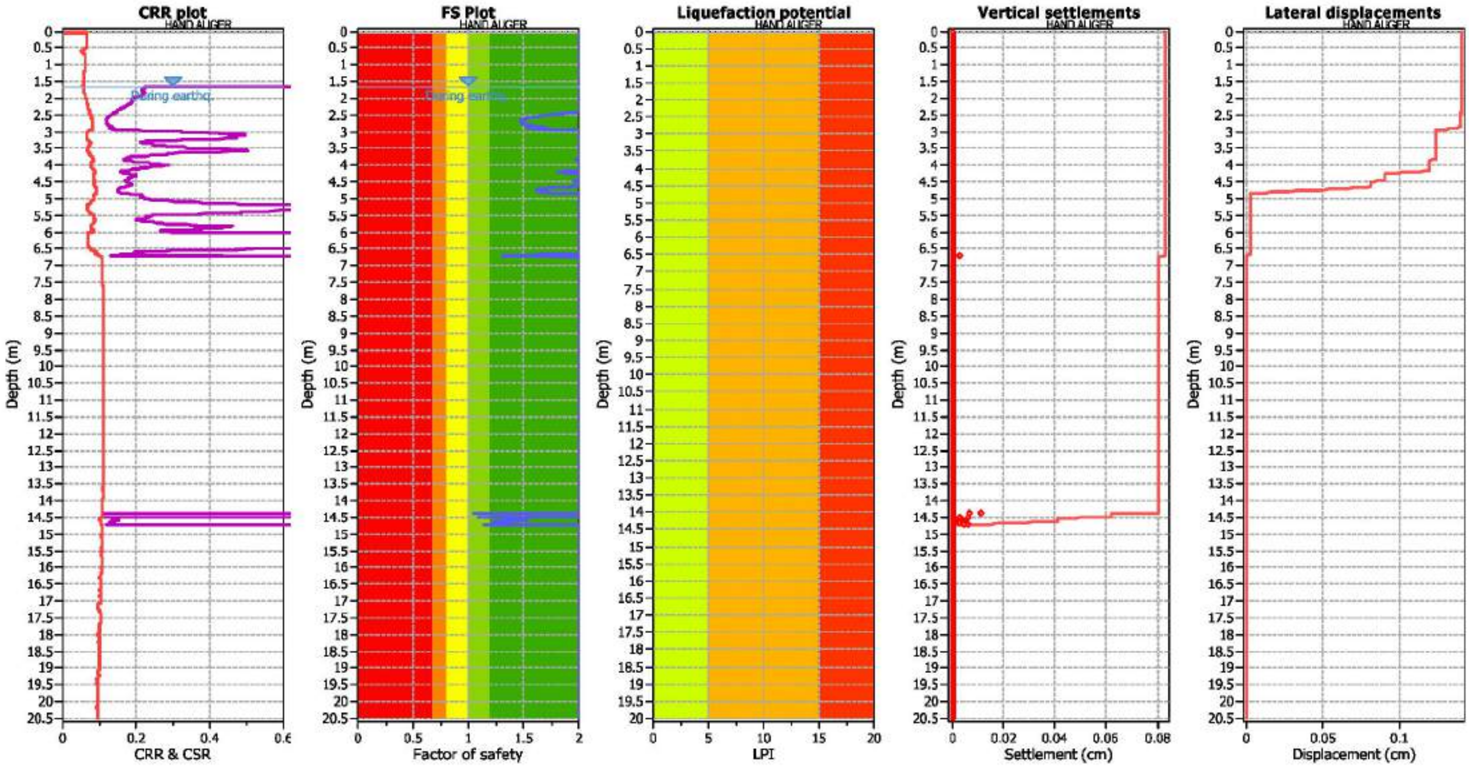
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.30	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.12	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	15.00 m

SBT legend

🟥 1. Sensitive fine grained	🟩 4. Clayey silt to silty	🟧 7. Gravely sand to sand
🟫 2. Organic material	🟩 5. Silty sand to sandy silt	⬜ 8. Very stiff sand to
🟦 3. Clay to silty clay	🟨 6. Clean sand to silty sand	⬜ 9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.30	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.12	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	15.00 m

F.S. color scheme

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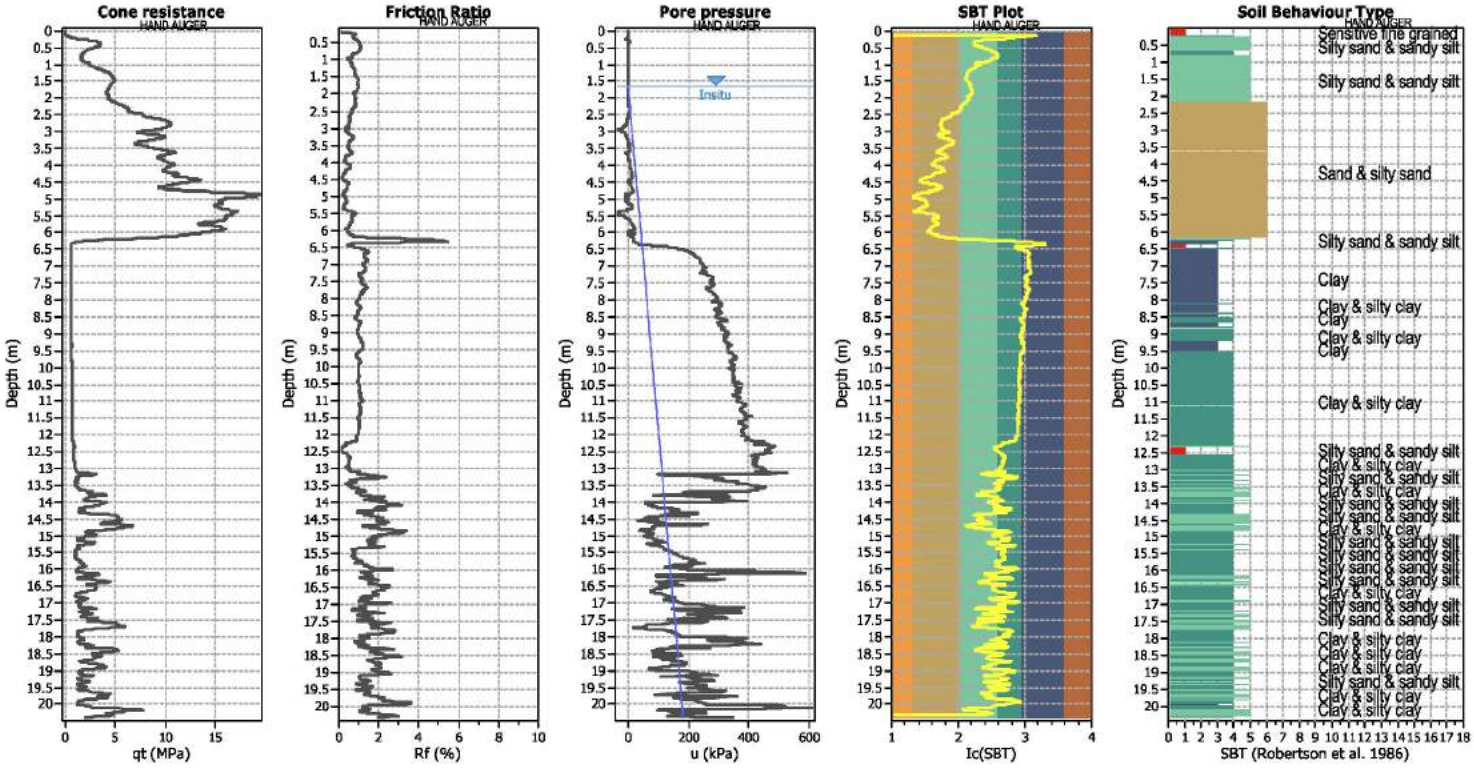
CPT basic interpretation plots



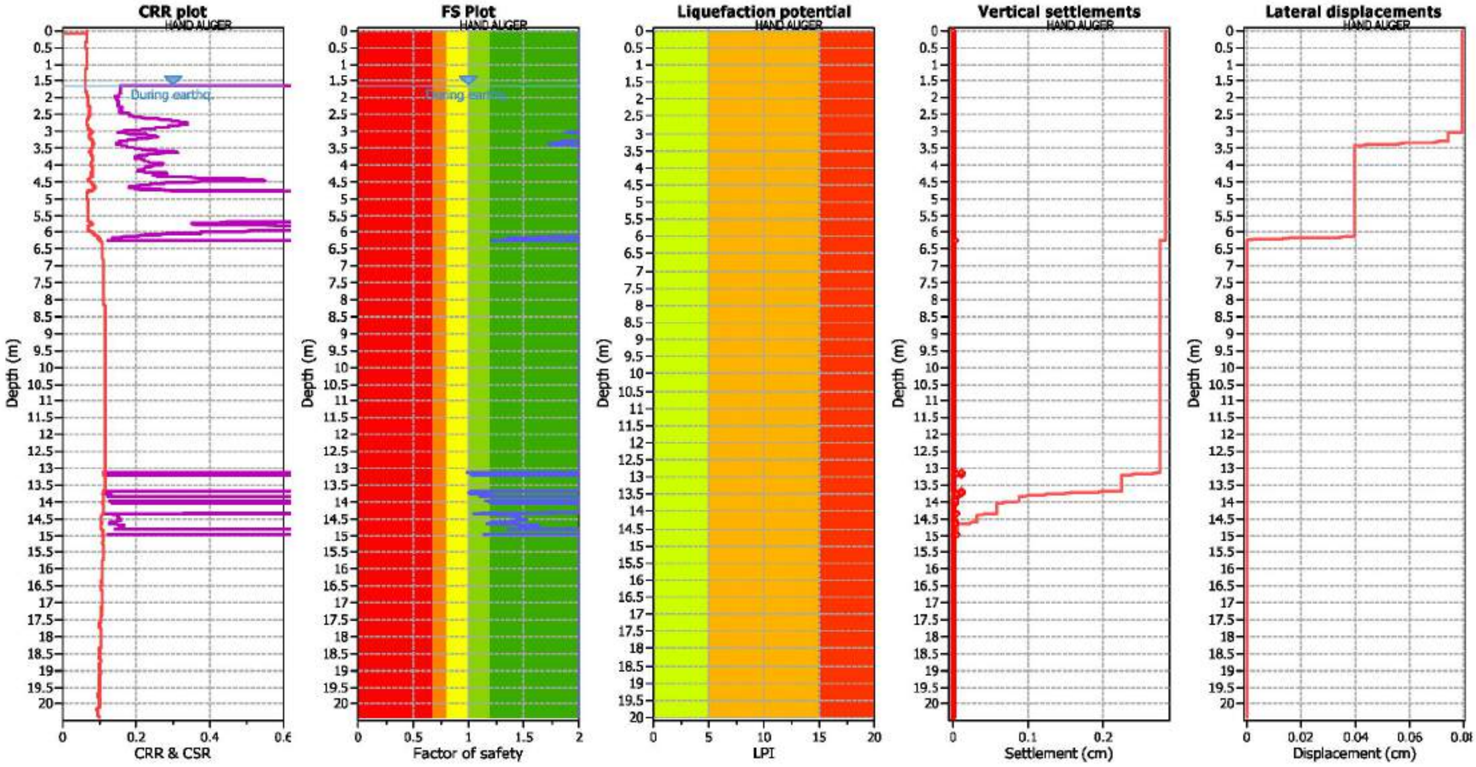
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.30	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.12	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	15.00 m

SBT legend

🟥 1. Sensitive fine grained	🟩 4. Clayey silt to silty	🟧 7. Gravely sand to sand
🟫 2. Organic material	🟩 5. Silty sand to sandy silt	⬛ 8. Very stiff sand to
🟦 3. Clay to silty clay	🟨 6. Clean sand to silty sand	⬜ 9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.30	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.12	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	15.00 m

F.S. color scheme

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LPI color scheme

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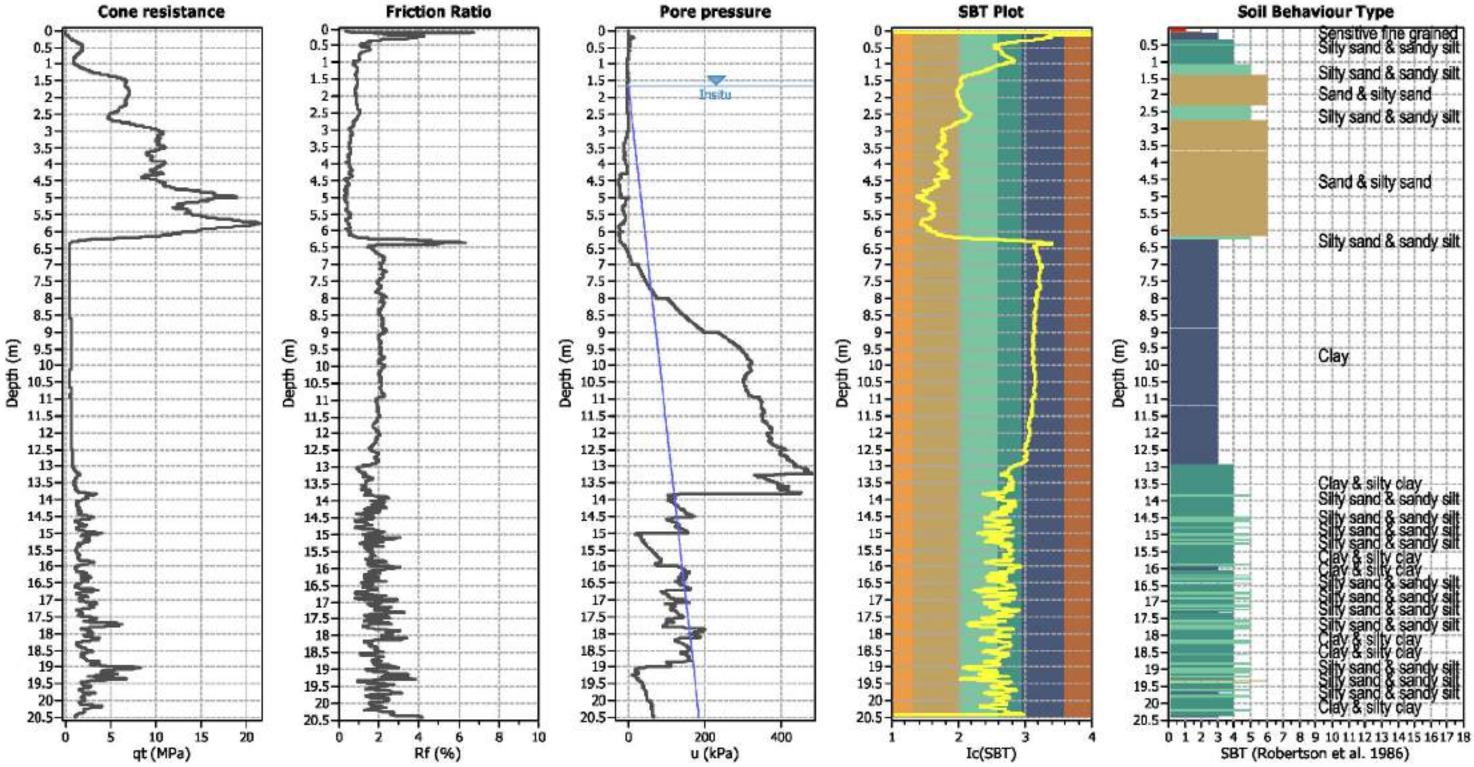
CPT basic interpretation plots



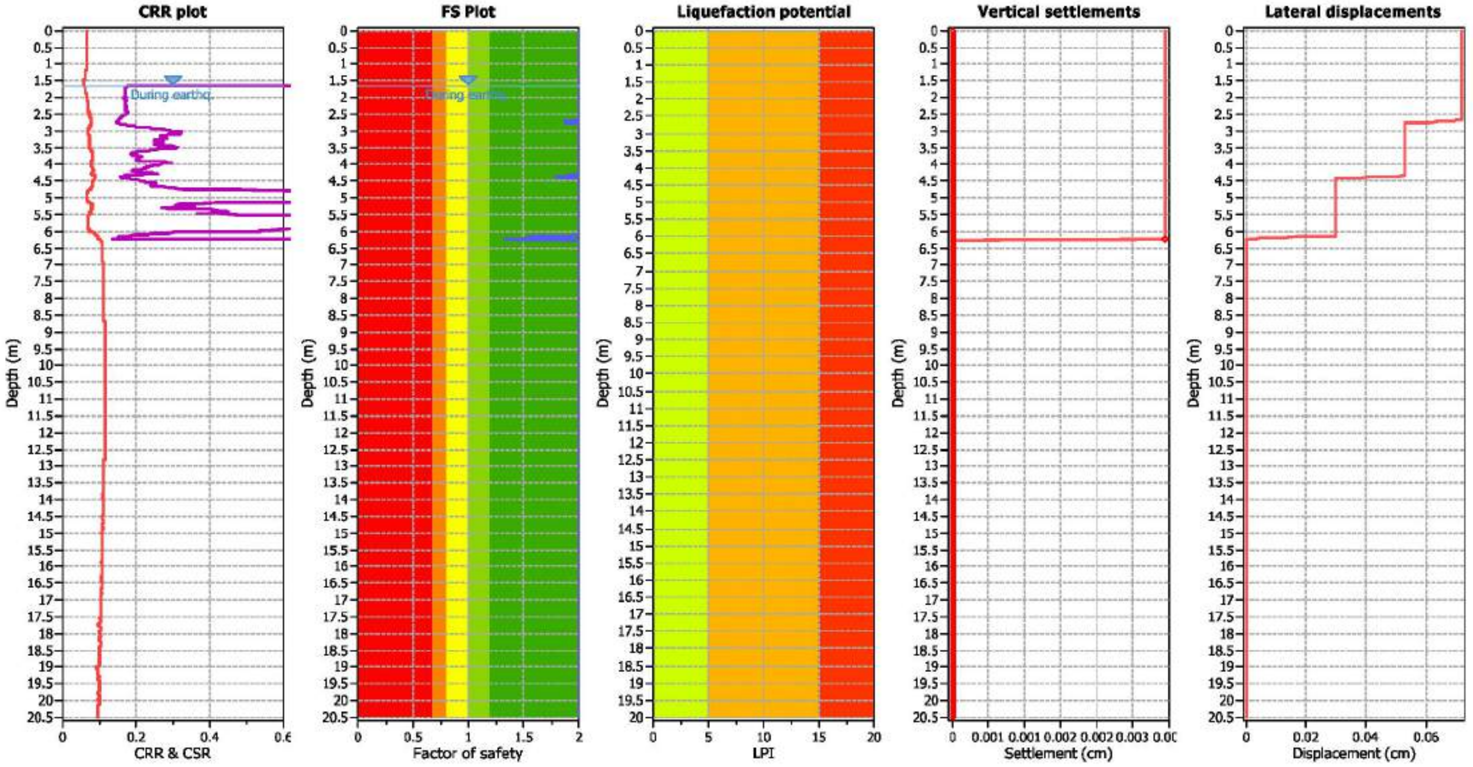
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.30	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.12	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	10.00 m

SBT legend

🟥 1. Sensitive fine grained	🟩 4. Clayey silt to silty	🟧 7. Gravely sand to sand
🟫 2. Organic material	🟩 5. Silty sand to sandy silt	⬛ 8. Very stiff sand to
🟦 3. Clay to silty clay	🟨 6. Clean sand to silty sand	⬜ 9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.30	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.12	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	10.00 m

F.S. color scheme

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LPI color scheme

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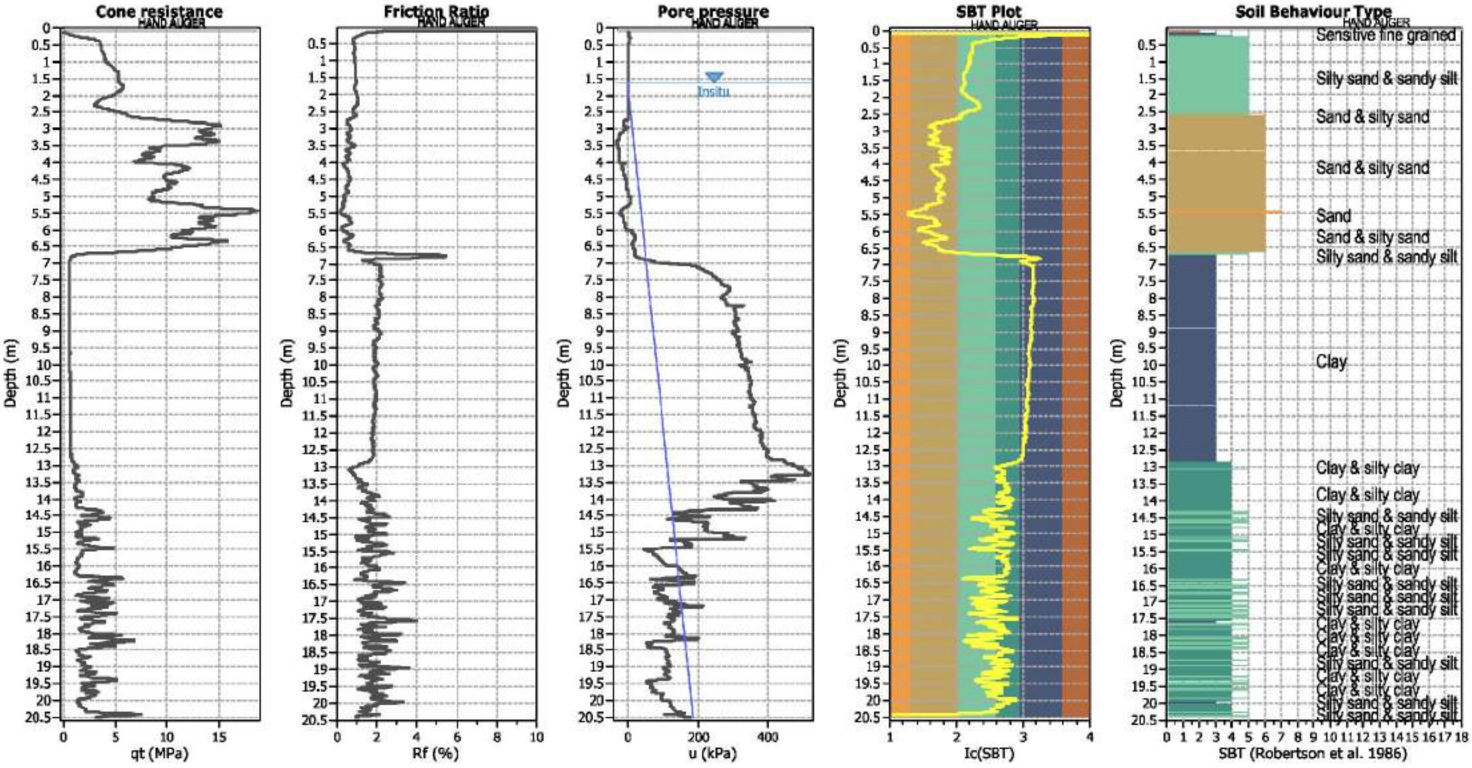
CPT basic interpretation plots



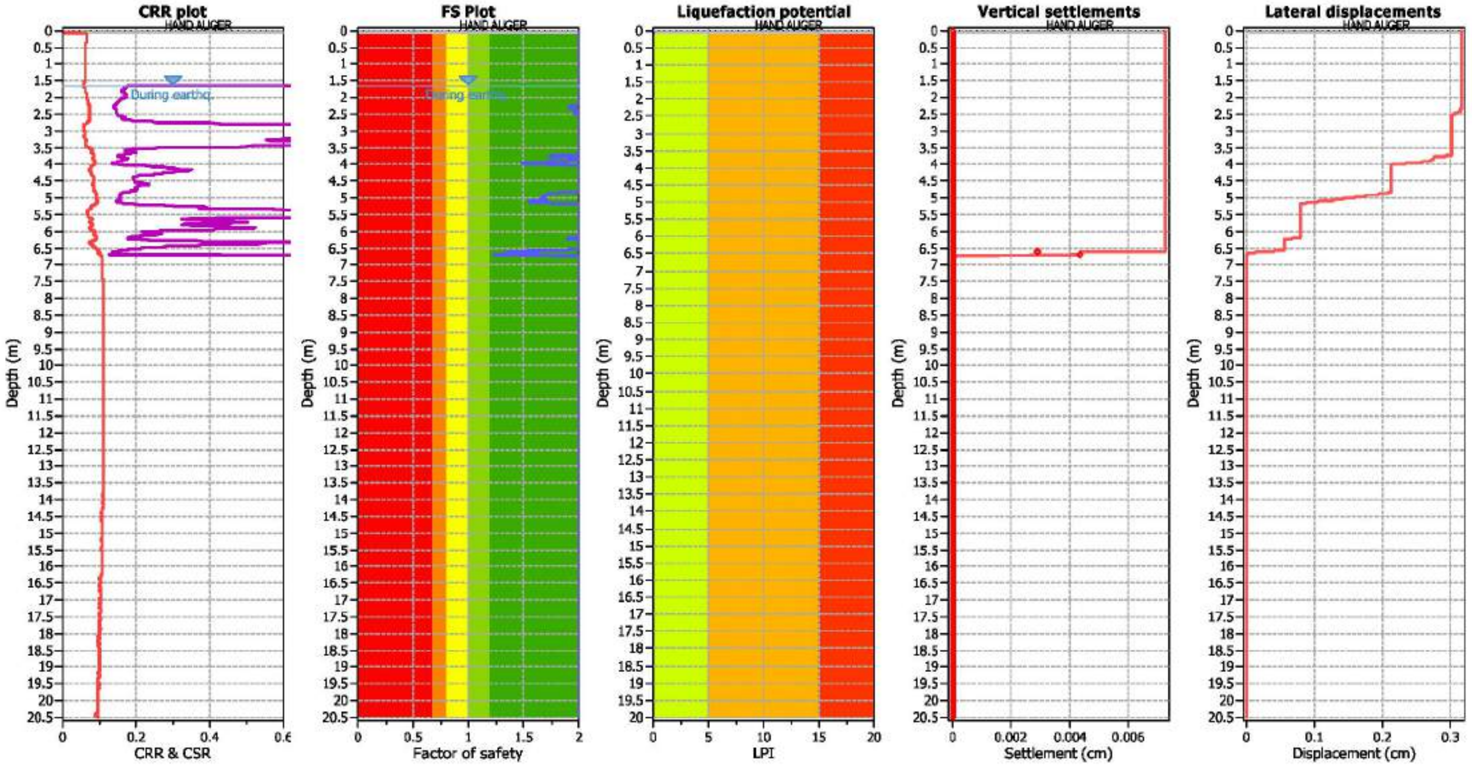
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.30	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.12	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	10.00 m

SBT legend

🟥	1. Sensitive fine grained	🟩	4. Clayey silt to silty	🟧	7. Gravely sand to sand
🟫	2. Organic material	🟩	5. Silty sand to sandy silt	⬛	8. Very stiff sand to
🟦	3. Clay to silty clay	🟨	6. Clean sand to silty sand	⬜	9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method: B&I (2014)
Fines correction method: B&I (2014)
Points to test: Based on Ic value
Earthquake magnitude M_w: 6.30
Peak ground acceleration: 0.12
Depth to water table (insitu): 1.65 m

Depth to GWT (erthq.): 1.65 m
Average results interval: 3
Ic cut-off value: 2.60
Unit weight calculation: Based on SBT
Use fill: No
Fill height: N/A

Fill weight: N/A
Transition detect. applied: No
K_σ applied: Yes
Clay like behavior applied: Sands only
Limit depth applied: Yes
Limit depth: 10.00 m

F.S. color scheme

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LPI color scheme

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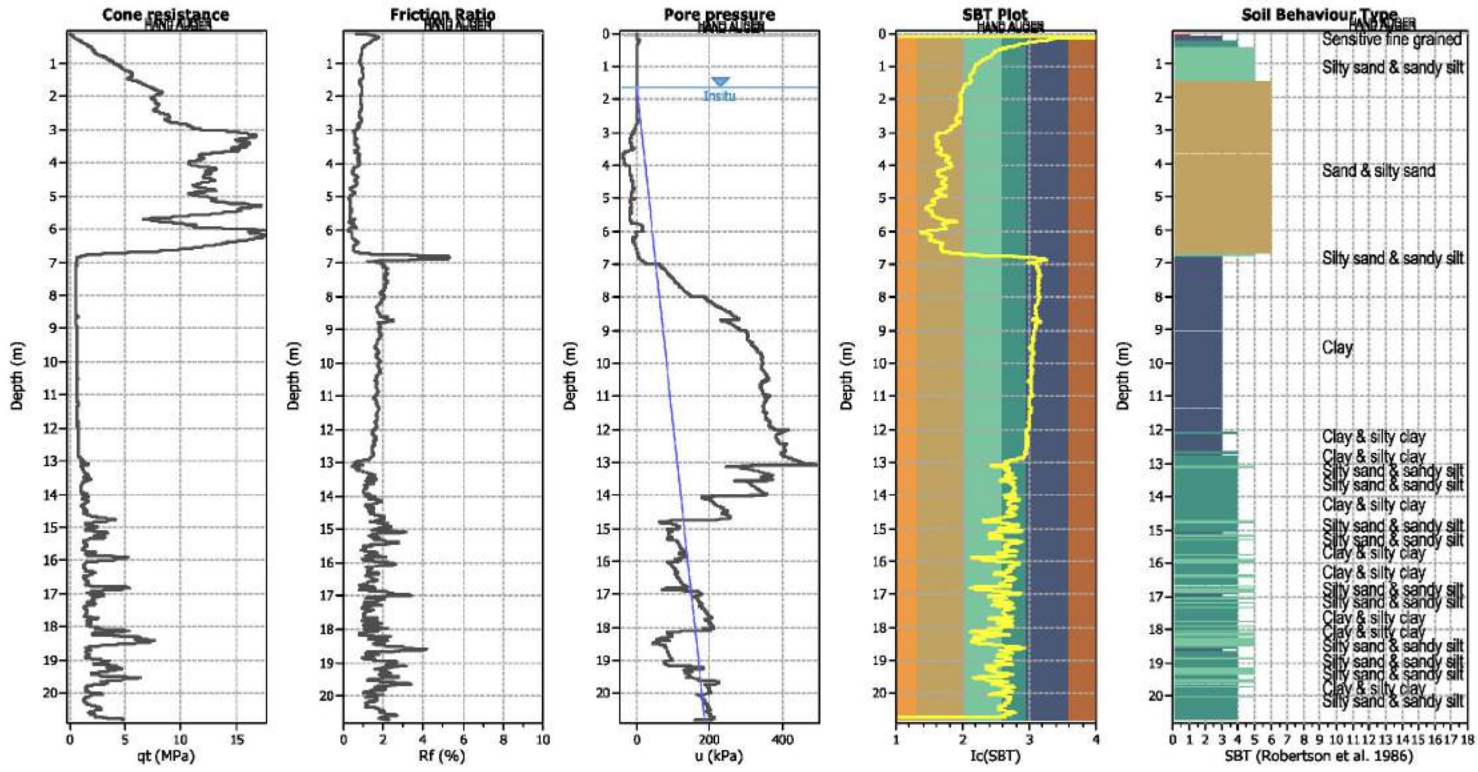
CPT basic interpretation plots



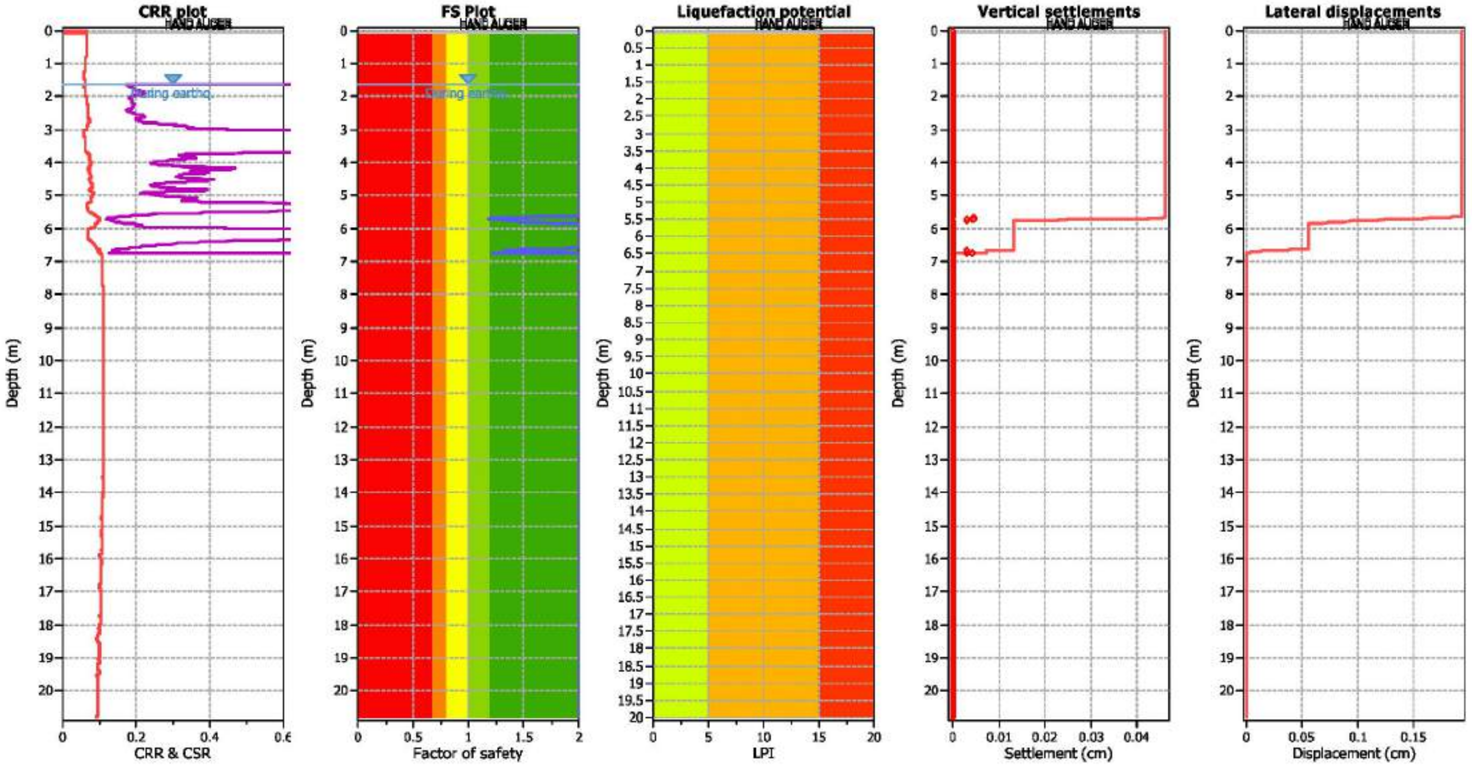
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.30	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.12	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	10.00 m

SBT legend

🟥 1. Sensitive fine grained	🟩 4. Clayey silt to silty	🟧 7. Gravely sand to sand
🟫 2. Organic material	🟩 5. Silty sand to sandy silt	⬛ 8. Very stiff sand to
🟦 3. Clay to silty clay	🟨 6. Clean sand to silty sand	⬜ 9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.30	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.12	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	10.00 m

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LPI color scheme

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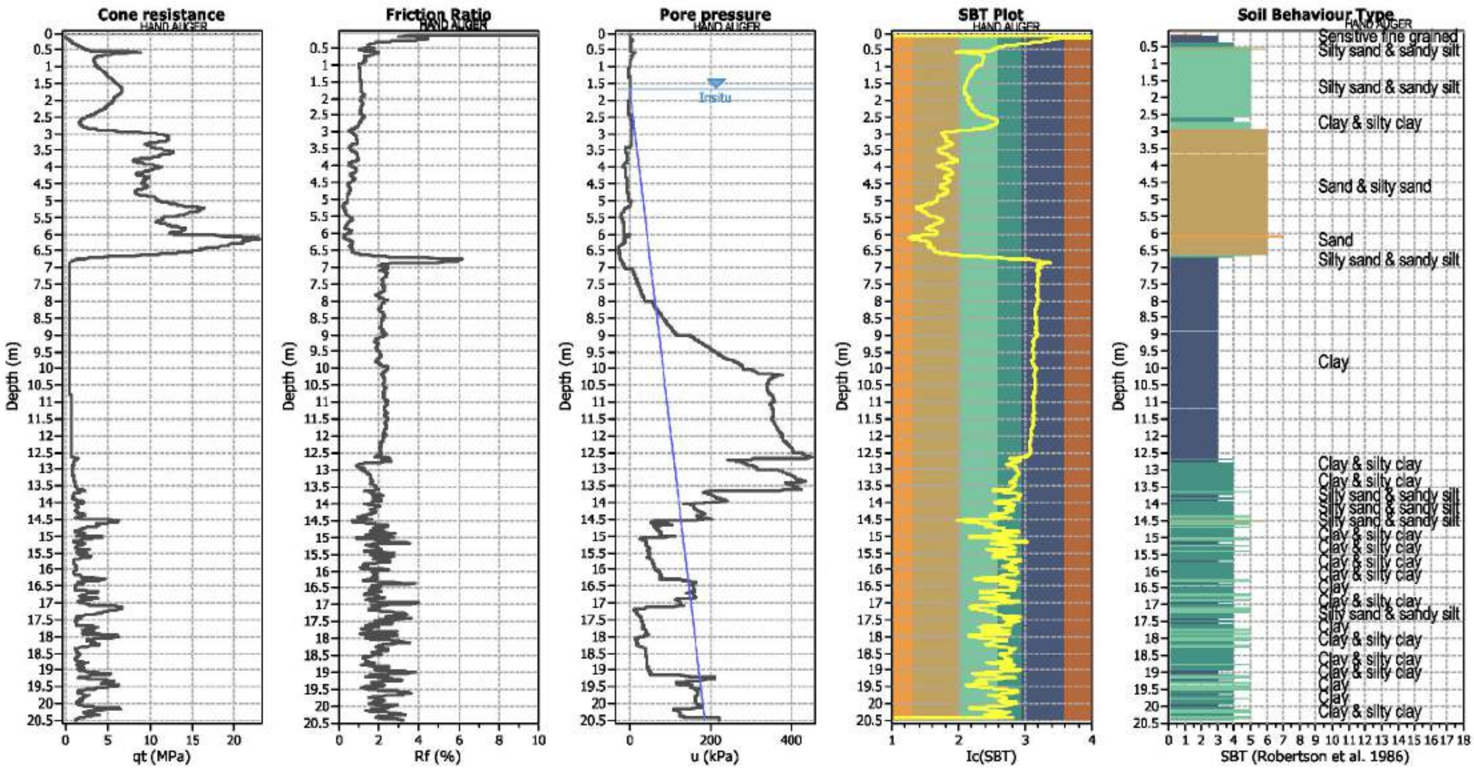
CPT basic interpretation plots



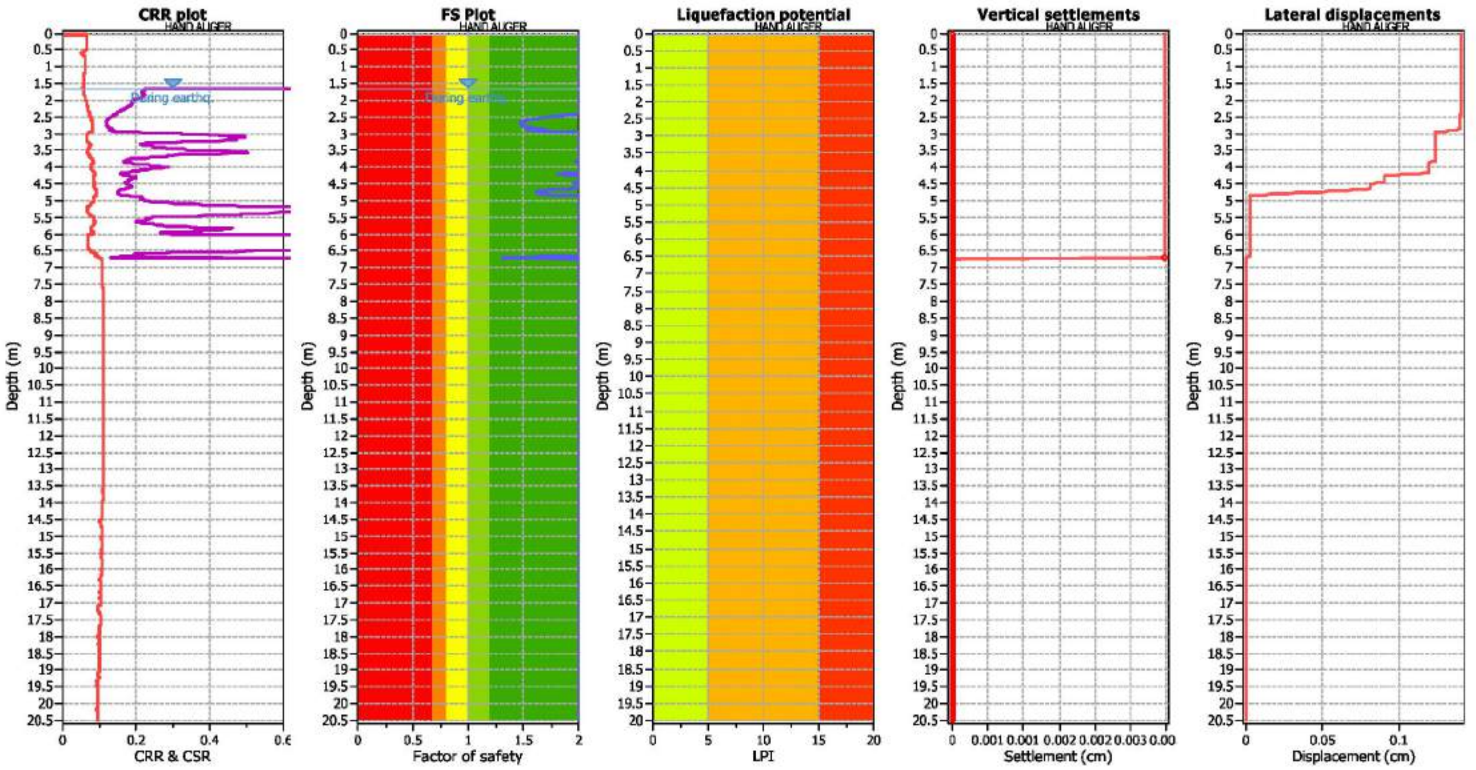
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.30	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.12	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	10.00 m

SBT legend

■ 1. Sensitive fine grained	■ 4. Clayey silt to silty	■ 7. Gravely sand to sand
■ 2. Organic material	■ 5. Silty sand to sandy silt	■ 8. Very stiff sand to
■ 3. Clay to silty clay	■ 6. Clean sand to silty sand	■ 9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method: B&I (2014)
Fines correction method: B&I (2014)
Points to test: Based on Ic value
Earthquake magnitude M_w: 6.30
Peak ground acceleration: 0.12
Depth to water table (insitu): 1.65 m

Depth to GWT (erthq.): 1.65 m
Average results interval: 3
Ic cut-off value: 2.60
Unit weight calculation: Based on SBT
Use fill: No
Fill height: N/A

Fill weight: N/A
Transition detect. applied: No
K_σ applied: Yes
Clay like behavior applied: Sands only
Limit depth applied: Yes
Limit depth: 10.00 m

F.S. color scheme

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LPI color scheme

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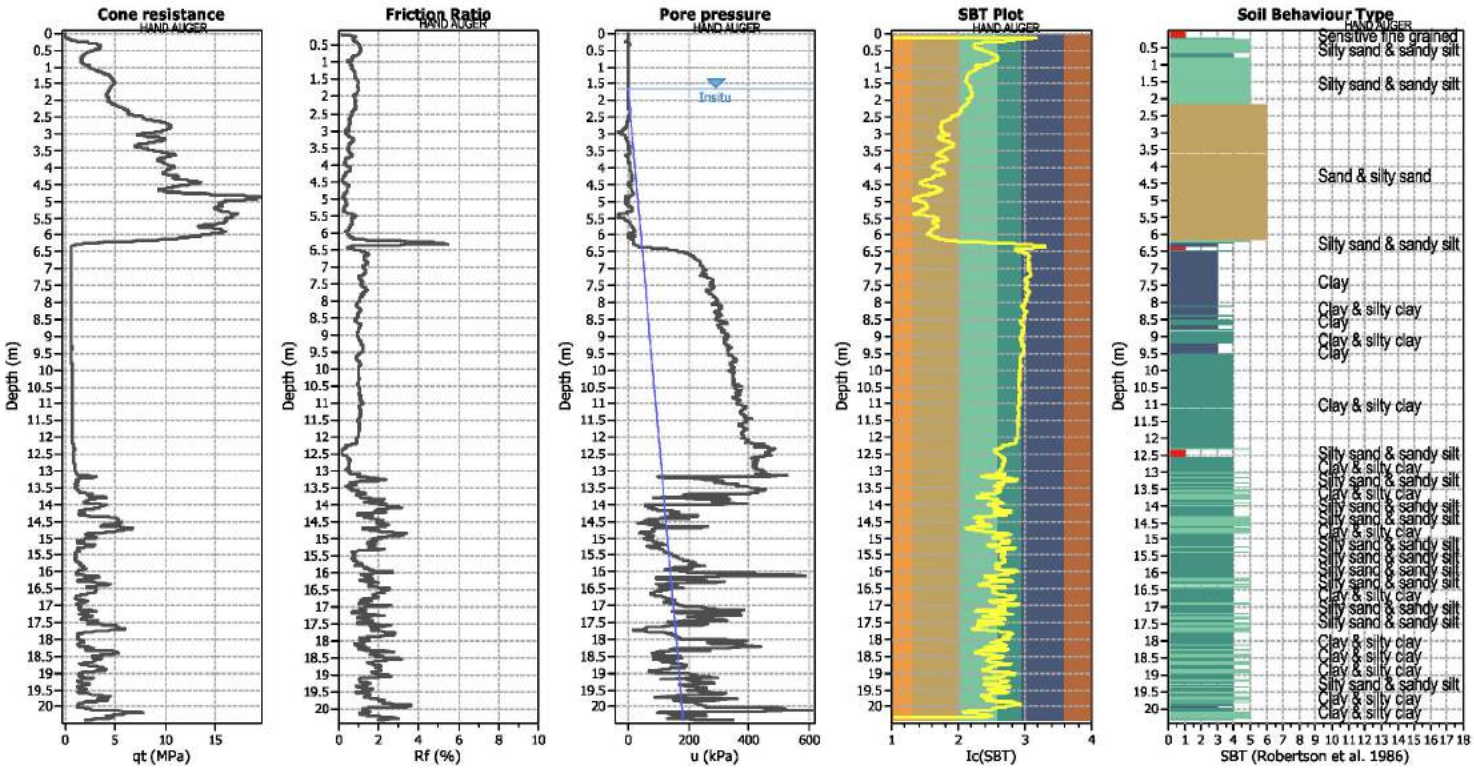
CPT basic interpretation plots



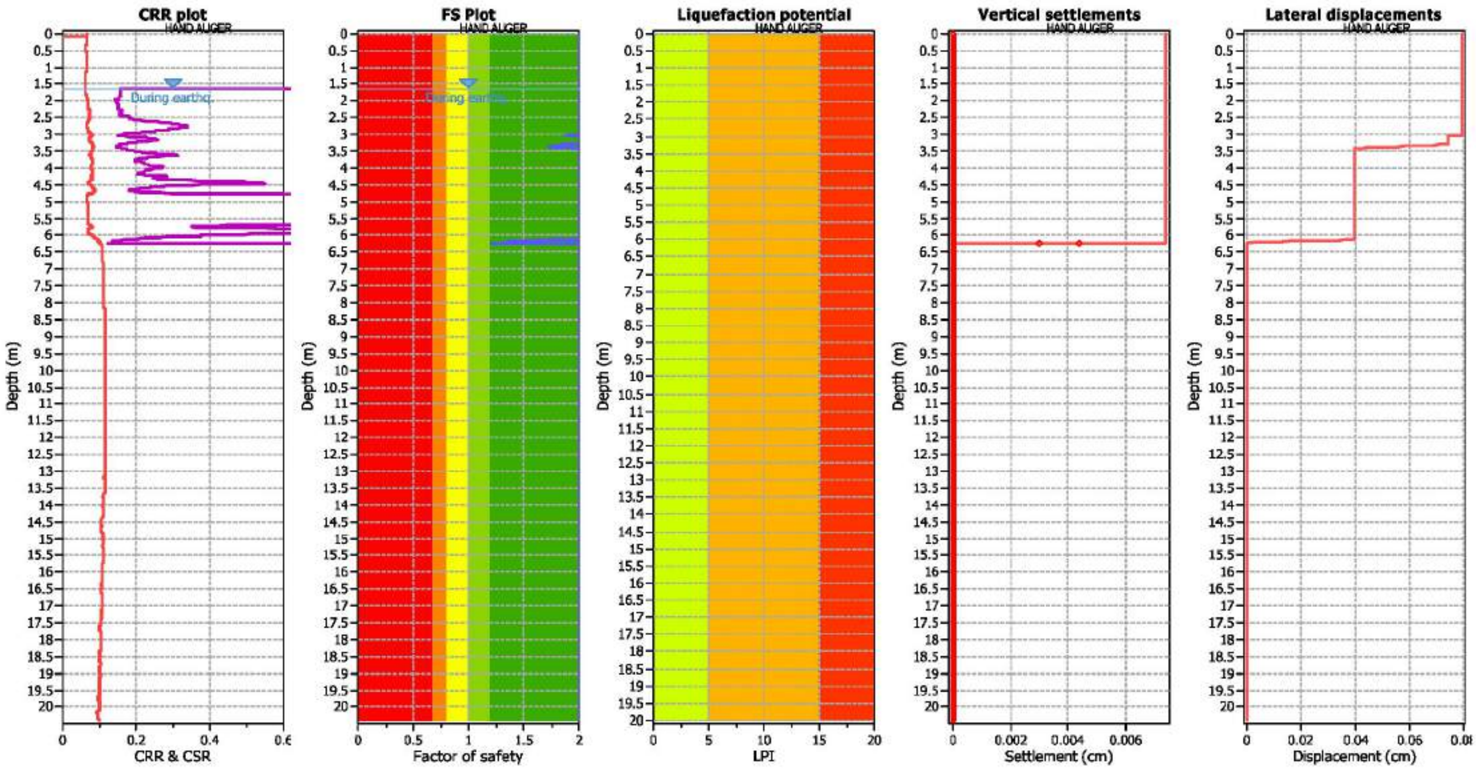
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.30	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.12	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	10.00 m

SBT legend

- 🟥 1. Sensitive fine grained
- 🟫 2. Organic material
- 🟦 3. Clay to silty clay
- 🟩 4. Clayey silt to silty
- 🟩 5. Silty sand to sandy silt
- 🟨 6. Clean sand to silty sand
- 🟧 7. Gravely sand to sand
- ⬛ 8. Very stiff sand to
- ⬜ 9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.30	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.12	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	10.00 m

F.S. color scheme

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LPI color scheme

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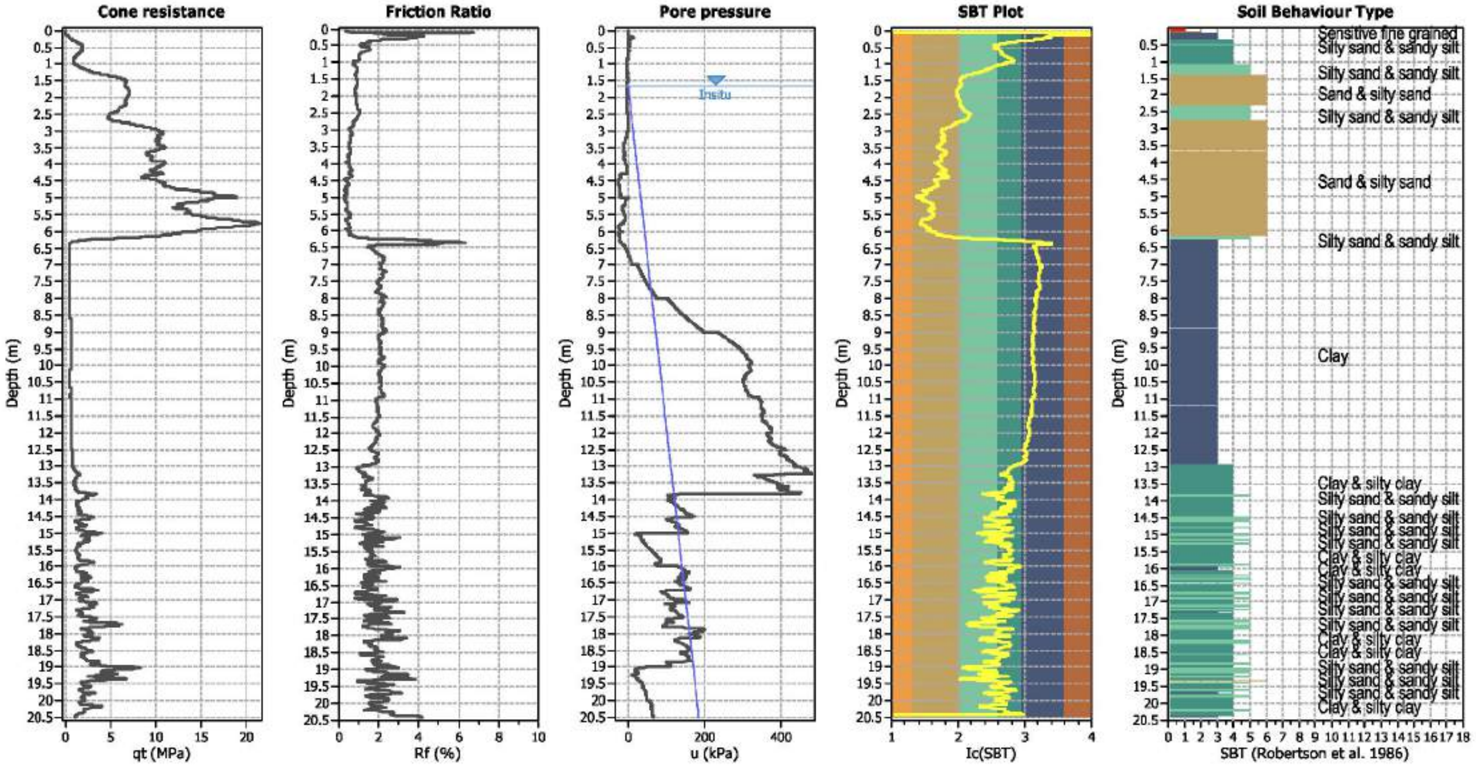
CPT name: ILS- CPT01

CPT basic interpretation plots



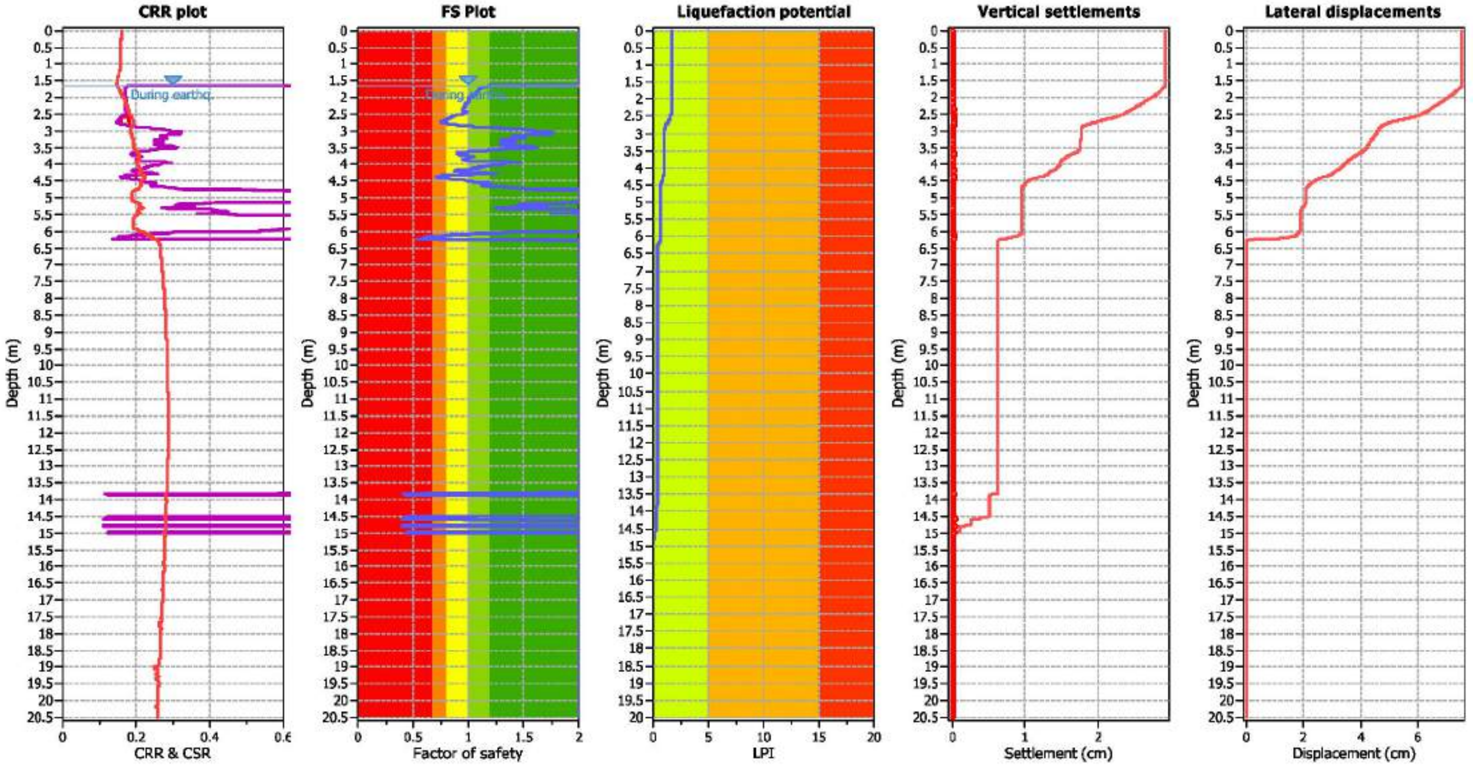
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.28	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	15.00 m

SBT legend

🟥 1. Sensitive fine grained	🟩 4. Clayey silt to silty	🟧 7. Gravely sand to sand
🟫 2. Organic material	🟩 5. Silty sand to sandy silt	⬛ 8. Very stiff sand to
🟦 3. Clay to silty clay	🟨 6. Clean sand to silty sand	⬜ 9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.28	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	15.00 m

F.S. color scheme

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LPI color scheme

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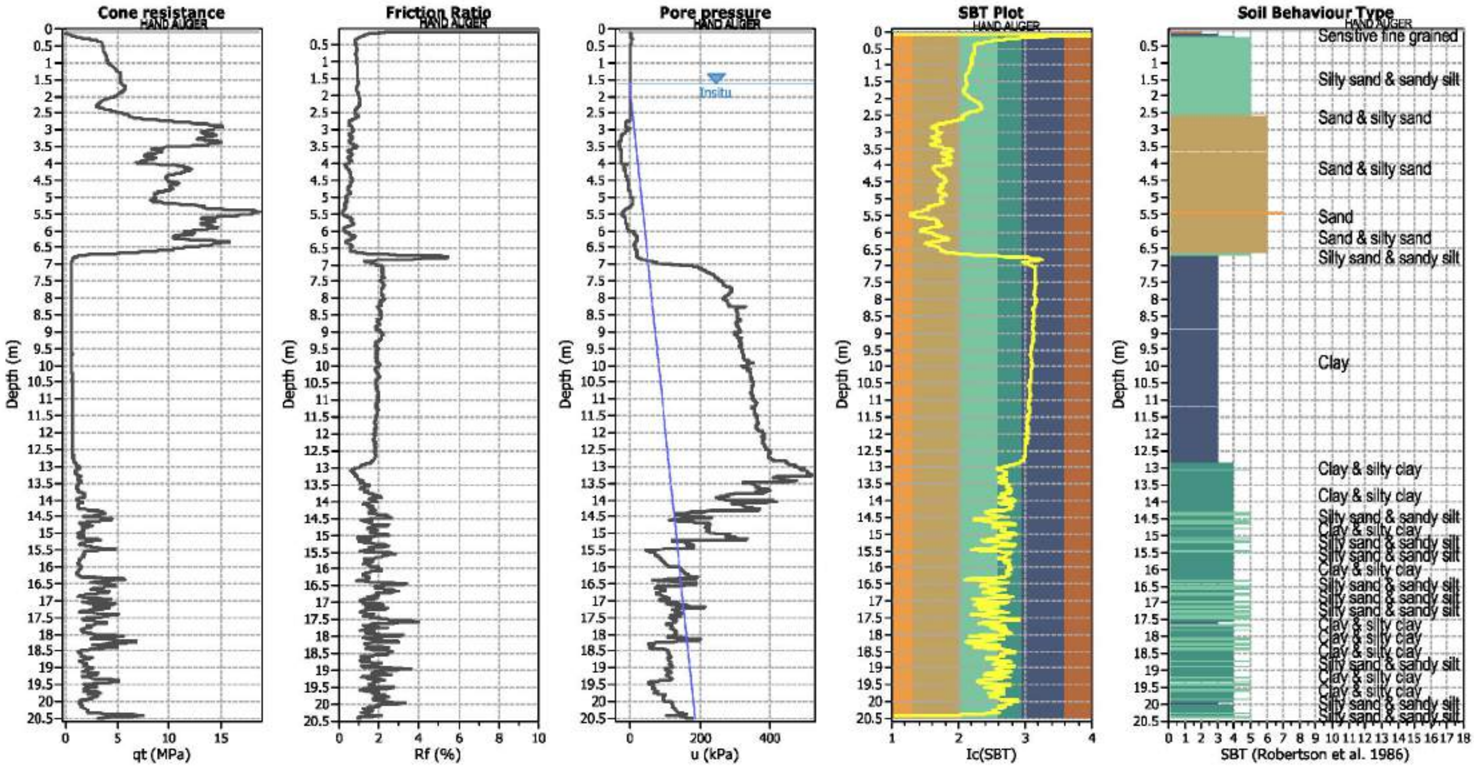
- 🟧 High risk
- 🟩 Low risk

CPT basic interpretation plots



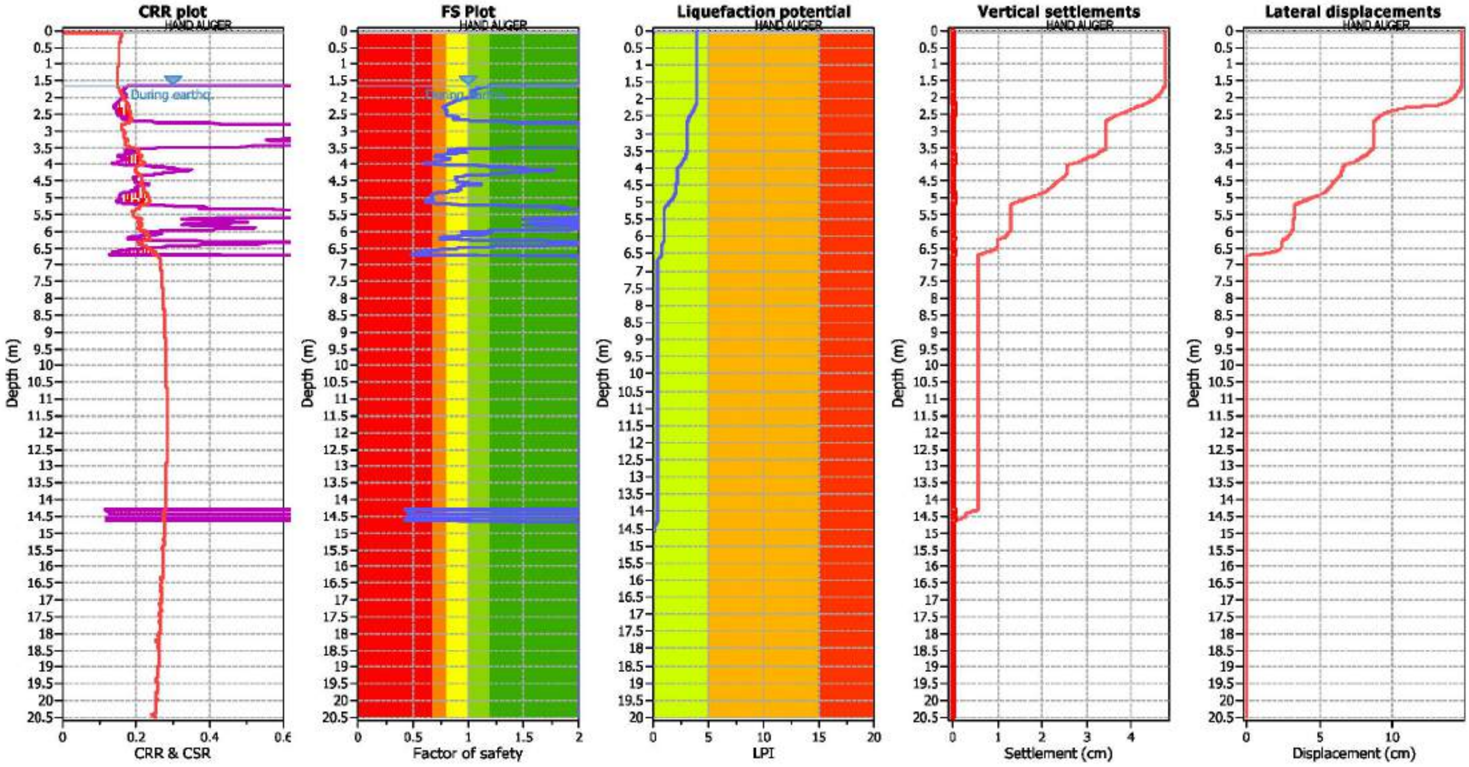
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.28	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	15.00 m

SBT legend

🟥 1. Sensitive fine grained	🟩 4. Clayey silt to silty	🟧 7. Gravely sand to sand
🟫 2. Organic material	🟩 5. Silty sand to sandy silt	⬛ 8. Very stiff sand to
🟦 3. Clay to silty clay	🟨 6. Clean sand to silty sand	⬜ 9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method: B&I (2014)
Fines correction method: B&I (2014)
Points to test: Based on Ic value
Earthquake magnitude M_w: 6.80
Peak ground acceleration: 0.28
Depth to water table (insitu): 1.65 m

Depth to GWT (erthq.): 1.65 m
Average results interval: 3
Ic cut-off value: 2.60
Unit weight calculation: Based on SBT
Use fill: No
Fill height: N/A

Fill weight: N/A
Transition detect. applied: No
K_σ applied: Yes
Clay like behavior applied: Sands only
Limit depth applied: Yes
Limit depth: 15.00 m

F.S. color scheme

- 🟥 Almost certain it will liquefy
- 🟧 Very likely to liquefy
- 🟨 Liquefaction and no liq. are equally likely
- 🟩 Unlike to liquefy
- 🟩 Almost certain it will not liquefy

LPI color scheme

- 🟥 Very high risk
- 🟧 High risk
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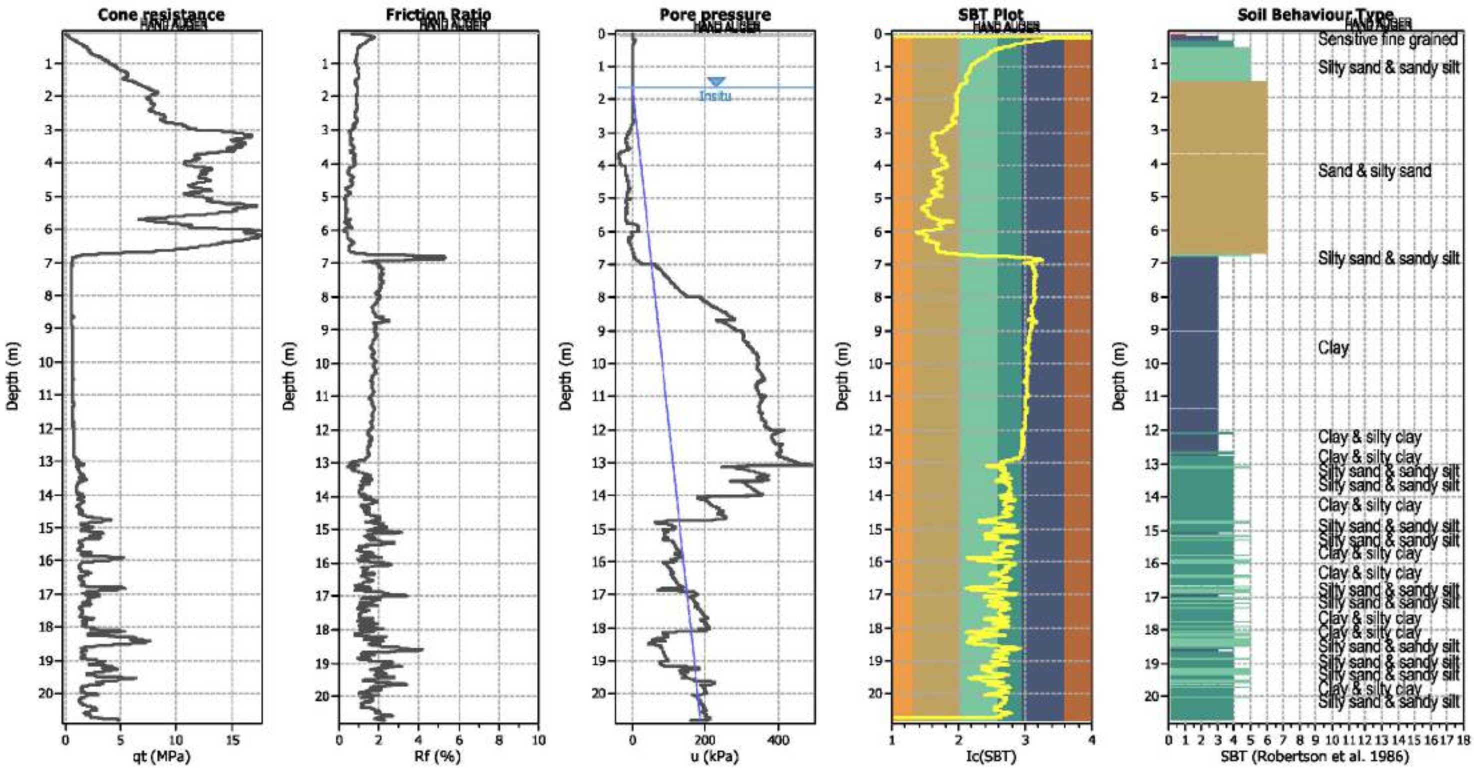
CPT basic interpretation plots



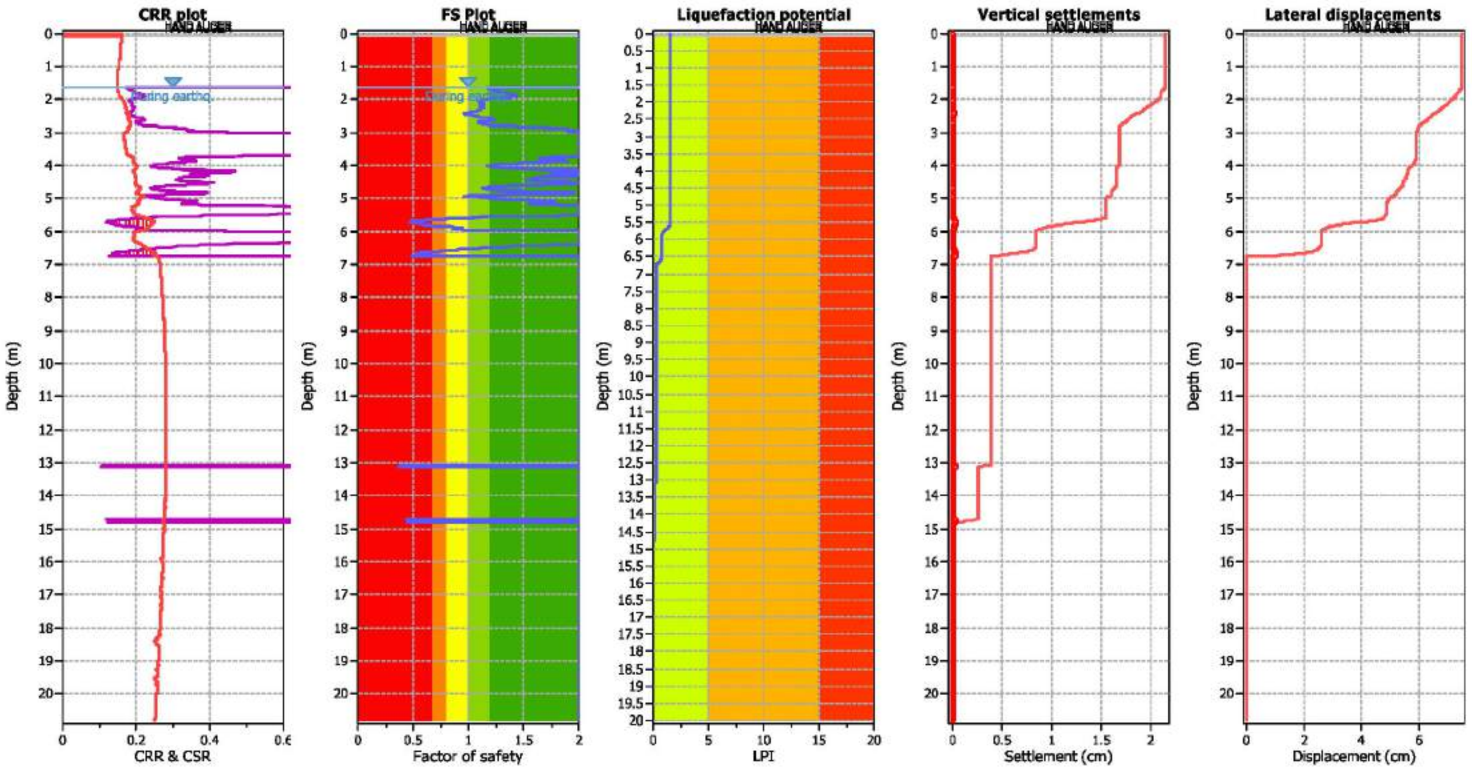
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.28	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	15.00 m

SBT legend

🟥 1. Sensitive fine grained	🟩 4. Clayey silt to silty	🟧 7. Gravely sand to sand
🟫 2. Organic material	🟩 5. Silty sand to sandy silt	⬛ 8. Very stiff sand to
🟦 3. Clay to silty clay	🟨 6. Clean sand to silty sand	⬜ 9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.28	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	15.00 m

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LPI color scheme

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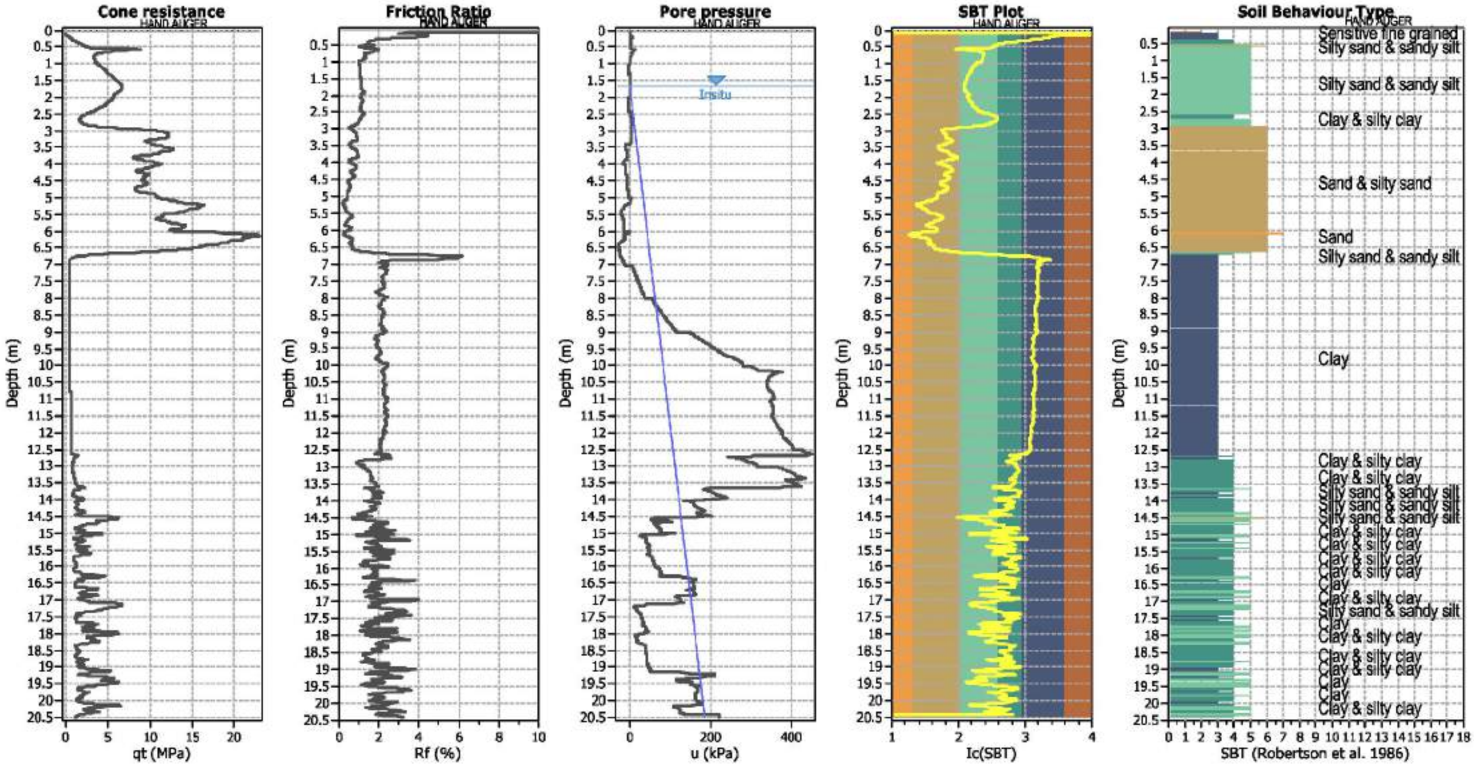
CPT basic interpretation plots



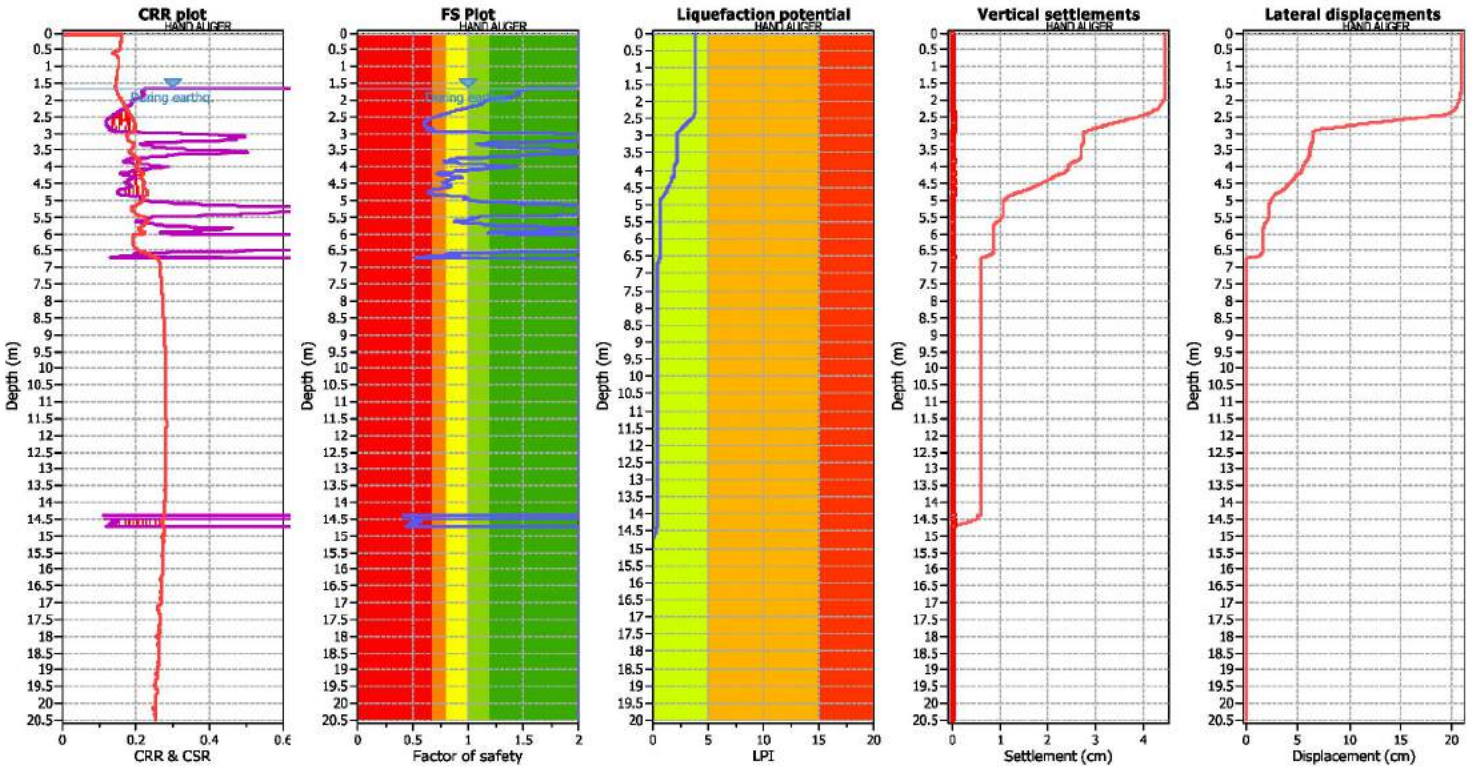
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.28	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	15.00 m

SBT legend

🟥 1. Sensitive fine grained	🟩 4. Clayey silt to silty	🟧 7. Gravely sand to sand
🟫 2. Organic material	🟩 5. Silty sand to sandy silt	⬜ 8. Very stiff sand to
🟦 3. Clay to silty clay	🟨 6. Clean sand to silty sand	⬜ 9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.28	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	15.00 m

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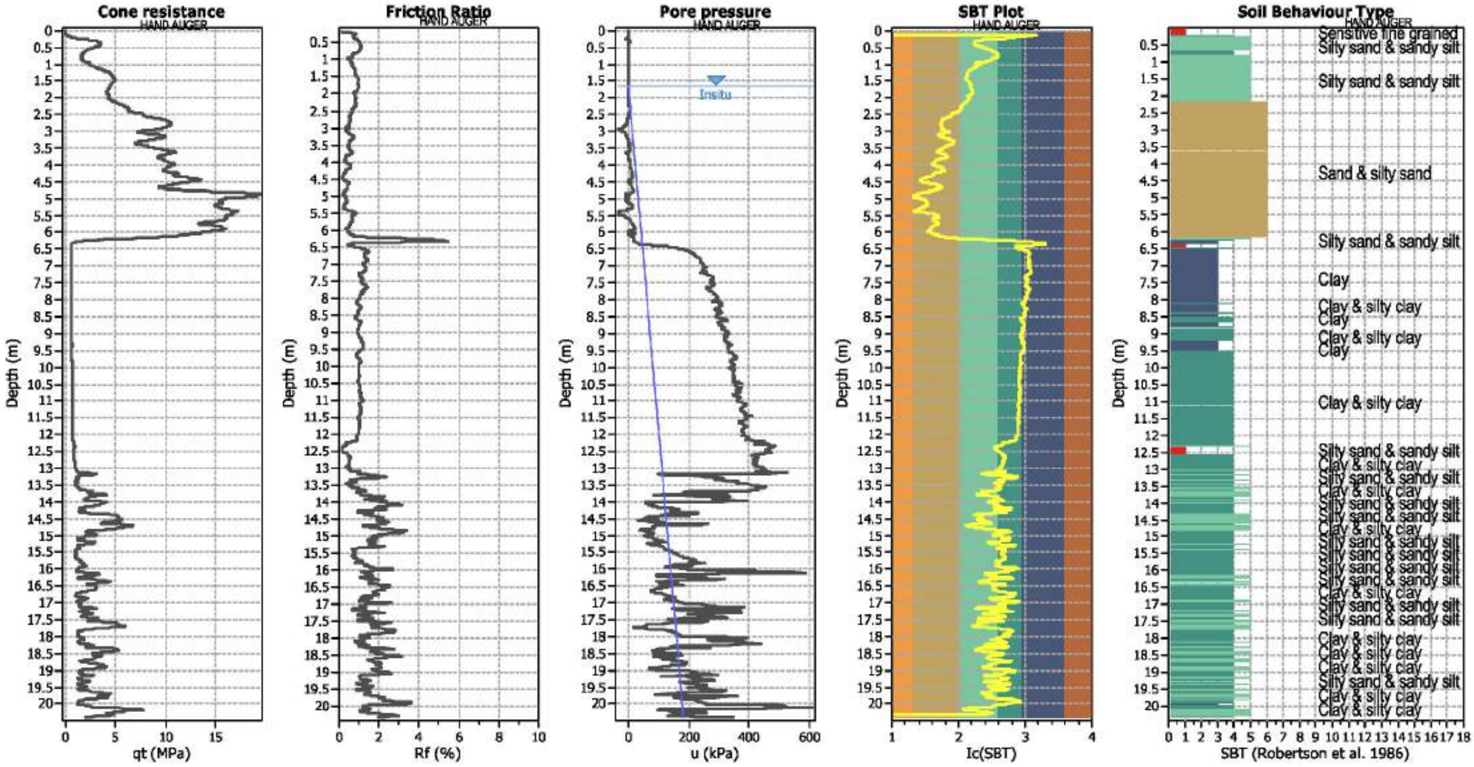
CPT basic interpretation plots



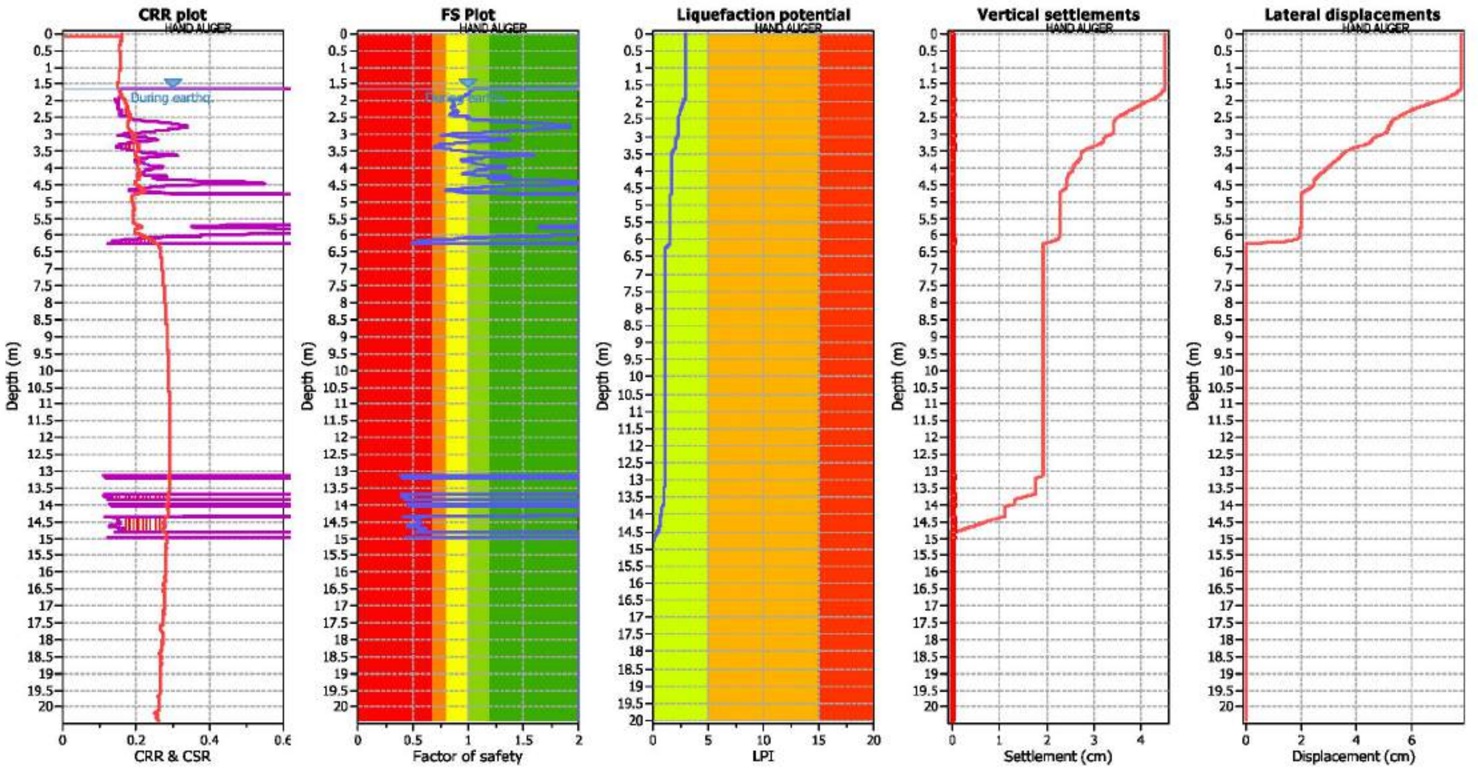
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.28	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	15.00 m

SBT legend

🟥 1. Sensitive fine grained	🟩 4. Clayey silt to silty	🟧 7. Gravely sand to sand
🟫 2. Organic material	🟩 5. Silty sand to sandy silt	⬛ 8. Very stiff sand to
🟦 3. Clay to silty clay	🟨 6. Clean sand to silty sand	⬜ 9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.28	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	15.00 m

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LPI color scheme

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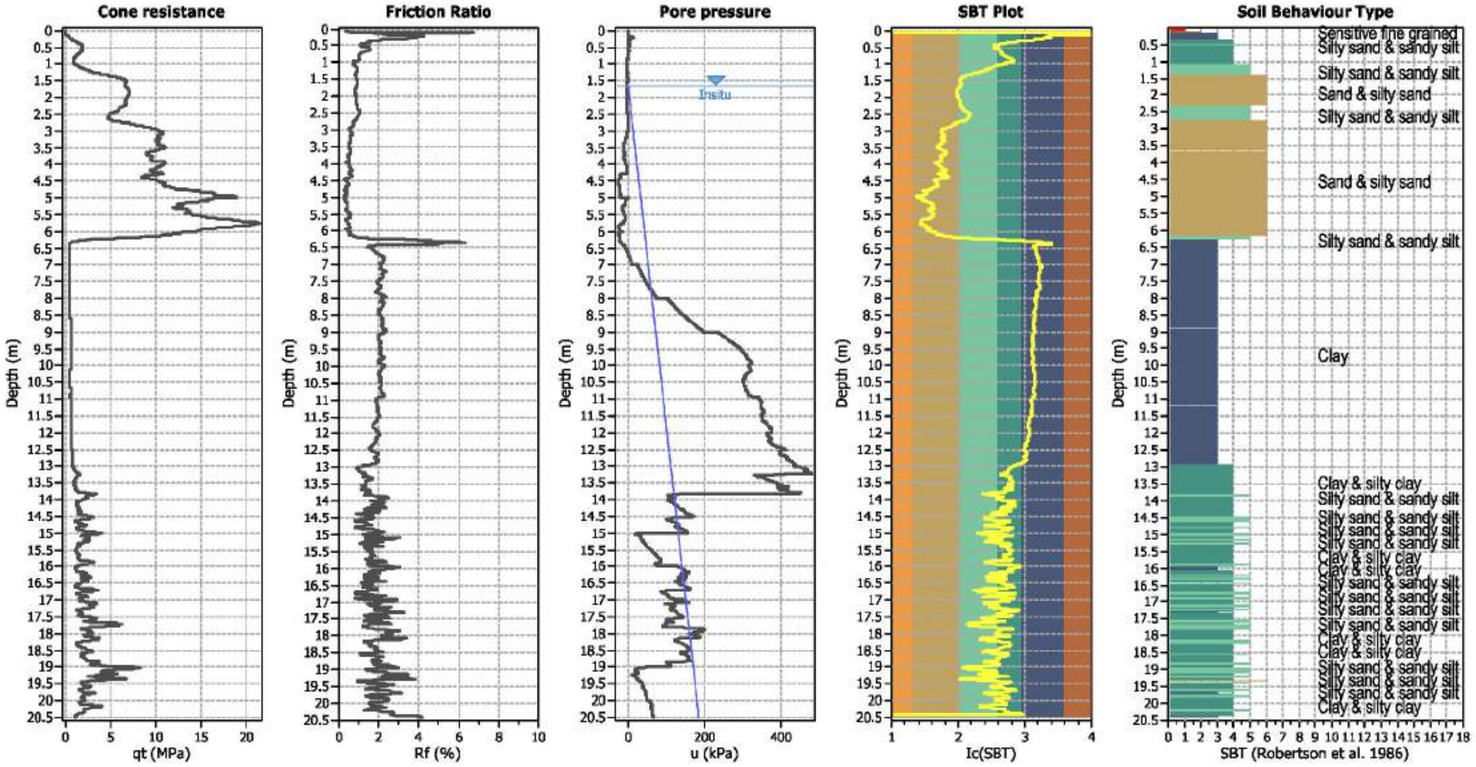
CPT basic interpretation plots



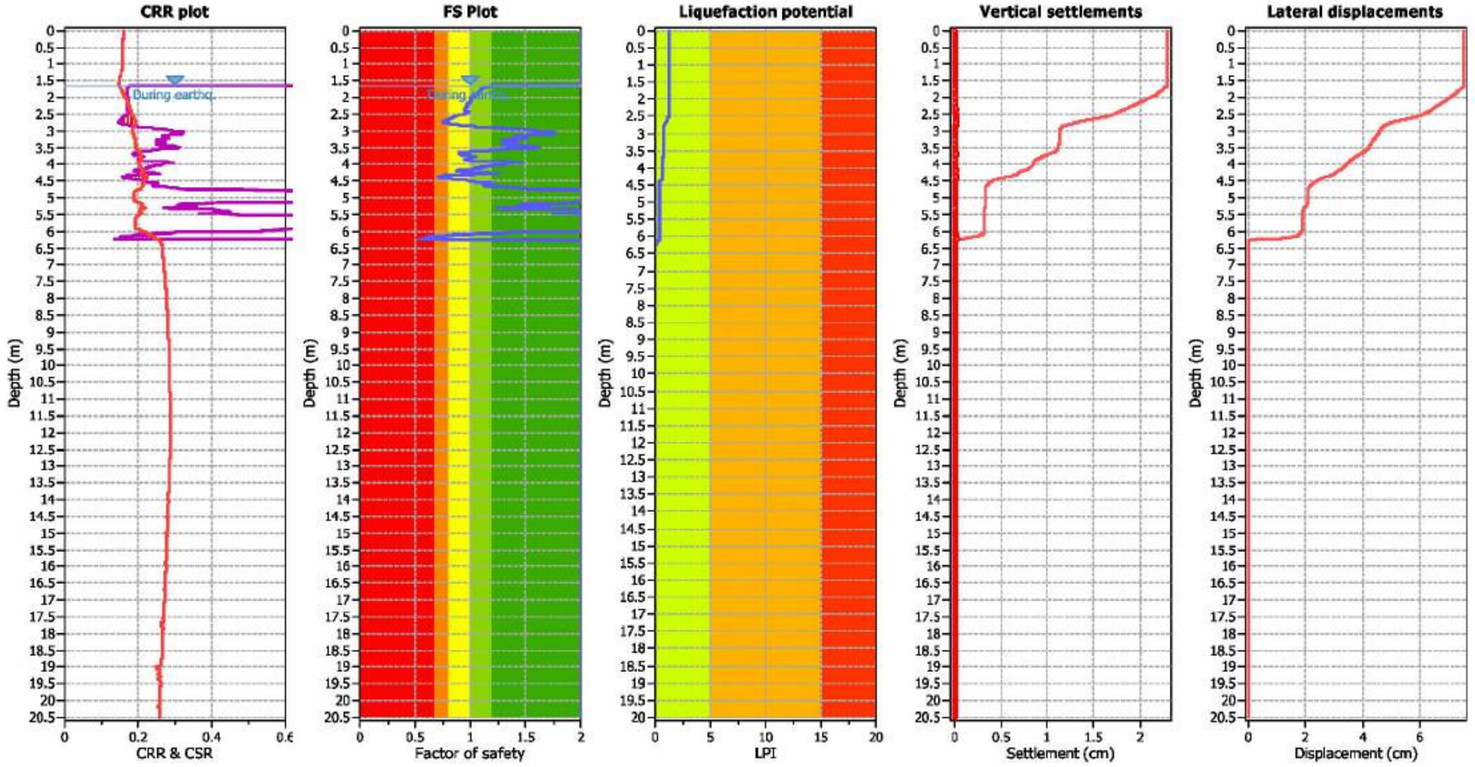
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.28	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	10.00 m

SBT legend

🟥 1. Sensitive fine grained	🟩 4. Clayey silt to silty	🟧 7. Gravely sand to sand
🟫 2. Organic material	🟩 5. Silty sand to sandy silt	⬛ 8. Very stiff sand to
🟦 3. Clay to silty clay	🟨 6. Clean sand to silty sand	⬜ 9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.28	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	10.00 m

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LPI color scheme

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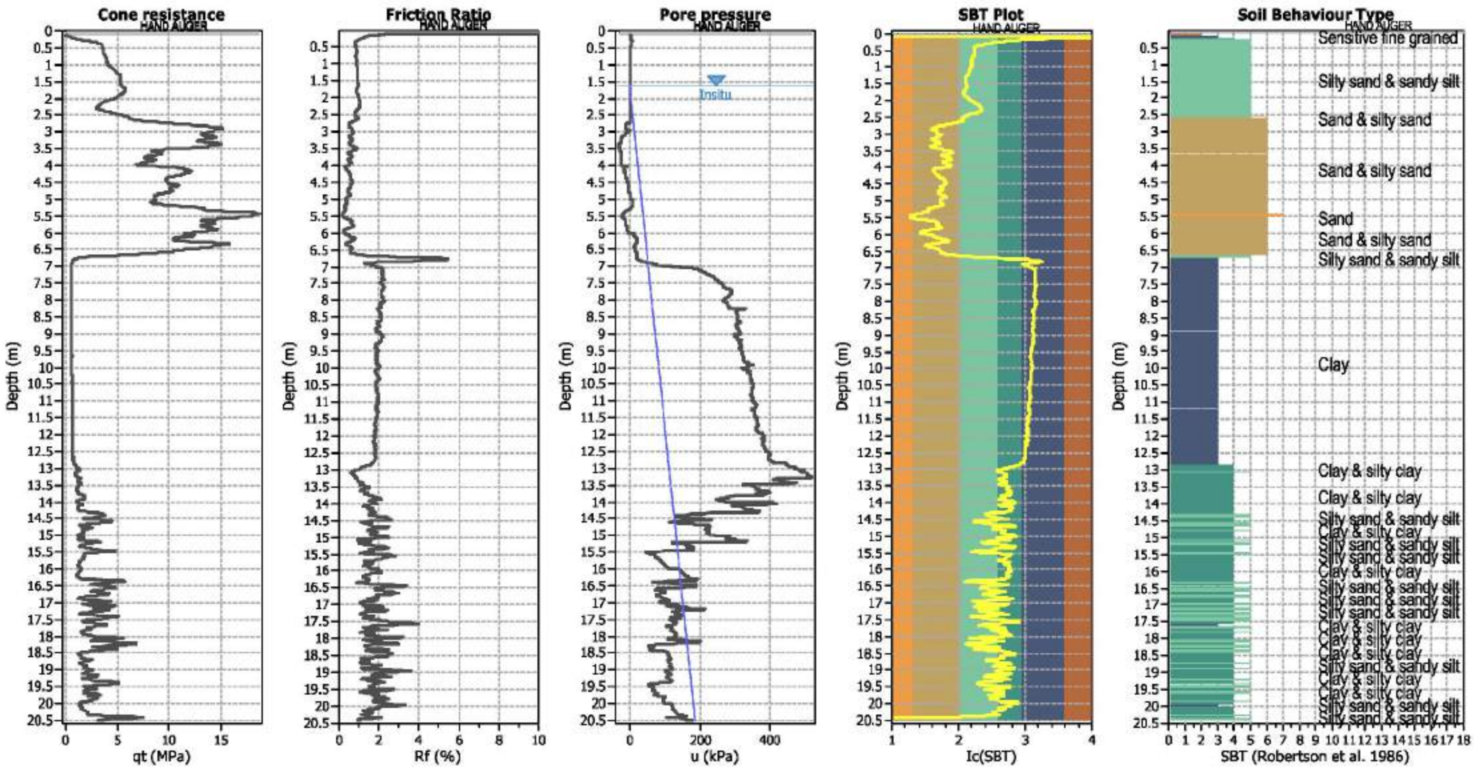
CPT basic interpretation plots



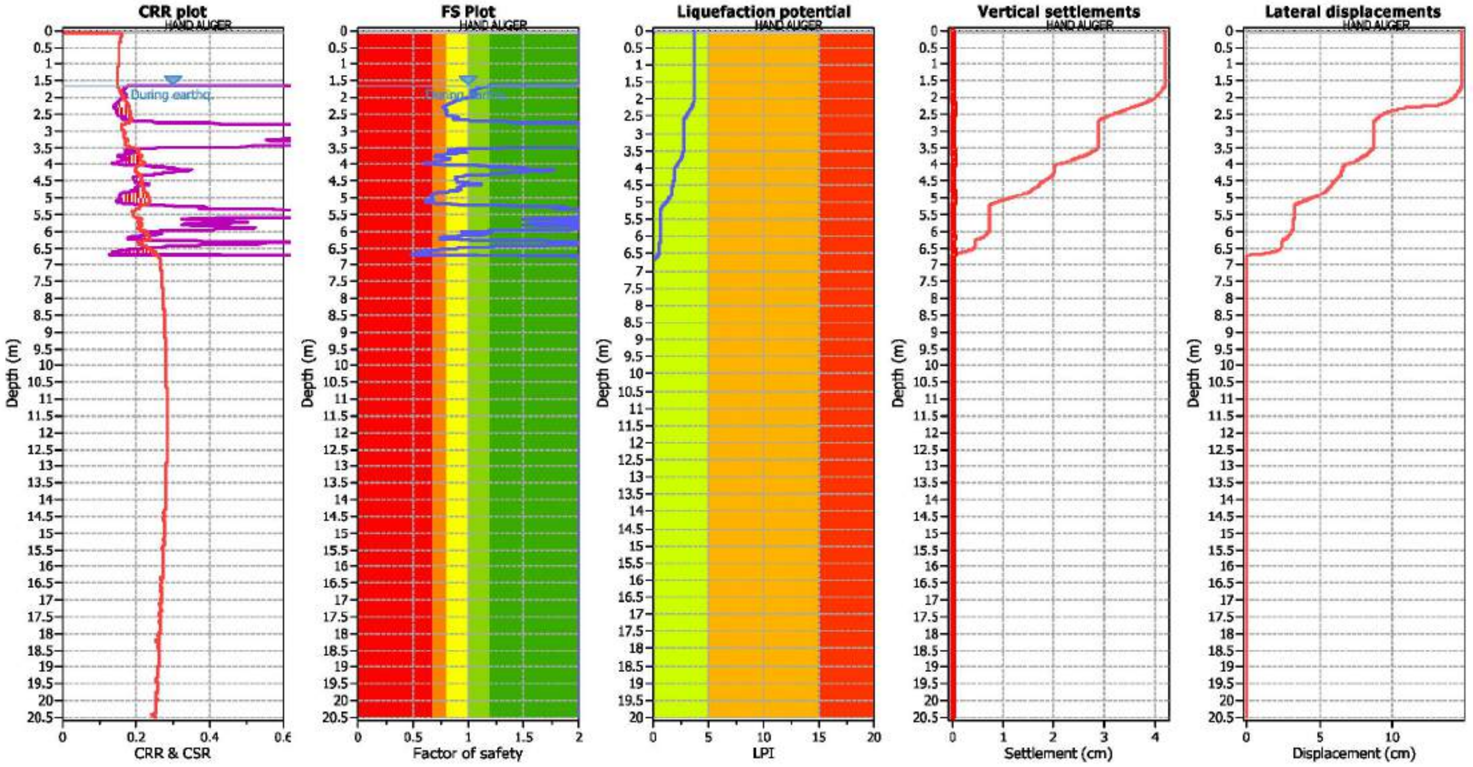
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.28	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	10.00 m

SBT legend

🟥 1. Sensitive fine grained	🟩 4. Clayey silt to silty	🟧 7. Gravely sand to sand
🟫 2. Organic material	🟩 5. Silty sand to sandy silt	⬜ 8. Very stiff sand to
🟦 3. Clay to silty clay	🟨 6. Clean sand to silty sand	⬜ 9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.28	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	10.00 m

F.S. color scheme

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LPI color scheme

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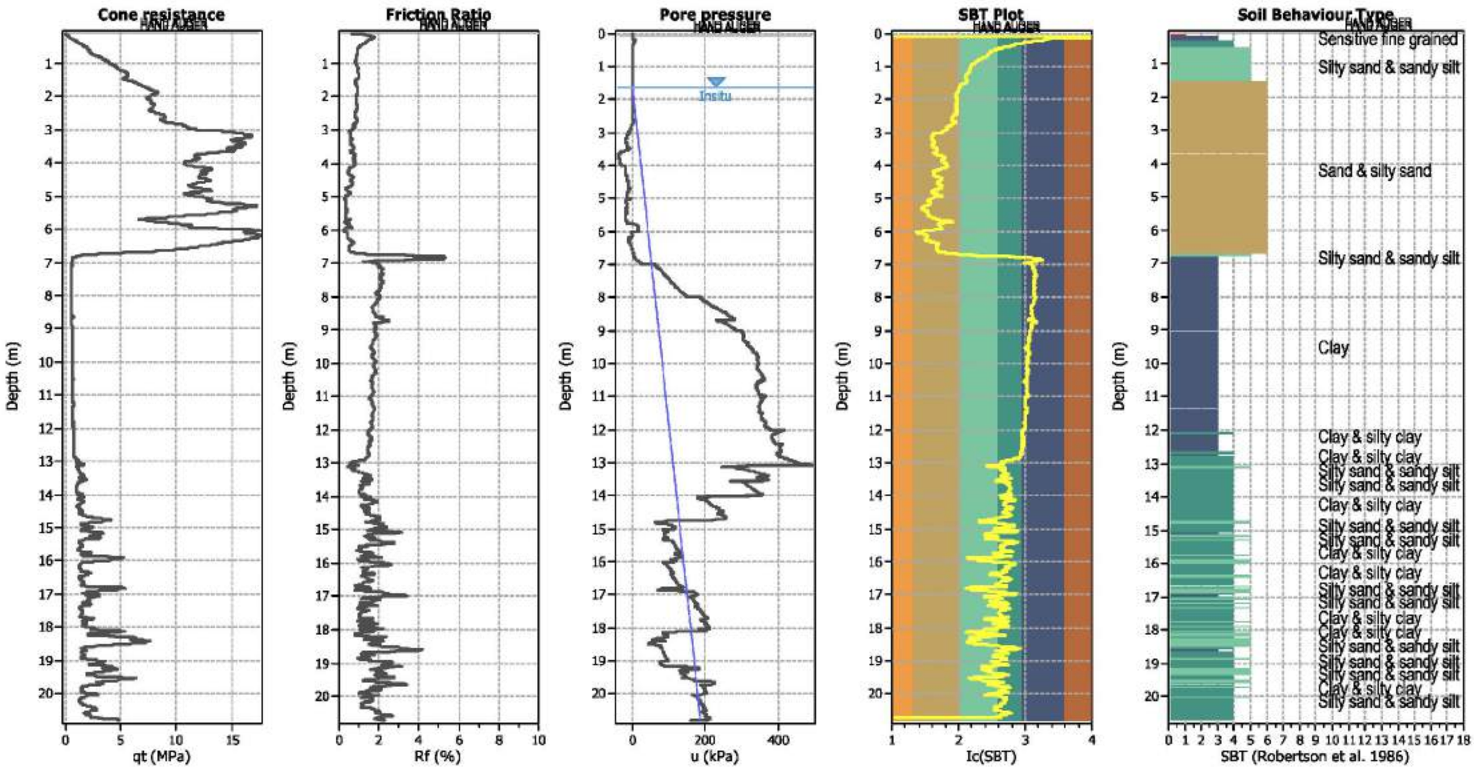
CPT basic interpretation plots



Input parameters and analysis data

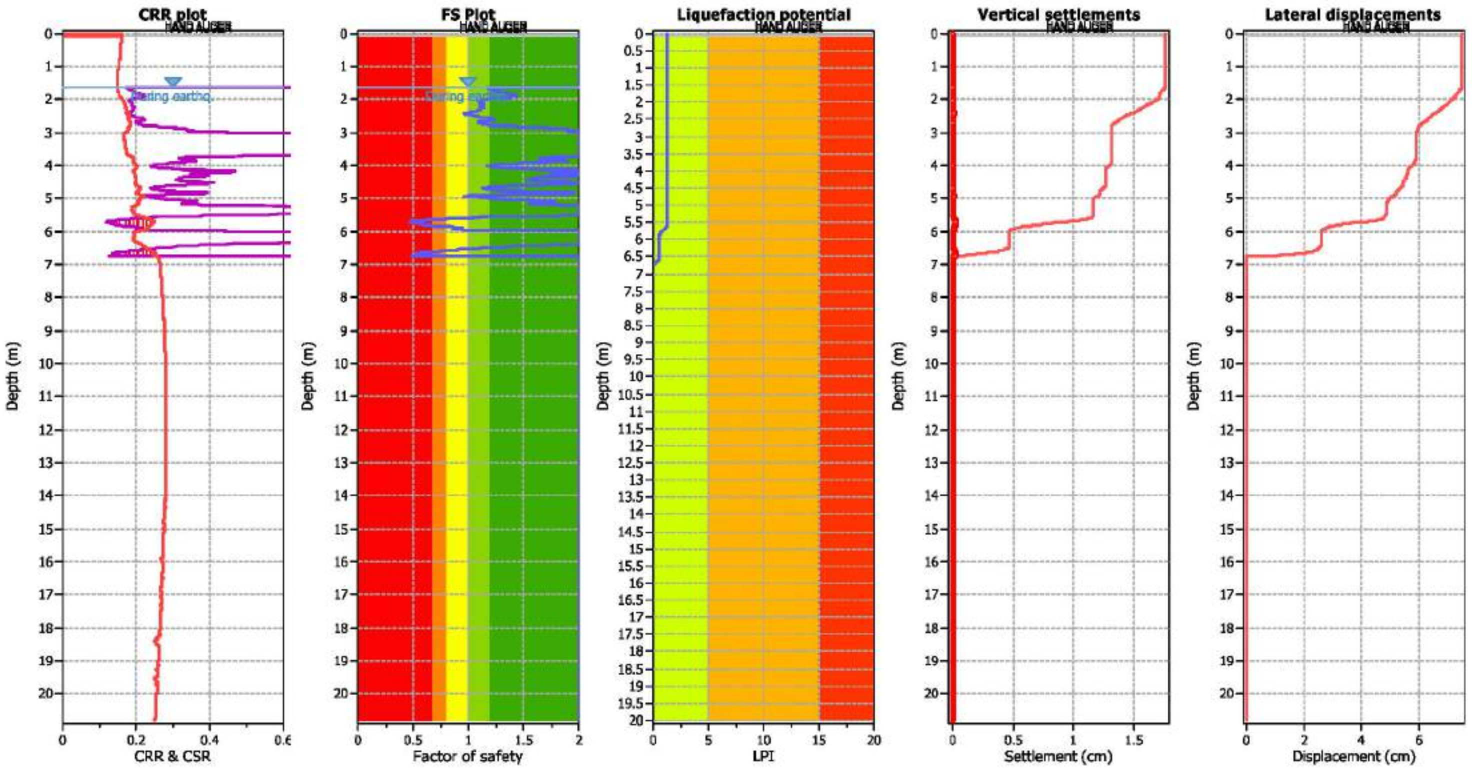
Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.28	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	10.00 m

SBT legend

🟥	1. Sensitive fine grained	🟩	4. Clayey silt to silty	🟧	7. Gravely sand to sand
🟫	2. Organic material	🟩	5. Silty sand to sandy silt	⬛	8. Very stiff sand to
🟦	3. Clay to silty clay	🟨	6. Clean sand to silty sand	⬜	9. Very stiff fine grained

CPT name: ILS- CPT03 (10m)

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method: B&I (2014)
Fines correction method: B&I (2014)
Points to test: Based on Ic value
Earthquake magnitude M_w: 6.80
Peak ground acceleration: 0.28
Depth to water table (insitu): 1.65 m

Depth to GWT (erthq.): 1.65 m
Average results interval: 3
Ic cut-off value: 2.60
Unit weight calculation: Based on SBT
Use fill: No
Fill height: N/A

Fill weight: N/A
Transition detect. applied: No
K_σ applied: Yes
Clay like behavior applied: Sands only
Limit depth applied: Yes
Limit depth: 10.00 m

F.S. color scheme

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LPI color scheme

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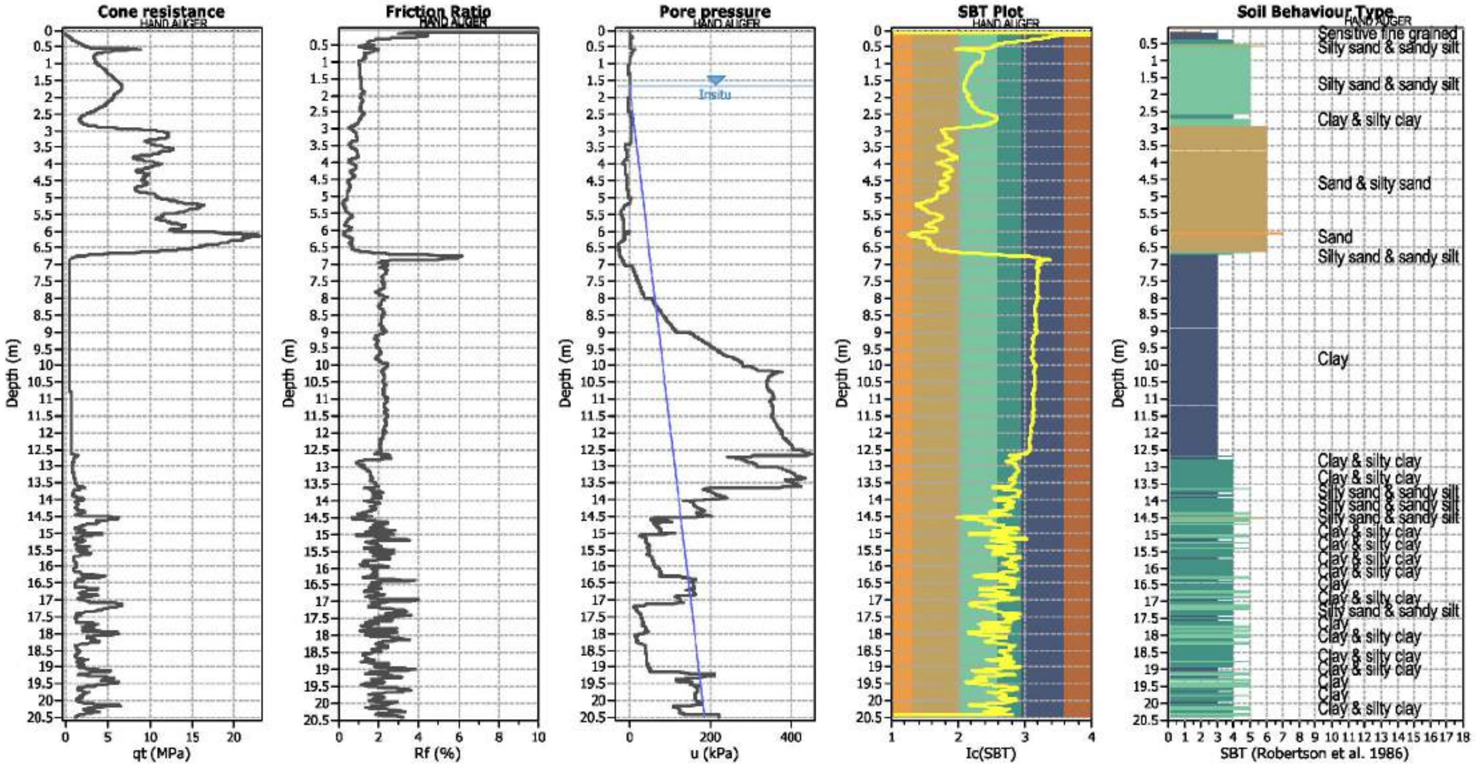
CPT basic interpretation plots



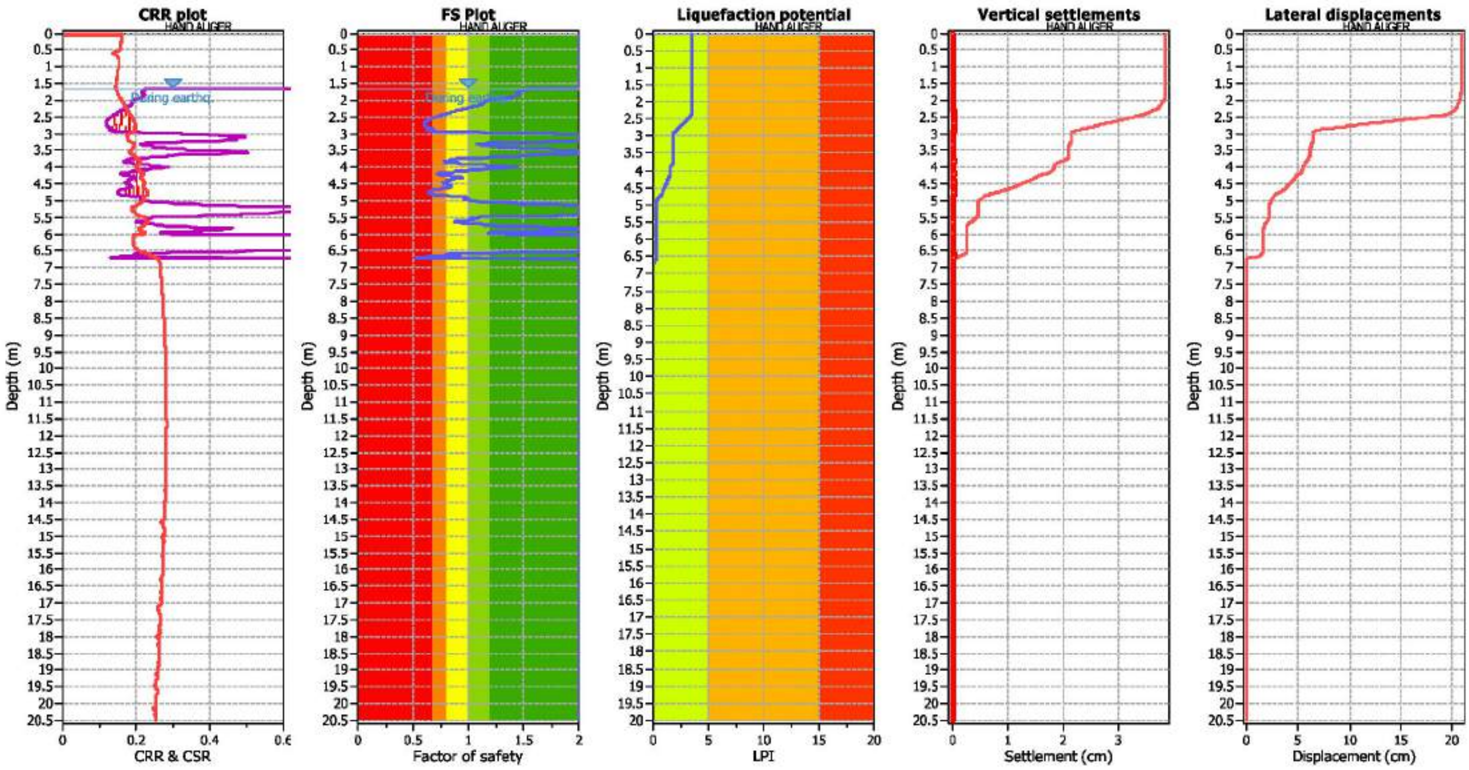
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.28	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	10.00 m

SBT legend

🟥 1. Sensitive fine grained	🟩 4. Clayey silt to silty	🟧 7. Gravely sand to sand
🟫 2. Organic material	🟩 5. Silty sand to sandy silt	⬛ 8. Very stiff sand to
🟦 3. Clay to silty clay	🟨 6. Clean sand to silty sand	⬜ 9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.28	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	10.00 m

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LPI color scheme

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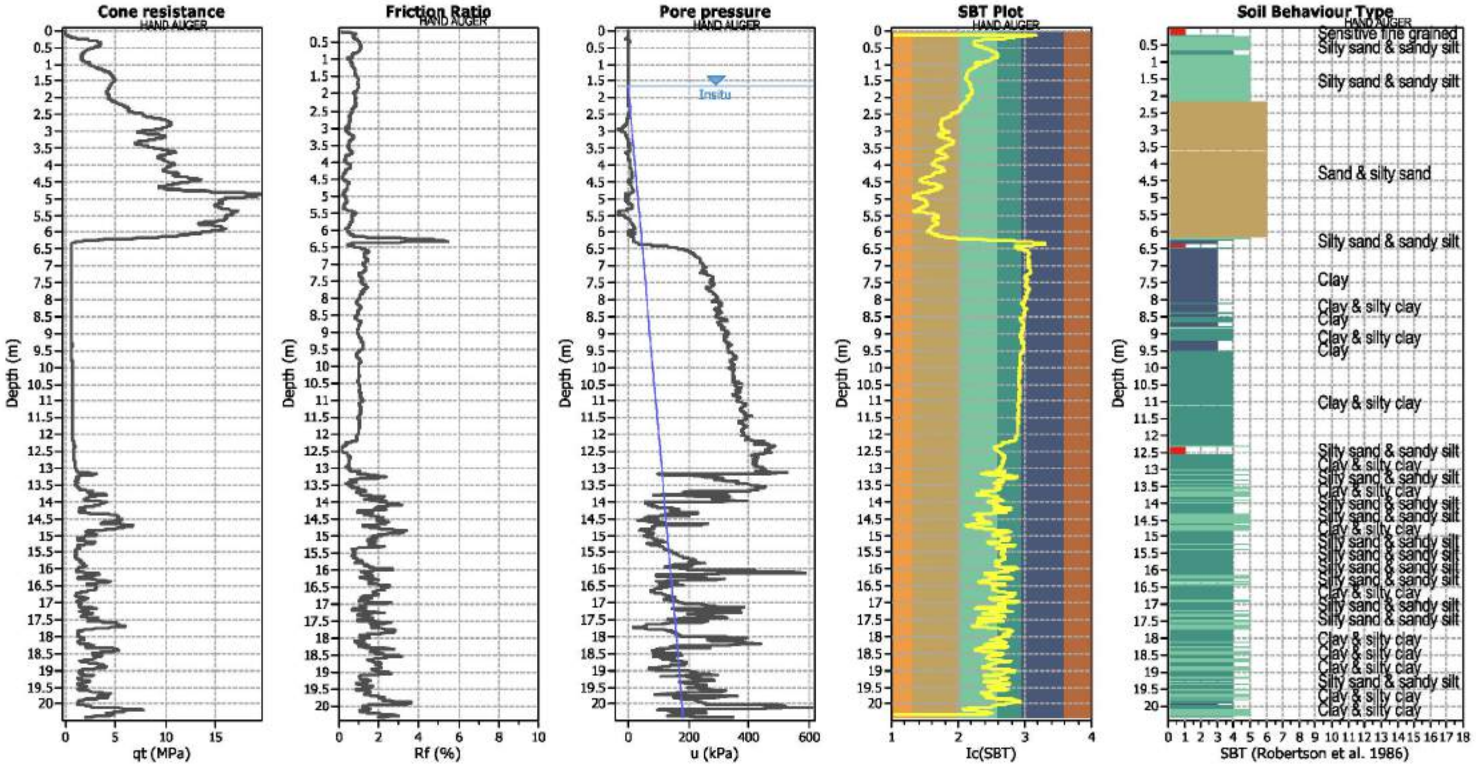
CPT basic interpretation plots



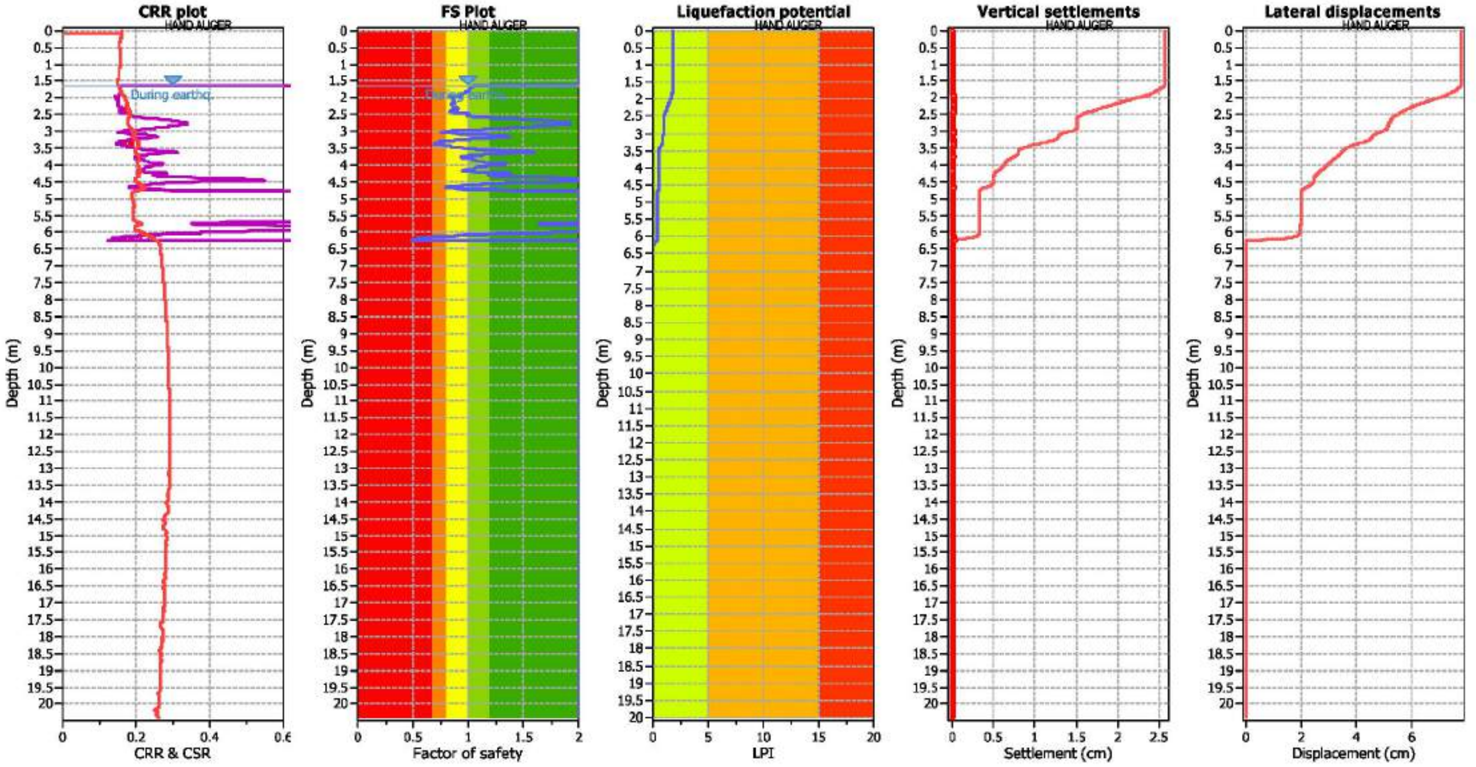
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.28	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	10.00 m

SBT legend

🟥 1. Sensitive fine grained	🟩 4. Clayey silt to silty	🟧 7. Gravely sand to sand
🟫 2. Organic material	🟩 5. Silty sand to sandy silt	⬜ 8. Very stiff sand to
🟦 3. Clay to silty clay	🟨 6. Clean sand to silty sand	⬜ 9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.28	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	10.00 m

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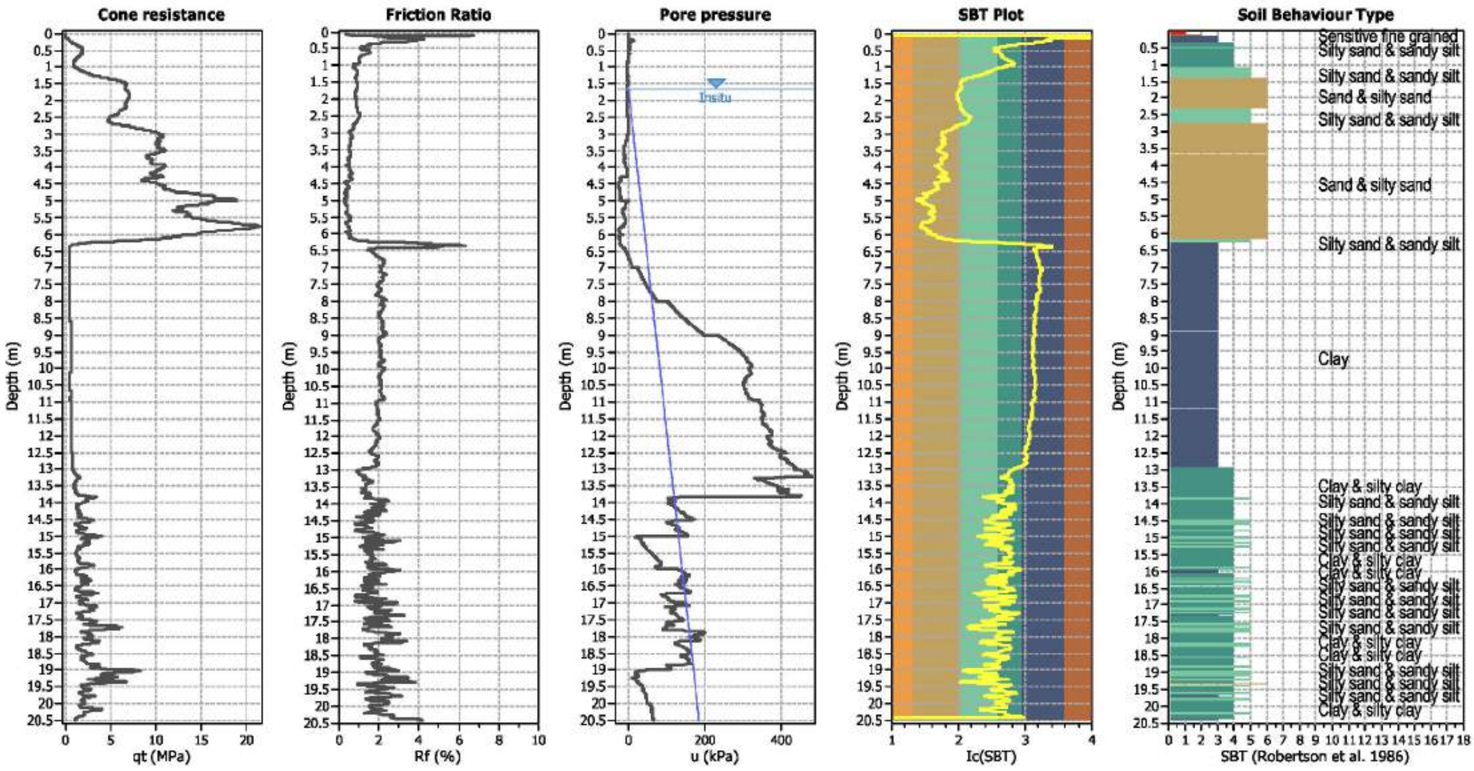
CPT basic interpretation plots



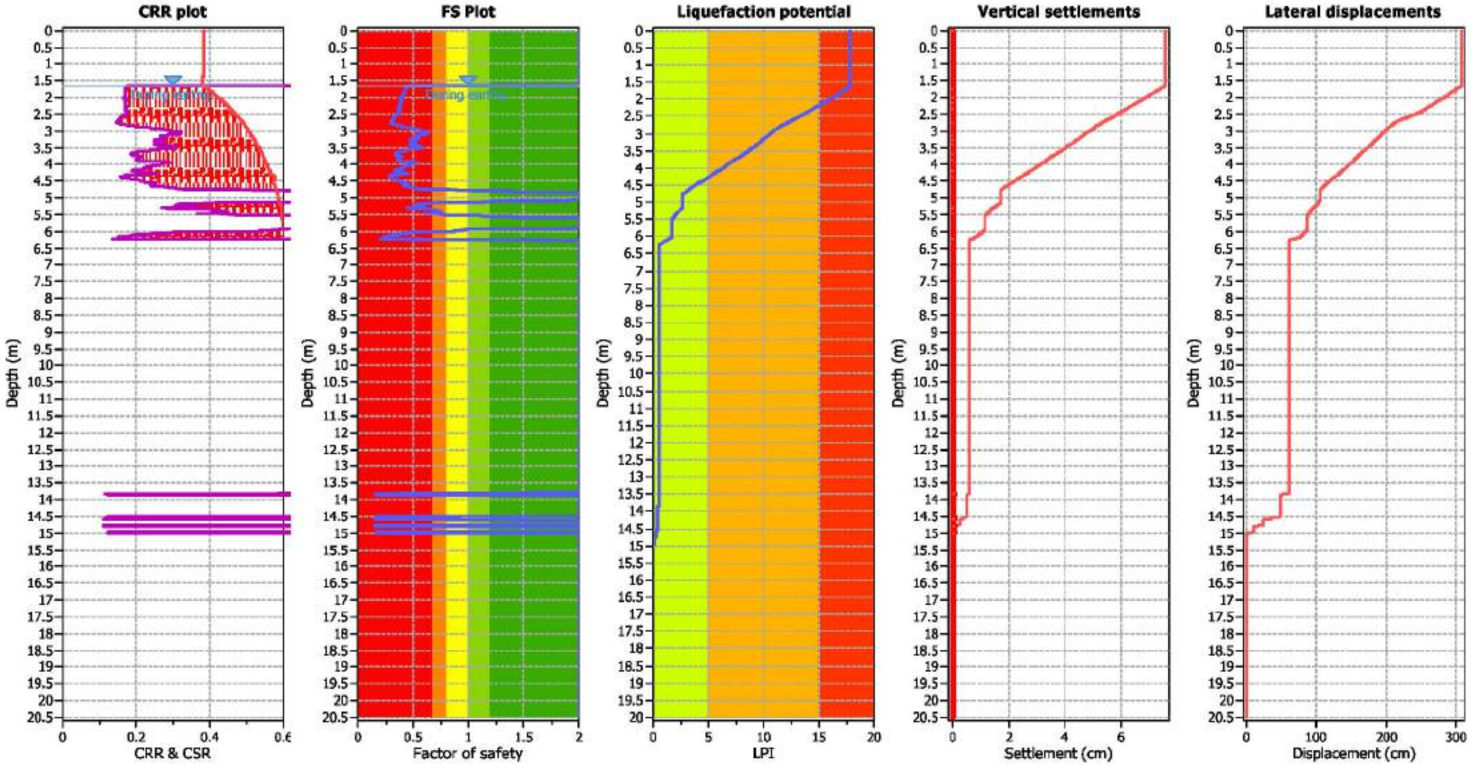
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.65	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	15.00 m

SBT legend

🟥 1. Sensitive fine grained	🟩 4. Clayey silt to silty	🟧 7. Gravely sand to sand
🟫 2. Organic material	🟩 5. Silty sand to sandy silt	⬜ 8. Very stiff sand to
🟦 3. Clay to silty clay	🟨 6. Clean sand to silty sand	⬜ 9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.65	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	15.00 m

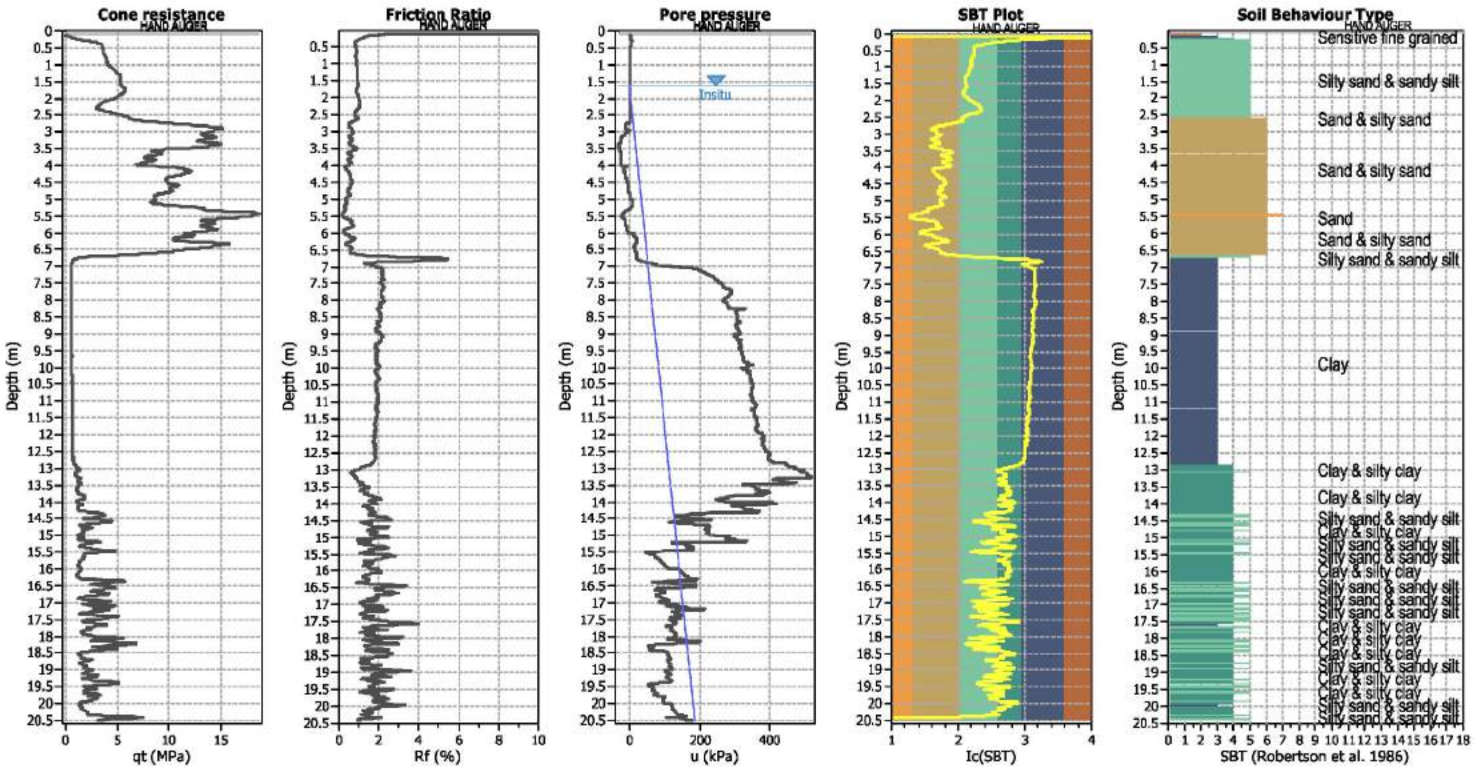
F.S. color scheme

🟥	Almost certain it will liquefy
🟧	Very likely to liquefy
🟨	Liquefaction and no liq. are equally likely
🟩	Unlike to liquefy
🟩	Almost certain it will not liquefy

LPI color scheme

🟥	Very high risk
🟧	High risk
🟨	Low risk

CPT basic interpretation plots



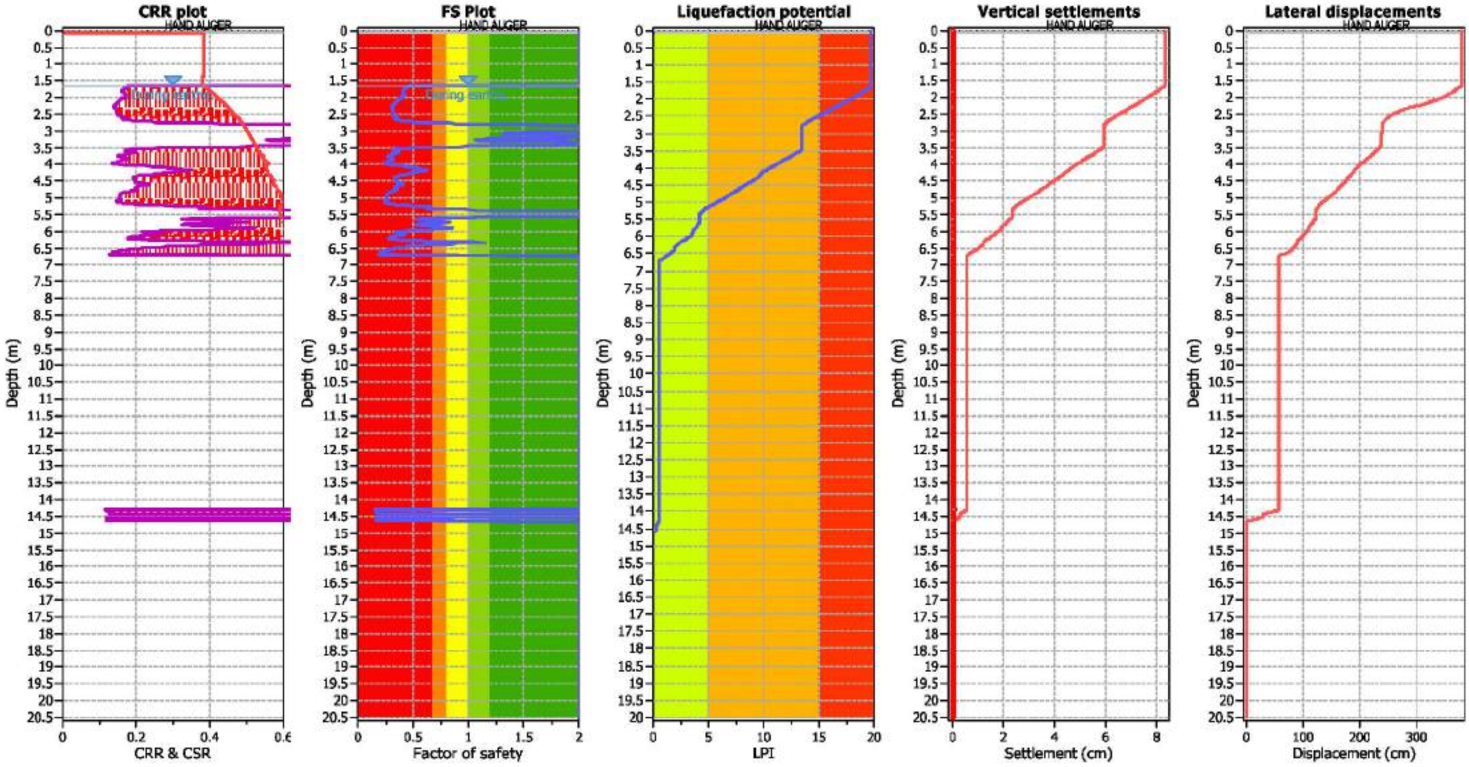
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.65	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	15.00 m

SBT legend

🟥	1. Sensitive fine grained	🟩	4. Clayey silt to silty	🟧	7. Gravely sand to sand
🟫	2. Organic material	🟩	5. Silty sand to sandy silt	⬛	8. Very stiff sand to
🟦	3. Clay to silty clay	🟨	6. Clean sand to silty sand	⬜	9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.65	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	15.00 m

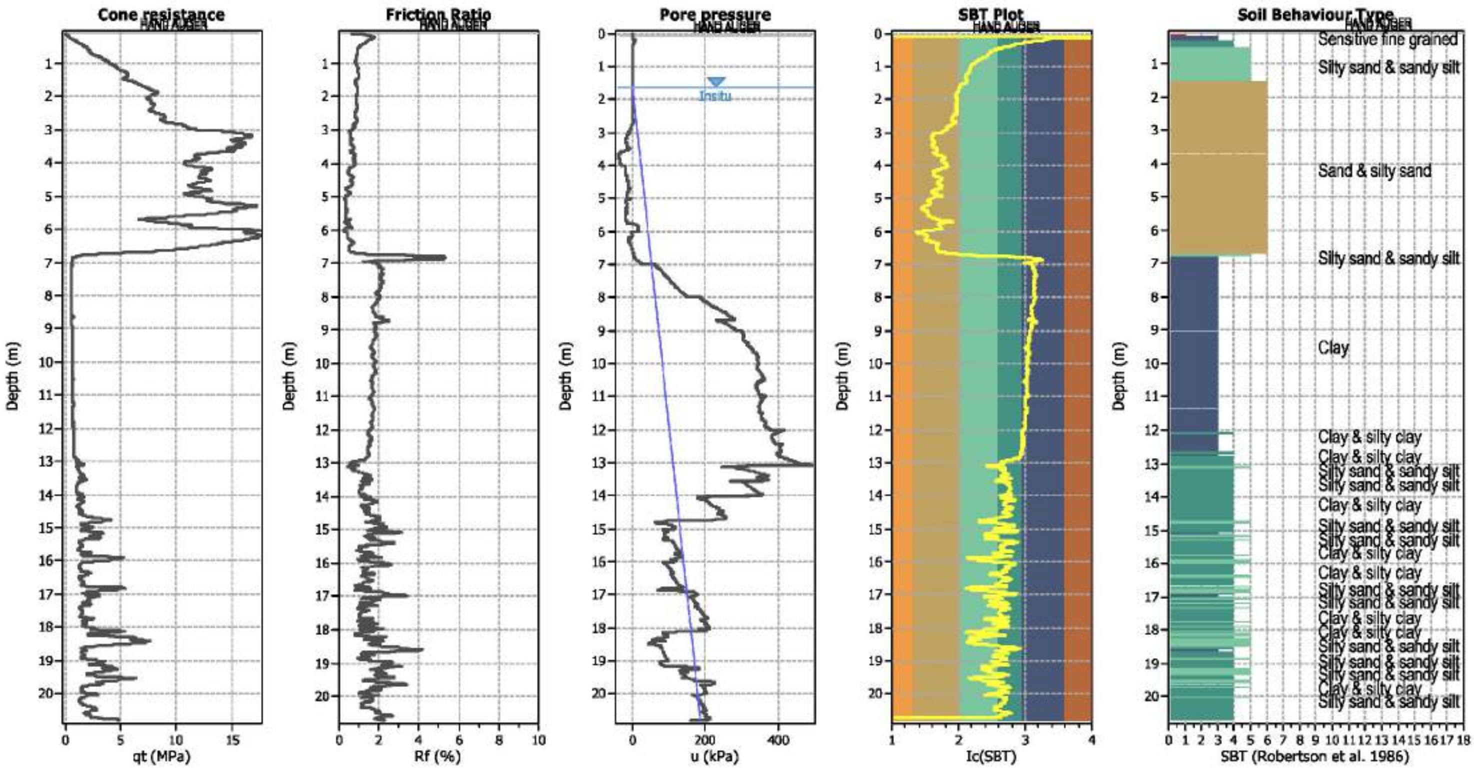
F.S. color scheme

- 🟥 Almost certain it will liquefy
- 🟧 Very likely to liquefy
- 🟨 Liquefaction and no liq. are equally likely
- 🟩 Unlike to liquefy
- 🟩 Almost certain it will not liquefy

LPI color scheme

- 🟥 Very high risk
- 🟧 High risk
- 🟩 Low risk

CPT basic interpretation plots



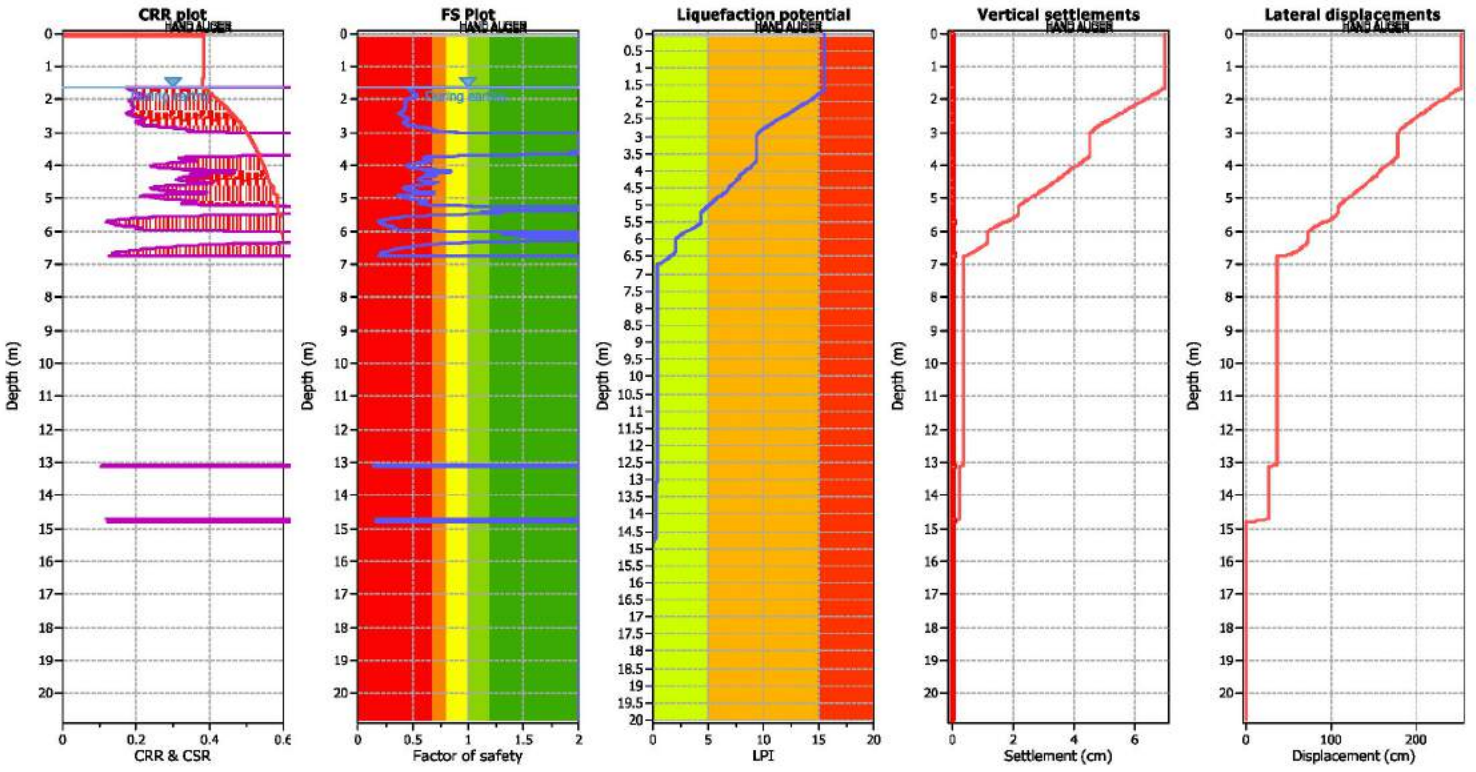
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.65	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	15.00 m

SBT legend

🟥 1. Sensitive fine grained	🟩 4. Clayey silt to silty	🟧 7. Gravely sand to sand
🟫 2. Organic material	🟩 5. Silty sand to sandy silt	⬛ 8. Very stiff sand to
🟦 3. Clay to silty clay	🟨 6. Clean sand to silty sand	⬜ 9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.65	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	15.00 m

F.S. color scheme

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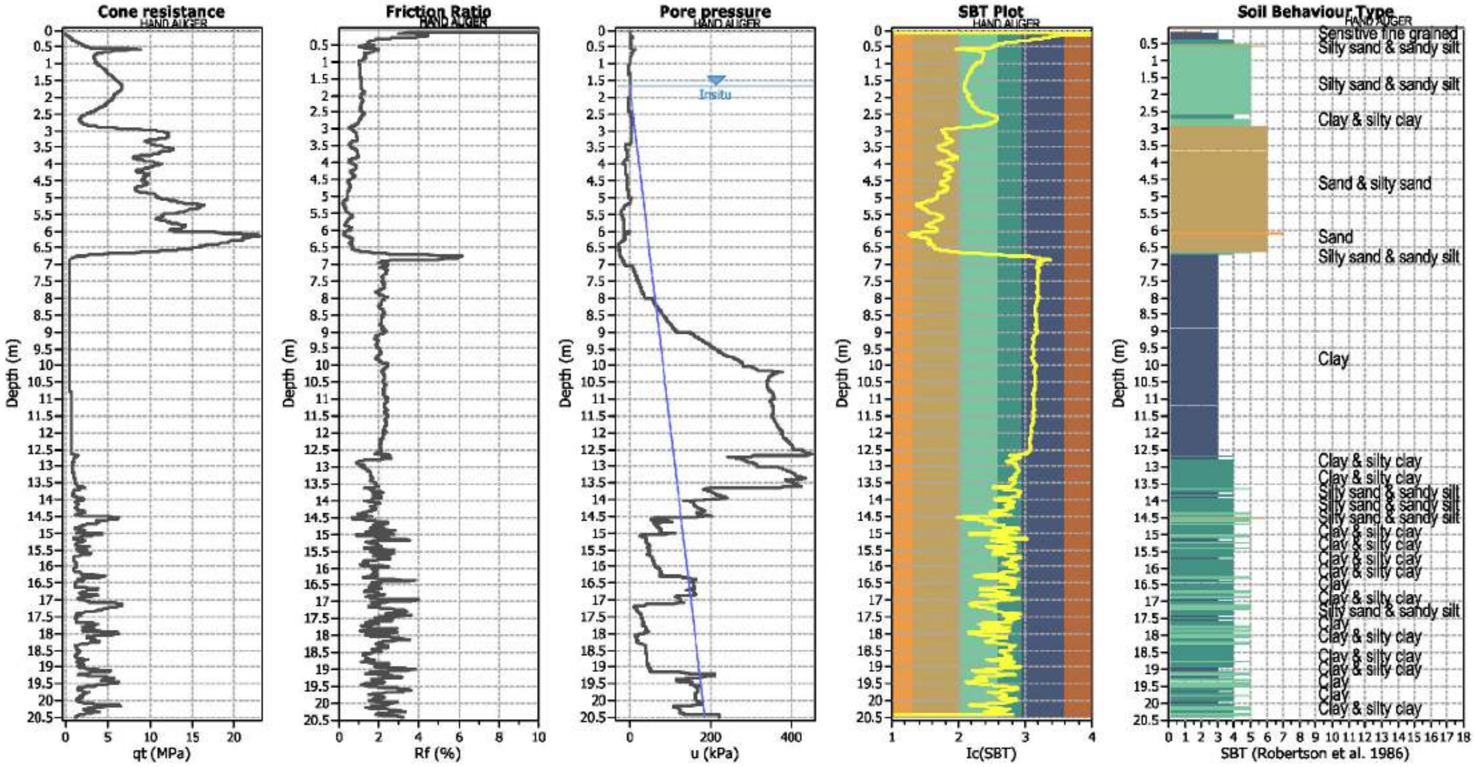
LPI color scheme

- 🟥 Very high risk
- 🟧 High risk
- 🟩 Low risk

CPT basic interpretation plots



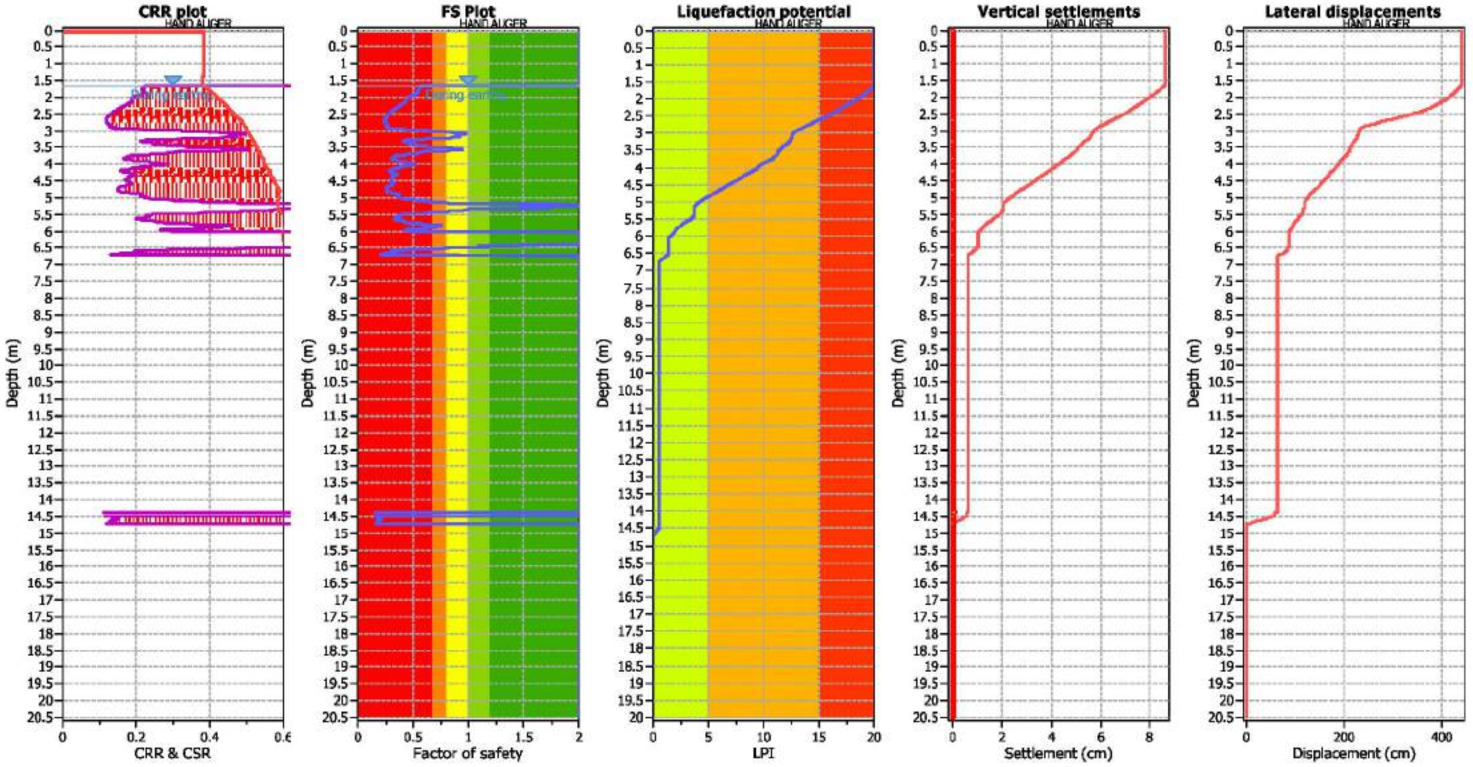
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.65	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	15.00 m

SBT legend

🟥 1. Sensitive fine grained	🟩 4. Clayey silt to silty	🟧 7. Gravely sand to sand
🟫 2. Organic material	🟩 5. Silty sand to sandy silt	⬜ 8. Very stiff sand to
🟦 3. Clay to silty clay	🟨 6. Clean sand to silty sand	⬜ 9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.65	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	15.00 m

F.S. color scheme

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- 🟨 Liquefaction and no liq. are equally likely
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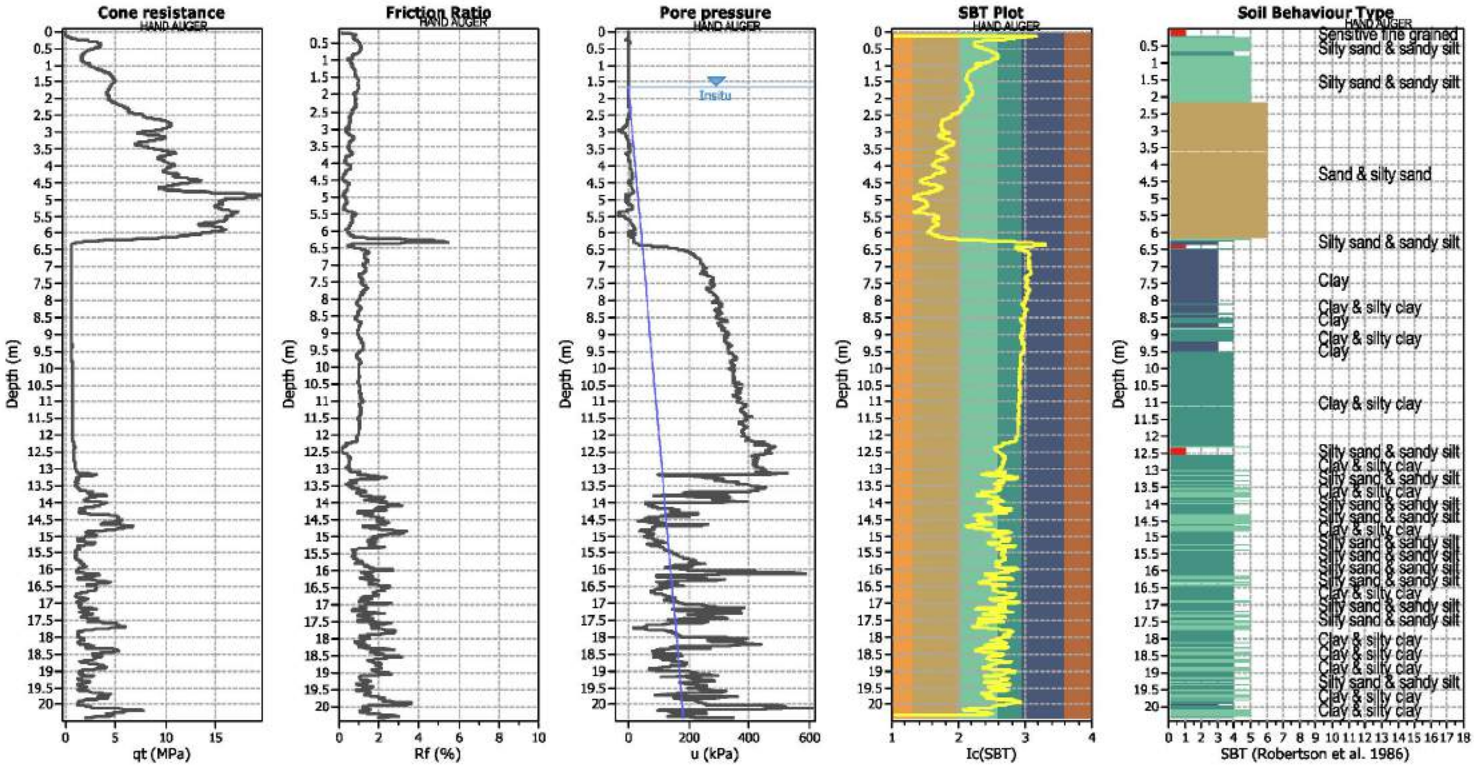
LPI color scheme

- 🟥 Very high risk
- 🟧 High risk
- 🟩 Low risk

CPT basic interpretation plots



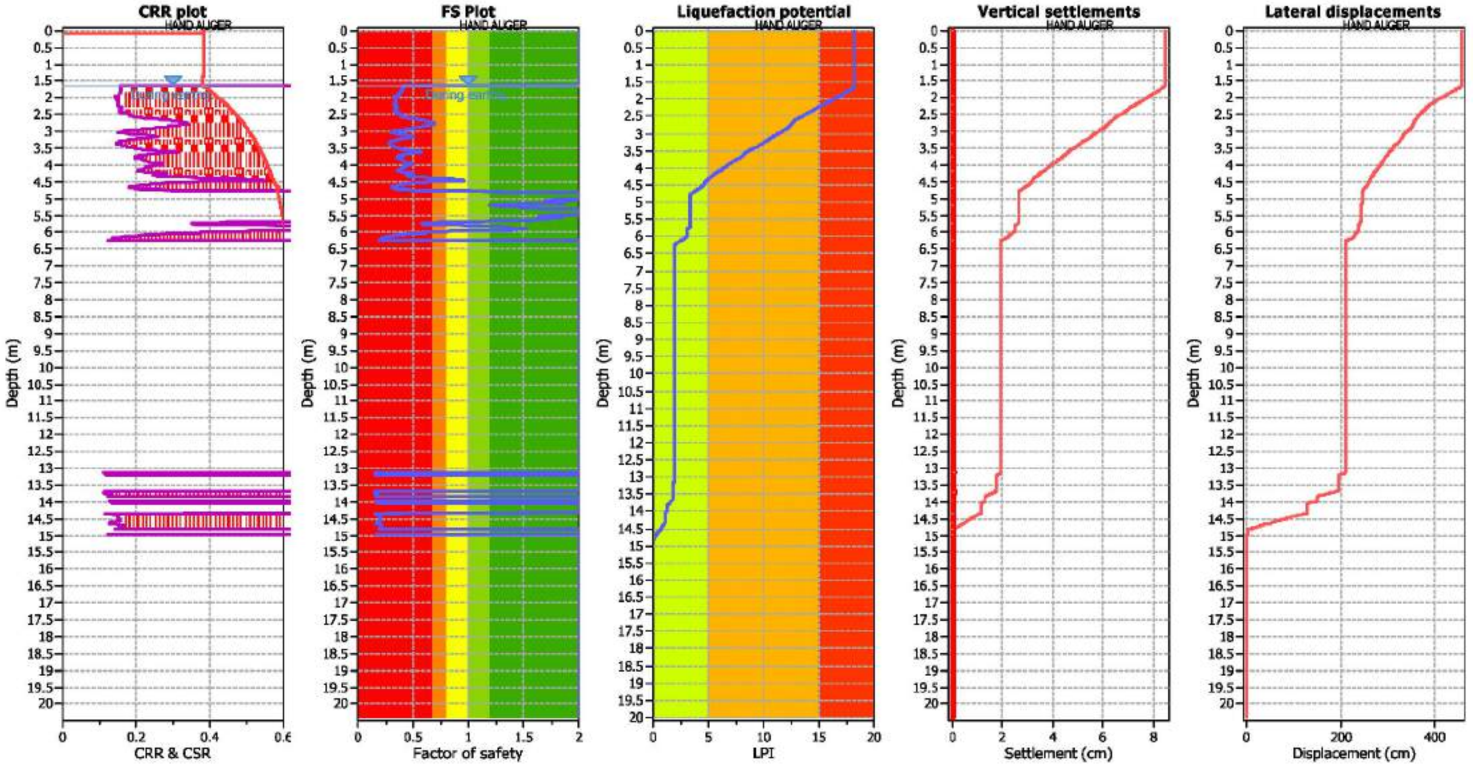
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.65	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	15.00 m

SBT legend

🟥	1. Sensitive fine grained	🟩	4. Clayey silt to silty	🟧	7. Gravely sand to sand
🟫	2. Organic material	🟩	5. Silty sand to sandy silt	⬛	8. Very stiff sand to
🟦	3. Clay to silty clay	🟨	6. Clean sand to silty sand	⬜	9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.65	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	15.00 m

F.S. color scheme

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- 🟨 Liquefaction and no liq. are equally likely
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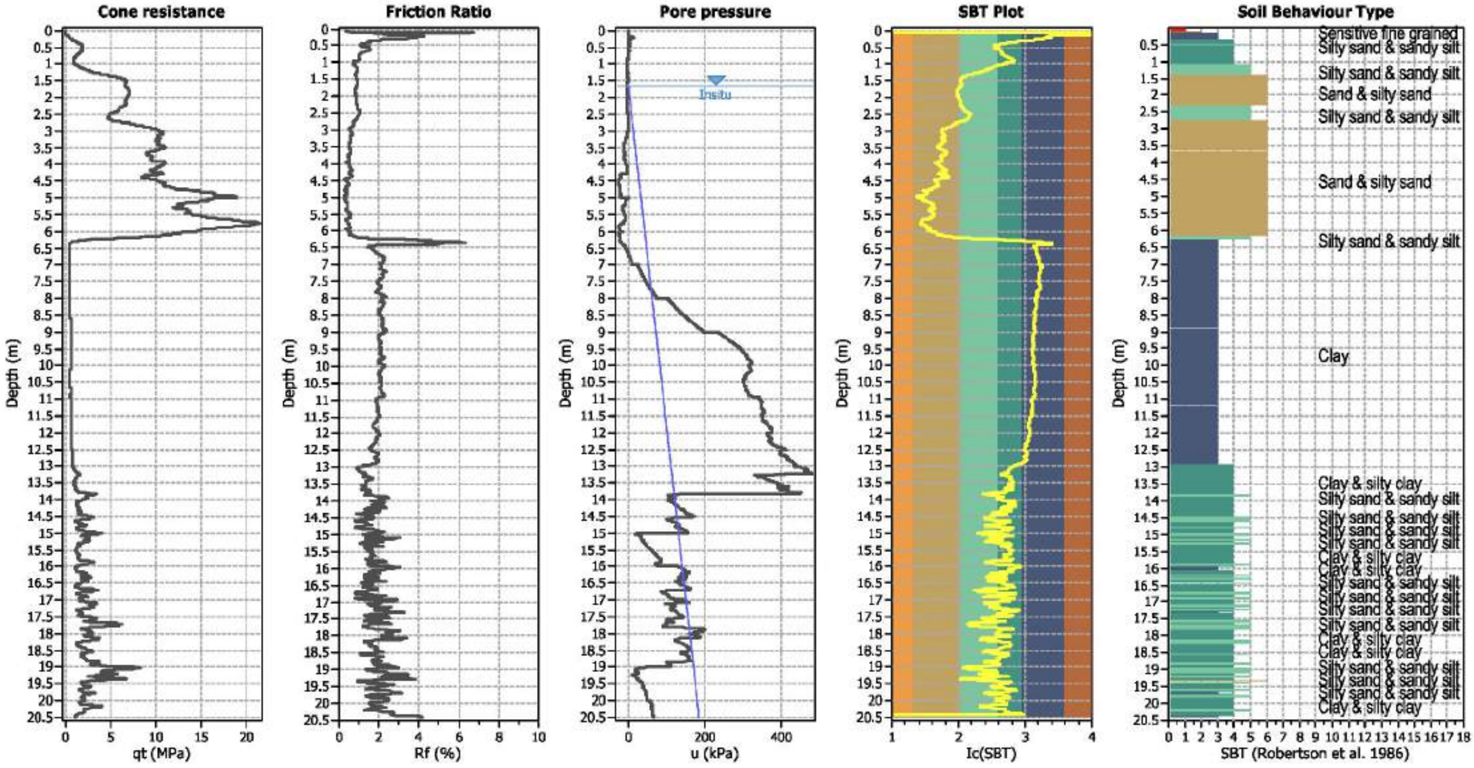
- 🟩 Almost certain it will not liquefy

LPI color scheme

- 🟥 Very high risk
- 🟧 High risk
- 🟨 Low risk

CPT basic interpretation plots



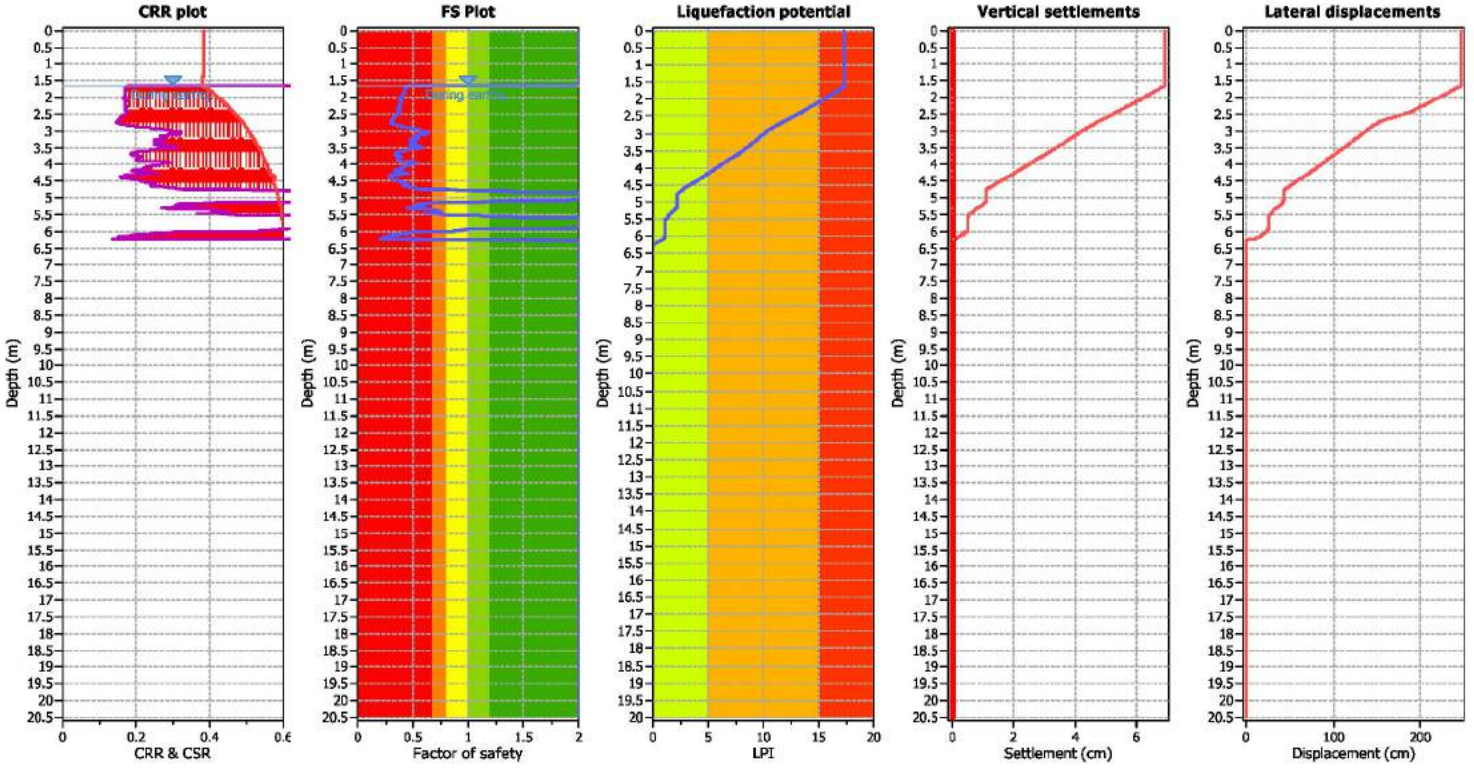
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.65	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	10.00 m

SBT legend

🟥	1. Sensitive fine grained	🟩	4. Clayey silt to silty	🟧	7. Gravely sand to sand
🟫	2. Organic material	🟩	5. Silty sand to sandy silt	⬛	8. Very stiff sand to
🟦	3. Clay to silty clay	🟨	6. Clean sand to silty sand	⬜	9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.65	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	10.00 m

F.S. color scheme

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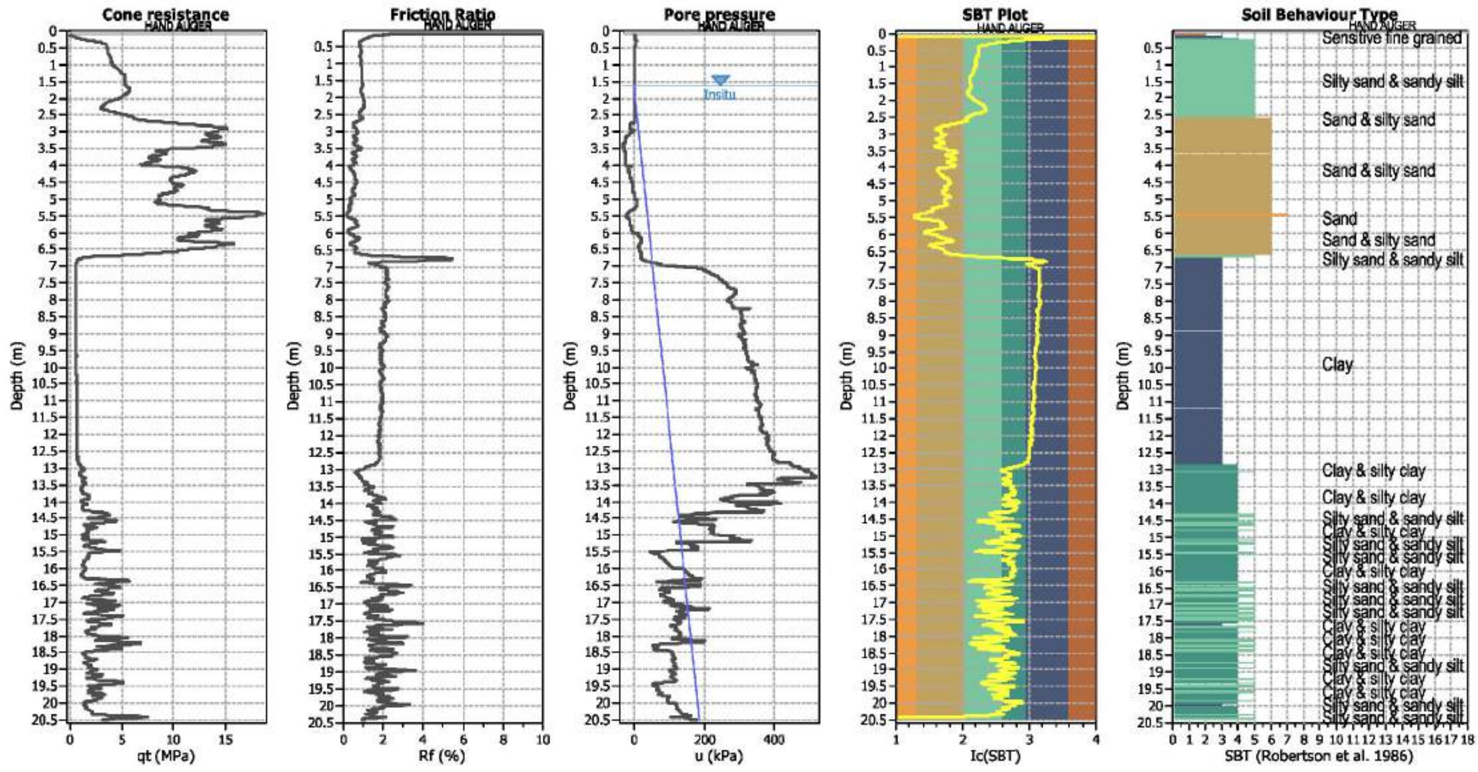
LPI color scheme

- 🟥 Very high risk
- 🟧 High risk
- 🟨 Low risk

CPT basic interpretation plots



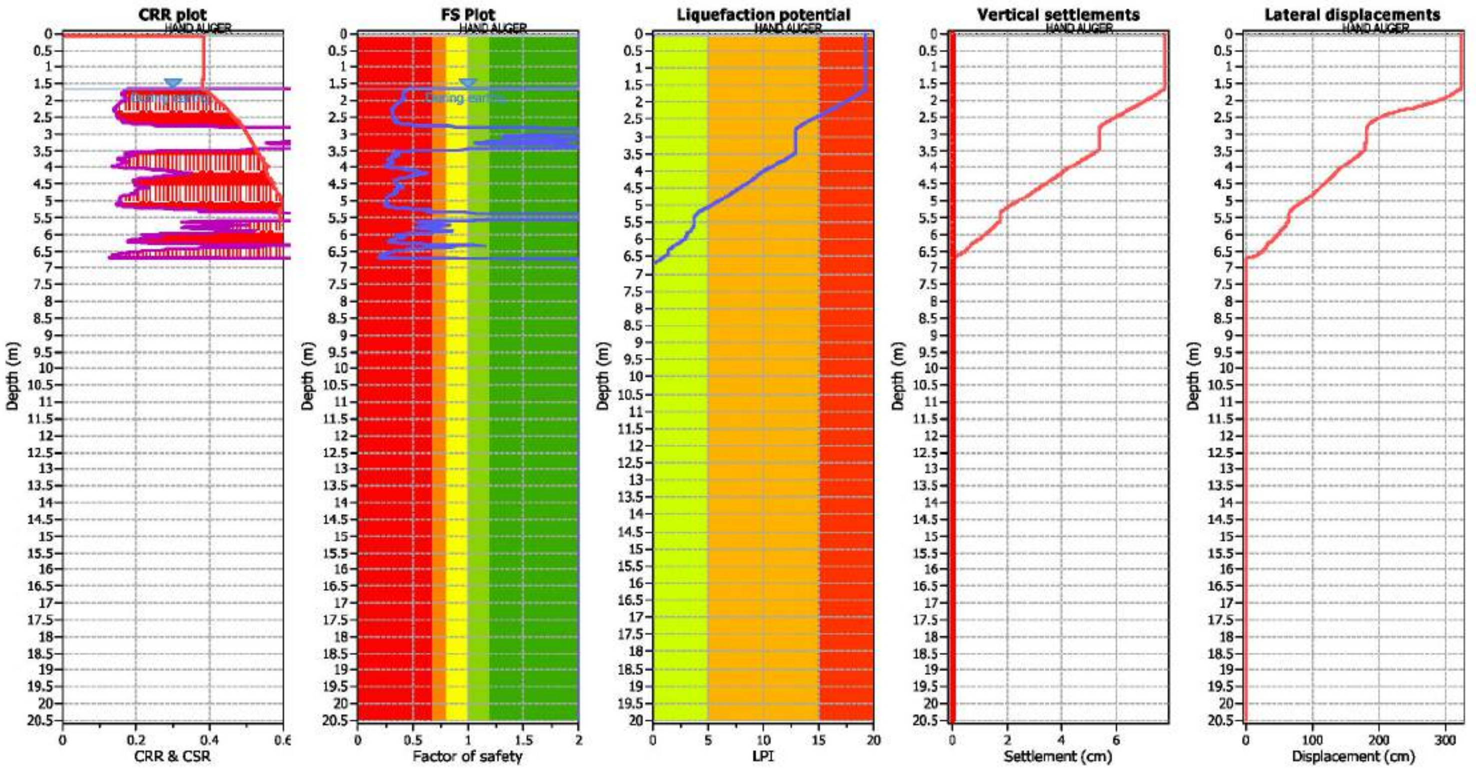
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.65	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	10.00 m

SBT legend

🟥 1. Sensitive fine grained	🟩 4. Clayey silt to silty	🟧 7. Gravely sand to sand
🟫 2. Organic material	🟩 5. Silty sand to sandy silt	⬛ 8. Very stiff sand to
🟦 3. Clay to silty clay	🟨 6. Clean sand to silty sand	⬜ 9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.65	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	10.00 m

F.S. color scheme

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- 🟨 Liquefaction and no liq. are equally likely
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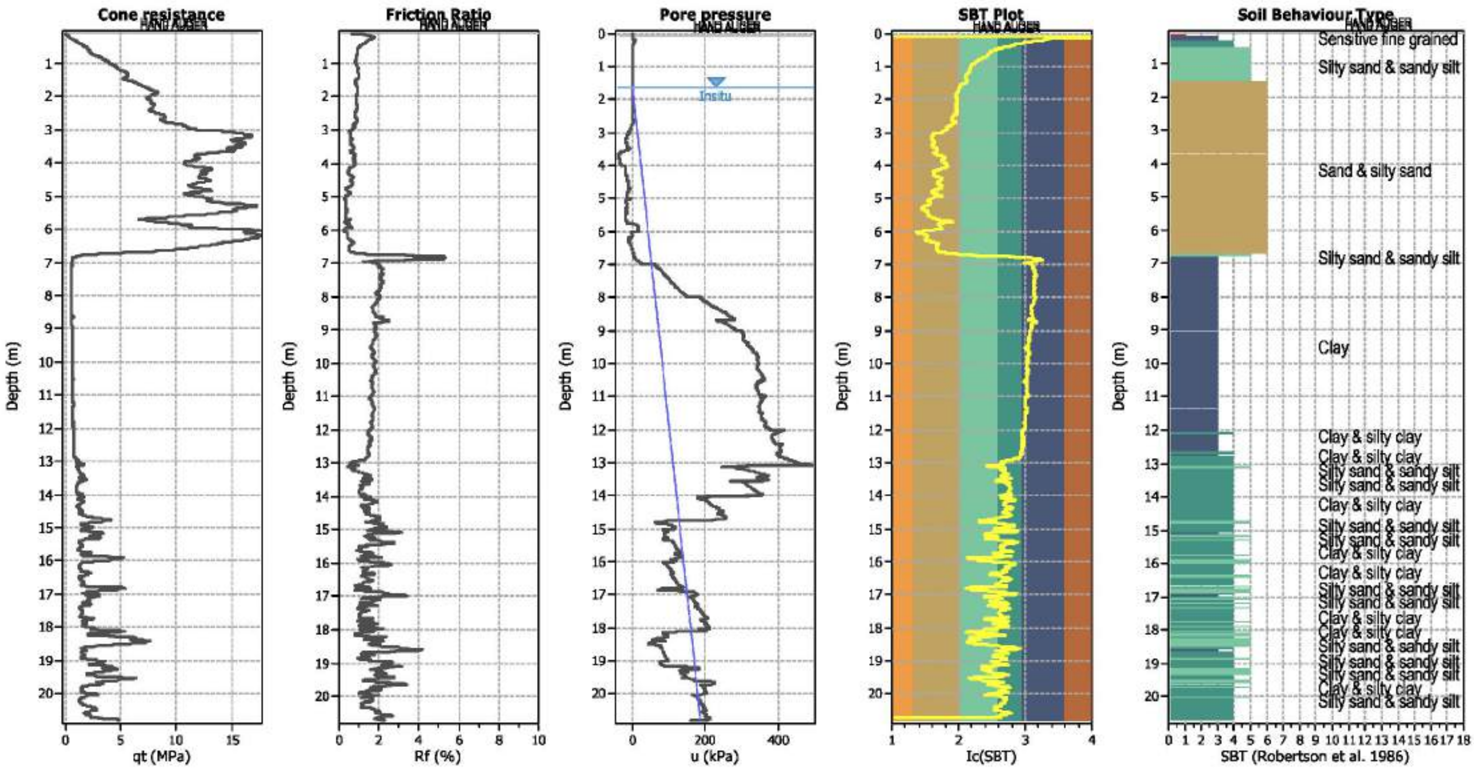
LPI color scheme

- 🟥 Very high risk
- 🟧 High risk
- 🟨 Low risk

CPT basic interpretation plots



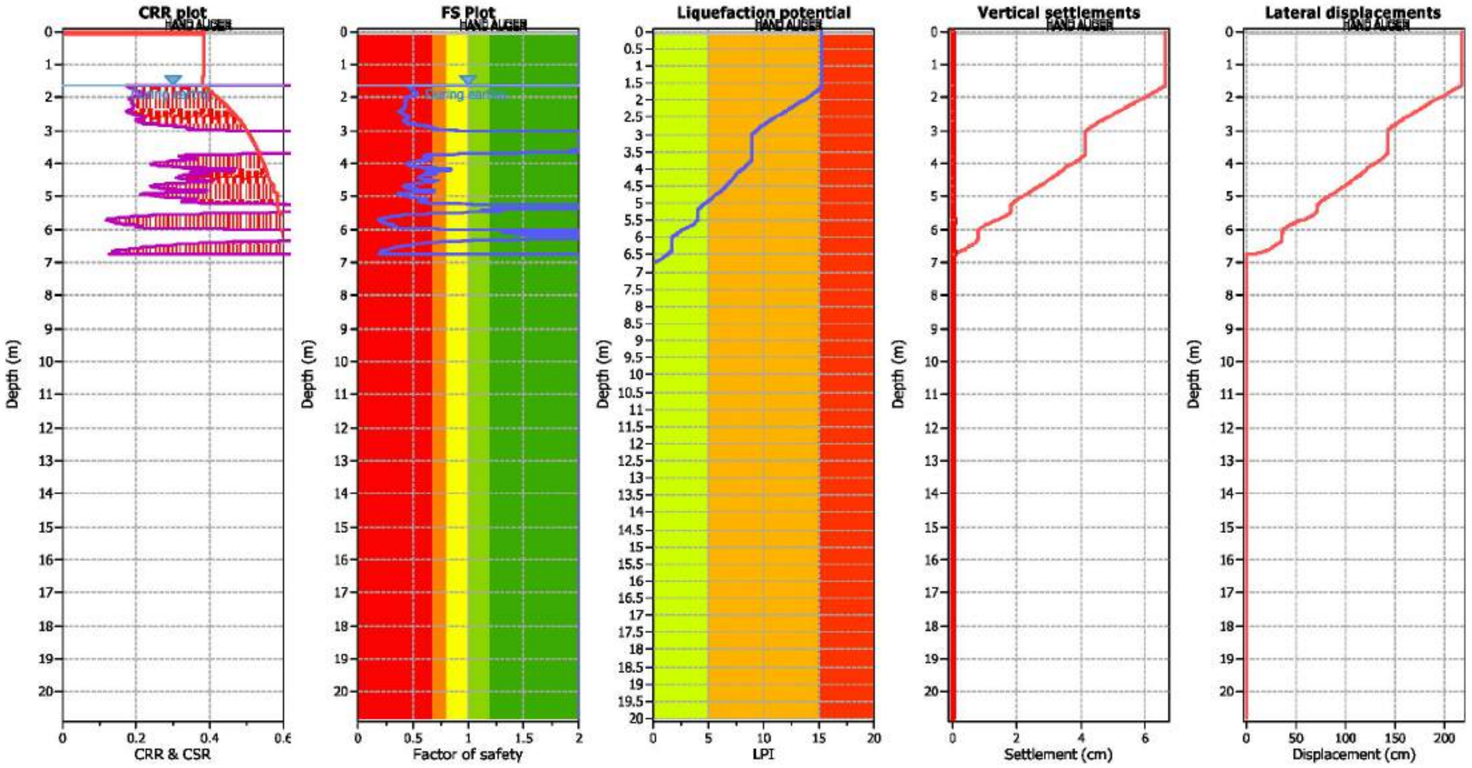
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.65	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	10.00 m

SBT legend

🟥 1. Sensitive fine grained	🟩 4. Clayey silt to silty	🟧 7. Gravely sand to sand
🟫 2. Organic material	🟩 5. Silty sand to sandy silt	⬛ 8. Very stiff sand to
🟦 3. Clay to silty clay	🟨 6. Clean sand to silty sand	⬜ 9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.65	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	10.00 m

F.S. color scheme

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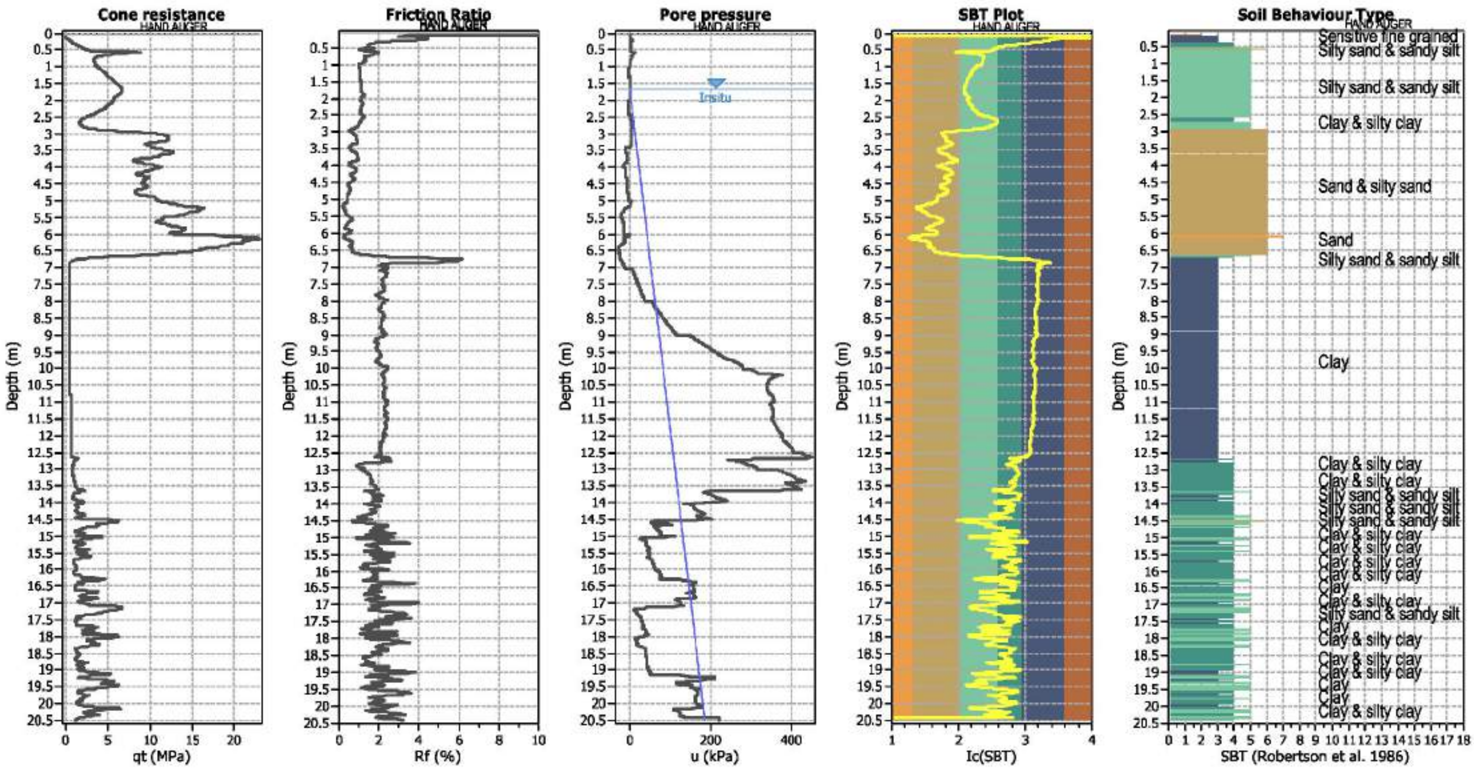
LPI color scheme

- 🟥 Very high risk
- 🟧 High risk
- 🟨 Low risk

CPT name: ULS- CPT04 (10m)

CPT basic interpretation plots



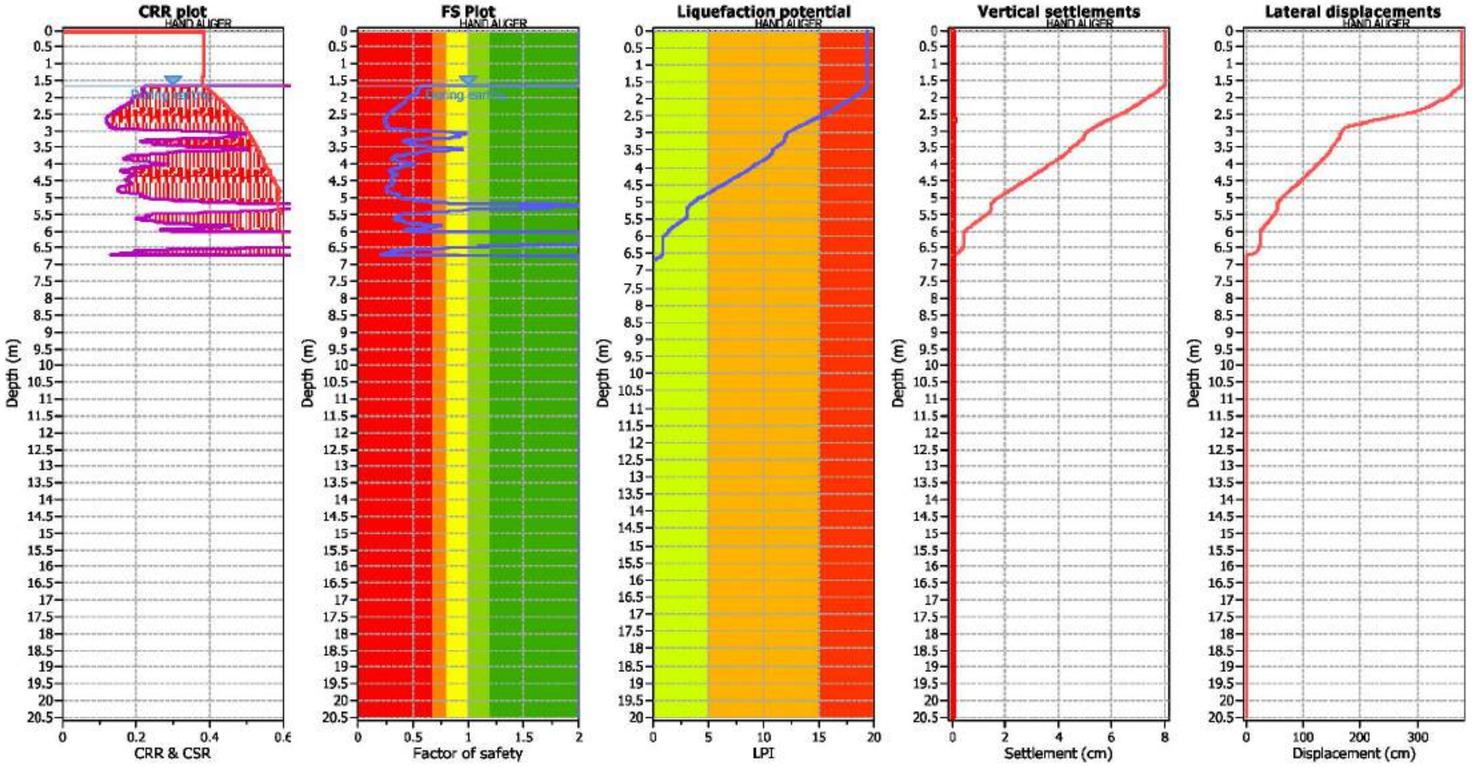
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.65	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	10.00 m

SBT legend

🟥 1. Sensitive fine grained	🟩 4. Clayey silt to silty	🟧 7. Gravely sand to sand
🟫 2. Organic material	🟩 5. Silty sand to sandy silt	⬛ 8. Very stiff sand to
🟦 3. Clay to silty clay	🟨 6. Clean sand to silty sand	⬜ 9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.65	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	10.00 m

F.S. color scheme

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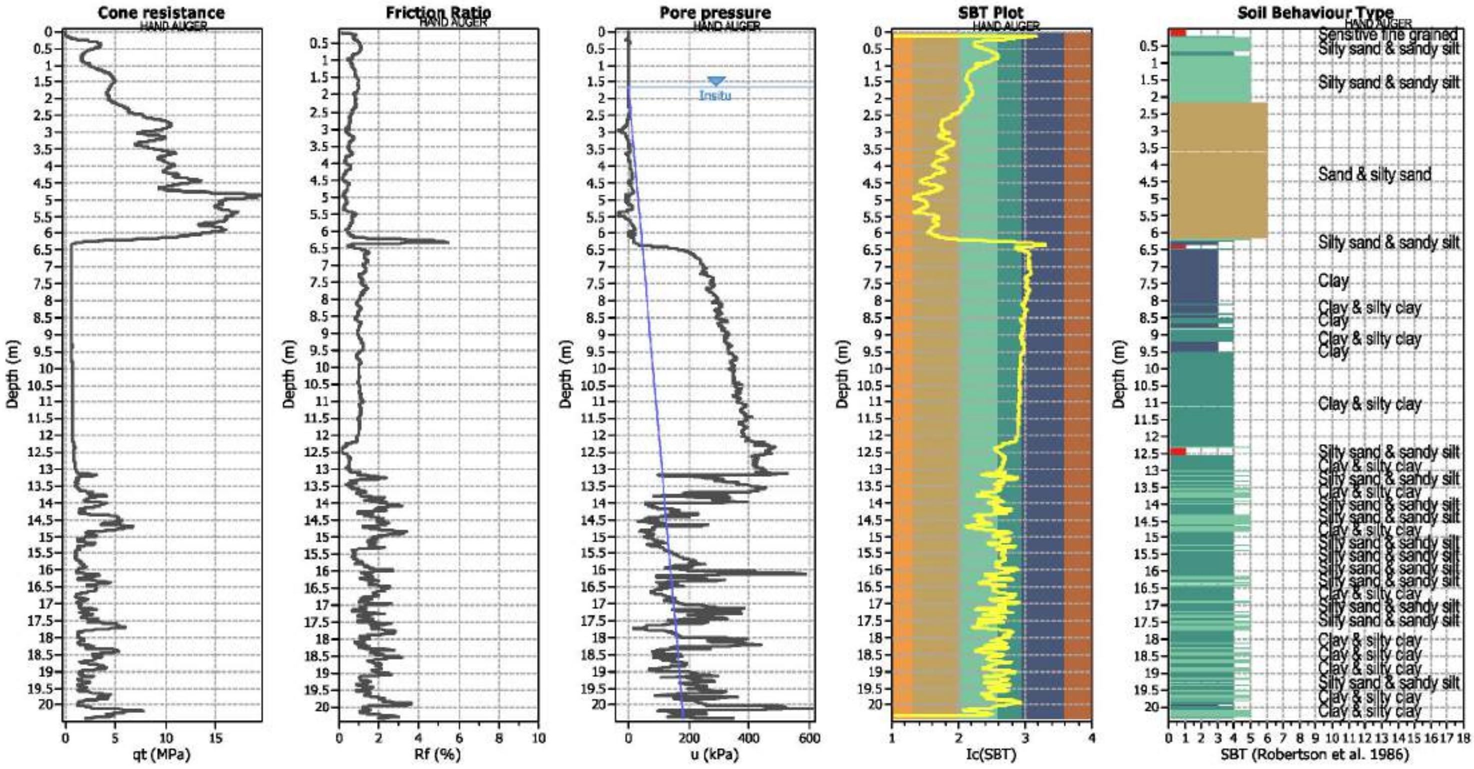
LPI color scheme

- 🟥 Very high risk
- 🟧 High risk
- 🟨 Low risk

CPT basic interpretation plots



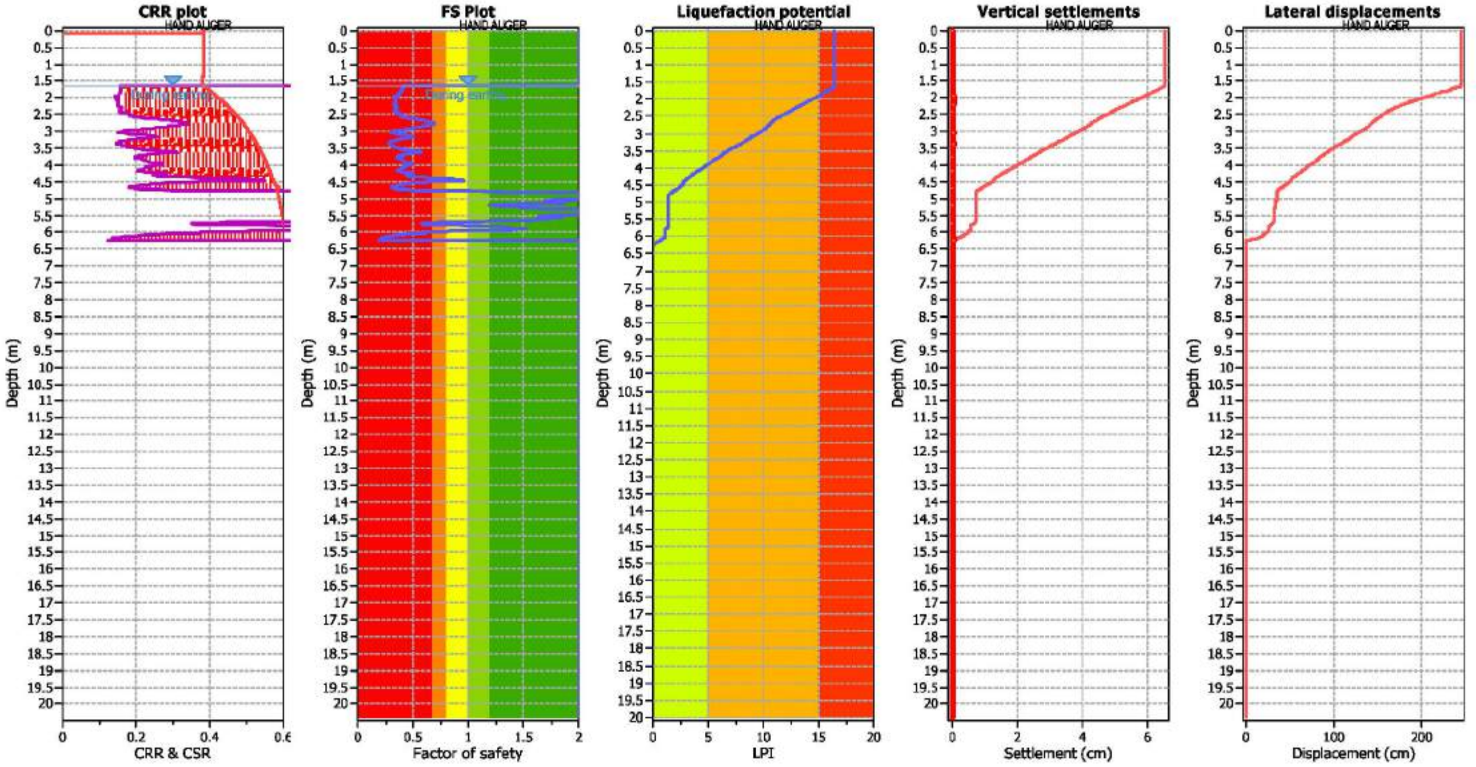
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.65	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	10.00 m

SBT legend

🟥 1. Sensitive fine grained	🟩 4. Clayey silt to silty	🟧 7. Gravely sand to sand
🟫 2. Organic material	🟩 5. Silty sand to sandy silt	⬜ 8. Very stiff sand to
🟦 3. Clay to silty clay	🟨 6. Clean sand to silty sand	⬜ 9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.65	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	10.00 m

F.S. color scheme

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LPI color scheme

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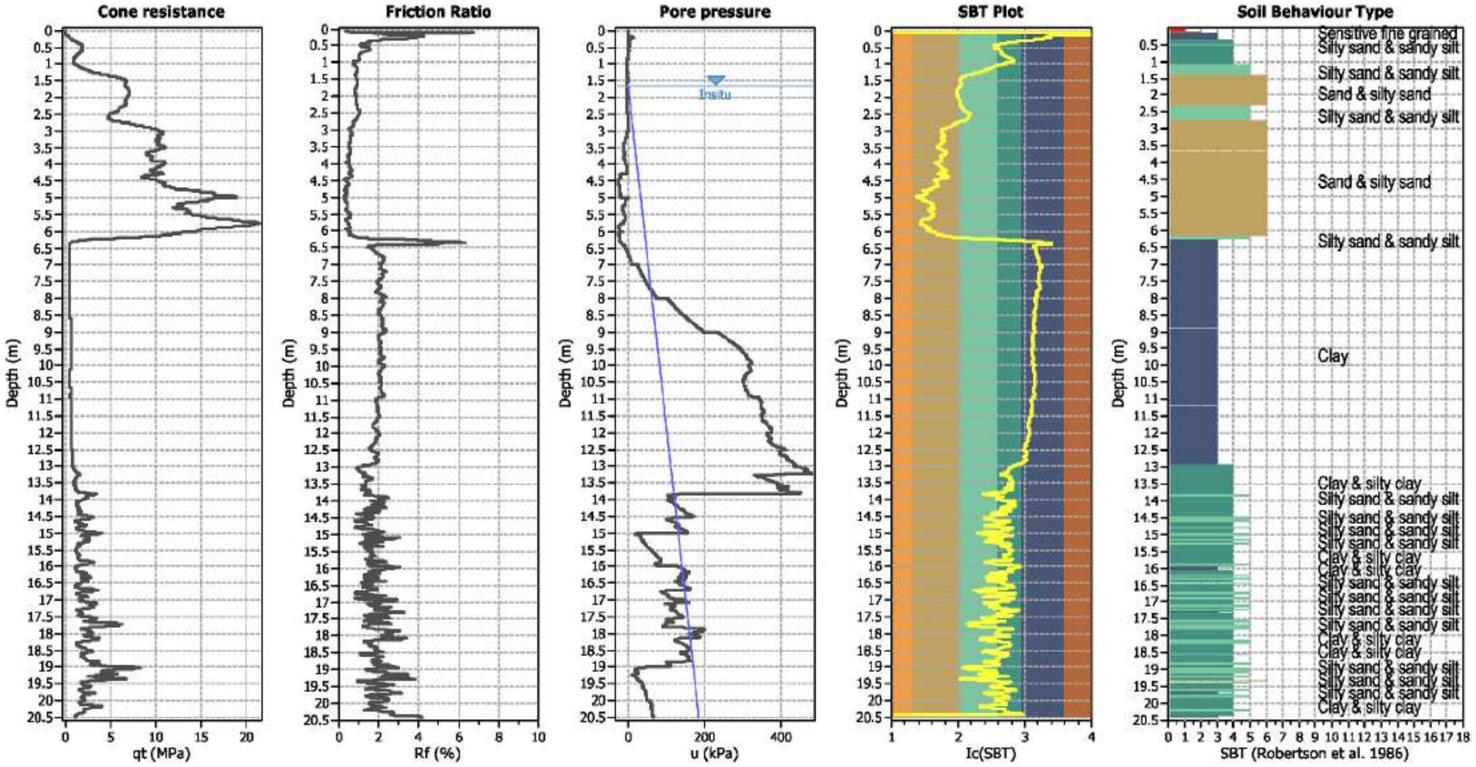
- 🟧 High risk
- 🟨 Low risk

CPT basic interpretation plots



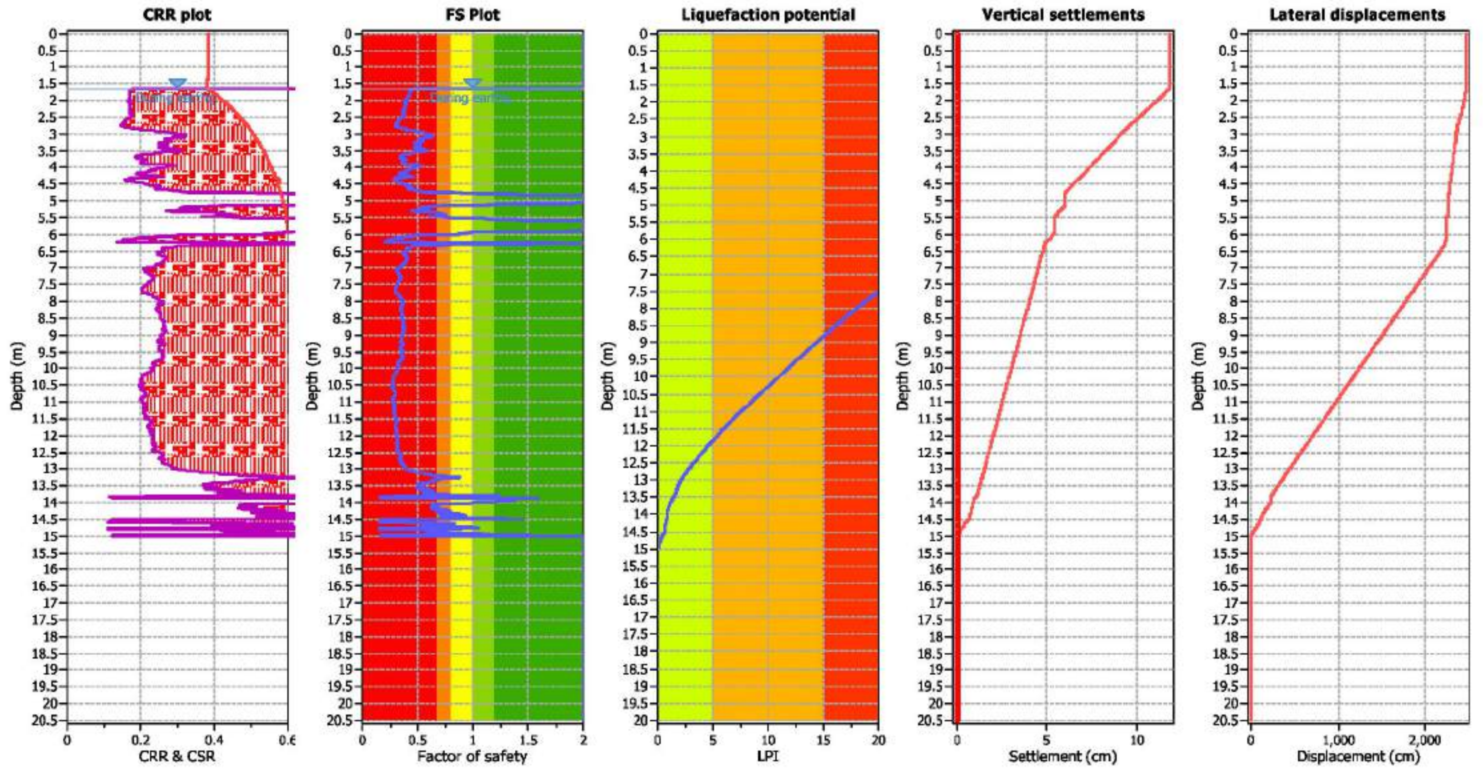
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.65	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	15.00 m

SBT legend

- 🟥 1. Sensitive fine grained
- 🟫 2. Organic material
- 🟦 3. Clay to silty clay
- 🟩 4. Clayey silt to silty
- 🟩 5. Silty sand to sandy silt
- 🟨 6. Clean sand to silty sand
- 🟧 7. Gravely sand to sand
- ⬜ 8. Very stiff sand to
- ⬜ 9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

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Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.65	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	15.00 m

F.S. color scheme

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LPI color scheme

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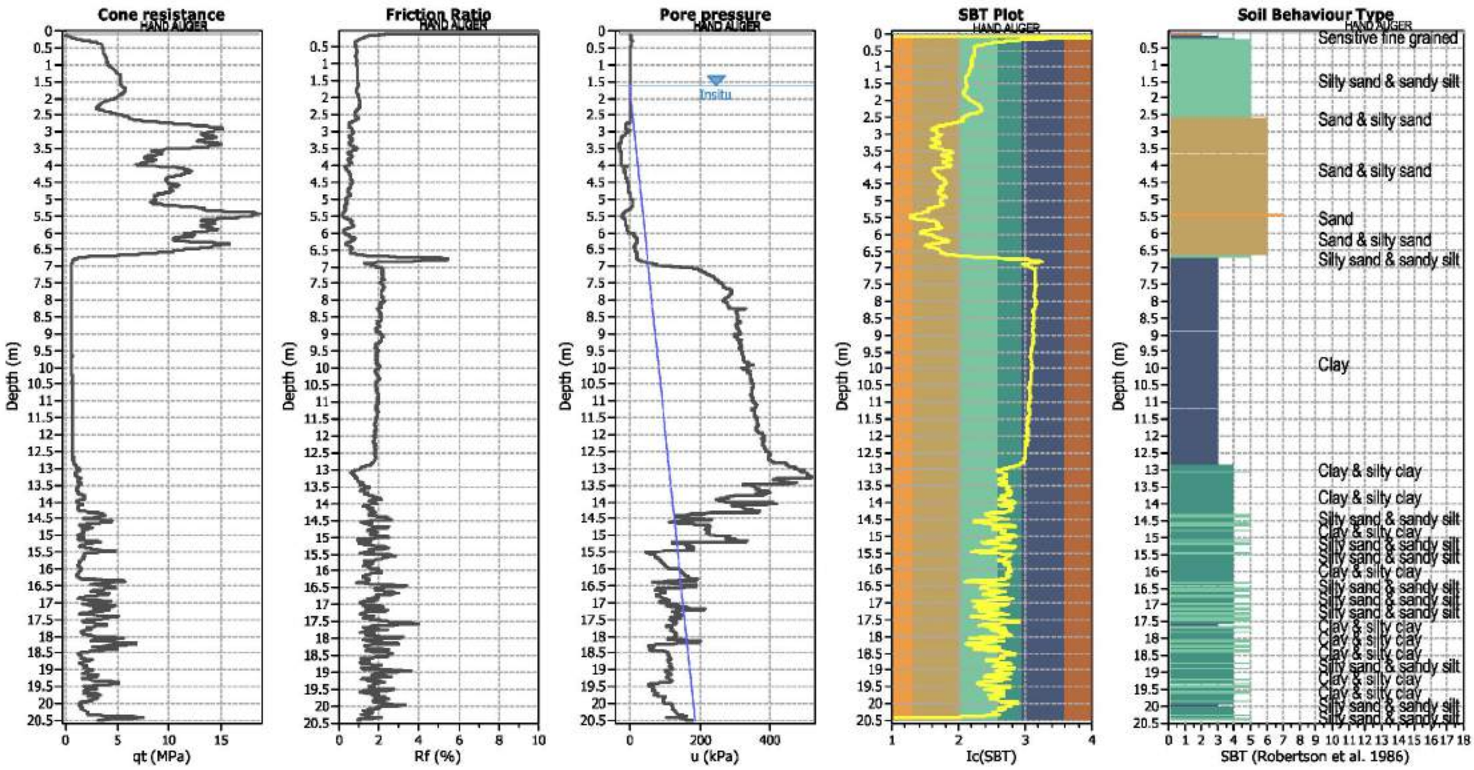
CPT basic interpretation plots



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SBT legend

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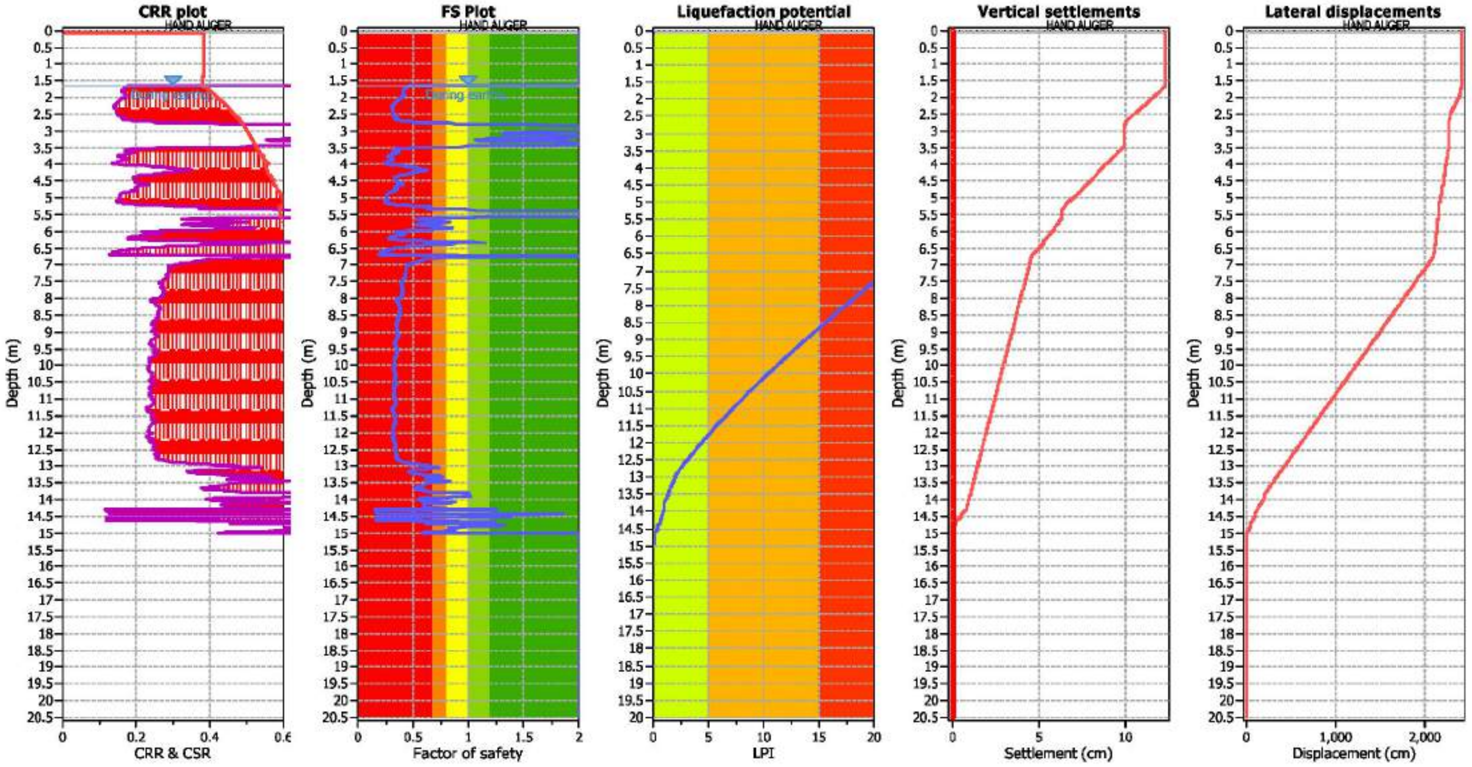
Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
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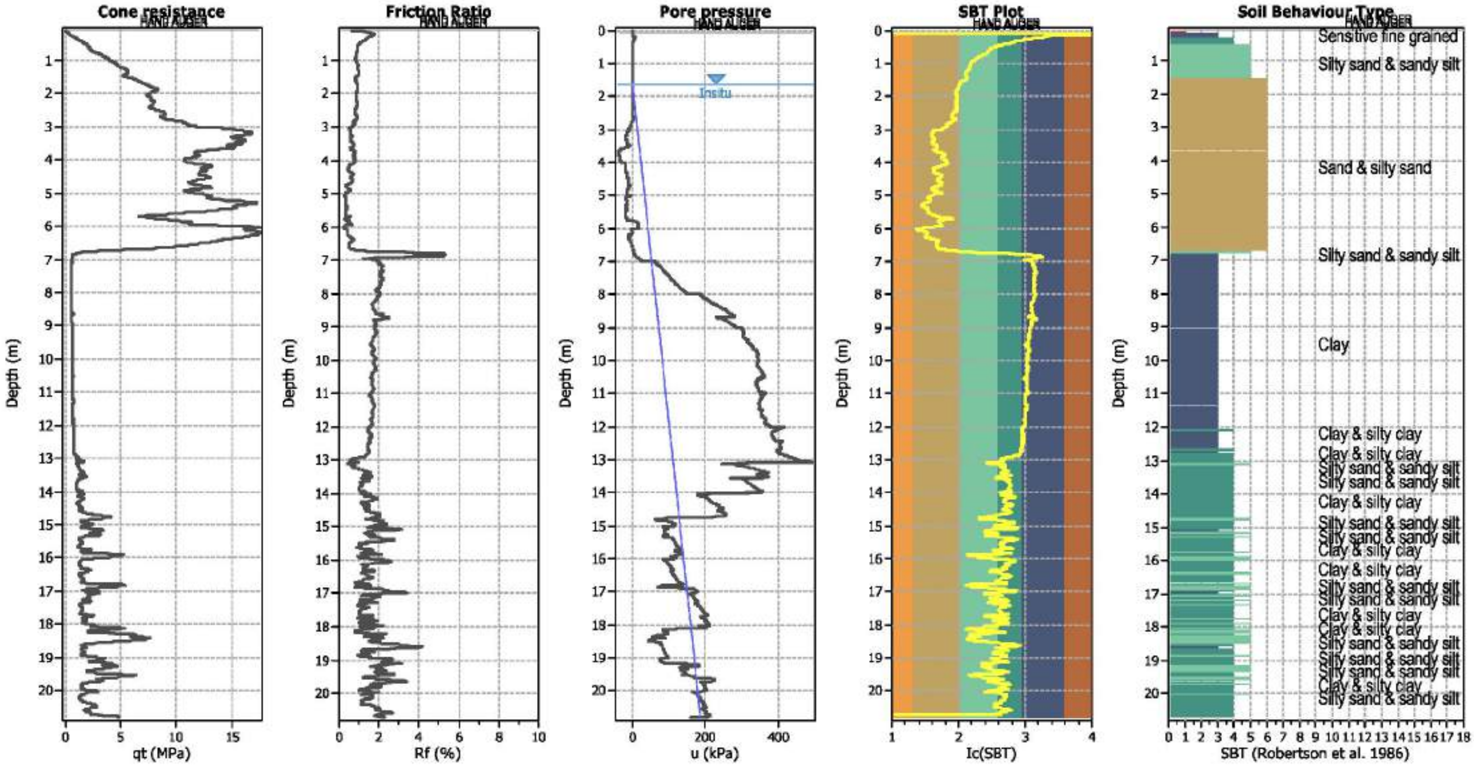

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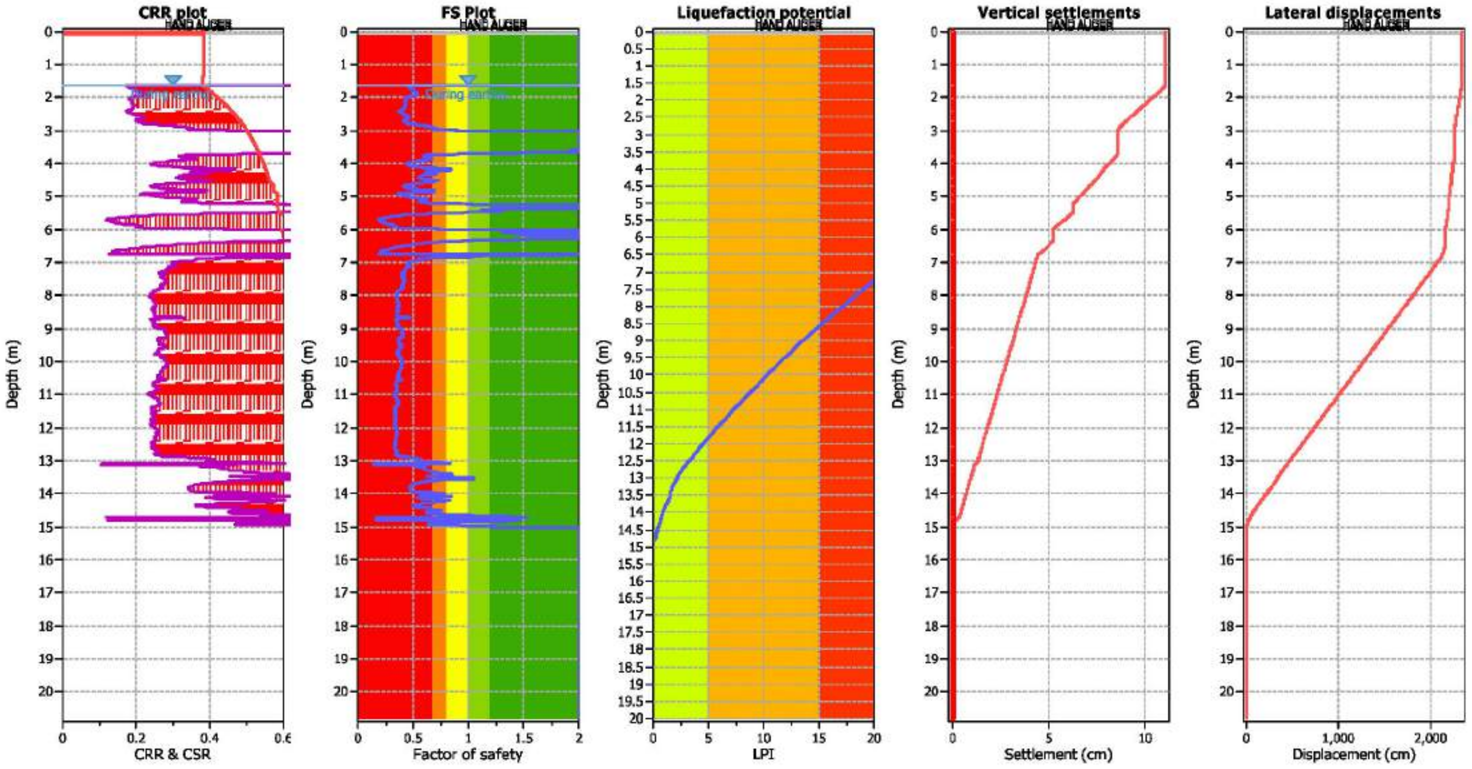

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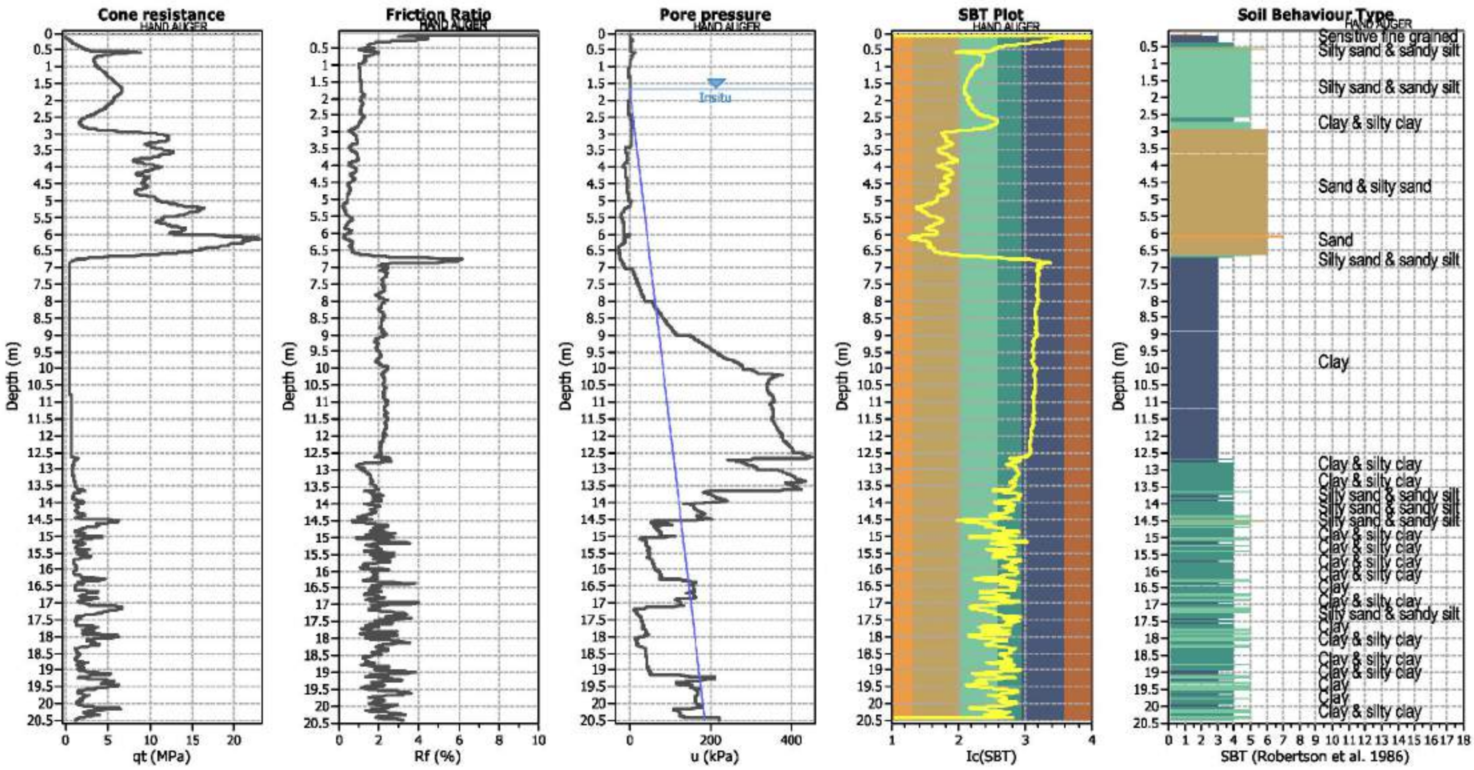

Input parameters and analysis data

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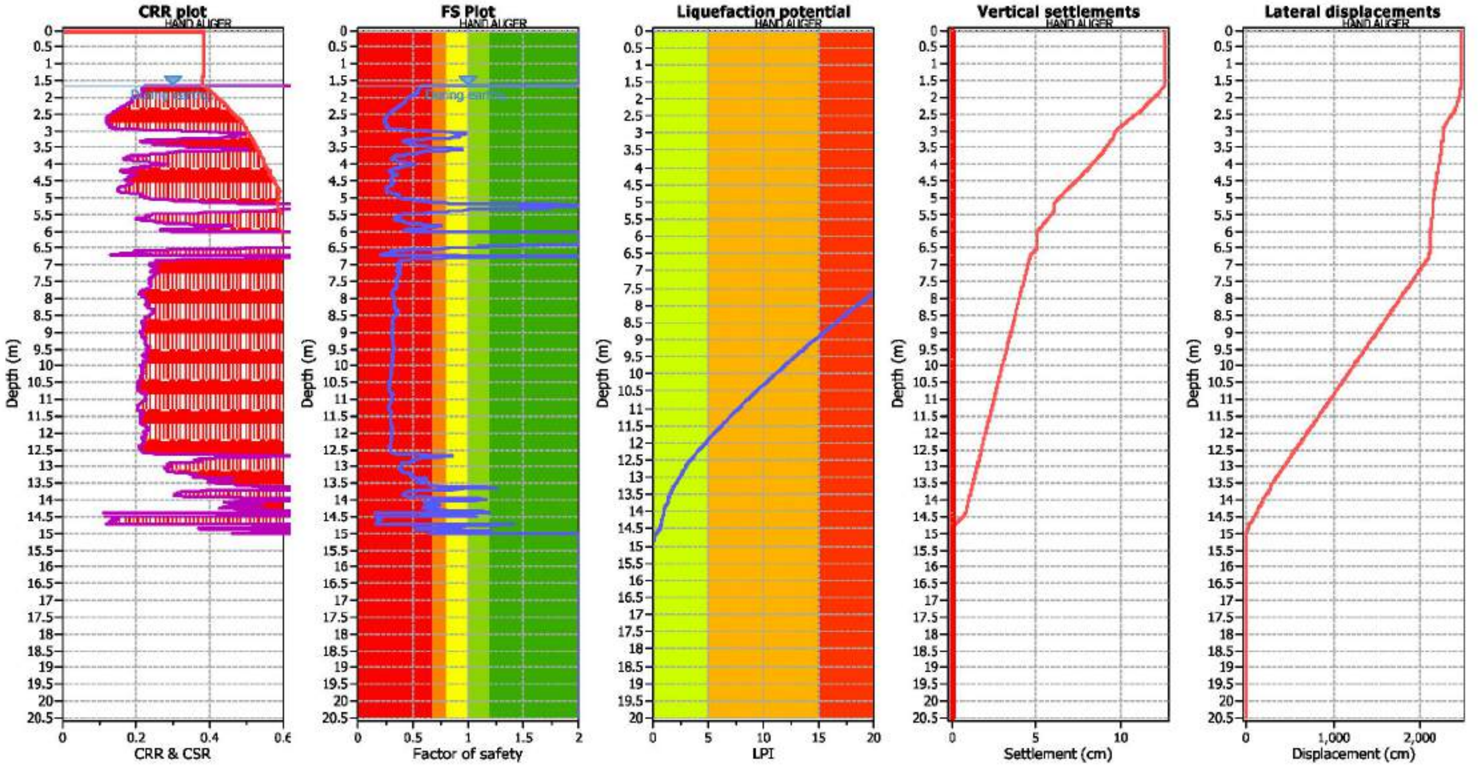

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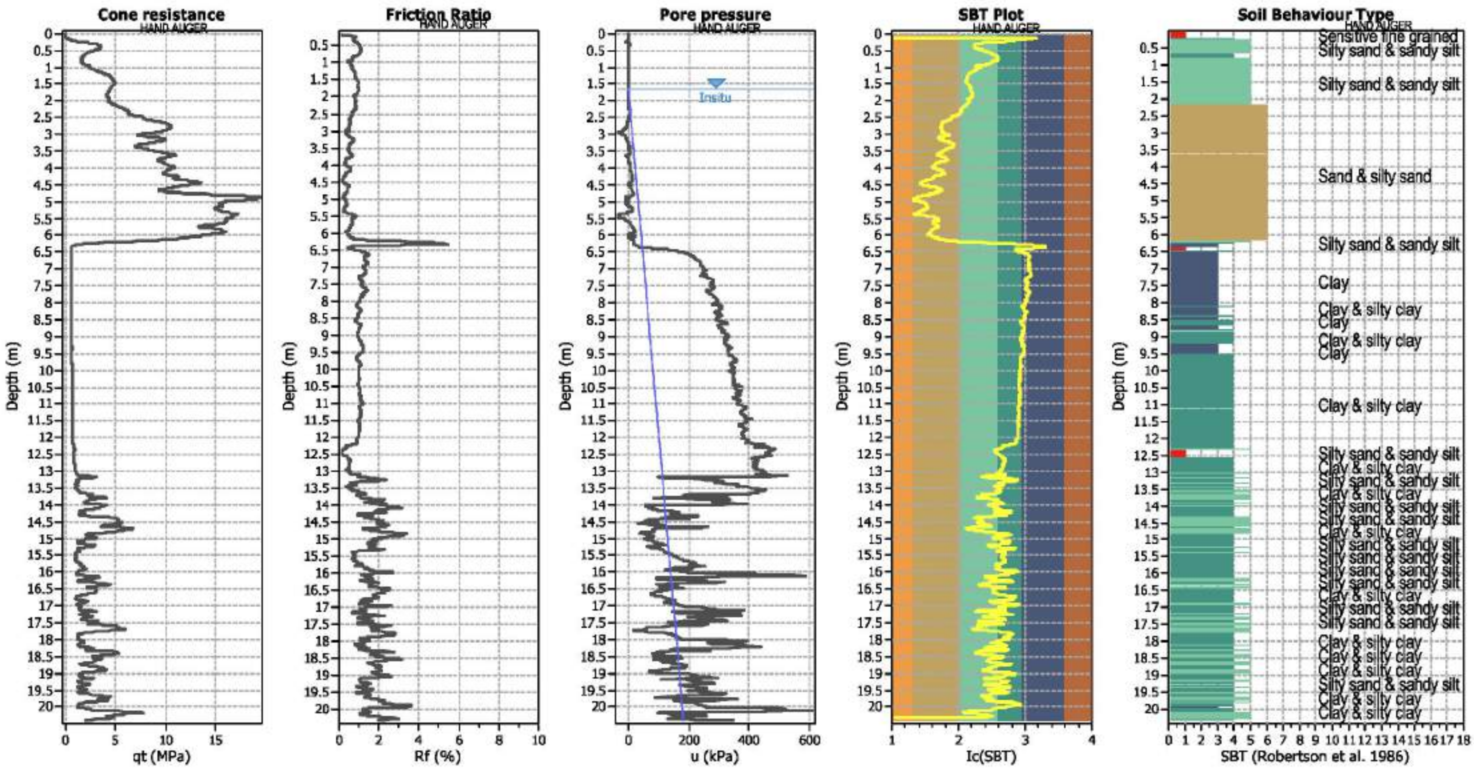

Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
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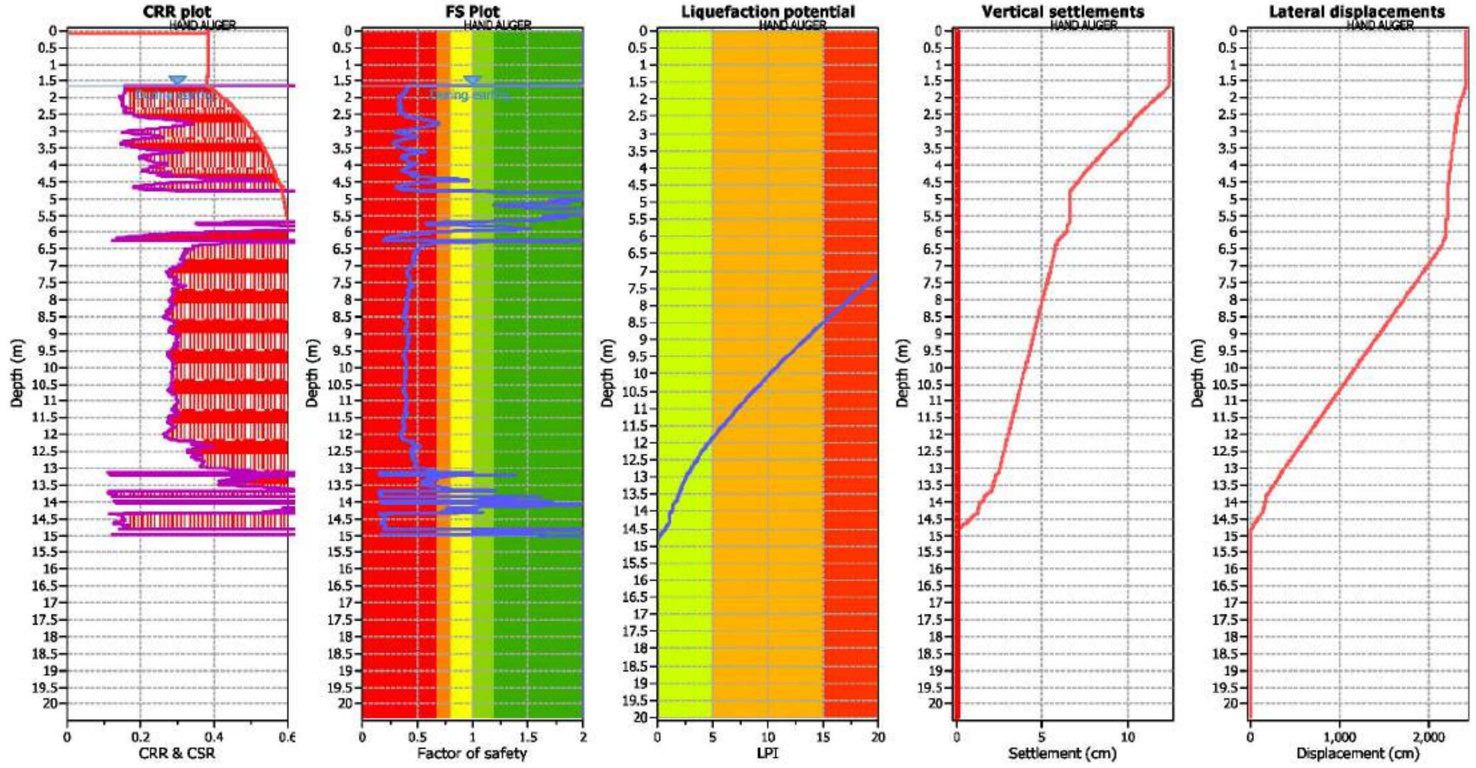

Input parameters and analysis data

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Fines correction method: B&I (2014)
Points to test: Based on Ic value
Earthquake magnitude M_w: 7.50
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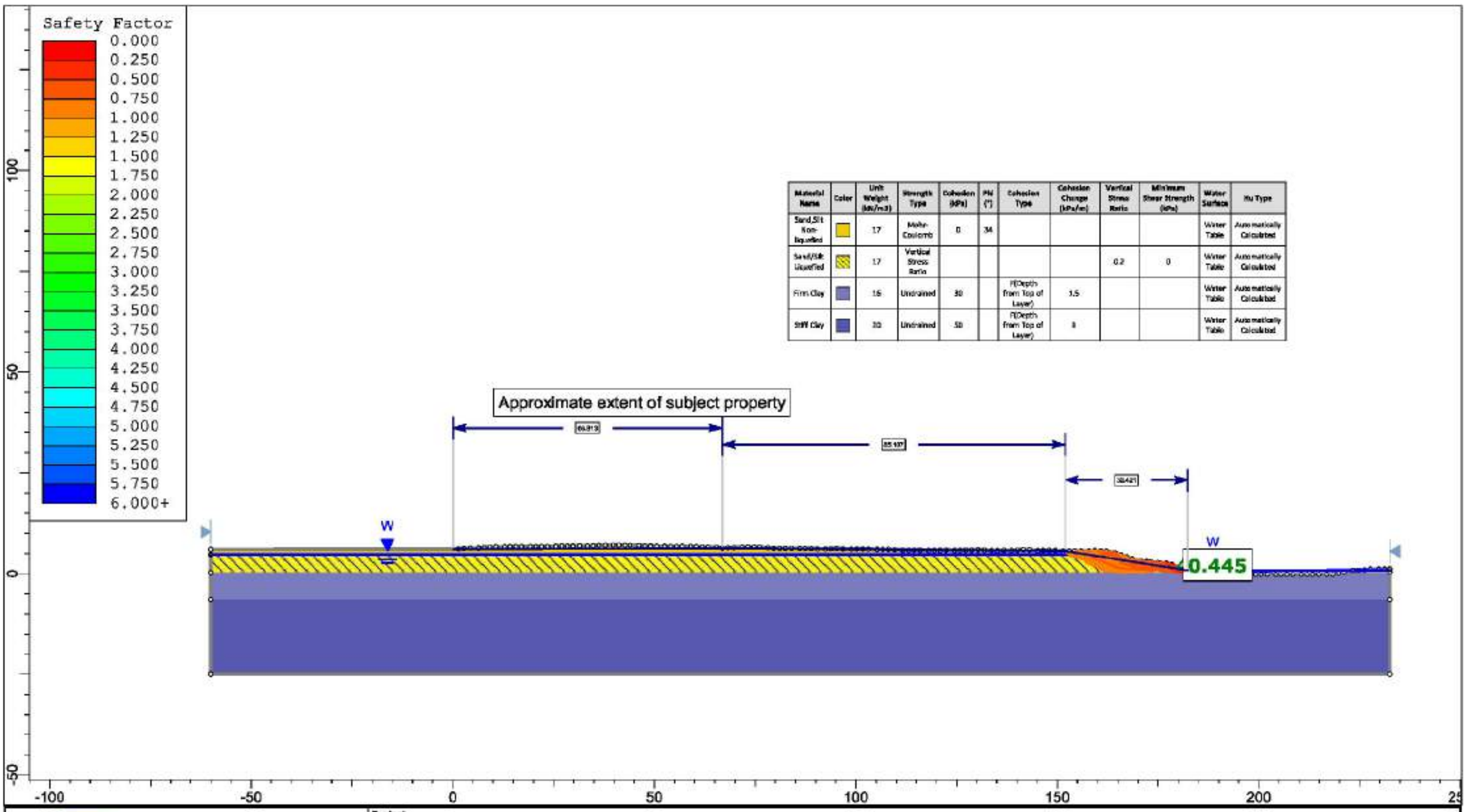
APPENDIX E

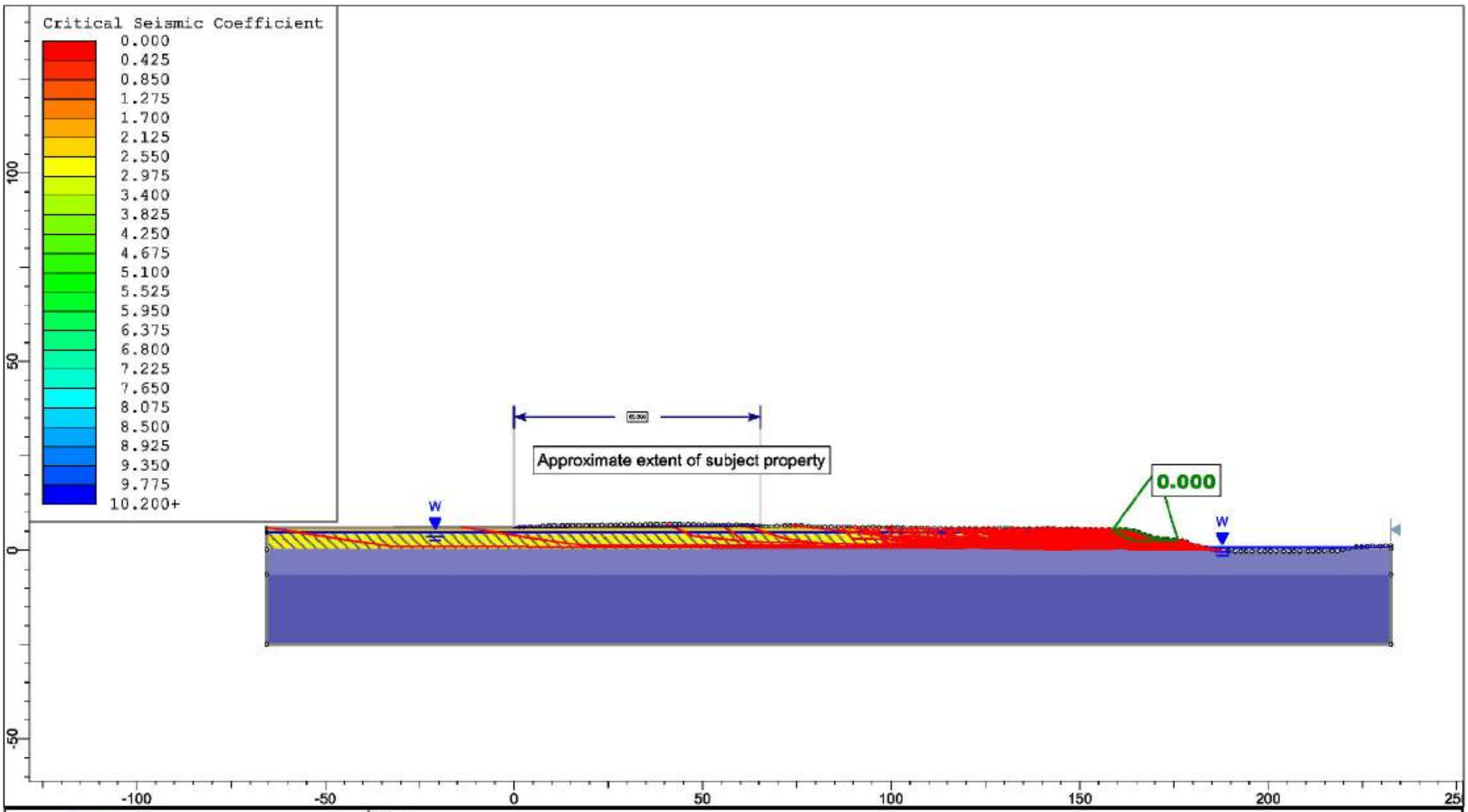
SLOPE STABILITY OUTPUTS



Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (°)	Cohesion Type	Cohesion Change (kPa/m)	Vertical Stress Ratio	Minimum Shear Strength (kPa)	Water Surface	Hu Type
Sand,Silt Non-liquefied	🟨	17	Mohr-Coulomb	0	34					Water Table	Automatically Calculated
Sand/Silt Liquefied	▨	17	Vertical Stress Ratio					0.2	0	Water Table	Automatically Calculated
Firm Clay	🟪	16	Undrained	30		f(Depth from Top of Layer)	1.5			Water Table	Automatically Calculated
Stiff Clay	🟦	20	Undrained	50		f(Depth from Top of Layer)	8			Water Table	Automatically Calculated

SLIDEINTERPRET 9.028

Project	Slide2 - An Interactive Slope Stability Program		
Group	Group 1	*Scenario*	T/S ratio 0.2 - Static Flow
Drawn By	SS	*Company*	LDE Ltd
Date	31/08/2023	*File Name*	Lateral Spreading Analysis.slmd



LAND DEVELOPMENT & ENGINEERING

SLIDEINTERPRET 9.028

Project	Slide2 - An Interactive Slope Stability Program		
Group	Group 4	Scenario	T/S ratio 0.2 - Yield Seismic
Drawn By	SS	Company	LDE Ltd
Date	31/08/2023	File Name	Lateral Spreading Analysis.slmd

NZHG Gisborne Limited

GEOTECHNICAL ASSESSMENT REPORT FOR PROPOSED RESIDENTIAL DWELLING, LOT 11 AND LOT 12

556-560 Aberdeen Road, Te Hapara, Gisborne

Project Reference: 24477
October 13, 2023

DOCUMENT CONTROL

Version	Date	Comments
01	13/10/2023	Issued for Resource Consent. Plan review required prior to submission for Building Consent.

Version	Issued For	Date	Prepared By	Reviewed & Authorised By
01	Issued for Design	13/10/2023	Sahil Sathwara *B.Tech (Civil), MEngNZ* Geotechnical Engineer	Dan Bond *CMEngNZ, PEngGeol.* Associate Engineering Geologist

CONTENTS

1 INTRODUCTION

Land Development & Engineering Ltd (LDE) was engaged by NZHG Gisborne Limited to undertake a geotechnical investigation of a site located at 556 & 560 Aberdeen Road, Gisborne (Figure 1).

The 2,700m^2 site is proposed to be subdivided into 12 Lots for residential development (Figure 1). This geotechnical report pertains to proposed Lot 11 and Lot 12, 556 & 560 Aberdeen Road, Gisborne.

Figure 1 556-560 Aberdeen Road (outlined in blue), with the proposed subdivision outlined in yellow, Lot 11 and 12 highlighted in white. Image source: Tairāwhiti Maps (Gisborne District Council, 2023) Accessed: September 2023

2 PROPOSED DEVELOPMENT

A 12-lot subdivision is proposed at 556 & 560 Aberdeen Road across the property with the legal description Lot 2 DP 1585, PT Lot 1 DP 1585, and Lot 1 DP 1817. The proposed development consists of 7 structures formed of four double-storey duplex buildings, one single-storey building and two standalone dwellings (Figure 1).

The proposed driveway is located centrally of the site to provide access between lots and Aberdeen Road. Proposed access and building platform locations are shown in Figure 1 and Appendix A.

A 93.6m^2 double storey building is proposed across Lot 11 and 12 (Figure 2), with timber framing in accordance with NZS3604 (2011), with weatherboard and sheet wall cladding, profiled metal roofing and a concrete floor or suspended timber floor.

The purpose of this investigation was to determine and assess the nature of the ground beneath the building site to inform our geotechnical recommendations for site development and design of the building's foundations. The investigation was completed to satisfy the requirements of Gisborne District Council (2022) for Resource and Building Consent.

Areas		
	Space Name	Area (m²)
Footprint Per Unit		
	First Floor Footprint	43.4
	Ground Floor Footprint	46.8
		90.2 m²
Unit 1		
	Bath	4.1
	Bedroom 1	10.1
	Bedroom 2	9.2
	Circ.	1.4
	Covered Entry	1.4
	Hall	5.3
	HWC	0.7
	LDY	1.9
	Linen	0.7
	Living / Dining / Kitchen	36.0
	Stair Void	5.2
	Store	1.0
	Store	0.8
	Str.	0.4
	WR 1	0.7
	WR 2	1.3
		80.0 m²
Unit 2		
	Bath	4.1
	Bedroom 1	10.1
	Bedroom 2	9.2
	Circ.	1.4
	Covered Entry	1.4
	Hall	5.3
	HWC	0.7
	LDY	1.9
	Linen	0.7
	Living / Dining / Kitchen	36.0
	Stair Void	5.2
	Store	0.8
	Store	1.0
	Str.	0.4
	WR 1	0.7
	WR 2	1.3
		80.0 m²

Figure 2: (From top to bottom): Floor plans for proposed duplex building across Lot 11 and 12, alongside the architect's drawing (Lot 11 and 12 is labelled). Image Source: Client supplied.

3 SITE STUDY

3.1 Site Description

The site is located within the established suburb of Te Hapara, Gisborne, approximately 2.0km northwest of the Gisborne CBD. The site is generally flat and is elevated between 6m and 7m (New Zealand Vertical Datum (NZVD) 2016). 556 (LOT 2 PT 1 DP 1585) & 560 (LOT 1 DP 1817) Aberdeen Road, occupy a combined area of approximately 2,700m^2.

3.2 Geomorphology and Geology

556 & 560 Aberdeen Road, occupy flat lying ground which, at one time, comprised the historic foreshore of Tūranganui-a-Kiwa (Poverty Bay). The 1:250,000 geological map of the region (Mazengarb & Speden, 2000) indicates the site is underlain by Holocene aged beach deposits which consist predominantly of sand. The Taruheru River is located approximately 120 m to the north; elevation falls relatively gently towards the river until the riverbank, which falls around 6m over some 25m laterally.

The GNS Active Fault Database does not identify any active fault traces or any fault buffer zones affecting the site. The nearest mapped active fault is the Repongaere Fault, located approximately 14 km to the north-west of the properties (GNS Science, 2020).

3.3 Geotechnical Risks

Our review of Gisborne District Council's (GDC) GIS viewer, Tairāwhiti Maps (Gisborne District Council, 2023), and GNS Science's Active Faults Database (GNS Science, 2020) revealed the following:

- 556 & 560 Aberdeen are mapped as being within an area of moderate liquefaction risk.
- The nearest active fault is the Repongaere Fault, located approximately 14 km to the north-west of the properties.
- The site is mapped as yellow tsunami evacuation zone.

In addition to the risk of liquefaction, the nearby riverbanks of the Taruheru River presents the possibility of lateral spreading in a liquefaction-inducing earthquake event.

Our review of the 2023 aerial photographs indicates that the properties were not severely impacted by flooding associated with Cyclone Gabrielle.

3.4 Historical Aerial Photographs

Historical aerial imagery was reviewed as part of this investigation using Retrolens and Google earth aerial photography, which revealed the following: -

- Residential dwellings were constructed at both properties prior to 1942 (the earliest available aerial photograph with sufficient resolution).
- In the 1942 aerial photograph there appears to be some form of structure/s, a pile of material, or disturbance to the ground beneath the southwest corner of 556 Aberdeen Road. However, the resolution of the aerial photography is not sufficient to reliably determine what occupied the southwest corner of the property.
- A large shed was constructed in the southwest corner of 556 Aberdeen Road sometime between 1942 and 1966, along with smaller auxiliary structures at both properties.
- Several small structures or 'lean-tos' were constructed between 1966 and 1988 across both properties.
- A shed/garage was constructed in the south-east corner of 560 Aberdeen Road.
- Between 1988 and 2021 additions were carried out to the garage/shed in the south-east corner of 560,

  and the large shed in the southwest corner of 556. The water tank for 560 Aberdeen Road was removed, along with several of the smaller auxiliary structures across both properties.

Figure 3: Historical aerial imagery of the Aberdeen Road Subdivision (Source: (Retrolens.co.nz)), with the location of the individual lots marked in yellow. (a) Aerial imagery from 1942, (b)1966, (c) 1977, (d) 1988.

4 GEOTECHNICAL INVESTIGATION

4.1 Development wide Investigation Scope

Our investigation of the entire site included the following: -

- A walkover assessment of the site and immediate surrounding area to assess its geomorphology and identify any features which may influence our engineering recommendations, or the long-term performance of the ground.

- 15No. 50mm diameter, hand auger boreholes drilled to refusal or 2.5m target depth at the proposed building locations, with measurements of undrained shear strength taken every 0.2m, and associated DCP's to the 2.5m target depth.

- Complete liquefaction analysis of the Five CPTs which were undertaken across the site during the due diligence phase, three at 556 Aberdeen Road and two at 560 Aberdeen Road (Figure 4).

4.2 Lot 11 and Lot 12 Investigation Scope

No geotechnical investigations were undertaken within the proposed lot areas, due to presence of the existing driveway, trees, and vegetation.

Site wide test locations are shown on the Geotechnical Investigation Plan (Figure 4), and as Appendix A. Logs with details of the relevant testing completed are presented as Appendices B and C.

Figure 4: Geotechnical Investigation Plan for proposed development, Lot 11 and 12 highlighted in white.

5 GROUND CONDITIONS

This section addresses the ground conditions encountered during our investigations.

5.1 Site Stratigraphy

5.1.1 Development Wide

Ground conditions are reasonably consistent across the site. Typically, the property is underlain by topsoil and/or fill to a depth between 0.3m and 0.8m below ground level (bgl), which overlies sand/ silt mixtures to a depth of 1.0m. Underlying this, medium dense to dense sand was encountered to around 6.5m to 7.0m.
Deposits of firm clay were encountered from around 6.5m to 7.0m, with stiff silt/clay mixtures extending to depth from approximately 13m.

A copy of the test logs is provided as Appendix B.

5.1.2 Lot 11 and Lot 12 Site Specific Nuances

The site is generally level and ground conditions were found to be relatively comparable across the site. The nearest available geotechnical investigations data, hand auger boreholes HA12 and HA15 from Lot 9 & 10 represents the Topsoil/ Fill depths of 0.5m and 0.6m from the existing ground surface and Dynamic penetrometer results ranged between 0.5 and 4 blows per 50mm. Therefore, we assume the results will comparably be similar within this proposed lot areas.

5.2 Groundwater

Groundwater was encountered at depths of between 1.50m and 2.88m across the site. A low-bound groundwater level of 1.65m bgl was adopted in our assessments. Given that testing was completed in the wettest year on record for Gisborne, the groundwater level adopted is considered significantly elevated from typical levels and no further allowance has been applied for seasonal variations.

6 NATURAL HAZARDS

6.1 Definition & Legislation

This section summarises our assessment of the natural hazards that might affect the site including earthquake, tsunami, erosion, volcanic and geothermal activity, landslip, subsidence, sedimentation, wind, drought, fire, or flooding, that might affect the property, as generally defined in Section 106 of the Resource Management Act., as well as the hazards as defined in Section 71(3) of the Building Act (2004), including erosion (including coastal erosion, bank erosion, and sheet erosion), falling debris (including soil, rock, snow and ice), subsidence, inundation (including flooding, overland flow, storm surge, tidal effects and ponding), and slippage.

6.2 Seismic Hazard

6.2.1 Surface Fault Rupture

The GNS NZ Geology Web-map and Active Faults Database (GNS Science, 2020) do not show any faults passing beneath the subject site. There also does not appear to be any surface expressions which would indicate the presence of an active fault beneath or within close proximity to the site. We therefore consider the surface fault rupture risk to be low.

6.2.2 Site Subsoil Class

Based on the published geological information for the region, discussed in Section 3.2, and obtained site-specific CPT data, we consider that a seismic site subsoil classification of D- "Deep or Soft Soil" is appropriate as defined by NZS 1170.5 (2004).

6.2.3 Seismic Actions

In accordance with the NZ Building Code and NZS 1170.5 (2004) the structure proposed is considered Importance Level 2 (IL2) with a design working life of 50 years, therefore:

- The Serviceability Limit State (SLS) design earthquake has an annual exceedance probability (AEP) of 1/25, and;
- The Ultimate Limit State (ULS) design earthquake has an AEP of 1/500.

An intermediate state event (ILS) has been considered in accordance with Gisborne District Council's (GDC's) requirements. This design case has an AEP of 1/100.

The modules of the Earthquake Geotechnical Engineering Practice series jointly published by Ministry of Business Innovation and Employment (MBIE) and the New Zealand Geotechnical Society (NZGS) (2021) provides guidance under Section 175 of the Building Act (2004), to assist with ensuring compliance with the Act. We have adopted the ground motions published within Module 1 (2021) for geotechnical design which are summarised in Table 1.

Table 1 - Summary of adopted seismic parameters.

Seismic Parameters	SLS	ILS	ULS
Horizontal Peak Ground Accelerations (PGA), g	0.12	0.28	0.65
Effective magnitude, Mw	6.3	6.8	7.5

6.3 Liquefaction and Cyclic Softening Assessments

6.3.1 Liquefaction

Liquefaction is the term used to describe the temporary, but substantial, loss of strength and stiffness which can occur in saturated, unconsolidated soils that are subjected to strong shaking. In addition to near-total strength loss, liquefaction may also result in the expulsion of sediment and water at the surface, ground, and structure settlement, and in lateral (spreading) displacement of the ground.

The liquefaction potential was assessed with site-specific CPT data using specialist geotechnical software (CLiq Ver.3.3.1.13) in general accordance with NZGS/ MBIE Module 3 Guidance (2021).

Liquefaction triggering was assessed using the method proposed by Boulanger and Idriss (2014).

Liquefaction-induced, free-field, vertical, volumetric strains were estimated using the method proposed by Zhang et al (2002)

A low-bound groundwater level of 1.65m bgl was adopted as discussed in Section 5.2.

6.3.2 Cyclic-Softening

Cyclic softening is a phenomenon that occurs when the strength and stiffness of a soil decreases due to repeated cyclic loading such as that resulting from strong seismic shaking. Relatively soft clay soils are commonly susceptible to this phenomenon, which can be accentuated where these soils are sensitive i.e., there is a significant difference between the soil's peak and residual shear strength.

Due to the presence of the clay rich estuarine soils at this site, we have undertaken a cyclic softening analysis for the ULS design case. The Gisborne 2007 earthquake was of comparable magnitude and PGA to the ILS design case. No liquefaction or induced settlements were identified within the proximity of the subject site because of this earthquake. Accordingly, cyclic softening has been assessed for the ULS design case only.

Our assessments assumed:

- An N_{kt} value of 14 for the clay-like soils, based on previous work undertaken proximally by LDE within the estuarine deposits.
- An estimate of the maximum, post-liquefaction, volumetric strain based on the work by Robertson and Cabal (Robertson & Cabal, 2014) which recommends a default value of 0.5% for clay-like soils.

6.3.3 Liquefaction and Cyclic Softening Results

The results of our analyses is summarised in Table 2; detailed outputs are included as Appendix D.

The Liquefaction Potential Index (LPI) and Liquefaction Severity Number (LSN) are indices used to assess the general performance level of liquefied deposits in accordance with the NZGS/MBIE Module 3 Guidance (2021).

Our analyses indicate that liquefaction-induced settlements are likely to be negligible (<5mm) in a design SLS seismic event.

Under the ILS design case, liquefaction-induced settlements are estimated to be between 20mm and 50mm. As discussed in Section 6.3.2, no liquefaction, or liquefaction-induced settlements were identified within the proximity of the subject site as a result of the Gisborne 2007 earthquake, which had almost identical ground motions. Accordingly, we consider it unlikely that liquefaction would be realised under ILS seismic shaking and conclude that the software is likely to be over-estimating liquefaction potential.

Table 2 - Summary of liquefaction analysis results.

Limit State / AEP	CPT ID	LPI	LSN	Estimated Seismic Volumetric Settlements (mm) [Limited to 10m] (3)			Effects of Liquefaction
				Liquefaction	Cyclic Softening	Total Seismic Settlement	
SLS 1/25 year	CPT-01	0	0	<5 [<5]	-	**<5 [<5]**	**L0**
	CPT-02	0	0	<5 [<5]	-	**<5 [<5]**	
	CPT-03	0	0	<5 [<5]	-	**<5 [<5]**	
	CPT-04	0	0	<5 [<5]	-	**<5 [<5]**	
	CPT-05	0	0	<5 [<5]	-	**<5 [<5]**	
ILS 1/100 year	CPT-01	2	8	~30 [~25]	-	**~30 [~25]**	**L2**
	CPT-02	4	12	~50 [~45]	-	**~50 [~45]**	
	CPT-03	2	5	~20 [~20]	-	**~20 [~20]**	
	CPT-04	4	12	~45 [~40]	-	**~45 [~40]**	
	CPT-05	3	10	~45 [~30]	-	**~45 [~30]**	
ULS 1/500 year	CPT-01	18	23	~75 [~70]	~45	**~120 [~70]**	**L3**
	CPT-02	18	23	~85 [~75]	~40	**~125 [~75]**	
	CPT-03	16	19	~70 [~65]	~40	**~110 [65]**	
	CPT-04	20	24	~85 [~80]	~40	**~125 [65]**	
	CPT-05	18	23	~85 [~65]	~40	**~125 [65]**	
Effects of liquefaction Key	**L0: Insignificant**		**L1: Mild**	**L2 Moderate**	**L3: High**	**L4 Severe**	**L5: Very Severe**

Notes:

- Liquefaction triggering Boulanger and Idriss (2014) methodology limited to upper 15m. Limited to 10m of soil profile shown in square brackets [ ].
- Settlements are free-field estimated settlements and do not include any building-induced settlements.
- Effects of Liquefaction based on NZGS Module 3 (New Zealand Geotechnical Society (NZGS) & Ministry of Business, Innovation and Employment (MBIE), 2021)

Under design ULS seismic shaking, settlements in the order of 110mm to 125mm are estimated. However, given the rationalisation to the Gisborne 2007 earthquake, discussed above, we consider that total, free-field, seismic settlements are likely to less than 100mm.

6.4 Lateral Spreading and Lateral Stretch

Lateral spreading typically occurs in sloping ground or level ground close to slopes or waterways and is most commonly caused by loss of strength due to earthquake-induced liquefaction. Typically, the degree of lateral movement diminishes as the distance from the waterway, or free face, increases.

Liquefaction-induced lateral displacements were estimated in CLiq software using the method proposed by Zhang et al (2004). utilising an Ic cut-off of 2.6, clean sand and overburden corrections, and inferred soil unit weights.

The methods available to predict lateral displacements from CPT data. Both these methods are based upon limited case studies and as such have inherent limitations for broader application. They are known to be highly inaccurate with predictions versus empirical data varying by a factor of two (NZGS Module 3 (2021)) or possibly more. Accordingly, lateral spreading potential was also assessed through numerical modelling, using Slide 2 (Version 9.027) by Rocscience Inc., to provide a more reliable estimate and allow sensitivity analyses to be undertaken.

Both methods, and associated results are discussed below.

6.4.1 CLiq Assessment

Our CLiq assessment adopted the 'Level ground with a free face' approach, because the alternative option (gently sloping ground) was found to estimate lateral displacements in excess of 600mm under the ILS design case.

Our assessment was based on the sites closest proximity to the Taruheru River (117m) and a free face height of 7m (elevation relief from the site to the river) and was completed for each CPT.

Table 3 presents the results of these analyses.

Table 3 - Summary of Lateral Spreading Displacements

CPT ID	SLS 1/25 year (mm)	ILS 1/100 year (mm)	ULS 1/500 year (mm)	Global Lateral Movement (ULS)
CPT01	<5	~105	~315	**Major**
CPT02	<5	~170	~390	**Major**
CPT03	<5	~100	~275	**Minor to Moderate**
CPT04	<5	~250	~460	**Major**
CPT05	<5	~180	~380	**Major**
Global lateral movement categories	**Minor to Moderate 0 to 300mm**	**Major 300 to 500mm**	**Severe >500mm**	

Notes:

- Free-face method adopted limits of lateral spreading to 2H. Chu et al (2006) have compared predicted values of lateral spread using the Zhang et al model with actual measurements of lateral displacement following the 1999 Chi Chi earthquake. They found that predicted values better matched observed values when liquefaction calculations in the CPT profile were limited to a depth of twice the free face height (2H).
- Global lateral movement categories based on MBIE Guidance for TC3 (Ministry of Business Innovation and Employment Hīkina Whakatutuki, 2015)

6.4.2 Numerical Modelling Assessment

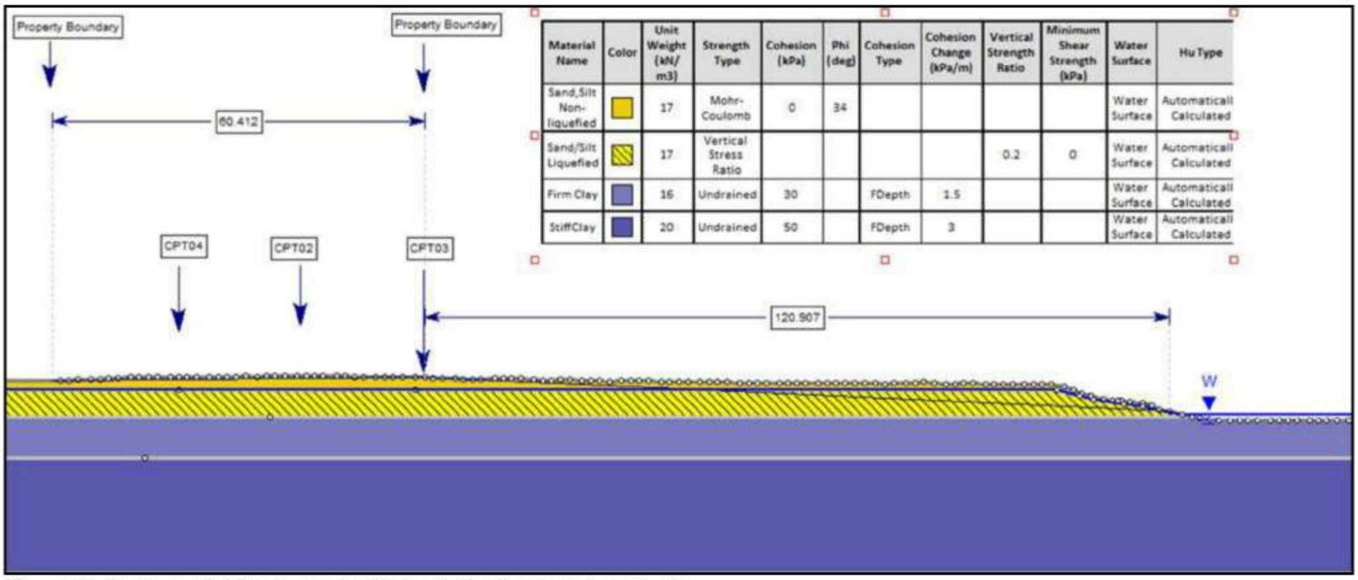
Numerical modelling was used to assess the potential for lateral displacements using Slide 2 as discussed above.

Our modelling assessed non-circular slip surfaces using the 'Cuckoo" search method and adopting the 'Vertical Strength Ratio' material strength model for the liquefied layer.

From past projects and general geological knowledge of this area, it is our experience that the Holocene beach sand transitions to clay-rich deposits towards the river, likely due to a combination of river migration and overbank deposition. In many areas along the Taruheru river a relic river terrace can be clearly identified, however this area had been developed prior to the earliest available historic aerial imagery and consequently the terrace boundary could not be identified.

Accordingly, we have adopted a conservative 'what if.' scenario in our modelling where the liquefied layer has been extended at consistent thickness and elevation to the river.

Figure 5 shows the base model, the surface profile of which was plotted from recent LiDAR data. Note the left side of the model has been manually extended to check the potential for more critical slip surfaces.



Material Name	Color	Unit Weight (kN/ m3)	Strength Type	Cohesion (kPa)	Phi (deg)	Cohesion Type	Cohesion Change (kPa/m)	Vertical Strength Ratio	Minimum Shear Strength (kPa)	Water Surface	Hu Type
Sand,Silt Non-liquefied	🟨	17	Mohr-Coulomb	0	34					Water Surface	Automaticall Calculated
Sand/Silt Liquefied	▨	17	Vertical Stress Ratio					0.2	0	Water Surface	Automaticall Calculated
Firm Clay	🟪	16	Undrained	30		FDepth	1.5			Water Surface	Automaticall Calculated
StiffClay	🟦	20	Undrained	50		FDepth	3			Water Surface	Automaticall Calculated

Figure 5: Base model for numerical lateral displacement analysis

The liquefied shear strength to overburden stress (Tau/ Sigma) ratio was derived for the sand/ silt mixtures from statistical analysis of CPT data. The Tau/ Sigma Ratio was found to vary significantly, ranging from 0.08 to 0.98; a value of 0.2 was adopted to provide a moderately conservative estimate for the body of liquefied material. Figure 6 shows a plot of Tau/ Sigma ratio with depth for CPT04.

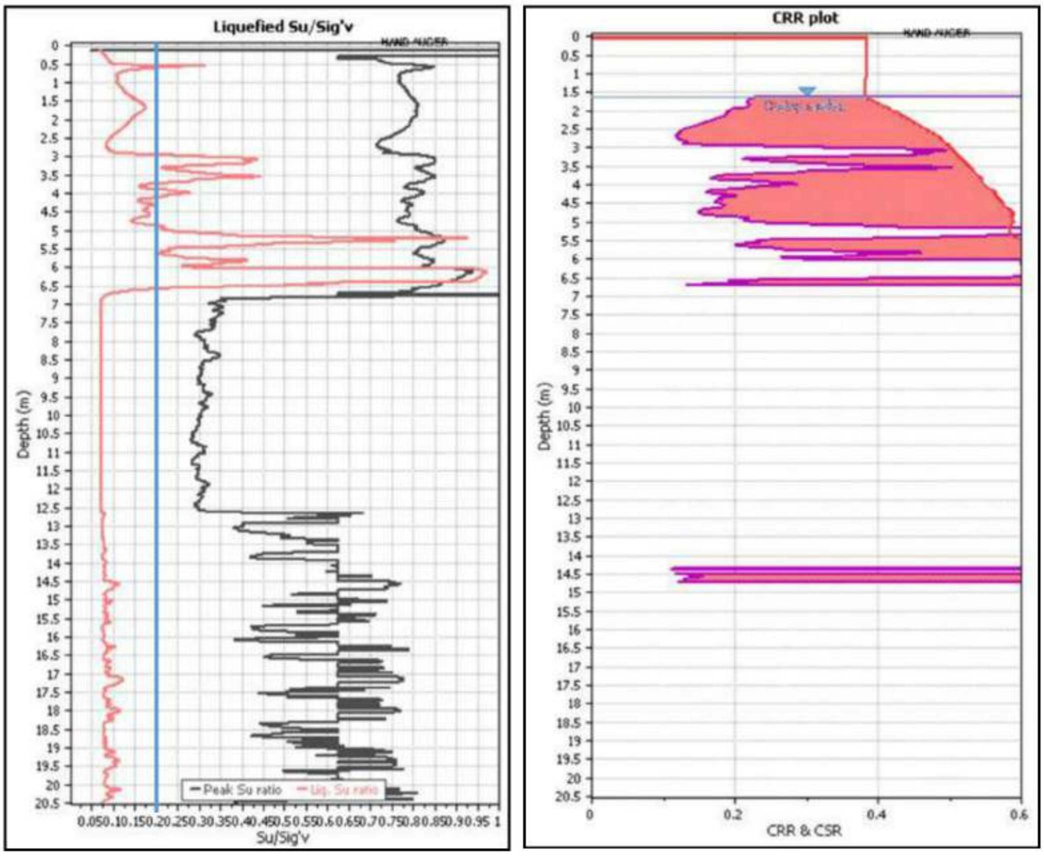


Figure 7: Tau/ Sigma ratio plot for CPT04 and plot showing depth of liquefiable material. Blue line shows value adopted in our modelling.

Two design cases were assessed:

1. Static Flow

   This design case models a post seismic liquefied case to assess the potential for flow failures to impact the subject property.
2. Seismic Yield

   This assessment determines the PGA required for the site to be affected by lateral displacements considering seismic action coincident with the fully liquefied condition. A magnitude of 0.1g was considered reasonable to represent an aftershock occurring within the short-term, liquefied timeframe.

6.4.2.1 Results

The results suggest that the property will not be affected in the static flow scenario with failures extending to a maximum of around 31m from the riverbank, some 85m from the subject property.

Under the seismic yield design case the subject property is estimated to be affected with a PGA of around 0.11g. Accordingly, lateral displacements are not anticipated in this scenario.

Full results are presented in Appendix E.

6.4.3 Conclusions

Numerical modelling indicates that lateral displacements of the magnitude estimated by CLiq are only achieved when full seismic PGAs are applied in the fully liquefied condition. Such a scenario is considered to be of very low probability, and highly conservative. We consider however that there is a reasonable probability of an aftershock occurring during this timeframe.

We conclude that the numerical modelling provides a more realistic estimate of ground performance, particularly given the apparent overestimation of liquefaction affects, discussed in Section 6.3.3. Accordingly, we consider that the subject site has low lateral spreading potential.

6.4.3.1 Lateral Stretch

Lateral stretch is a metric of the amount of differential extension that a portion of land may experience during an episode of lateral spreading. The lateral stretch across a foundation is a main factor in foundation damage due to liquefaction and lateral spreading as a result of a large earthquake.

Given the results of our numerical analyses, discussed above, lateral stretch is not anticipated at the subject site under the design cases assessed.

6.5 Liquefied Bearing

Liquefaction may lead to foundation bearing failure, by either 'punch through' failure or a reduction in bearing capacity when liquefaction occurs within the zone of influence of load bearing foundations.

A preferred foundation option has not been identified for the proposed structures at the time of writing and we have completed liquefied bearing assessments for both raft-type surface structures and piled foundations.

A unit weight of 17kN/m^3 was adopted for both the non-liquefied and liquefied soil layers. An angle of internal friction of 34 degree was adopted for the non-liquefied material.

The Tau/sigma ratio for these assessments was based on site-specific CPT data and taken as 0.075 for the liquefied material within the zone of influence of the foundations.

A low-bound groundwater level was taken as 1.65m, as discussed in Section 5.2.

A reduction factor of 0.75 was applied to the ultimate capacities calculated for the proposed, two-storey, duplex buildings, in accordance with MBIE Module 5 (2021) for moderately loaded structures.

6.5.1 Pile Foundation Assessment

Our assessment of pile foundations assumed:

- Ordinary piles embedded to a minimum depth of 0.5m at 0.3m diameter (including concrete cover), and
- Anchor piles embedded to a minimum depth of 0.9m at 0.4m diameter (including concrete cover), and
- 100kPa design load.

Both projected area and 'punch-through' failure mechanisms were assessed.

6.5.1.1 Results

The design load was found to be acceptable in both design cases. Note that our calculations are dependent on the assumptions listed within this Section. Should the pile diameter, pile embedment depth or design loads change, the liquefied bearing capacities will need to be reassessed.

6.5.2 Raft type Surface Structure Foundation Assessment

For the raft-type surface structures assessments were completed for the single-storey and two-storey buildings assuming:

- Foundation widths as presented in the 15% architectural drawings, and
- An embedment depth of 0.2m.

6.5.2.1 Results

Liquefied bearing capacities were calculated to be 19kPa for the proposed single-story buildings and 14kPa for the proposed two-storey duplex structures.

The values presented above are dependent on the assumptions listed. Should the foundation breadth, embedment depth or design loads change, the liquefied bearing capacities will need to be reassessed.

6.6 Equivalent MBIE Technical Category

Considering the rationalisation provided in Section 6.3.3, we consider that seismic ground performance at this site would be equivalent to a TC2 classification in accordance with Table 15.6 of the MBIE Guidance (2015).

6.7 Flood Hazard

The site is not located in a mapped flood hazard zone. GDC aerial imagery post cyclone Gabrielle does not indicate this site experienced significant impacts.

6.8 Tsunami

The Gisborne / East Cape coastline is classified as being at the highest risk in the country of being affected by tsunami. Modelling for the Gisborne region (GNS Science Te Pū Ao, 2016) indicates that the site is sufficiently elevated and is unlikely to be inundated in 1:100, 1:500, and 1:2500-year return period tsunami events, respectively. Civil defence tsunami inundation maps show that the site mapped as a yellow zone, which may be subject to tsunami hazard in the case of a severe (ie M8.9) local earthquake on the Hikurangi subduction margin (Gisborne District Council Te Kaunihera o Te Tairāwhiti, 2019) .

6.9 Expansive Soils

Cohesive soils containing significant proportions of certain clay minerals can be subject to appreciable volume change caused by variations in soil moisture content, most notably between seasons or from the uptake of water through the root systems of trees and shrubs. This is referred to as soil reactivity or shrink-swell behaviour.

The surficial soils at this site are granular in nature and therefore not subject to expansivity.

6.10 Consolidation Settlement

The topsoil across the site is expected to be subject to consolidation with applied load and is not suitable to support structural loads.

The firm clay beneath the site may also be subject to consolidation settlement depending on the foundation option selected and the structural loads applied. The potential for consolidation settlement within this material should be assessed once the foundation type and structural loads have been determined.

6.11 Natural Hazards Summary

From our assessment of the natural hazards and ground deformation risks presented to the proposed development we consider that the proposed structures can be safely located on the site, provided that the recommendations given in Section 7 are adopted.

7 ENGINEERING RECOMMENDATIONS

7.1 Site Contouring and Topsoiling

The finished ground level should be graded so that water cannot pond against, beneath or around the buildings for the economic life of structure. To achieve this, it will be important that the building platform beneath the topsoil grades away from the site. Contouring should avoid the potential for concentration and discharge of surface water over point locations which could result in soil erosion or instability.

7.2 Access Road Construction

Access is proposed from Aberdeen Road. No major/ significant earthworks are anticipated to form access to the proposed dwellings.

7.3 Foundation Recommendations

No lot specific geotechnical investigations were undertaken for this lot due to the presence of the existing driveway, trees, and vegetation. Ground conditions were found to be relatively comparable across the site. Any aberrations encountered for this lot will be addressed during construction.

7.3.1 Foundation Type

Based on the general site investigation and analysis, we consider that foundations comprising pile foundations or raft-type surface structures are suitable for the site conditions providing the recommendations and limitations presented within this section are addressed in design.

7.3.2 Design Considerations

Based on the scope of work completed, the following aspects need to be considered in detailed design:

- Site Class - Class D - Deep or soft soil
- Liquefaction-induced vertical settlements - TC2 equivalent
- Relatively high groundwater level
- Liquefied bearing capacity
- Potential for consolidation settlement

7.3.3 Bearing Capacity and Founding Depth

Foundations must extend beneath any topsoil, uncontrolled fill, organic and/ or otherwise unsuitable material.

The found ground conditions to be relatively comparable across the site and by taking available nearby geotechnical investigations data into consideration, we assume for the Lot 11/12 duplex structure, a static geotechnical ultimate bearing capacity of 210kPa will be available from 0.6m depth. A reduction factor of 0.45 should be applied to this value to give the design bearing strength (q_{dbs}).

A short-term, post-seismic (static), liquefied bearing capacity, equivalent to the values presented in Section 6.5, should be assessed in structural design. Note that these liquefied bearing capacities are contingent on the assumptions listed within Section 6.5. Should these assumptions change in design, the liquefied bearing capacities will need to be reassessed. This may require some iterative design between the geotechnical and structural engineers.

7.4 Surface Water

Surface water from roof, impermeable surfaces, or any slopes should be collected and discharged away from the building to mitigate against flooding, erosion, soil expansivity, and/ or potential instability. The site will be connected to the reticulated network. Rainwater will be collected from the roof and all paved surfaces including parking areas and discharged into the GDC reticulated stormwater network.

7.4.1 Service Pipes

All service pipes, stormwater structures should be designed and constructed to ensure adequate capacity, strength, and water tightness to prevent leakage into the platform through blockage, running under pressure, or structural failure.

All service pipes installed within any fill should be flexible, or flexibly joined, so that they may deflect without breaking if the ground settles.

A record should be kept of the position, type, and size of all subsoil drains, and in particular of their outlets.

7.5 Trees and Shrubs

There are trees within the vicinity scattered across the property which might potentially cause damage through heaving as a result of root growth and/or settlement resulting from soil shrinkage from the moisture uptake of the roots. To reduce the chance of damage to the foundations, we recommend one of the following options:

- Any Trees/ plants that at their mature high will not be a minimum of that height away from the foundation should be removed including its major root structure.
- A root barrier should be designed and installed between the offending plant and the structure.
- Foundation should be taken to a depth no less than 1.0m where damage from the roots of a plant is unlikely.

If new trees, shrubs, or gardens are established near the structure, care should be taken to ensure:

- The vegetation does not interfere with any subfloor ventilation or services to the structure.
- Over-watering of the vegetation does not saturate the ground near the foundations.
- Trees or shrubs with the potential to develop significant root systems should be planted a minimum distance equal to the mature height of the plant away from the foundations.

8 SUSTAINABILITY

Considering sustainability as early as possible in a project's development, could lead to significant project opportunities and wider positive outcomes. Geotechnical opportunities for increased sustainability for this project include:

- Striping and stocking topsoil for reuse (dependant on presence/ levels of contaminants).
- Designing for cut and fill balance where possible.
- Reuse of site won materials, or using materials won from other sites including use of recycled crushed concrete aggregate for hard fill.
- Contributing site investigation data to the New Zealand Geotechnical Database (NZGD) to help reduce the site investigations needed in the future.
- Using local consultants and contractors to reduce transport related emissions.

9 CONCLUSIONS

Following development of the site in accordance with our recommendations, we consider that: -

a) The land in respect of which a consent is sought, or any structure on the land built in accordance with our recommendations, is unlikely to be subject to material damage by erosion, falling debris, subsidence, slippage, or inundation from any source; and

b) Any subsequent use that is likely to be made of the land is unlikely to accelerate, worsen, or result in material damage to the land, other land, or structure by erosion, falling debris, subsidence, slippage, or inundation from any source; and

c) Sufficient provision has been made for physical access to each allotment to be created by the subdivision.

10 PLAN REVIEW

Prior to an application for Building Consent, it is important we are given the opportunity to review the final development drawings to ensure the recommendations contained within this report have been followed and interpreted correctly. Following successful review of the development drawings, we are able to update this report to support an application for Building Consent.

11 VERIFICATION

Verification requirements will be provided once the form of the foundations has been determined.

12 LIMITATIONS

This report should be read and reproduced in its entirety including the limitations to understand the context of the opinions and recommendations given.

This report has been prepared exclusively for NZHG Gisborne Limited in accordance with the brief given to us or the agreed scope and they will be deemed the exclusive owner on full and final payment of the invoice. Information, opinions, and recommendations contained within this report can only be used for the purposes with which it was intended. LDE accepts no liability or responsibility whatsoever for any use or reliance on the report by any party other than the owner or parties working for or on behalf of the owner, such as local authorities, and for purposes beyond those for which it was intended.

This report was prepared in general accordance with current standards, codes and best practice at the time of this report. These may be subject to change.

Opinions given in this report are based on visual methods and subsurface investigations at discrete locations designed to the constraints of the project scope to provide the best assessment of the environment. It must be appreciated that the nature and continuity of the subsurface materials between these locations are inferred and that actual conditions could vary from that described herein. We should be contacted immediately if the conditions are found to differ from those described in this report.

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14 GLOSSARY

Compressible Soils:	Compressible soils are those that will undergo a reduction in volume under an imposed load, such as the weight of fill or a structure. This occurs firstly as a result of the expulsion of air and water from the soil void spaces (primary settlement) and secondly due to a restructuring of the soil skeleton to take the load (secondary settlement).
Cyclic Softening:	Cyclic-softening is a related condition to liquefaction can also affect clay soils when subjected to cyclic-loading. Clay soils may significantly soften and led to bearing capacity failure, in addition to post-earthquake consolidation settlements may occur as a result of the earthquake shaking.
Expansive Soils:	Cohesive soils containing significant proportions of certain clay minerals can be subject to appreciable volume change caused by variations in soil moisture content, most notably between seasons or from the uptake of water through the root systems of trees and shrubs. This is also often referred to as soil reactivity or shrink-swell behaviour.
Lateral Spread:	Lateral spread of liquefied soils is the lateral displacement of blocks of land moving laterally towards a free edge (for example a riverbank) or within sloping ground. More lateral movement tends to occur closest to the edge with less movement further back. Lateral spreading may result in large permanent ground displacements including cracks, fissures, vertical officesets and overall settlement of the ground.
Lateral Stretch:	Lateral stretch is the amount of differential extension that a portion of land may experience during an episode of lateral spreading. The lateral stretch across a foundation is a main factor in foundation damage due to liquefaction and lateral spreading because of a large earthquake.
LiDAR	Light Detection and Ranging (LiDAR) is a method of remote sensing topographical survey.
Limit States:	Seismic design criteria for performance-based design. SLS, SLS2 & ULS are prescribed in NZS1170.5 (Standards New Zealand Te Mana Tautikanga O Aotearoa, 2004) • **Serviceability Limit State (SLS):** Functional requirements for the serviceability limit state are assumed to be met if the structure or part can continue to be used as originally intended without the need for repair (SLS1) or can remain operational or continue to be occupied as appropriate (SLS2). SLS earthquakes are considered highly likely to occur during the lifetime of the structure. • **Ultimate Limit State (ULS):** Functional requirements for the ultimate limit state are assumed to be met if: a) People within, and adjacent to the structure are not endangered by the structure

or part.

b) Displacements of the structure are such that there is no contact between any parts of a structure for which contact is not intended, or between separate structures on the same site, if such contact would damage the structures or parts to the extent that persons would be endangered, or detrimentally alter the response of the structure(s) or parts, or reduce the strength of structural elements below the required strength.

c) The structure does not deflect beyond a site boundary adjacent to which other structures can be built or collision between the structure and any adjacent existing structures cannot occur.

d) There is no loss of structural integrity in either the structure or part.

- **Intermediate Limit State (ILS):** ILS is an intermediate seismic event between SLS & ULS although is not a code requirement. The behaviour of soils and geotechnical systems under earthquake shaking may be highly non-linear and even exhibit a pronounced 'step change' in performance with increasing intensity of shaking. For such cases, only considering performance at the SLS and ULS levels of shaking would fail to identify potentially poor and unacceptable performance at intermediate return periods of shaking.

Liquefaction:	Liquefaction is the term used to describe the temporary, but substantial, loss of strength and stiffness which can occur in saturated, unconsolidated soils that are subjected to strong shaking. In addition to near-total strength loss, liquefaction may also result in the expulsion of sediment and water at the surface, ground and structure settlement, and in lateral (spreading) displacement of the ground.
LPI	Liquefaction potential index is a liquefaction damage index. LPI ranges between 0 and 100 and sites with an LPI of 5 indicate a high liquefaction risk and sites with LPI greater than 15 indicate very high risk (Iwasaki et al, 1982). Not to be used as a precise measure of liquefaction-induced ground damage but as an indicator of the general level of liquefaction severity.
LSN	Liquefaction Severity Number is a liquefaction damage index. LSN varies from 0 (representing no liquefaction vulnerability) to more than 100 (representing very high liquefaction vulnerability (van Ballegooy et al, 2013). LSN places greater importance (than LPI) on the thickness of the non-liquefied crust when the groundwater table is close to the ground surface. Not to be used as a precise measure of liquefaction-induced ground damage but as an indicator of the general level of liquefaction severity. LNS was developed based on the observations/ investigations from the Canterbury earthquake sequence
PGA:	Peak Ground Acceleration (PGA) is the maximum ground acceleration during an earthquake as a proportion of gravity.
Punch Through	Punch through failure occurs when a foundation punches through a crust of non-liquefiable material due to underlying liquefaction occurring and can lead to potential damage to

Failure: foundations and/ or large settlements.

Technical Category: Following the 2010 -2011 Canterbury earthquake sequence the Ministry of Business Innovation and Employment (MBIE) assigned three technical categories (TC1, TC2, TC3) across the residential 'green zone' for foundation investigation and design guidance focusing on one and two storey timber-framed dwellings. These categories are broadly defined as below:

- **TC1:** Liquefaction damage is unlikely in future large earthquakes. Standard residential foundation assessment and construction is appropriate.
- **TC2:** Liquefaction damage is possible in future large earthquakes. Standard enhanced foundation repair and rebuild options in accordance with MBIE guidance are suitable to mitigate against this possibility.
- **TC3:** Liquefaction damage is possible in future large earthquakes. Individual engineering assessment is required to select the appropriate foundation repair or rebuild option.
- **TC2/ TC3 Hybrid:** A site that straddles liquefaction settlement limits of TC2 and TC3 where the SLS settlements are assessed as being less than 50 mm but the ULS settlements are assessed at greater than 100mm.

Whilst this guidance is intended for residential buildings in the Canterbury region, they have been widely adopted to convey liquefaction vulnerability across New Zealand.

The Modules: The New Zealand Geotechnical Society (NZGS) and MBIE jointly published a series of guidelines for Earthquake Geotechnical Engineering Practice. Revision 1 of the Modules was published in November 2021 and they provide guidance under section 175 of the Building Act 2004 to assist parties to comply with their obligations under the Building Act 2004. The following modules currently form the collection:

- **Module 1:** Overview of the guidelines
- **Module 2:** Geotechnical investigation for earthquake engineering
- **Module 3:** Identification, assessment, and mitigation of liquefaction hazards
- **Module 4:** Earthquake resistant foundation design
- **Module 5:** Ground improvement
- **Module 5A:** Specification of ground improvement for residential properties in the Canterbury region
- **Module 6:** Retaining walls

APPENDIX A

SITE PLAN

LEGEND

Project Data

🟨	Proposed Lots Boundary
🟥	Proposed Building Platform
—	Proposed Accessway
●	Hand Auger + DCP
▽	CPT (Due Diligence)

0 6 12 18 24 m

SCALE A3: 1:350

NOTES

1. Aerial basemap and property boundaries sourced from LINZ Data Service (CC-BY 4.0).
2. Investigation locations shown approximately only.

CLIENT

NZHG Gisborne Limited

PROJECT

Geotechnical Investigation for proposed subdivision
556-560 Aberedeen Road, Te Hapara
Gisborne

DRAWING TITLE

Geotechnical Investigation Plan

LAND DEVELOPMENT & ENGINEERING

PROJECT REF	DRAWING REF	REVISION
24477	GIP	A
DATE	PREPARED BY	CHECKED BY
29/09/2023	SS	RH

FILE PATH

M:\FILES\LDE - Projects\77008-24477\Geo QGIS Zip Folder (ID 79084)\24477 QGIS Site Maps\24477 Aberdeen Rd.qgz

APPENDIX B

HAND AUGER TEST LOGS

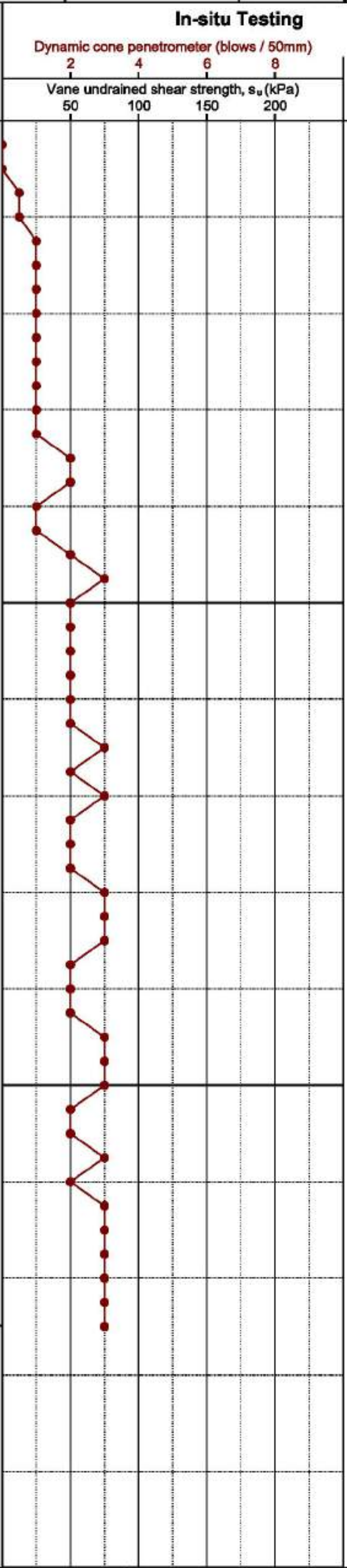
Hand Auger Borehole Log

Method: 50mm Hand Auger

Client:	NZHG	**Coordinates:**	5709871mN, 2036134mE	**Test ID:**	HA01
Project:	Geotechnical Investigation	**System:**	NZTM	**Project ID:**	24477
Location:	556-560 Abeerdeen Rd, Gisborne	**Elevation:**	6.5m (NZVD2016)	**Sheet:**	1 of 1
Test Site:	Refer to geotechnical investigation plan	**Located By:**	Site plan/map	**Test Date:**	12/09/2023
				Logged By:	SS
				Prepared By:	SS
				Checked By:	RH

Depth (m)	Geology	Material Description	Water	RL (m)
0.0–0.3	TS	SAND, with trace rootlets and silt; dark brown. Very loose; moist; sand, fine to medium.	Groundwater not encountered	
0.3–2.5	Holocene Beach Deposits	SAND; brown. Loose; moist; sand, fine to medium. 1.80m: Light grey. 2.20m: Grey with orange mottles. 2.40m: Wet.		
0.5				6.0
1.0				5.5
1.5				5.0
2.0				4.5
2.5				4.0

In-situ Testing



Values

Vane ID: N/A

peak / residual (sensitivity)

Hole Depth: 2.50m	**Termination:** TARGET DEPTH

Remarks:

Materials are described in general accordance with NZGS 'Field Description of Soil and Rock' (2005).
No correlation is implied between shear vane and DCP values.

● Vane peak
○ Vane residual
◆ Vane UTP
▼ Standing water level
◁ Groundwater inflow
▷ Groundwater outflow

UTP = Unable to Penetrate

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Hand Auger Borehole Log

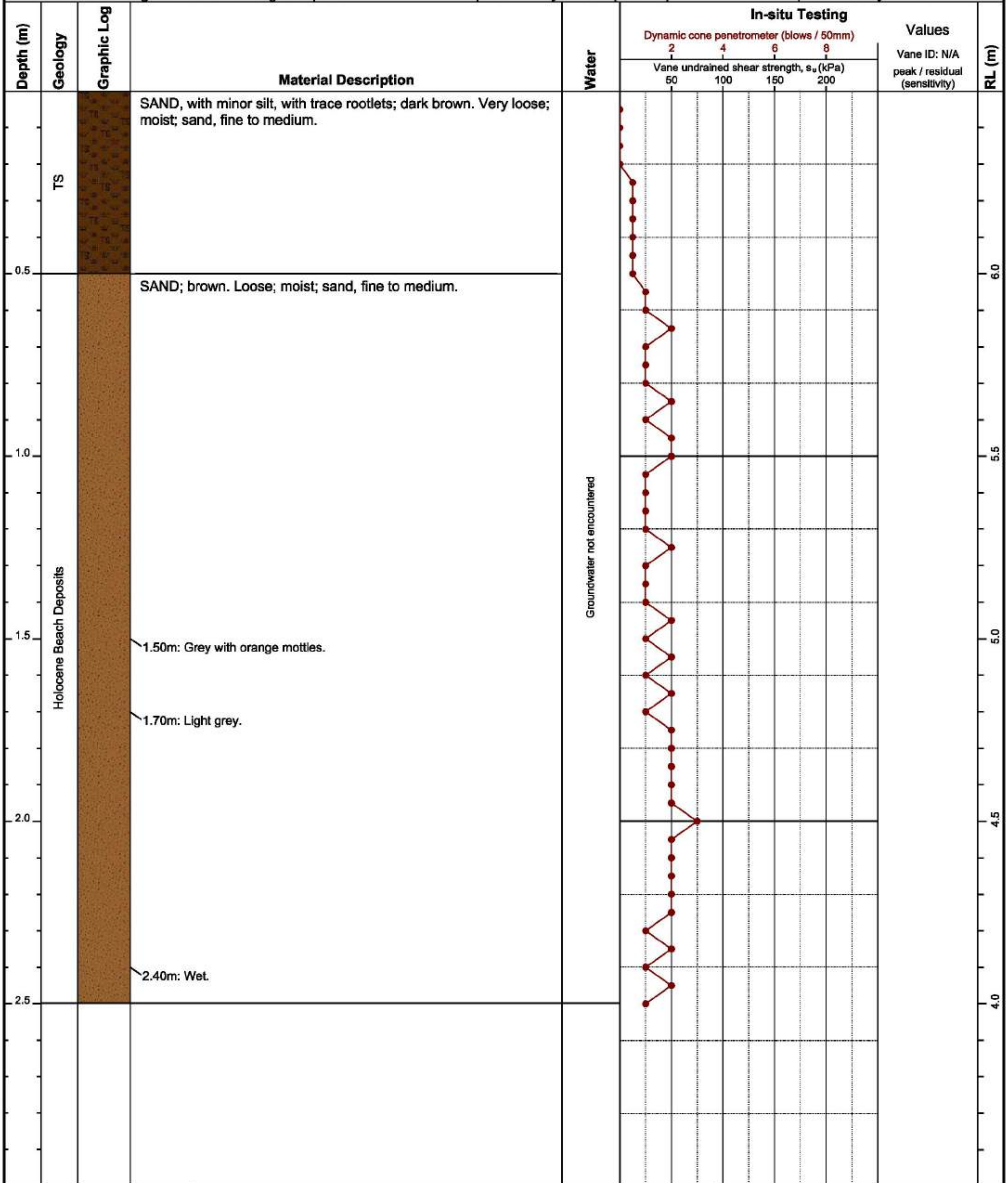
Method: 50mm Hand Auger

Test ID: HA02
Project ID: 24477
Sheet: 1 of 1

Client: NZHG
Project: Geotechnical Investigation
Location: 556-560 Abeerdeen Rd, Gisborne
Test Site: Refer to geotechnical investigation plan

Coordinates: 5709864mN, 2036136mE
System: NZTM
Elevation: 6.5m (NZVD2016)
Located By: Site plan/map

Test Date: 12/09/2023
Logged By: SS
Prepared By: SS
Checked By: RH



SAND, with minor silt, with trace rootlets; dark brown. Very loose; moist; sand, fine to medium.

SAND; brown. Loose; moist; sand, fine to medium.

1.50m: Grey with orange mottles.

1.70m: Light grey.

2.40m: Wet.

Hole Depth: 2.50m **Termination:** TARGET DEPTH

Remarks:

Materials are described in general accordance with NZGS 'Field Description of Soil and Rock' (2005).
No correlation is implied between shear vane and DCP values.

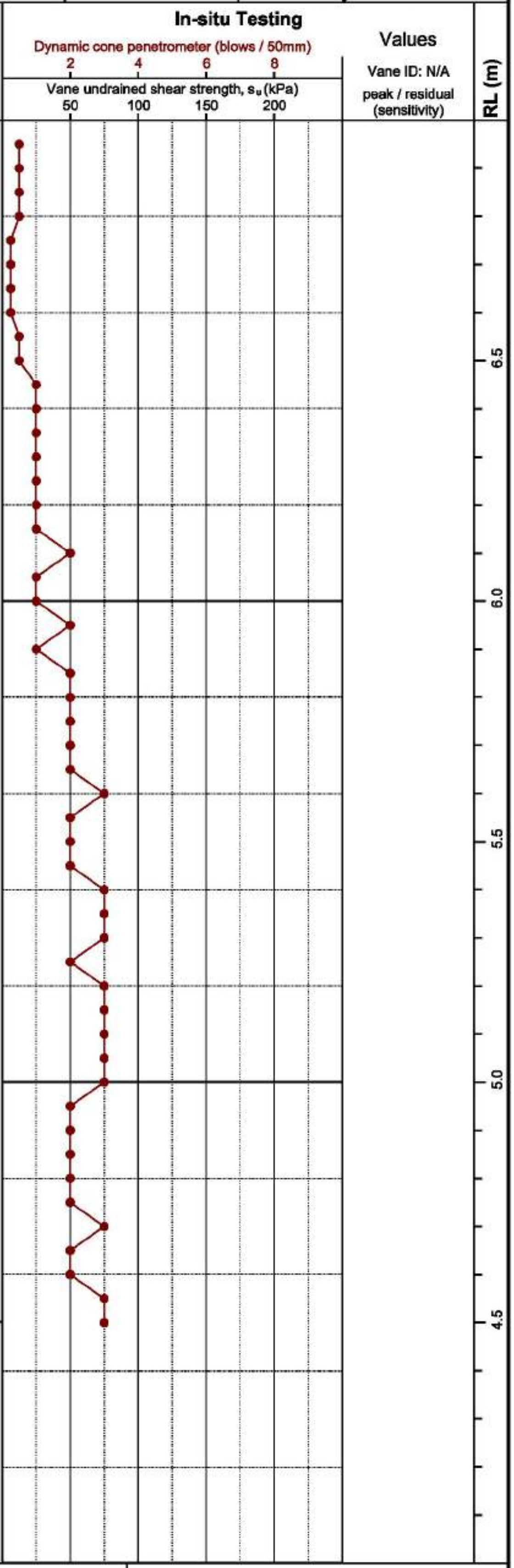
● Vane peak
○ Vane residual
◆ Vane UTP
▼ Standing water level
◁ Groundwater inflow
▷ Groundwater outflow
UTP = Unable to Penetrate

Hand Auger Borehole Log

Method: 50mm Hand Auger

Test ID:	HA03		
Project ID:	24477		
Sheet:	1 of 1		
Client:	NZHG	**Coordinates:**	5709847mN, 2036129mE
Project:	Geotechnical Investigation	**System:**	NZTM
Location:	556-560 Abeerdeen Rd, Gisborne	**Elevation:**	7m (NZVD2016)
Test Site:	Refer to geotechnical investigation plan	**Located By:**	Site plan/map
Test Date:	12/09/2023		
Logged By:	SS		
Prepared By:	SS		
Checked By:	RH		

Depth (m)	Geology	Material Description	Water
0.0–0.55	Uncontrolled Fill / Topsoil	SAND, with minor silt, with trace rootlets; dark brown. Very loose; moist; sand, fine to medium; trace metal fragments.	
0.55–2.50	Holocene Beach Deposits	SAND; brown. Loose; moist; sand, fine to medium. 1.80m: Grey with orange mottles. 1.90m: Wet. 2.40m: Saturated.	▼ (2.40m)



Hole Depth: 2.50m **Termination:** TARGET DEPTH

Remarks:

Materials are described in general accordance with NZGS 'Field Description of Soil and Rock' (2005).
No correlation is implied between shear vane and DCP values.

● Vane peak	▼ Standing water level
○ Vane residual	◁ Groundwater inflow
◆ Vane UTP	▷ Groundwater outflow

UTP = Unable to Penetrate

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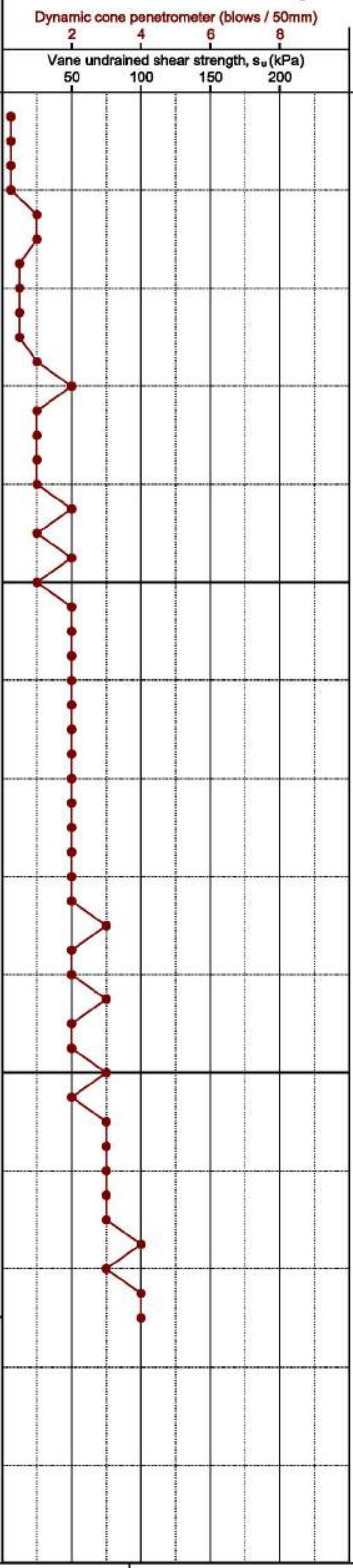
Hand Auger Borehole Log

Method: 50mm Hand Auger

Test ID:	**HA04**
Project ID:	24477
Sheet:	1 of 1

Client:	NZHG	**Coordinates:**	5709842mN, 2036126mE	**Test Date:**	12/09/2023
Project:	Geotechnical Investigation	**System:**	NZTM	**Logged By:**	SS
Location:	556-560 Abeerdeen Rd, Gisborne	**Elevation:**	7m (NZVD2016)	**Prepared By:**	SS
Test Site:	Refer to geotechnical investigation plan	**Located By:**	Site plan/map	**Checked By:**	RH

Depth (m)	Geology	Graphic Log	Material Description	Water	In-situ Testing	Values Vane ID: N/A peak / residual (sensitivity)	RL (m)
	TS		SAND, with minor silt, with trace rootlets; dark brown. Loose; moist; sand, fine to medium.				
0.5	Holocene Beach Deposits		SAND; brown. Loose; moist; sand, fine to medium.				6.5
1.0							6.0
1.5							5.5
			1.90m: Wet.				
2.0							5.0
			2.20m: Saturated.	▼			
2.5							4.5



Hole Depth: 2.50m

Termination: TARGET DEPTH

Remarks:

Materials are described in general accordance with NZGS 'Field Description of Soil and Rock' (2005).
No correlation is implied between shear vane and DCP values.

● Vane peak	▼ Standing water level
○ Vane residual	◁ Groundwater inflow
◆ Vane UTP	▷ Groundwater outflow

UTP = Unable to Penetrate

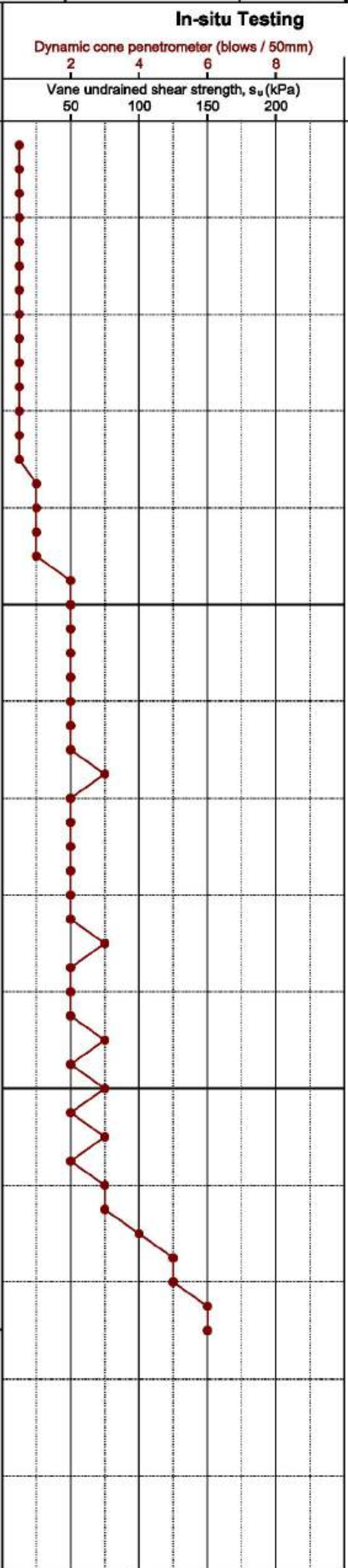
Hand Auger Borehole Log

Method: 50mm Hand Auger

Test ID:	**HA05**
Project ID:	24477
Sheet:	1 of 1

Client:	NZHG	**Coordinates:**	5709846mN, 2036121mE	**Test Date:**	12/09/2023
Project:	Geotechnical Investigation	**System:**	NZTM	**Logged By:**	SS
Location:	556-560 Abeerdeen Rd, Gisborne	**Elevation:**	7m (NZVD2016)	**Prepared By:**	SS
Test Site:	Refer to geotechnical investigation plan	**Located By:**	Site plan/map	**Checked By:**	RH

Depth (m)	Geology	Material Description	Water
0.0–0.5	Uncontrolled Fill / Topsoil	SAND, with minor silt, with trace rootlets and gravel; dark brown. Loose; moist; sand, fine to medium; gravel, fine to medium, subrounded to subangular.	
0.5–2.5	Holocene Beach Deposits	SAND; brown. Loose; moist; sand, fine to medium. 1.80m: Brownish grey. 1.90m: Wet. 2.40m: Saturated.	▼ (2.40)



Values

Vane ID: N/A

peak / residual (sensitivity)

Hole Depth: 2.50m	**Termination:** TARGET DEPTH

Remarks:

Materials are described in general accordance with NZGS 'Field Description of Soil and Rock' (2005).
No correlation is implied between shear vane and DCP values.

- ● Vane peak
- ○ Vane residual
- ◆ Vane UTP
- ▼ Standing water level
- ◁ Groundwater inflow
- ▷ Groundwater outflow

UTP = Unable to Penetrate

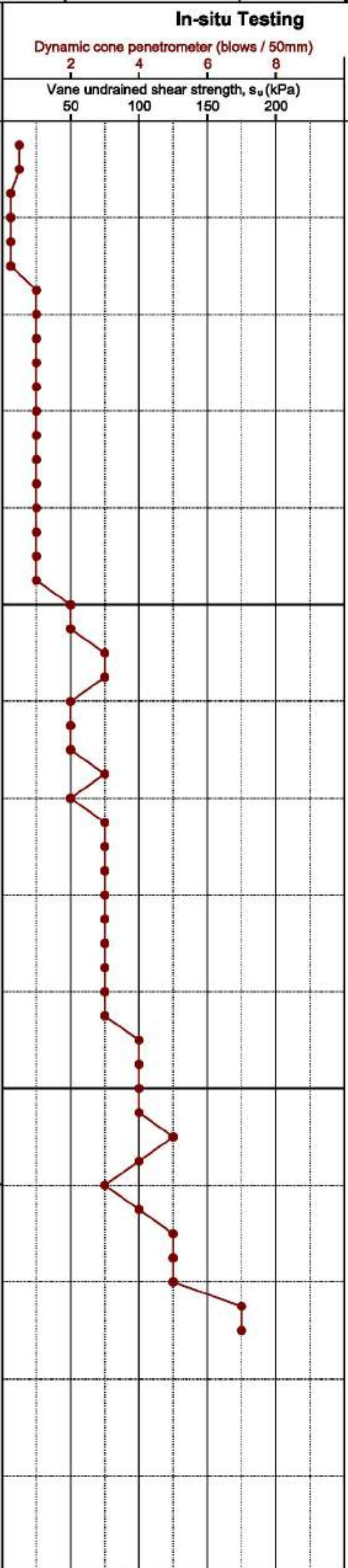
Hand Auger Borehole Log

Method: 50mm Hand Auger

Test ID:	**HA06**
Project ID:	24477
Sheet:	1 of 1

Client:	NZHG	**Coordinates:**	5709835mN, 2036107mE	**Test Date:**	12/09/2023
Project:	Geotechnical Investigation	**System:**	NZTM	**Logged By:**	SS
Location:	556-560 Abeerdeen Rd, Gisborne	**Elevation:**	6.2m (NZVD2016)	**Prepared By:**	SS
Test Site:	Refer to geotechnical investigation plan	**Located By:**	Site plan/map	**Checked By:**	RH

Depth (m)	Geology	Material Description	Water
0.00–0.30	Uncontrolled Fill / Topsoil	SAND, with minor silt, with trace rootlets and gravel; dark brown. Very loose; moist; sand, fine to medium; gravel, fine, subangular.	
0.30–2.20	Holocene Beach Deposits	SAND; brownish orange. Loose; moist; sand, fine to medium. 1.60m: Wet. 1.80m: Heavy orange mottling. 1.90m: Brownish grey. Saturated. 2.00m: Brownish grey with orange mottles. Poor recovery > 50%.	▼ (1.90m)



Values
Vane ID: N/A
peak / residual (sensitivity)

RL (m): 6.0, 5.5, 5.0, 4.5, 4.0, 3.5

Depth (m): 0.5, 1.0, 1.5, 2.0, 2.5

Hole Depth: 2.20m **Termination:** HOLE COLLAPSE

Remarks:

Materials are described in general accordance with NZGS 'Field Description of Soil and Rock' (2005).
No correlation is implied between shear vane and DCP values.

● Vane peak	▼ Standing water level
○ Vane residual	◁ Groundwater inflow
◆ Vane UTP	▷ Groundwater outflow

UTP = Unable to Penetrate

Hand Auger Borehole Log

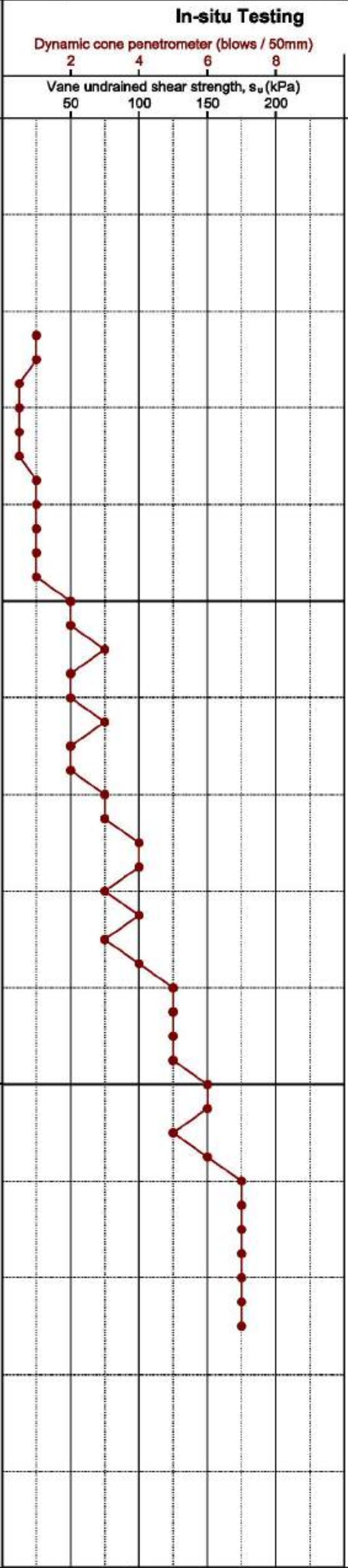
Method: 50mm Hand Auger

Test ID:	HA07	**Project ID:**	24477	**Sheet:**	1 of 1
Client:	NZHG	**Coordinates:**	5709824mN, 2036090mE	**Test Date:**	12/09/2023
Project:	Geotechnical Investigation	**System:**	NZTM	**Logged By:**	SS
Location:	556-560 Abeerdeen Rd, Gisborne	**Elevation:**	6m (NZVD2016)	**Prepared By:**	SS
Test Site:	Refer to geotechnical investigation plan	**Located By:**	Site plan/map	**Checked By:**	RH

Depth (m)	Geology	Material Description	Water
0.0 – 0.8	Uncontrolled Fill / Topsoil	SILT, with minor sand, with trace rootlets; dark brown. Stiff; moist; non-plastic; sand, fine to medium; trace charcoal. 0.40m: Sandy. Sand, fine to medium.	
0.8 – 2.0	Holocene Beach Deposits	SAND; light brown with orange mottles. Loose; moist; sand, fine to medium. 1.00m: Brownish grey with orange streaks. 1.20m: Wet. 1.50m: Saturated. 1.70m: Poor recovery > 30%.	▼ (1.50m)

Depth (m): 0.5, 1.0, 1.5, 2.0, 2.5

RL (m): 5.5, 5.0, 4.5, 4.0, 3.5



Values
Vane ID: N/A
peak / residual (sensitivity)

Hole Depth: 2.00m **Termination:** HOLE COLLAPSE

Remarks:

● Vane peak	▼ Standing water level
○ Vane residual	◁ Groundwater inflow
◆ Vane UTP	▷ Groundwater outflow

UTP = Unable to Penetrate

Materials are described in general accordance with NZGS 'Field Description of Soil and Rock' (2005).
No correlation is implied between shear vane and DCP values.

Hand Auger Borehole Log

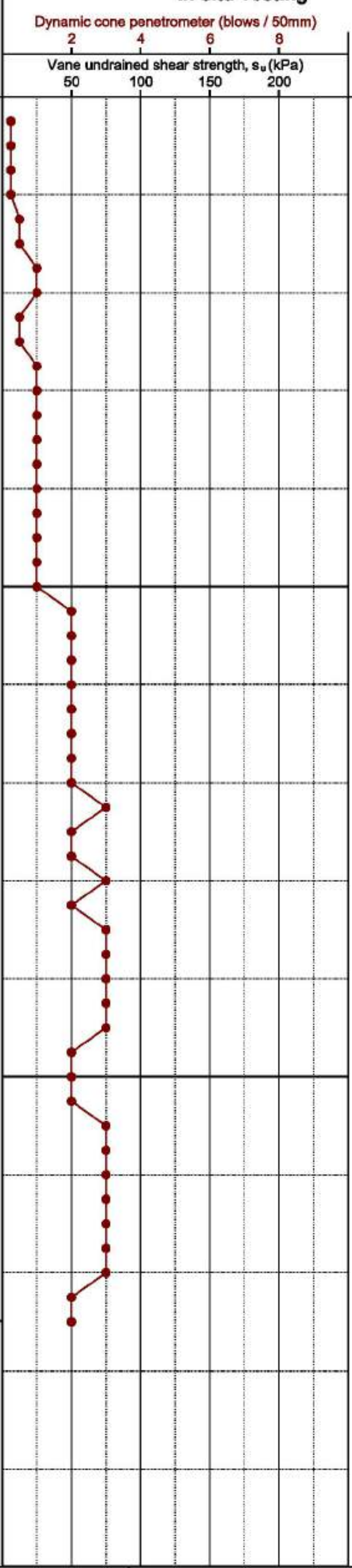
Method: 50mm Hand Auger

Test ID:	HA08
Project ID:	24477
Sheet:	1 of 1

Client:	NZHG	**Coordinates:**	5709850mN, 2036087mE	**Test Date:**	12/09/2023
Project:	Geotechnical Investigation	**System:**	NZTM	**Logged By:**	SS
Location:	556-560 Abeerdeen Rd, Gisborne	**Elevation:**	6.5m (NZVD2016)	**Prepared By:**	SS
Test Site:	Refer to geotechnical investigation plan	**Located By:**	Site plan/map	**Checked By:**	RH

Depth (m)	Geology	Graphic Log	Material Description	Water
0.0–0.30	Topsoil		SAND, with minor silt, with trace rootlets; dark brown. Very loose; moist; sand, fine to medium.	
0.30–2.50	Holocene Beach Deposits		SAND; light brown. Loose; moist; sand, fine to medium. 1.60m: Brownish grey. 1.80m: Brownish grey orange streaks. 2.00m: Dark brown. Wet. 2.30m: Brownish grey. 2.40m: Saturated.	▼ (2.40m)

In-situ Testing



Values

Vane ID: N/A

peak / residual (sensitivity)

Depth (m)	RL (m)
0.5	6.0
1.0	5.5
1.5	5.0
2.0	4.5
2.5	4.0

Hole Depth: 2.50m **Termination:** TARGET DEPTH

Remarks:

Materials are described in general accordance with NZGS 'Field Description of Soil and Rock' (2005).
No correlation is implied between shear vane and DCP values.

● Vane peak	▼ Standing water level
○ Vane residual	◁ Groundwater inflow
◆ Vane UTP	▷ Groundwater outflow

UTP = Unable to Penetrate

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Hand Auger Borehole Log

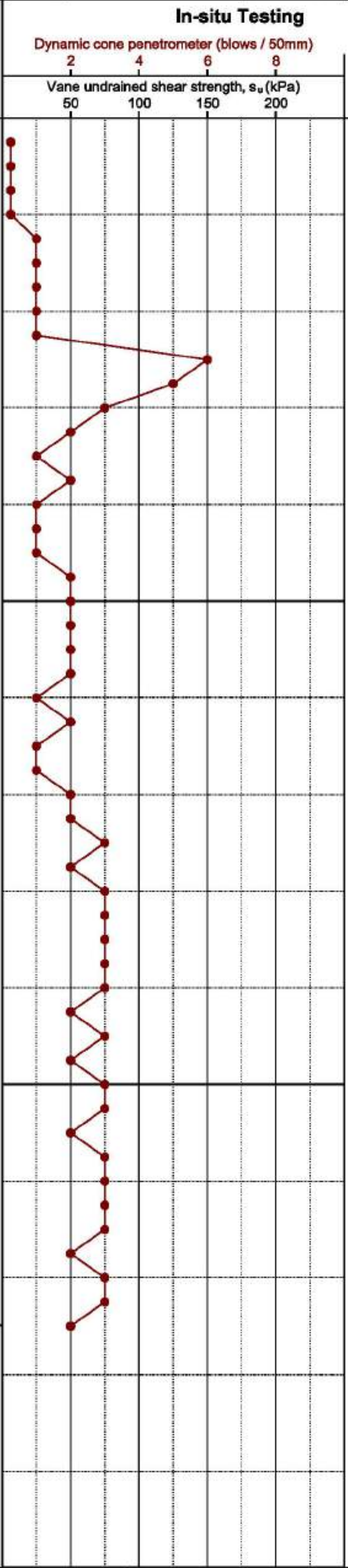
Method: 50mm Hand Auger

Test ID:	HA09
Project ID:	24477
Sheet:	1 of 1

Client:	NZHG	**Coordinates:**	5709853mN, 2036094mE	**Test Date:**	12/09/2023
Project:	Geotechnical Investigation	**System:**	NZTM	**Logged By:**	SS
Location:	556-560 Abeerdeen Rd, Gisborne	**Elevation:**	6.5m (NZVD2016)	**Prepared By:**	SS
Test Site:	Refer to geotechnical investigation plan	**Located By:**	Site plan/map	**Checked By:**	RH

Depth (m)	Geology	Material Description	Water	RL (m)
0.00	Topsoil	SILT, with minor sand, with trace rootlets; dark brown. Stiff; moist; non-plastic; sand, fine.		
0.20		0.20m: SAND, with minor silt. Sand, fine to medium; trace brick fragments.		
0.5				6.0
0.60	Holocene Beach Deposits	SAND; brownish orange. Loose; moist; sand, fine to medium.		
1.0				5.5
1.5		1.50m: Brownish grey.		5.0
2.0		2.00m: Wet.		4.5
2.40		2.40m: Saturated.	▼	
2.5				4.0

In-situ Testing



Values

Vane ID: N/A

peak / residual (sensitivity)

Hole Depth: 2.50m **Termination:** TARGET DEPTH

Remarks:

Materials are described in general accordance with NZGS 'Field Description of Soil and Rock' (2005).
No correlation is implied between shear vane and DCP values.

● Vane peak	▼ Standing water level
○ Vane residual	◁ Groundwater inflow
◆ Vane UTP	▷ Groundwater outflow

UTP = Unable to Penetrate

Hand Auger Borehole Log

Method: 50mm Hand Auger

Test ID: HA10
Project ID: 24477
Sheet: 1 of 1

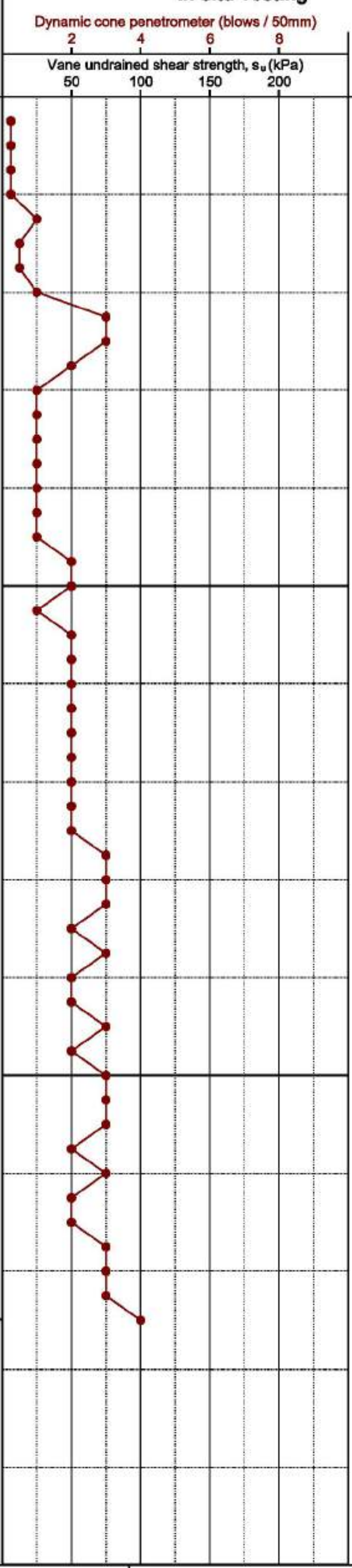
Client: NZHG
Project: Geotechnical Investigation
Location: 556-560 Abeerdeen Rd, Gisborne
Test Site: Refer to geotechnical investigation plan

Coordinates: 5709860mN, 2036093mE
System: NZTM
Elevation: 6.5m (NZVD2016)
Located By: Site plan/map

Test Date: 12/09/2023
Logged By: SS
Prepared By: SS
Checked By: RH

Depth (m)	Geology	Material Description	Water	Values Vane ID: N/A peak / residual (sensitivity)	RL (m)
	Topsoil	SILT, with minor sand, with trace rootlets; dark brown. Stiff; moist; non-plastic; sand, fine.			
		0.20m: SAND. Sand, fine to medium.			
0.5					6.0
	Holocene Beach Deposits	SAND; brownish orange. Loose; moist; sand, fine to medium.			
1.0					5.5
1.5					5.0
		1.70m: Brownish grey.			
2.0		2.00m: Wet.			4.5
		2.40m: Dark brown. Saturated.	▼		
2.5					4.0

In-situ Testing



Hole Depth: 2.50m
Termination: TARGET DEPTH

Remarks:

Materials are described in general accordance with NZGS 'Field Description of Soil and Rock' (2005).
No correlation is implied between shear vane and DCP values.

● Vane peak	▼ Standing water level
○ Vane residual	◁ Groundwater inflow
◆ Vane UTP	▷ Groundwater outflow

UTP = Unable to Penetrate

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Hand Auger Borehole Log

Method: 50mm Hand Auger

Test ID:	HA11
Project ID:	24477
Sheet:	1 of 1

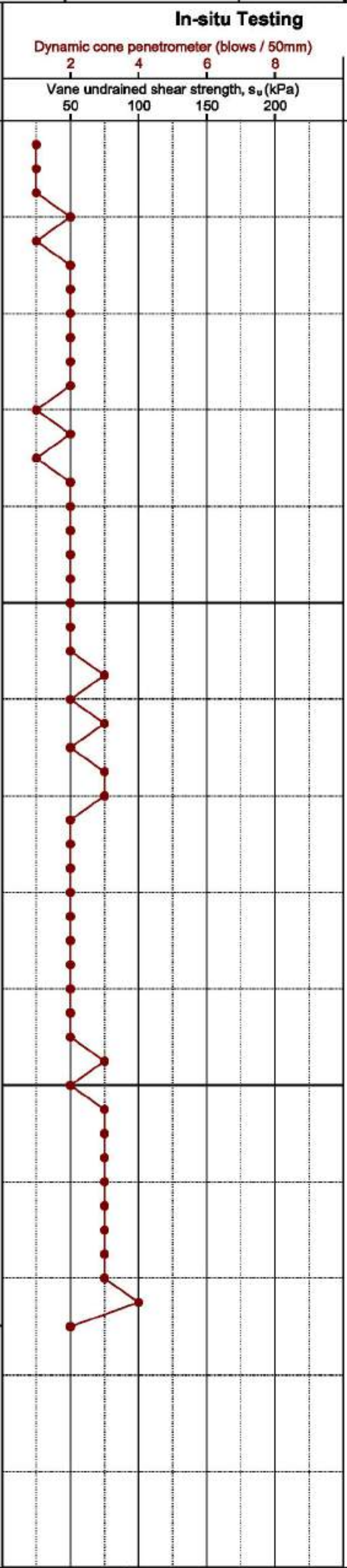
Client:	NZHG	**Coordinates:**	5709865mN, 2036106mE	**Test Date:**	12/09/2023
Project:	Geotechnical Investigation	**System:**	NZTM	**Logged By:**	SS
Location:	556-560 Abeerdeen Rd, Gisborne	**Elevation:**	7m (NZVD2016)	**Prepared By:**	SS
Test Site:	Refer to geotechnical investigation plan	**Located By:**	Site plan/map	**Checked By:**	RH

Depth (m)	Geology	Material Description	Water	RL (m)
0.0–0.30	Uncontrolled Fill / Topsoil	SAND, with trace silt and gravel; dark brown. Loose; moist; sand, fine to medium; gravel, fine to medium, subrounded to subangular.	Groundwater not encountered	
0.30–2.50	Holocene Beach Deposits	SAND; brownish orange. Medium dense; moist; sand, fine to medium. 2.30m: Wet.		

Depth (m): 0.5, 1.0, 1.5, 2.0, 2.5

RL (m): 6.5, 6.0, 5.5, 5.0, 4.5

In-situ Testing



Values

Vane ID: N/A

peak / residual (sensitivity)

Hole Depth: 2.50m **Termination:** TARGET DEPTH

Remarks:

Materials are described in general accordance with NZGS 'Field Description of Soil and Rock' (2005).
No correlation is implied between shear vane and DCP values.

● Vane peak	▼ Standing water level
○ Vane residual	◁ Groundwater inflow
◆ Vane UTP	▷ Groundwater outflow

UTP = Unable to Penetrate

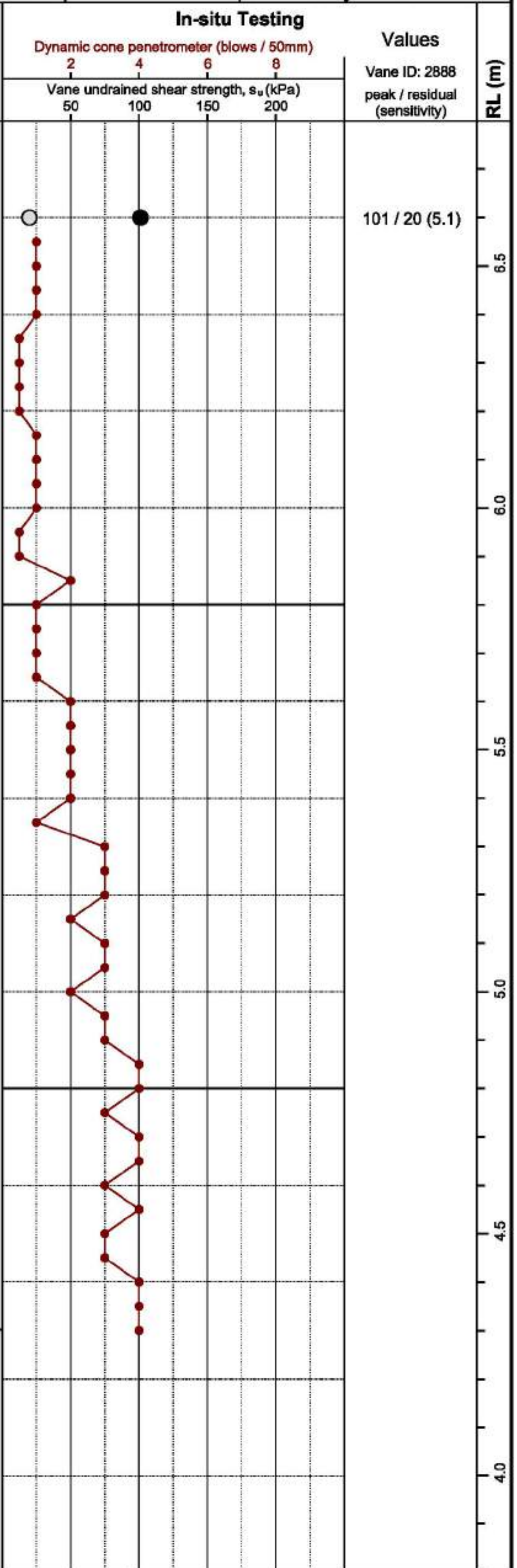
Hand Auger Borehole Log

Method: 50mm Hand Auger

Test ID:	HA12
Project ID:	24477
Sheet:	1 of 1

Client:	NZHG	**Coordinates:**	5709880mN, 2036108mE	**Test Date:**	12/09/2023
Project:	Geotechnical Investigation	**System:**	NZTM	**Logged By:**	SS
Location:	556-560 Abeerdeen Rd, Gisborne	**Elevation:**	6.8m (NZVD2016)	**Prepared By:**	SS
Test Site:	Refer to geotechnical investigation plan	**Located By:**	Site plan/map	**Checked By:**	RH

Depth (m)	Geology	Material Description	Water
0.0 – 0.5	Topsoil	SILT, with minor sand, with trace rootlets; dark brown. Stiff; moist; non-plastic; sand, fine. 0.30m: SAND, with minor silt. Sand, fine to medium. 0.40m: Black.	
0.5 – 2.5	Holocene Beach Deposits	SAND; brownish orange. Very loose; moist; sand, fine to medium. 2.00m: Wet. 2.50m: Saturated.	▼ 2.5



Hole Depth: 2.50m **Termination:** TARGET DEPTH

Remarks:

Materials are described in general accordance with NZGS 'Field Description of Soil and Rock' (2005).
No correlation is implied between shear vane and DCP values.

● Vane peak	▼ Standing water level
○ Vane residual	◁ Groundwater inflow
◆ Vane UTP	▷ Groundwater outflow

UTP = Unable to Penetrate

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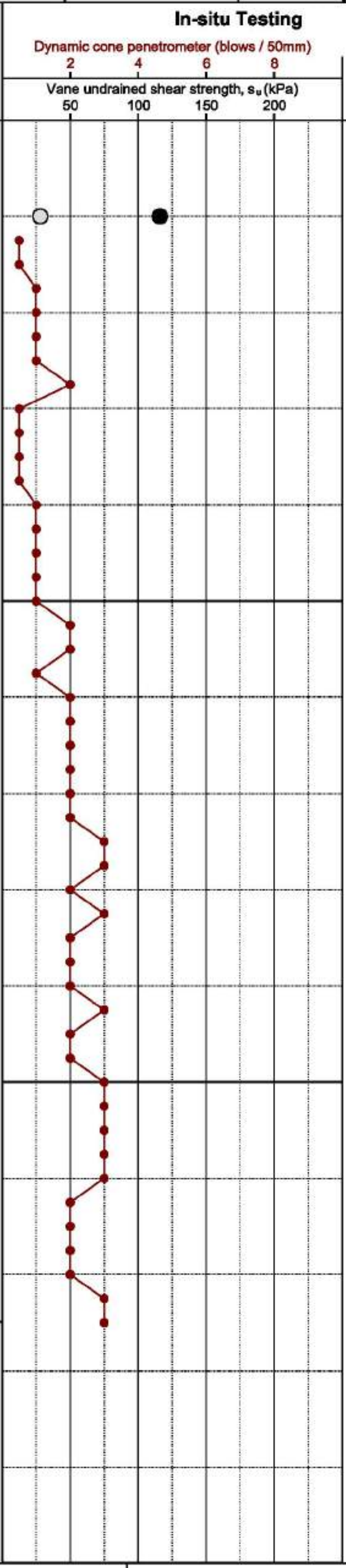
Hand Auger Borehole Log

Method: 50mm Hand Auger

Test ID:	**HA13**
Project ID:	24477
Sheet:	1 of 1

Client:	NZHG	**Coordinates:**	5709882mN, 2036101mE	**Test Date:**	12/09/2023
Project:	Geotechnical Investigation	**System:**	NZTM	**Logged By:**	SS
Location:	556-560 Abeerdeen Rd, Gisborne	**Elevation:**	6.8m (NZVD2016)	**Prepared By:**	SS
Test Site:	Refer to geotechnical investigation plan	**Located By:**	Site plan/map	**Checked By:**	RH

Depth (m)	Geology	Material Description	Water	Values	RL (m)
0.0	Topsoil	SILT, with minor sand, with trace rootlets; dark brown. Stiff; moist; non-plastic; sand, fine.			
0.2				116 / 28 (4.1)	
0.30		0.30m: SAND, with minor silt. Sand, fine to medium.			6.5
0.5	Holocene Beach Deposits	SAND; brownish orange. Loose; moist; sand, fine to medium.			
					6.0
1.0					
					5.5
1.5					
					5.0
1.90		1.90m: Brownish grey.			
2.0		2.00m: Wet.			
					4.5
2.50		2.50m: Saturated.	▼		
					4.0



Values
Vane ID: 2888
peak / residual (sensitivity)

Hole Depth: 2.50m	**Termination:** TARGET DEPTH

Remarks:

● Vane peak	▼ Standing water level
○ Vane residual	◁ Groundwater inflow
◆ Vane UTP	▷ Groundwater outflow

UTP = Unable to Penetrate

Materials are described in general accordance with NZGS 'Field Description of Soil and Rock' (2005).
No correlation is implied between shear vane and DCP values.

LDE LAND DEVELOPMENT & ENGINEERING

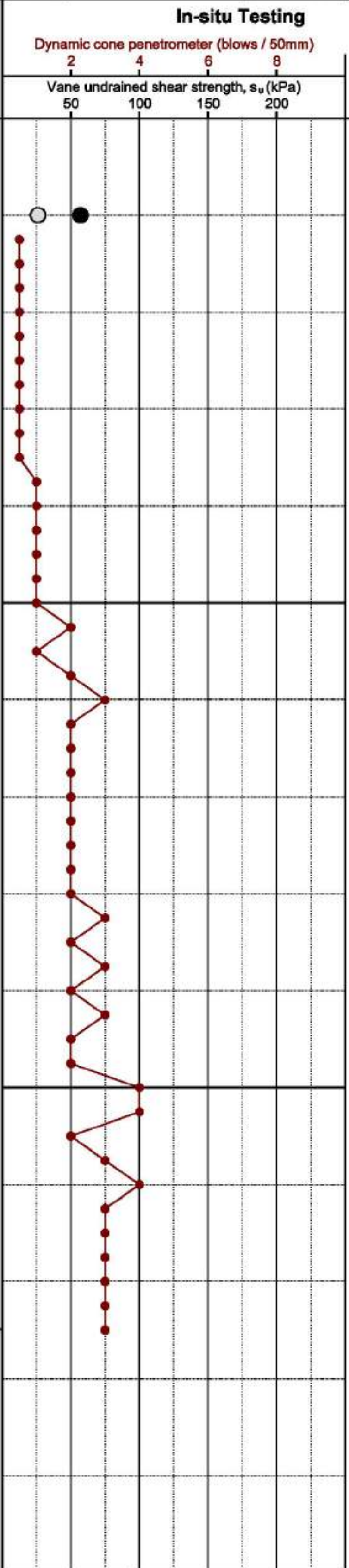
Hand Auger Borehole Log

Method: 50mm Hand Auger

Test ID:	HA14
Project ID:	24477
Sheet:	1 of 1

Client:	NZHG	**Coordinates:**	5709887mN, 2036103mE	**Test Date:**	12/09/2023
Project:	Geotechnical Investigation	**System:**	NZTM	**Logged By:**	SS
Location:	556-560 Abeerdeen Rd, Gisborne	**Elevation:**	6.8m (NZVD2016)	**Prepared By:**	SS
Test Site:	Refer to geotechnical investigation plan	**Located By:**	Site plan/map	**Checked By:**	RH

Depth (m)	Geology	Material Description	Water	Values Vane ID: 2888 peak / residual (sensitivity)	RL (m)
0.0	Topsoil	SILT, with minor sand, with trace rootlets; dark brown. Firm; moist; non-plastic; sand, fine.			
0.2				57 / 26 (2.2)	
0.3	Holocene Beach Deposits	SAND; brownish orange. Very loose; moist; sand, fine to medium.			6.5
0.5					
0.8					6.0
1.0					
1.3					5.5
1.5					
1.60		1.60m: Brownish grey.			
1.8					5.0
1.90		1.90m: Wet.			
2.0					
2.3					4.5
2.50		2.50m: Saturated.	▼		
2.8					4.0



Hole Depth: 2.50m	**Termination:** TARGET DEPTH

Remarks:

Materials are described in general accordance with NZGS 'Field Description of Soil and Rock' (2005).
No correlation is implied between shear vane and DCP values.

● Vane peak	▼ Standing water level
○ Vane residual	◁ Groundwater inflow
◆ Vane UTP	▷ Groundwater outflow

UTP = Unable to Penetrate

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Hand Auger Borehole Log

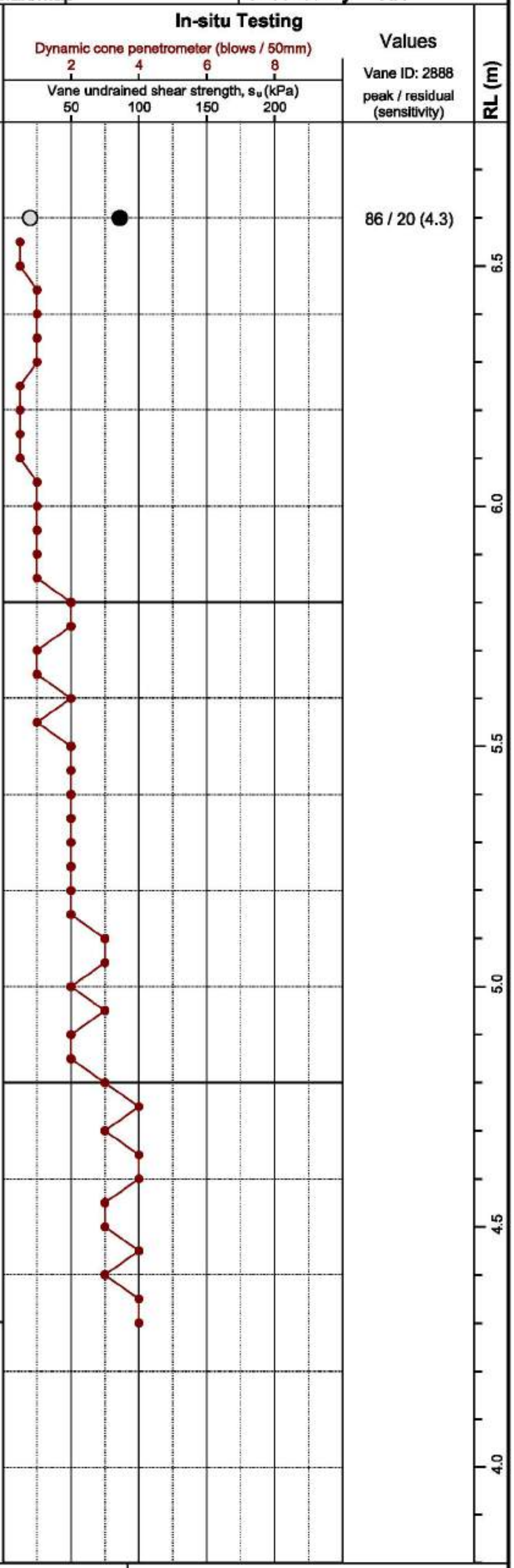
Method: 50mm Hand Auger

Test ID:	**HA15**
Project ID:	24477
Sheet:	1 of 1

Client:	NZHG	**Coordinates:**	5709885mN, 2036111mE
Project:	Geotechnical Investigation	**System:**	NZTM
Location:	556-560 Abeerdeen Rd, Gisborne	**Elevation:**	6.8m (NZVD2016)
Test Site:	Refer to geotechnical investigation plan	**Located By:**	Site plan/map

Test Date:	12/09/2023
Logged By:	SS
Prepared By:	SS
Checked By:	RH

Depth (m)	Geology	Material Description	Water
0.0 – 0.60	Topsoil	SILT, with minor sand, with trace rootlets; dark brown. Stiff; moist; non-plastic; sand, fine. 0.40m: SAND, with minor silt. Sand, fine to medium.	
0.60 – 2.50	Holocene Beach Deposits	SAND; brownish orange. Very loose; moist; sand, fine to medium. 2.00m: Brownish grey. Wet. 2.40m: Saturated.	▼ (2.40)



Hole Depth: 2.50m **Termination:** TARGET DEPTH

Remarks:

Materials are described in general accordance with NZGS 'Field Description of Soil and Rock' (2005).
No correlation is implied between shear vane and DCP values.

● Vane peak	▼ Standing water level
○ Vane residual	◁ Groundwater inflow
◆ Vane UTP	▷ Groundwater outflow

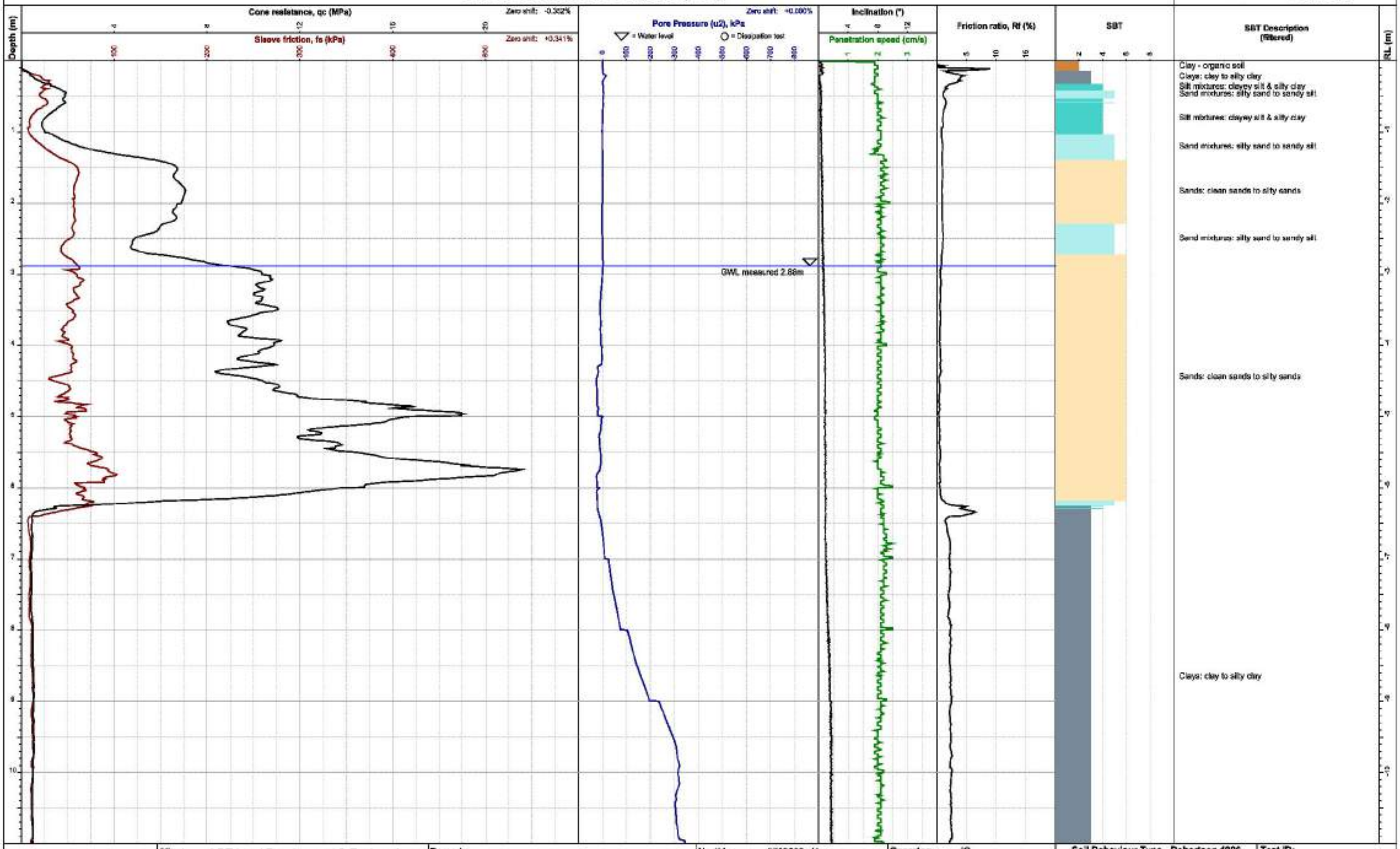
UTP = Unable to Penetrate

APPENDIX C

CONE PENETRATION TEST LOGS

Cone Penetration Test (CPTu) Log

Test ID: CPT-01



Client:	LDE Land Development & Engineering	**Remarks:**	Ground water level located at 2.88m Test according to ISO 22476-1:12 (Class 2)
Project:	geotechnical Investigation	**Termination Reason:**	Target depth
Location:	556-560 Abeerdeen Rd, Gisborne		

Northing:	5709883mN
Easting:	2036106mE
System:	NZTM
Elevation:	Ground
Located By:	Phone GPS
Location:	As per site plan

Operator:	JC
Rig:	Pagani TG63-150
Cone ID:	Mks1042
Type:	Comp. piezo cone
Cone Area:	10 cm²
Sleeve Area:	150 cm²
Area Ratio:	0.8

Soil Behaviour Type - Robertson 1986

0	Undefined	5	Sand mixtures: silty sand to sandy silt
1	Sensitive fine-grained	6	Sands: clean sands to silty sands
2	Clay - organic soil	7	Dense sand to gravelly sand
3	Clays: clay to silty clay	8	Stiff sand to clayey sand
4	Silt mixtures: clayey silt & silty clay	9	Stiff fine-grained

Test ID: CPT-01

Project ID:	24477
Depth:	20.5m
Sheet:	1 of 2
Date:	30/05/2023

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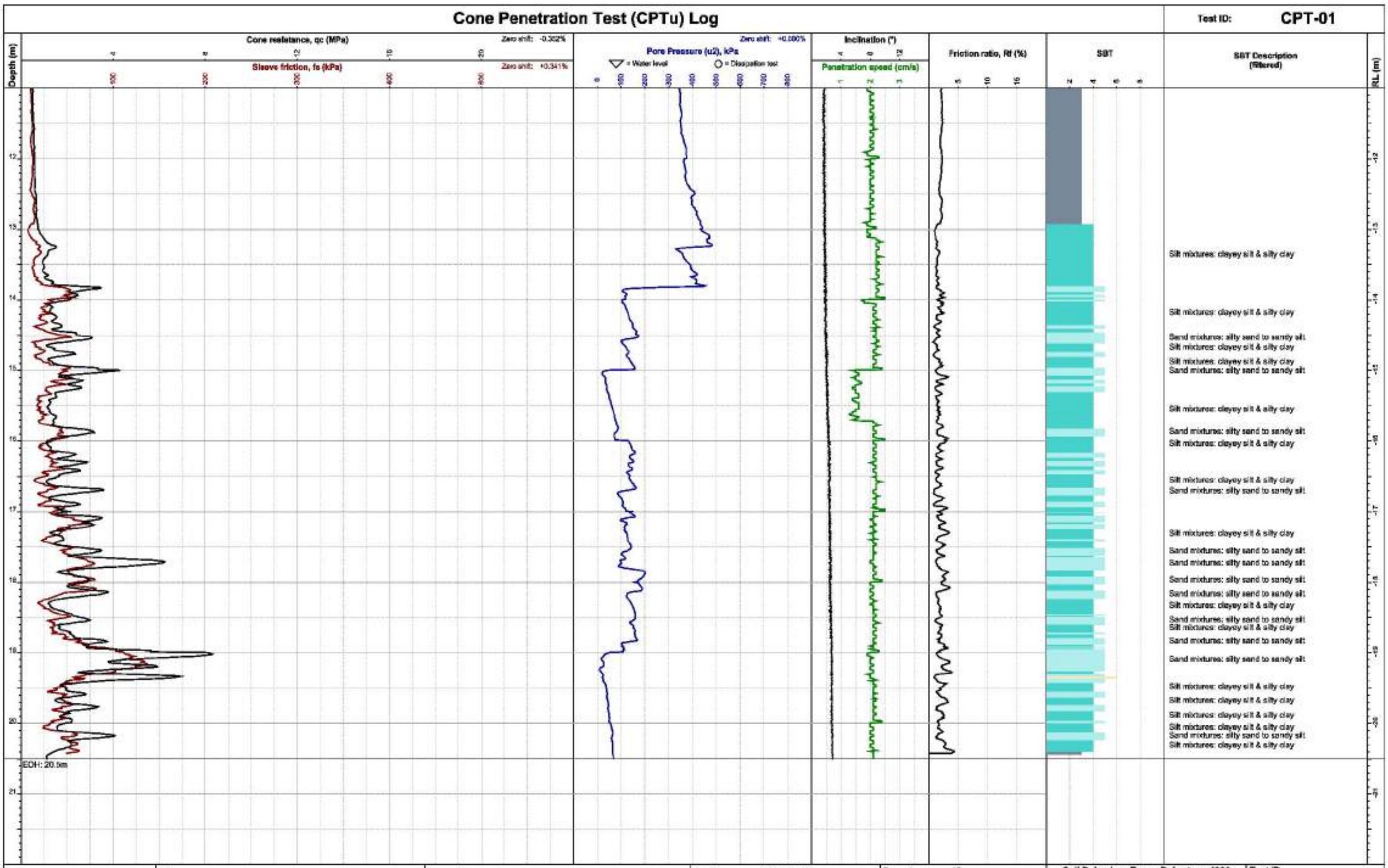
Cone Penetration Test (CPTu) Log

Test ID: CPT-01



Client: LDE Land Development & Engineering
Project: geotechnical Investigation
Location: 556-560 Abeerdeen Rd, Gisborne

Remarks:
Ground water level located at 2.88m
Test according to ISO 22476-1:12 (Class 2)

Termination Reason:
Target depth

Northing: 5709883mN
Easting: 2036106mE
System: NZTM
Elevation: Ground
Located By: Phone GPS
Location: As per site plan

Operator: JC
Rig: Pagani TG63-150
Cone ID: Mks1042
Type: Comp. piezo cone
Cone Area: 10 cm²
Sleeve Area: 150 cm²
Area Ratio: 0.8

Soil Behaviour Type - Robertson 1986

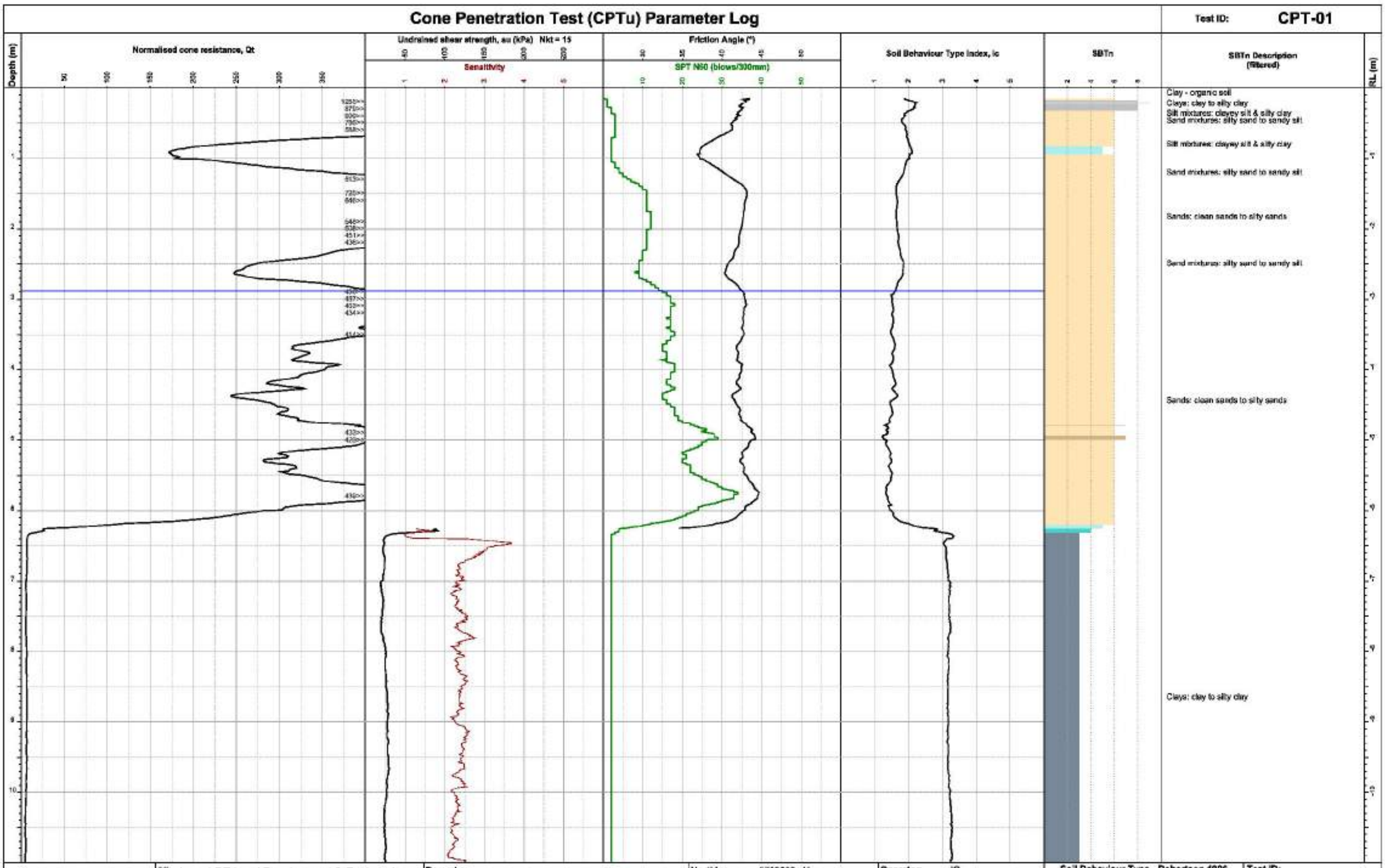
0	Undefined	5	Sand mixtures: silty sand to sandy silt
1	Sensitive fine-grained	6	Sands: clean sands to silty sands
2	Clay - organic soil	7	Dense sand to gravelly sand
3	Clays: clay to silty clay	8	Stiff sand to clayey sand
4	Silt mixtures: clayey silt & silty clay	9	Stiff fine-grained

Test ID: CPT-01
Project ID: 24477
Depth: 20.5m
Sheet: 2 of 2
Date: 30/05/2023

Generated with CORE-GS by Geroc - CPT Combined A3 v2 - 31/05/2023 9:14:04 am

Cone Penetration Test (CPTu) Parameter Log

Test ID: CPT-01



Client:	LDE Land Development & Engineering
Project:	geotechnical Investigation
Location:	556-560 Abeerdeen Rd, Gisborne

Remarks:
Ground water level located at 2.88m
Test according to ISO 22476-1:12 (Class 2)

Termination Reason:
Target depth

Northing:	5709883mN
Easting:	2036106mE
System:	NZTM
Elevation:	Ground
Located By:	Phone GPS
Location:	As per site plan

Operator:	JC
Rig:	Pagani TG63-150
Cone ID:	Mks1042
Type:	Comp. piezo cone
Cone Area:	10 cm²
Sleeve Area:	150 cm²
Area Ratio:	0.8

Soil Behaviour Type - Robertson 1986

0	Undefined	5	Sand mixtures: silty sand to sandy silt
1	Sensitive fine-grained	6	Sands: clean sands to silty sands
2	Clay - organic soil	7	Dense sand to gravelly sand
3	Clays: clay to silty clay	8	Stiff sand to clayey sand
4	Silt mixtures: clayey silt & silty clay	9	Stiff fine-grained

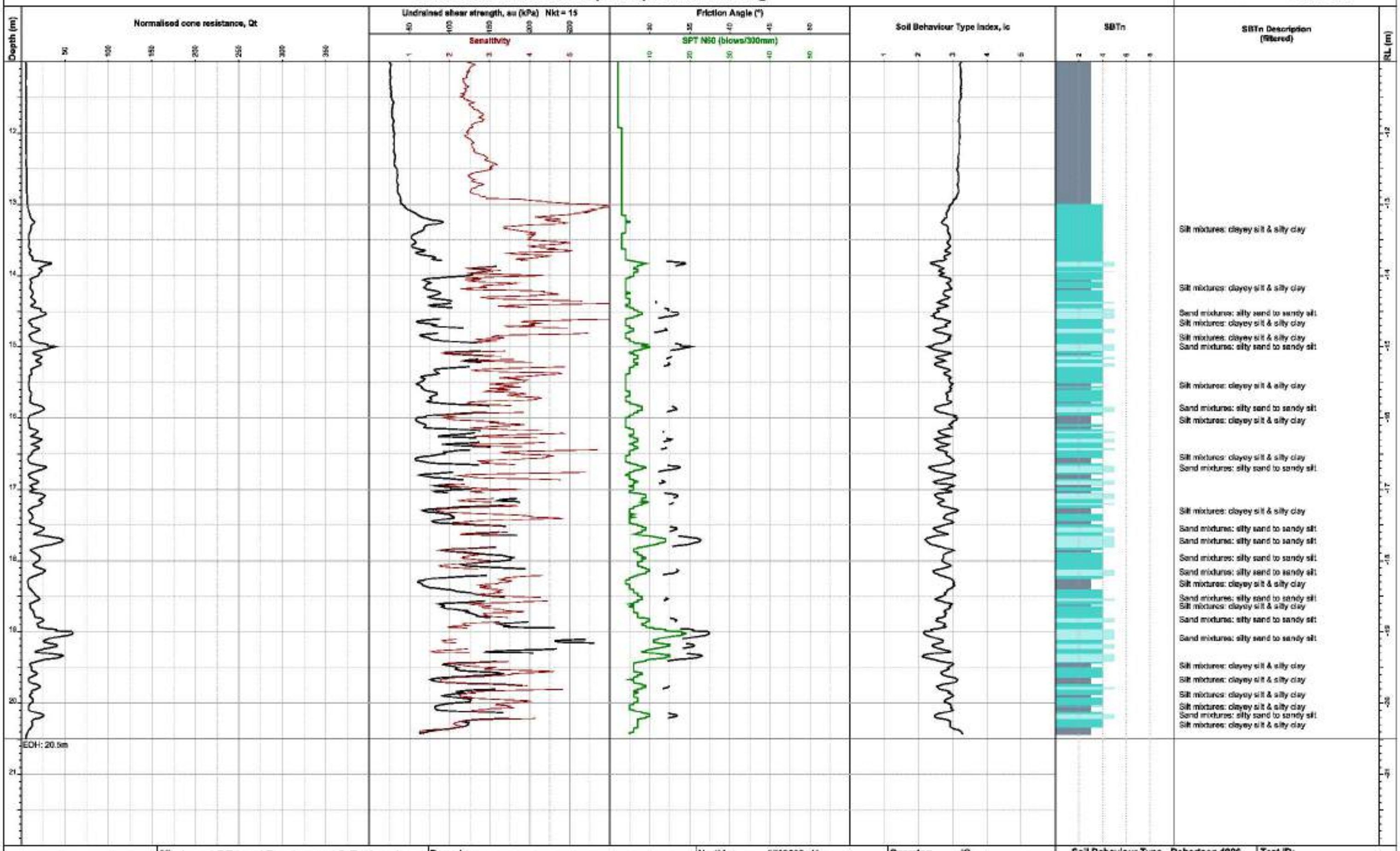
Test ID: CPT-01

Project ID:	24477
Depth:	20.5m
Sheet:	1 of 2
Date:	30/05/2023

Generated with CORE-GS by Geroc - CPT Combined A3 v2 - 31/05/2023 9:14:34 am

Cone Penetration Test (CPTu) Parameter Log

Test ID: CPT-01



Generated with CORE-GS by Geroc - CPT Combined A3 v2 - 31/05/2023 9:14:36 am

LAND DEVELOPMENT & ENGINEERING

Client: LDE Land Development & Engineering
Project: geotechnical Investigation
Location: 556-560 Abeerdeen Rd, Gisborne

Remarks:
Ground water level located at 2.88m
Test according to ISO 22476-1:12 (Class 2)

Termination Reason:
Target depth

Northing:	5709883mN
Easting:	2036106mE
System:	NZTM
Elevation:	Ground
Located By:	Phone GPS
Location:	As per site plan

Operator:	JC
Rig:	Pagani TG63-150
Cone ID:	Mks1042
Type:	Comp. piezo cone
Cone Area:	10 cm²
Sleeve Area:	150 cm²
Area Ratio:	0.8

Soil Behaviour Type - Robertson 1986

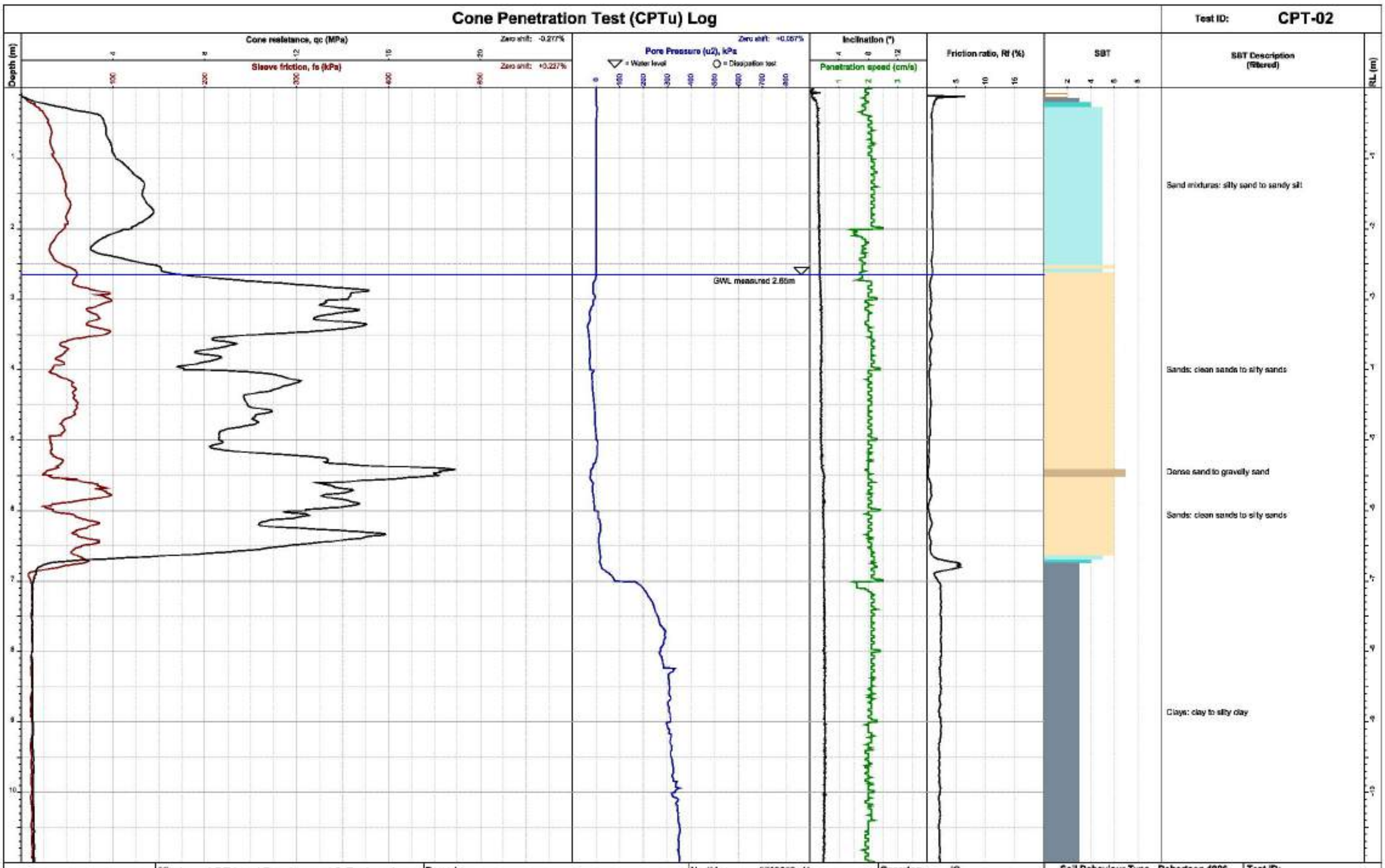
0	Undefined	5	Sand mixtures: silty sand to sandy silt
1	Sensitive fine-grained	6	Sands: clean sands to silty sands
2	Clay - organic soil	7	Dense sand to gravelly sand
3	Clays: clay to silty clay	8	Stiff sand to clayey sand
4	Silt mixtures: clayey silt & silty clay	9	Stiff fine-grained

Test ID:
CPT-01

Project ID:	24477
Depth:	20.5m
Sheet:	2 of 2
Date:	30/05/2023

Cone Penetration Test (CPTu) Log

Test ID: CPT-02



Client: LDE Land Development & Engineering
Project: geotechnical Investigation
Location: 556-560 Abeerdeen Rd, Gisborne

Remarks:
Ground water level located at 2.65m
Test according to ISO 22476-1:12 (Class 2)

Termination Reason:
Target depth

Northing:	5709858mN
Easting:	2036112mE
System:	NZTM
Elevation:	Ground
Located By:	Phone GPS
Location:	As per site plan

Operator:	JC
Rig:	Pagani TG63-150
Cone ID:	Mks1042
Type:	Comp. piezo cone
Cone Area:	10 cm²
Sleeve Area:	150 cm²
Area Ratio:	0.8

Soil Behaviour Type - Robertson 1986

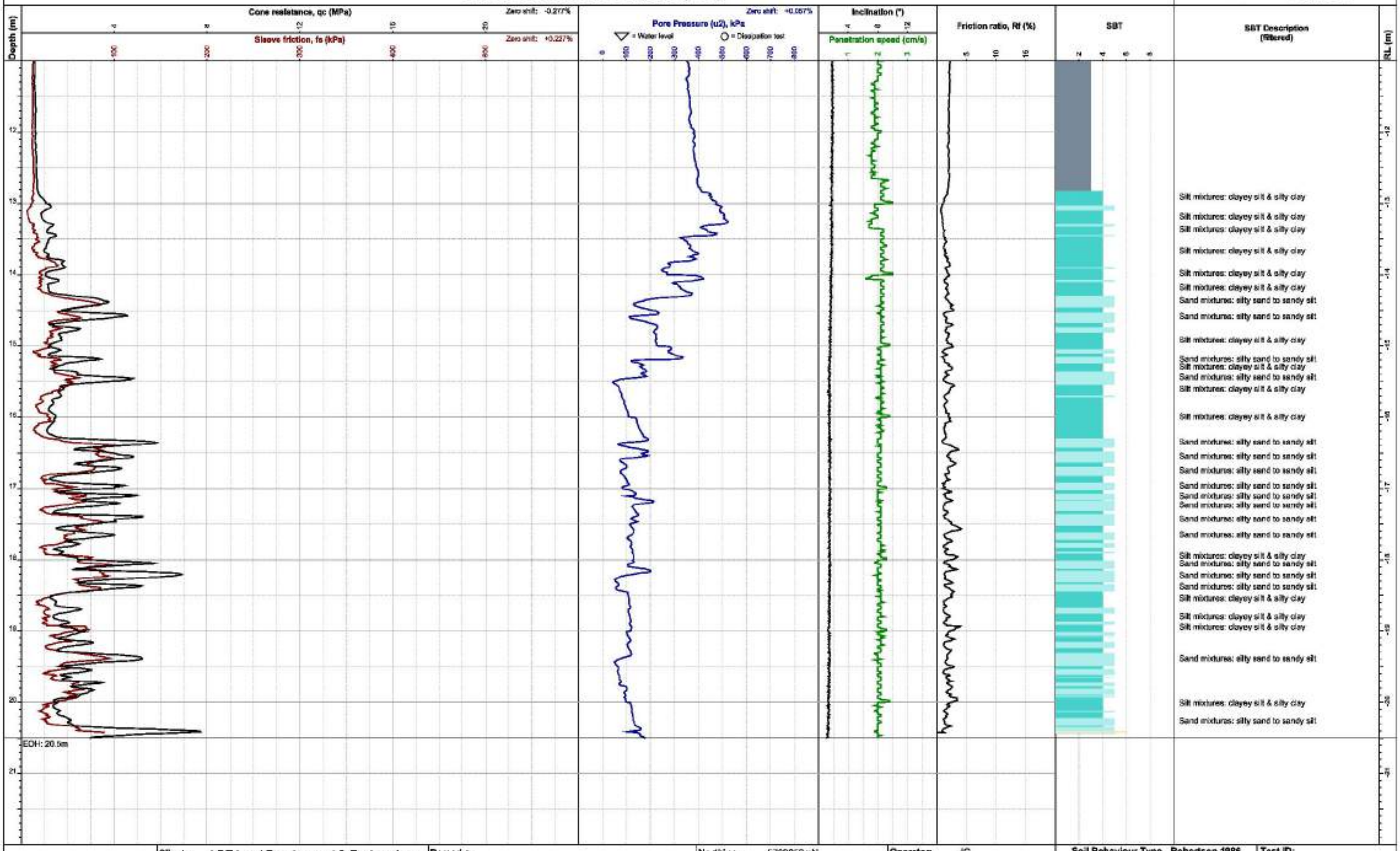
0	Undefined	5	Sand mixtures: silty sand to sandy silt
1	Sensitive fine-grained	6	Sands: clean sands to silty sands
2	Clay - organic soil	7	Dense sand to gravelly sand
3	Clays: clay to silty clay	8	Stiff sand to clayey sand
4	Silt mixtures: clayey silt & silty clay	9	Stiff fine-grained

Test ID: CPT-02

Project ID:	24477
Depth:	20.5m
Sheet:	1 of 2
Date:	30/05/2023

Cone Penetration Test (CPTu) Log

Test ID: CPT-02



Generated with CORE-GS by Geroc - CPT Combined A3 v2 - 31/05/2023 9:14:07 am

LAND DEVELOPMENT & ENGINEERING

Client: LDE Land Development & Engineering
Project: geotechnical Investigation
Location: 556-560 Aberdeen Rd, Gisborne

Remarks:
Ground water level located at 2.65m
Test according to ISO 22476-1:12 (Class 2)

Termination Reason:
Target depth

Northing:	5709858mN
Easting:	2036112mE
System:	NZTM
Elevation:	Ground
Located By:	Phone GPS
Location:	As per site plan

Operator:	JC
Rig:	Pagani TG63-150
Cone ID:	Mks1042
Type:	Comp. piezo cone
Cone Area:	10 cm²
Sleeve Area:	150 cm²
Area Ratio:	0.8

Soil Behaviour Type - Robertson 1986

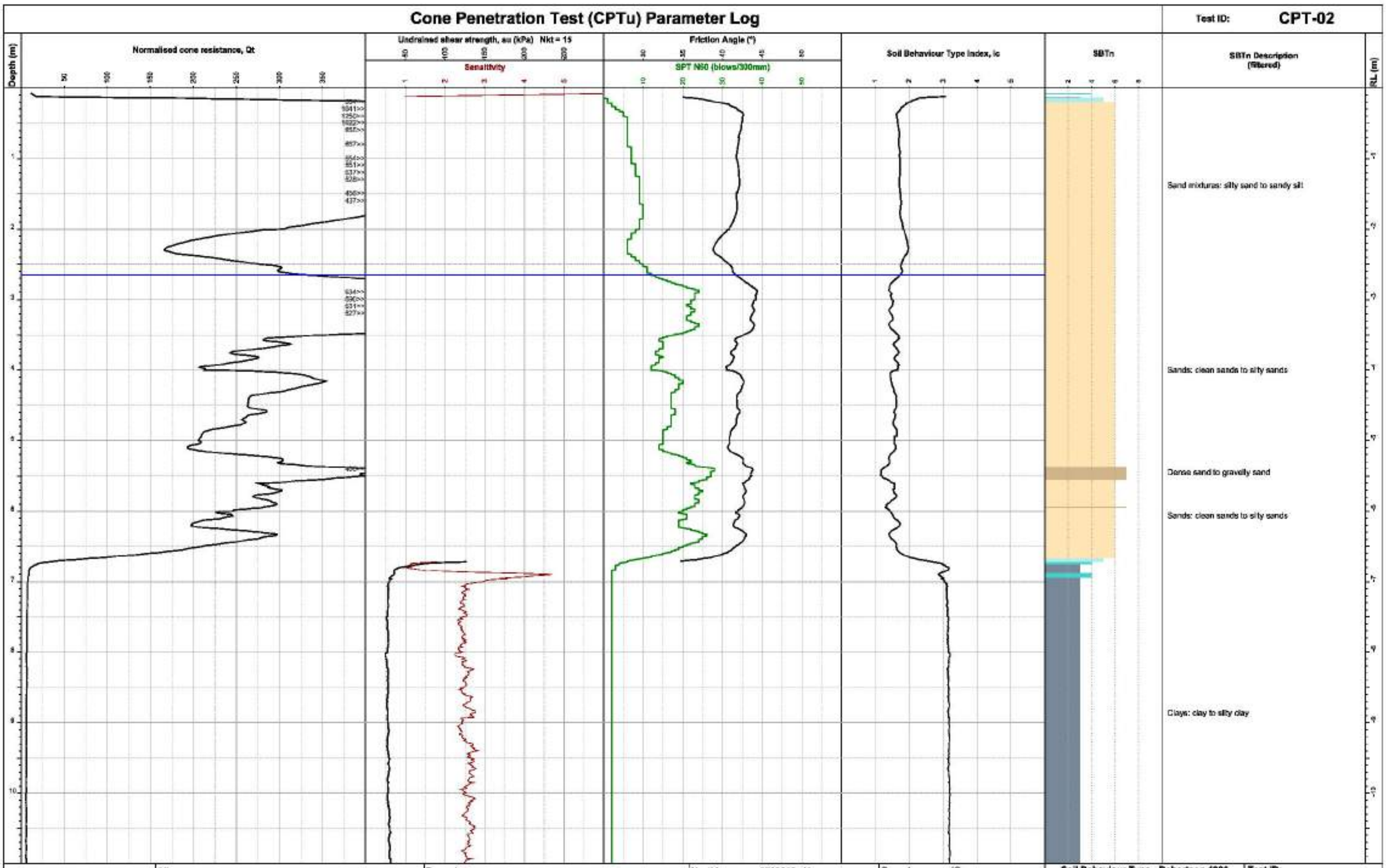
0	Undefined	5	Sand mixtures: silty sand to sandy silt
1	Sensitive fine-grained	6	Sands: clean sands to silty sands
2	Clay - organic soil	7	Dense sand to gravelly sand
3	Clays: clay to silty clay	8	Stiff sand to clayey sand
4	Silt mixtures: clayey silt & silty clay	9	Stiff fine-grained

Test ID: CPT-02

Project ID:	24477
Depth:	20.5m
Sheet:	2 of 2
Date:	30/05/2023

Cone Penetration Test (CPTu) Parameter Log

Test ID: CPT-02



Client:	LDE Land Development & Engineering	**Remarks:**	Ground water level located at 2.65m Test according to ISO 22476-1:12 (Class 2)
Project:	geotechnical Investigation	**Termination Reason:**	Target depth
Location:	556-560 Abeerdeen Rd, Gisborne		

Northing:	5709858mN
Easting:	2036112mE
System:	NZTM
Elevation:	Ground
Located By:	Phone GPS
Location:	As per site plan

Operator:	JC
Rig:	Pagani TG63-150
Cone ID:	Mks1042
Type:	Comp. piezo cone
Cone Area:	10 cm²
Sleeve Area:	150 cm²
Area Ratio:	0.8

Soil Behaviour Type - Robertson 1986

0	Undefined	5	Sand mixtures: silty sand to sandy silt
1	Sensitive fine-grained	6	Sands: clean sands to silty sands
2	Clay - organic soil	7	Dense sand to gravelly sand
3	Clays: clay to silty clay	8	Stiff sand to clayey sand
4	Silt mixtures: clayey silt & silty clay	9	Stiff fine-grained

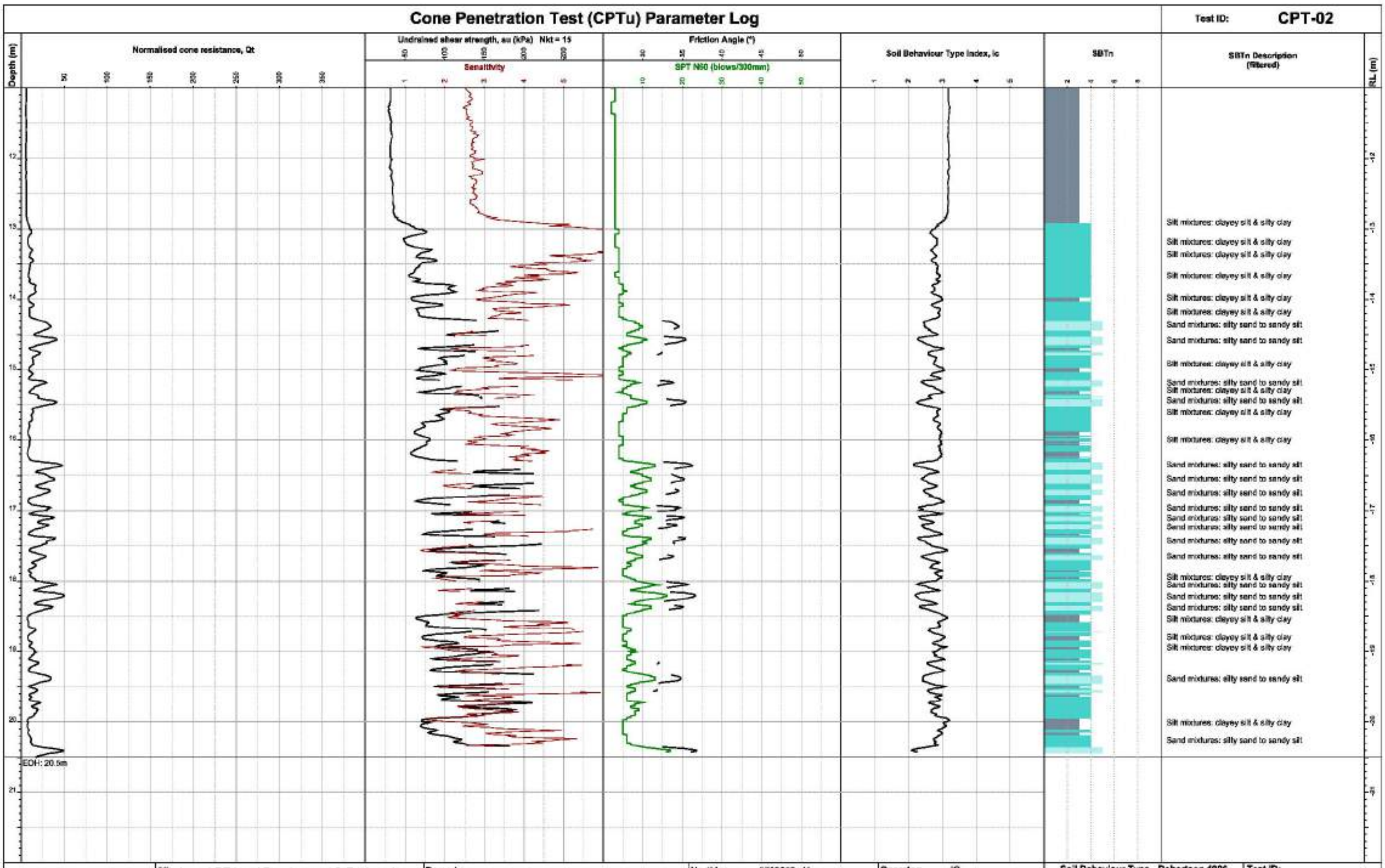
Test ID: CPT-02

Project ID:	24477
Depth:	20.5m
Sheet:	1 of 2
Date:	30/05/2023

Generated with CORE-GS by Geroc - CPT Combined A3 v2 - 31/05/2023 9:14:07 am

Cone Penetration Test (CPTu) Parameter Log

Test ID: CPT-02



Generated with CORE-GS by Geroc - CPT Combined A3 v2 - 31/05/2023 9:14:07 am

Client: LDE Land Development & Engineering
Project: geotechnical Investigation
Location: 556-560 Abeerdeen Rd, Gisborne

Remarks:
Ground water level located at 2.65m
Test according to ISO 22476-1:12 (Class 2)

Termination Reason:
Target depth

Northing: 5709858mN
Easting: 2036112mE
System: NZTM
Elevation: Ground
Located By: Phone GPS
Location: As per site plan

Operator: JC
Rig: Pageni TG63-150
Cone ID: Mks1042
Type: Comp. piezo cone
Cone Area: 10 cm²
Sleeve Area: 150 cm²
Area Ratio: 0.8

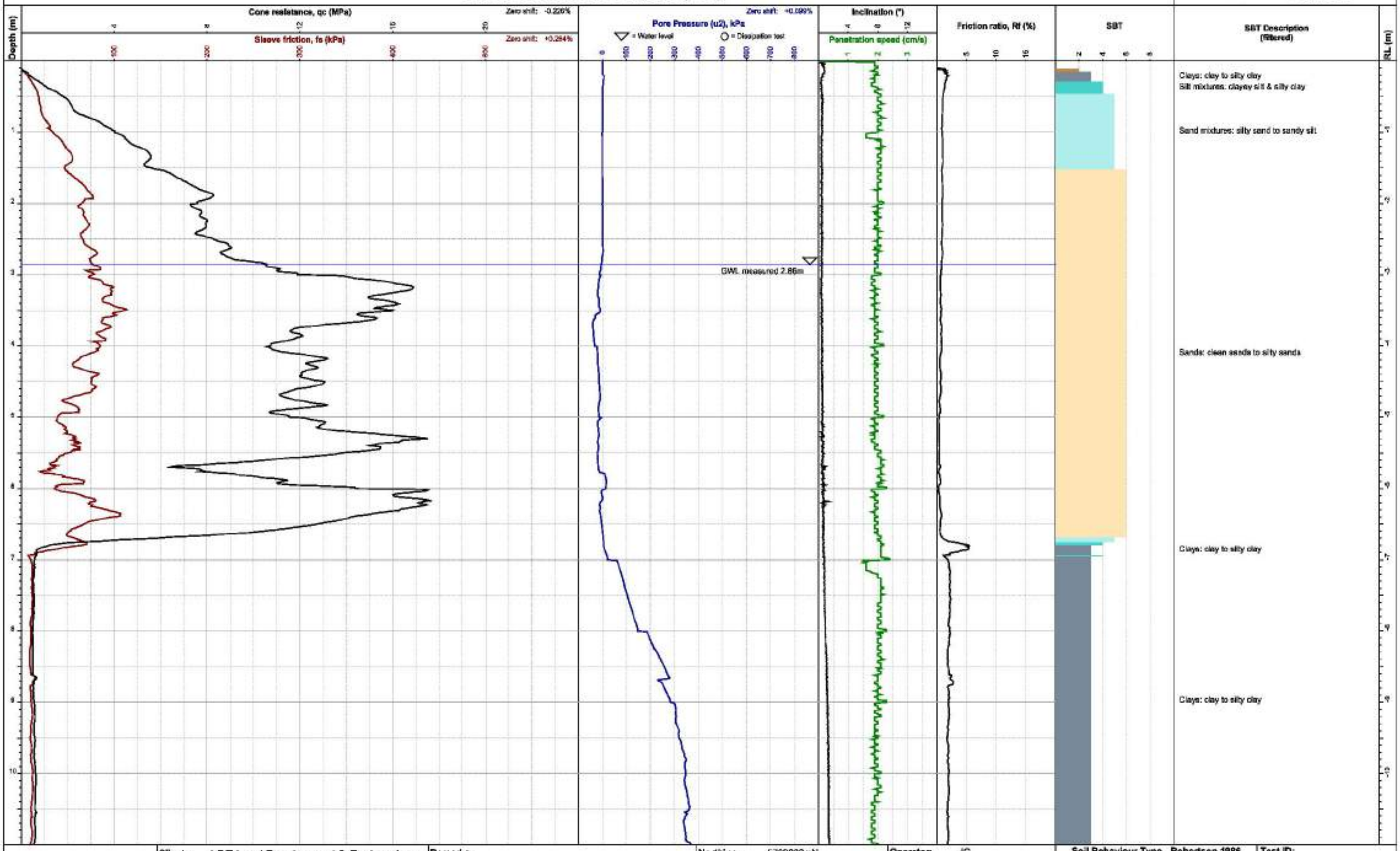
Soil Behaviour Type - Robertson 1986

0	Undefined	5	Sand mixtures: silty sand to sandy silt
1	Sensitive fine-grained	6	Sands: clean sands to silty sands
2	Clay - organic soil	7	Dense sand to gravelly sand
3	Clays: clay to silty clay	8	Stiff sand to clayey sand
4	Silt mixtures: clayey silt & silty clay	9	Stiff fine-grained

Test ID: CPT-02
Project ID: 24477
Depth: 20.5m
Sheet: 2 of 2
Date: 30/05/2023

Cone Penetration Test (CPTu) Log

Test ID: **CPT-03**



LDE LAND DEVELOPMENT & ENGINEERING

Client: LDE Land Development & Engineering
Project: geotechnical Investigation
Location: 556-560 Abeerdeen Rd, Gisborne

Remarks:
Ground water level located at 2.86m
Test according to ISO 22476-1:12 (Class 2)

Termination Reason:
Target depth

Northing:	5709866mN
Easting:	2036135mE
System:	NZTM
Elevation:	Ground
Located By:	Phone GPS
Location:	As per site plan

Operator:	JC
Rig:	Pagani TG63-150
Cone ID:	Mks1042
Type:	Comp. piezo cone
Cone Area:	10 cm²
Sleeve Area:	150 cm²
Area Ratio:	0.8

Soil Behaviour Type - Robertson 1986

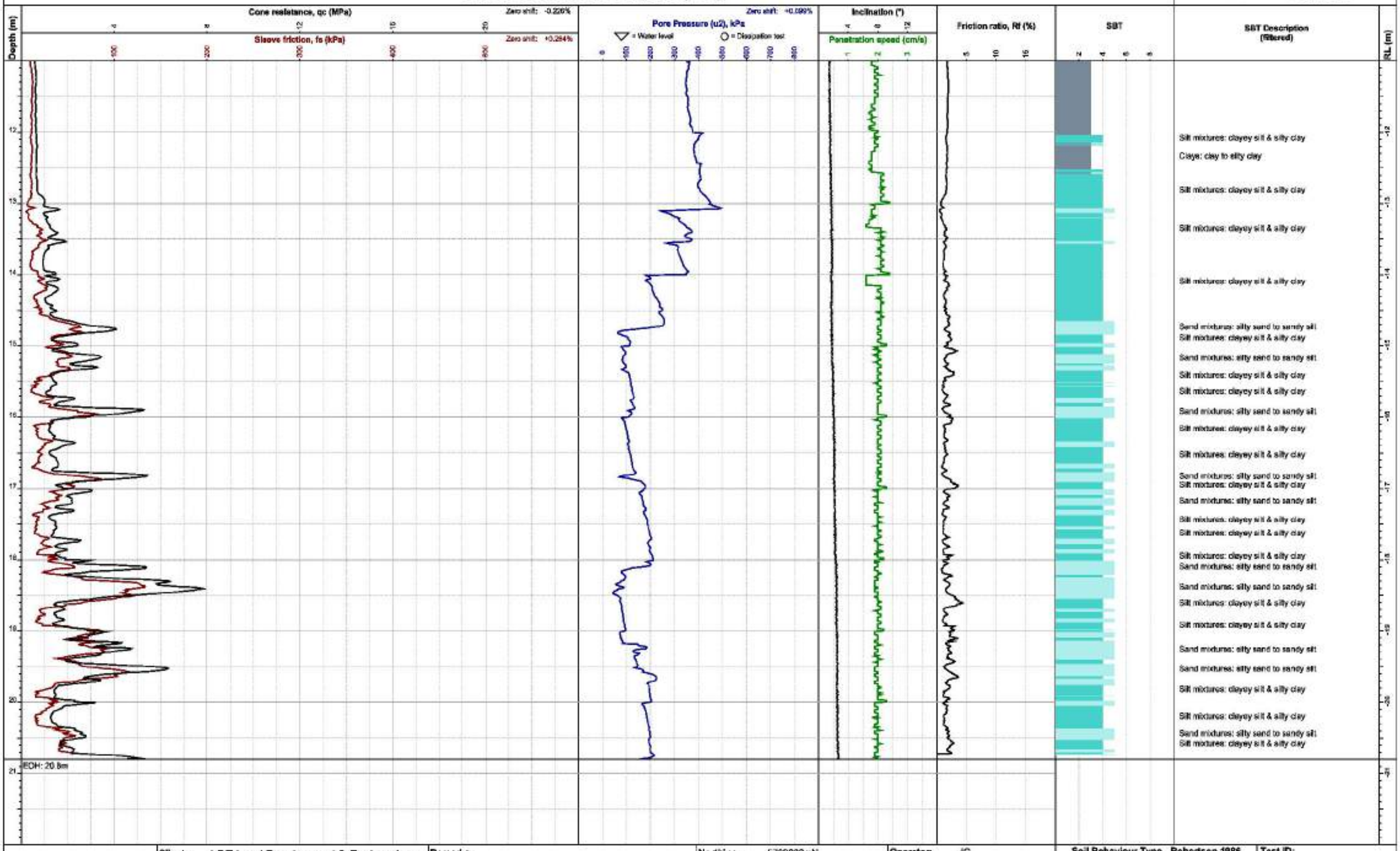
0	Undefined	5	Sand mixtures: silty sand to sandy silt
1	Sensitive fine-grained	6	Sands: clean sands to silty sands
2	Clay - organic soil	7	Dense sand to gravelly sand
3	Clays: clay to silty clay	8	Stiff sand to clayey sand
4	Silt mixtures: clayey silt & silty clay	9	Stiff fine-grained

Test ID:
CPT-03

Project ID:	24477
Depth:	20.8m
Sheet:	1 of 2
Date:	30/05/2023

Cone Penetration Test (CPTu) Log

Test ID: CPT-03



Silt mixtures: clayey silt & silty clay
Clays: clay to silty clay
Silt mixtures: clayey silt & silty clay
Silt mixtures: clayey silt & silty clay
Silt mixtures: clayey silt & silty clay
Sand mixtures: silty sand to sandy silt
Silt mixtures: clayey silt & silty clay
Sand mixtures: silty sand to sandy silt
Silt mixtures: clayey silt & silty clay
Silt mixtures: clayey silt & silty clay
Sand mixtures: silty sand to sandy silt
Silt mixtures: clayey silt & silty clay
Silt mixtures: clayey silt & silty clay
Sand mixtures: silty sand to sandy silt
Silt mixtures: clayey silt & silty clay
Sand mixtures: silty sand to sandy silt
Silt mixtures: clayey silt & silty clay
Silt mixtures: clayey silt & silty clay
Silt mixtures: clayey silt & silty clay
Sand mixtures: silty sand to sandy silt
Sand mixtures: silty sand to sandy silt
Silt mixtures: clayey silt & silty clay
Silt mixtures: clayey silt & silty clay
Sand mixtures: silty sand to sandy silt
Sand mixtures: silty sand to sandy silt
Silt mixtures: clayey silt & silty clay
Silt mixtures: clayey silt & silty clay
Sand mixtures: silty sand to sandy silt
Silt mixtures: clayey silt & silty clay

Client: LDE Land Development & Engineering
Project: geotechnical Investigation
Location: 556-560 Abeerdeen Rd, Gisborne

Remarks:
Ground water level located at 2.86m
Test according to ISO 22476-1:12 (Class 2)

Termination Reason:
Target depth

Northing:	5709866mN
Easting:	2036135mE
System:	NZTM
Elevation:	Ground
Located By:	Phone GPS
Location:	As per site plan

Operator:	JC
Rig:	Pagani TG63-150
Cone ID:	Mks1042
Type:	Comp. piezo cone
Cone Area:	10 cm²
Sleeve Area:	150 cm²
Area Ratio:	0.8

Soil Behaviour Type - Robertson 1986

0	Undefined	5	Sand mixtures: silty sand to sandy silt
1	Sensitive fine-grained	6	Sands: clean sands to silty sands
2	Clay - organic soil	7	Dense sand to gravelly sand
3	Clays: clay to silty clay	8	Stiff sand to clayey sand
4	Silt mixtures: clayey silt & silty clay	9	Stiff fine-grained

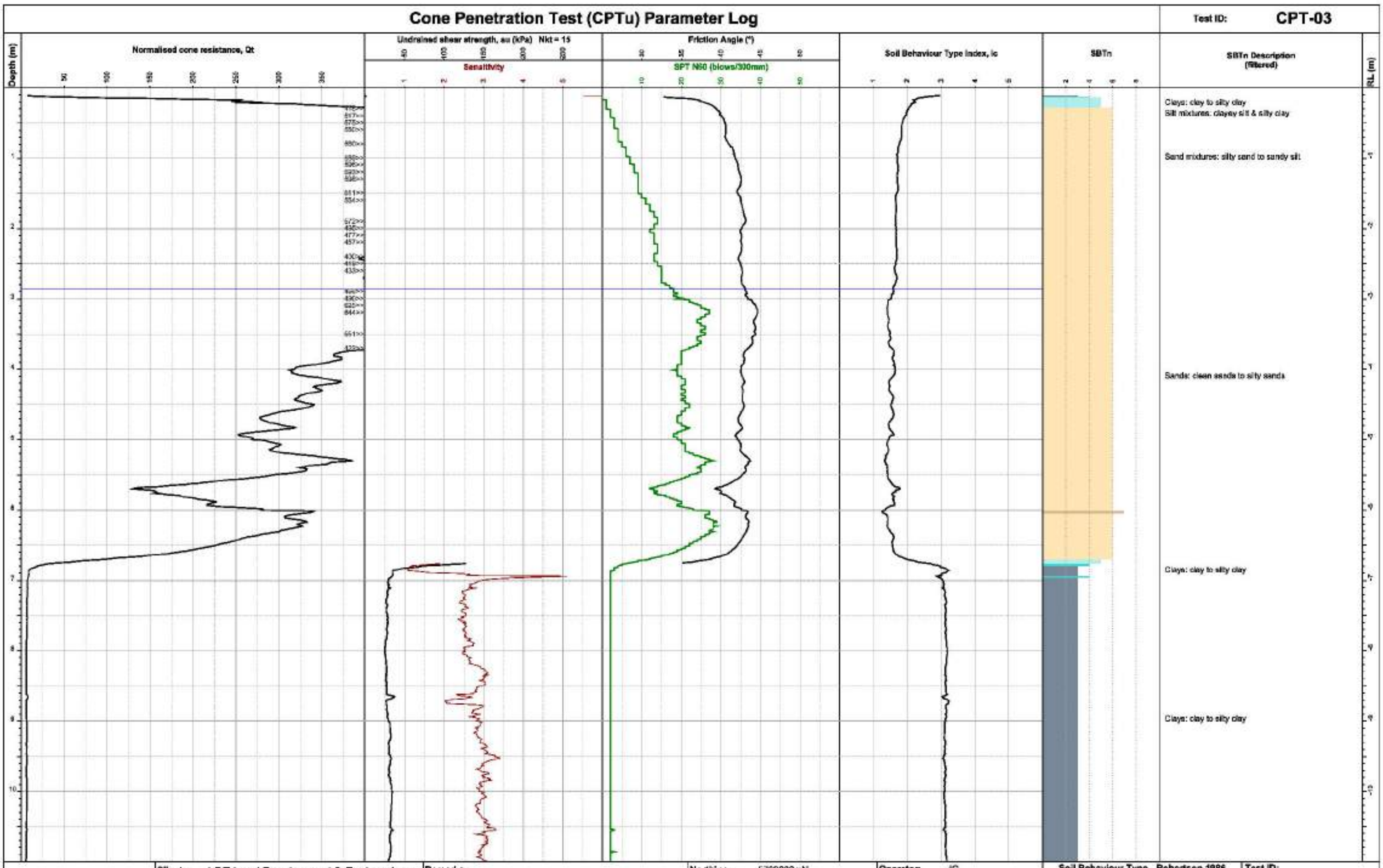
Test ID:
CPT-03

Project ID:	24477
Depth:	20.8m
Sheet:	2 of 2
Date:	30/05/2023

Generated with CORE-GS by Geroc - CPT Combined A3 v2 - 31/05/2023 9:14:10 am

Cone Penetration Test (CPTu) Parameter Log

Test ID: **CPT-03**



Client: LDE Land Development & Engineering

Project: geotechnical Investigation

Location: 556-560 Aberdeen Rd, Gisborne

Remarks:
Ground water level located at 2.86m
Test according to ISO 22476-1:12 (Class 2)

Termination Reason:
Target depth

Northing: 5709866mN
Easting: 2036136mE
System: NZTM
Elevation: Ground
Located By: Phone GPS
Location: As per site plan

Operator: JC
Rig: Pagani TG63-150
Cone ID: Mks1042
Type: Comp. piezo cone
Cone Area: 10 cm²
Sleeve Area: 150 cm²
Area Ratio: 0.8

Soil Behaviour Type - Robertson 1986

0	Undefined	5	Sand mixtures: silty sand to sandy silt
1	Sensitive fine-grained	6	Sands: clean sands to silty sands
2	Clay - organic soil	7	Dense sand to gravelly sand
3	Clays: clay to silty clay	8	Stiff sand to clayey sand
4	Silt mixtures: clayey silt & silty clay	9	Stiff fine-grained

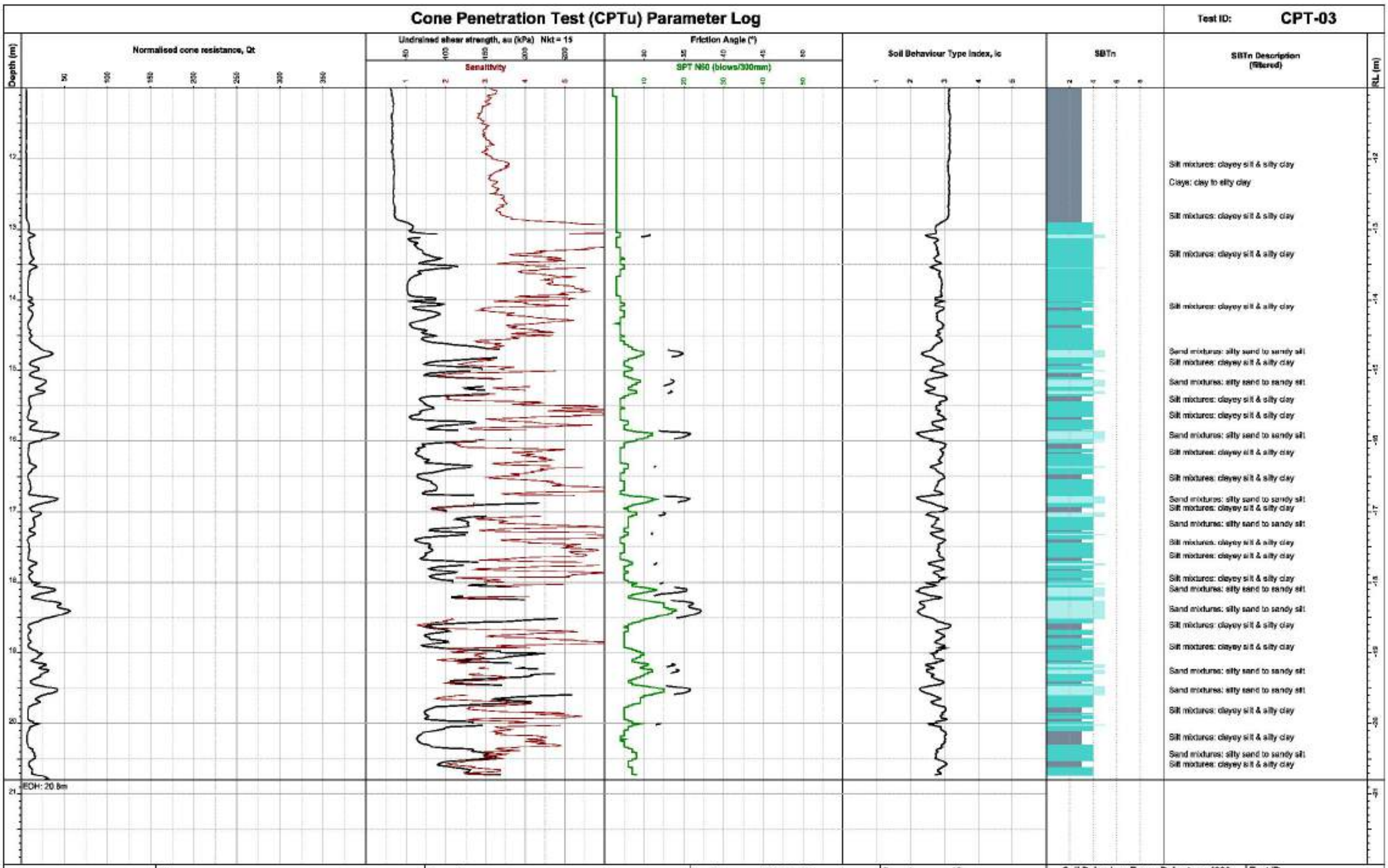
Test ID: **CPT-03**

Project ID: 24477
Depth: 20.8m
Sheet: 1 of 2
Date: 30/05/2023

Generated with CORE-GS by Geroc - CPT Combined A3 v2 - 31/05/2023 9:14:10 am

Cone Penetration Test (CPTu) Parameter Log

Test ID: CPT-03



Generated with CORE-GS by Geroc - CPT Combined A3 v2 - 31/05/2023 9:14:10 am

Client: LDE Land Development & Engineering

Project: geotechnical Investigation

Location: 556-560 Abeerdeen Rd, Gisborne

Remarks:
Ground water level located at 2.86m
Test according to ISO 22476-1:12 (Class 2)

Termination Reason:
Target depth

Northing:	5709866mN
Easting:	2036135mE
System:	NZTM
Elevation:	Ground
Located By:	Phone GPS
Location:	As per site plan

Operator:	JC
Rig:	Pagani TG63-150
Cone ID:	Mks1042
Type:	Comp. piezo cone
Cone Area:	10 cm²
Sleeve Area:	150 cm²
Area Ratio:	0.8

Soil Behaviour Type - Robertson 1986

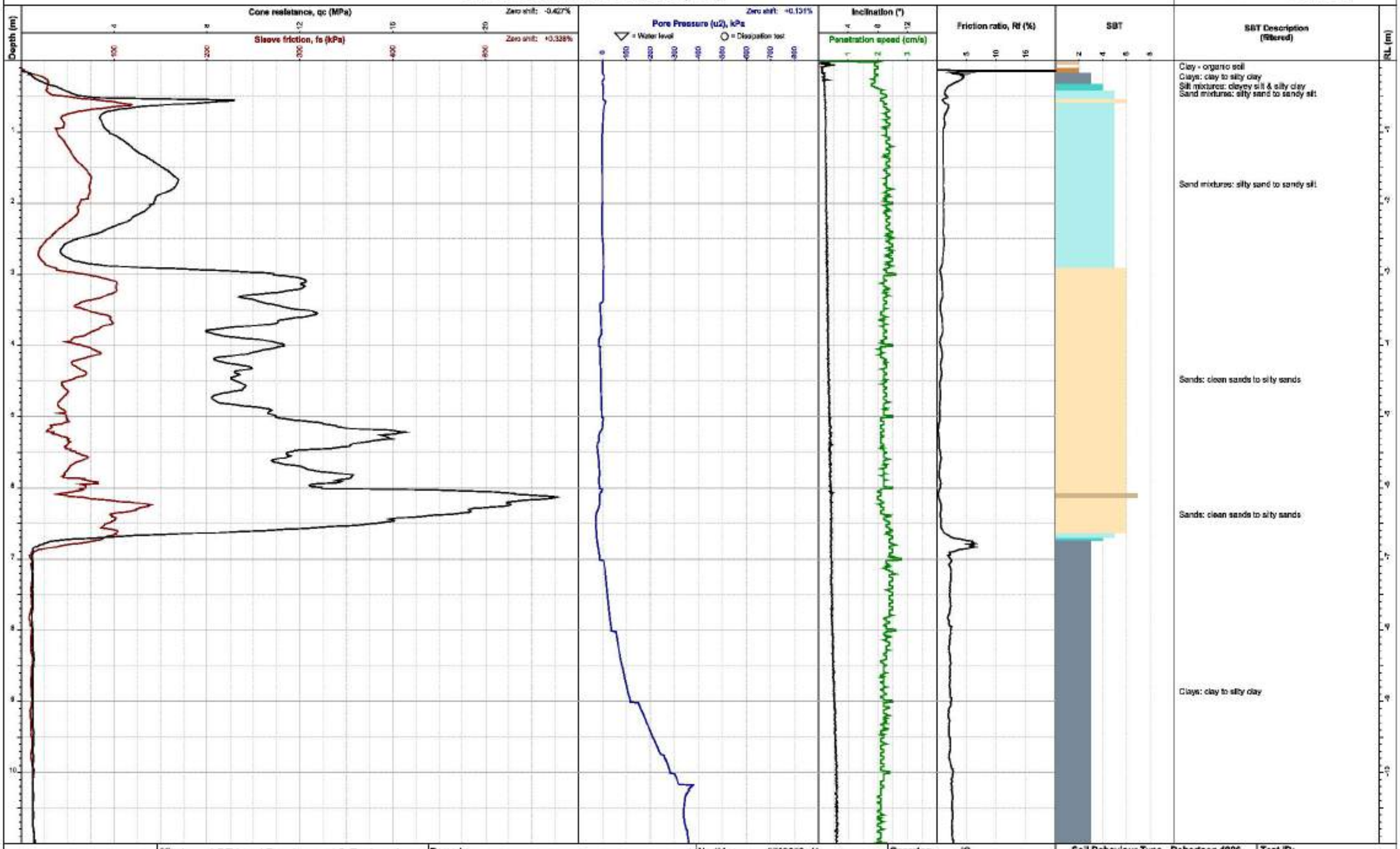
0	Undefined	5	Sand mixtures: silty sand to sandy silt
1	Sensitive fine-grained	6	Sands: clean sands to silty sands
2	Clay - organic soil	7	Dense sand to gravelly sand
3	Clays: clay to silty clay	8	Stiff sand to clayey sand
4	Silt mixtures: clayey silt & silty clay	9	Stiff fine-grained

Test ID: CPT-03

Project ID:	24477
Depth:	20.8m
Sheet:	2 of 2
Date:	30/05/2023

Cone Penetration Test (CPTu) Log

Test ID: CPT-04



Generated with CORE-GS by Geroc - CPT Combined A3 v2 - 31/05/2023 9:14:12 am

Client: LDE Land Development & Engineering

Project: geotechnical Investigation

Location: 556-560 Abeerdeen Rd, Gisborne

Remarks:
Ground water level located at 2.34m
Test according to ISO 22476-1:12 (Class 2)

Termination Reason:
Target depth

Northing: 5709856mN
Easting: 2036093mE
System: NZTM
Elevation: Ground
Located By: Phone GPS
Location: As per site plan

Operator: JC
Rig: Pagani TG63-150
Cone ID: Mks1042
Type: Comp. piezo cone
Cone Area: 10 cm²
Sleeve Area: 150 cm²
Area Ratio: 0.8

Soil Behaviour Type - Robertson 1986

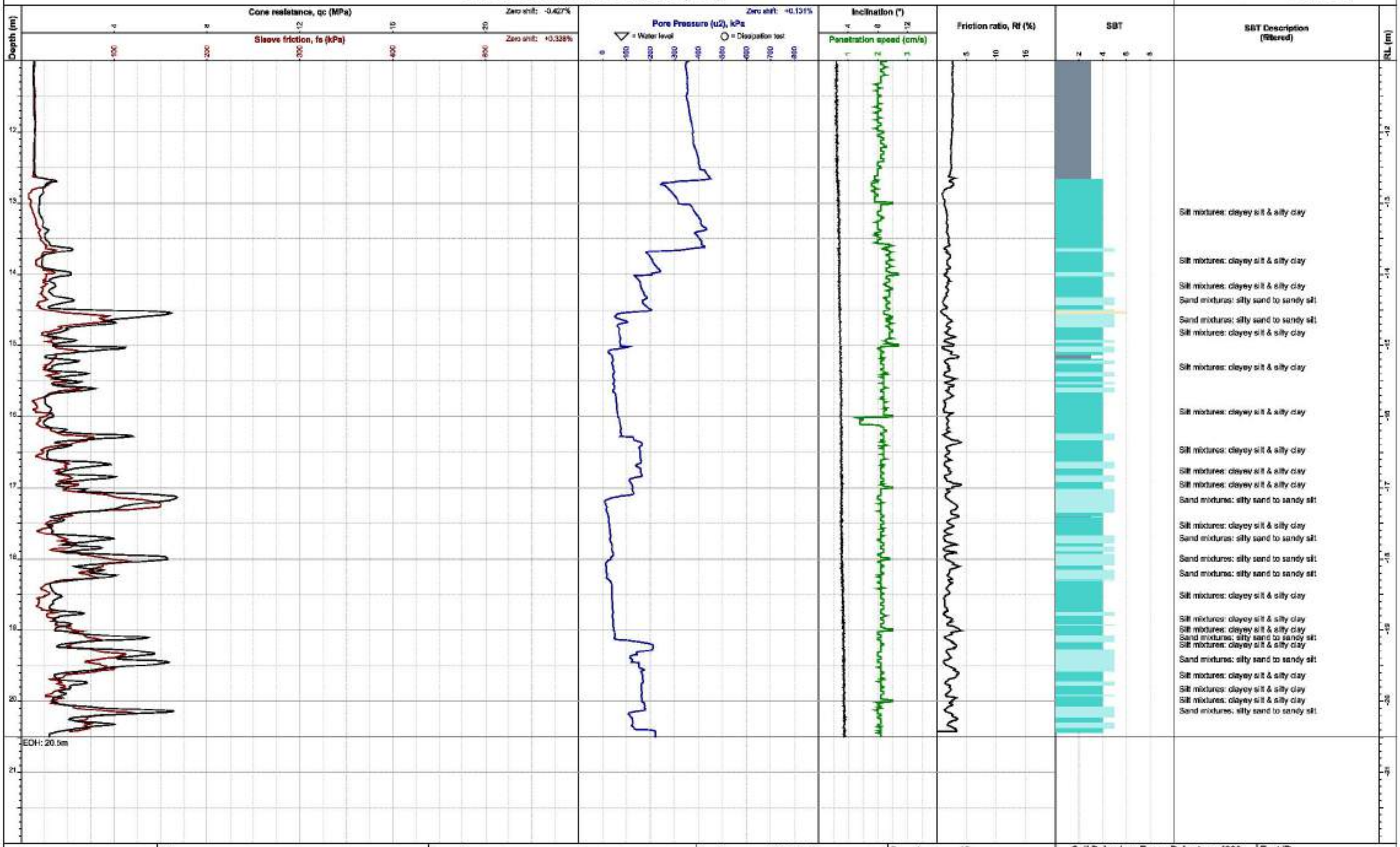
0	Undefined	5	Sand mixtures: silty sand to sandy silt
1	Sensitive fine-grained	6	Sands: clean sands to silty sands
2	Clay - organic soil	7	Dense sand to gravelly sand
3	Clays: clay to silty clay	8	Stiff sand to clayey sand
4	Silt mixtures: clayey silt & silty clay	9	Stiff fine-grained

Test ID: CPT-04

Project ID: 24477
Depth: 20.5m
Sheet: 1 of 2
Date: 30/05/2023

Cone Penetration Test (CPTu) Log

Test ID: CPT-04



Client: LDE Land Development & Engineering

Project: geotechnical Investigation

Location: 556-560 Abeerdeen Rd, Gisborne

Remarks:
Ground water level located at 2.34m
Test according to ISO 22476-1:12 (Class 2)

Termination Reason:
Target depth

Northing:	5709856mN
Easting:	2036093mE
System:	NZTM
Elevation:	Ground
Located By:	Phone GPS
Location:	As per site plan

Operator:	JC
Rig:	Pagani TG63-150
Cone ID:	Mks1042
Type:	Comp. piezo cone
Cone Area:	10 cm²
Sleeve Area:	150 cm²
Area Ratio:	0.8

Soil Behaviour Type - Robertson 1986

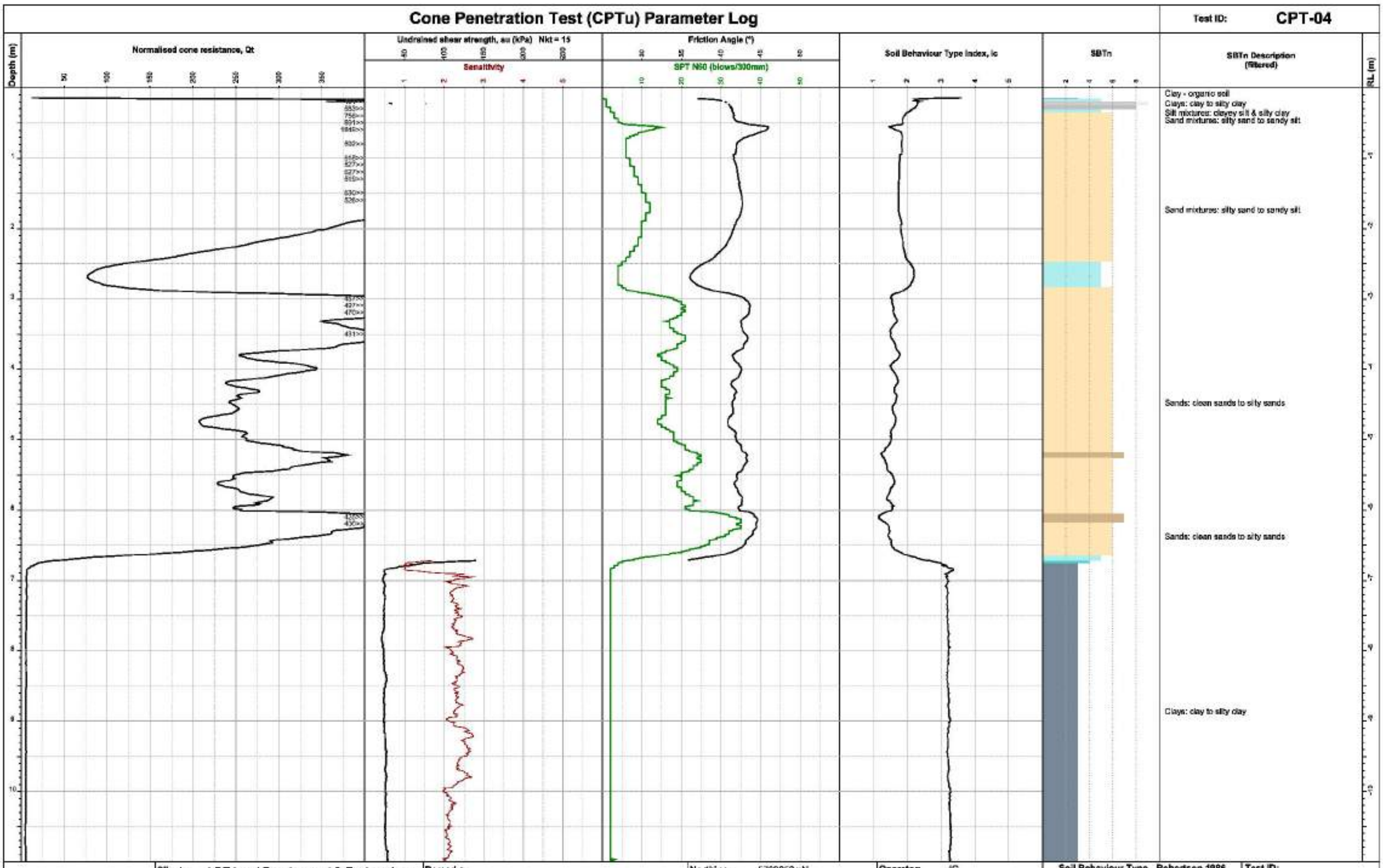
0	Undefined	5	Sand mixtures: silty sand to sandy silt
1	Sensitive fine-grained	6	Sands: clean sands to silty sands
2	Clay - organic soil	7	Dense sand to gravelly sand
3	Clays: clay to silty clay	8	Stiff sand to clayey sand
4	Silt mixtures: clayey silt & silty clay	9	Stiff fine-grained

Test ID: CPT-04

Project ID:	24477
Depth:	20.5m
Sheet:	2 of 2
Date:	30/05/2023

Cone Penetration Test (CPTu) Parameter Log

Test ID: CPT-04



Generated with CORE-GS by Geroc - CPT Combined A3 v2 - 31/05/2023 9:14:12 am

Client:	LDE Land Development & Engineering
Project:	geotechnical Investigation
Location:	556-560 Abeerdeen Rd, Gisborne

Remarks:
Ground water level located at 2.34m
Test according to ISO 22476-1:12 (Class 2)

Termination Reason:
Target depth

Northing:	5709856mN
Easting:	2036093mE
System:	NZTM
Elevation:	Ground
Located By:	Phone GPS
Location:	As per site plan

Operator:	JC
Rig:	Pagani TG63-150
Cone ID:	Mks1042
Type:	Comp. piezo cone
Cone Area:	10 cm²
Sleeve Area:	150 cm²
Area Ratio:	0.8

Soil Behaviour Type - Robertson 1986

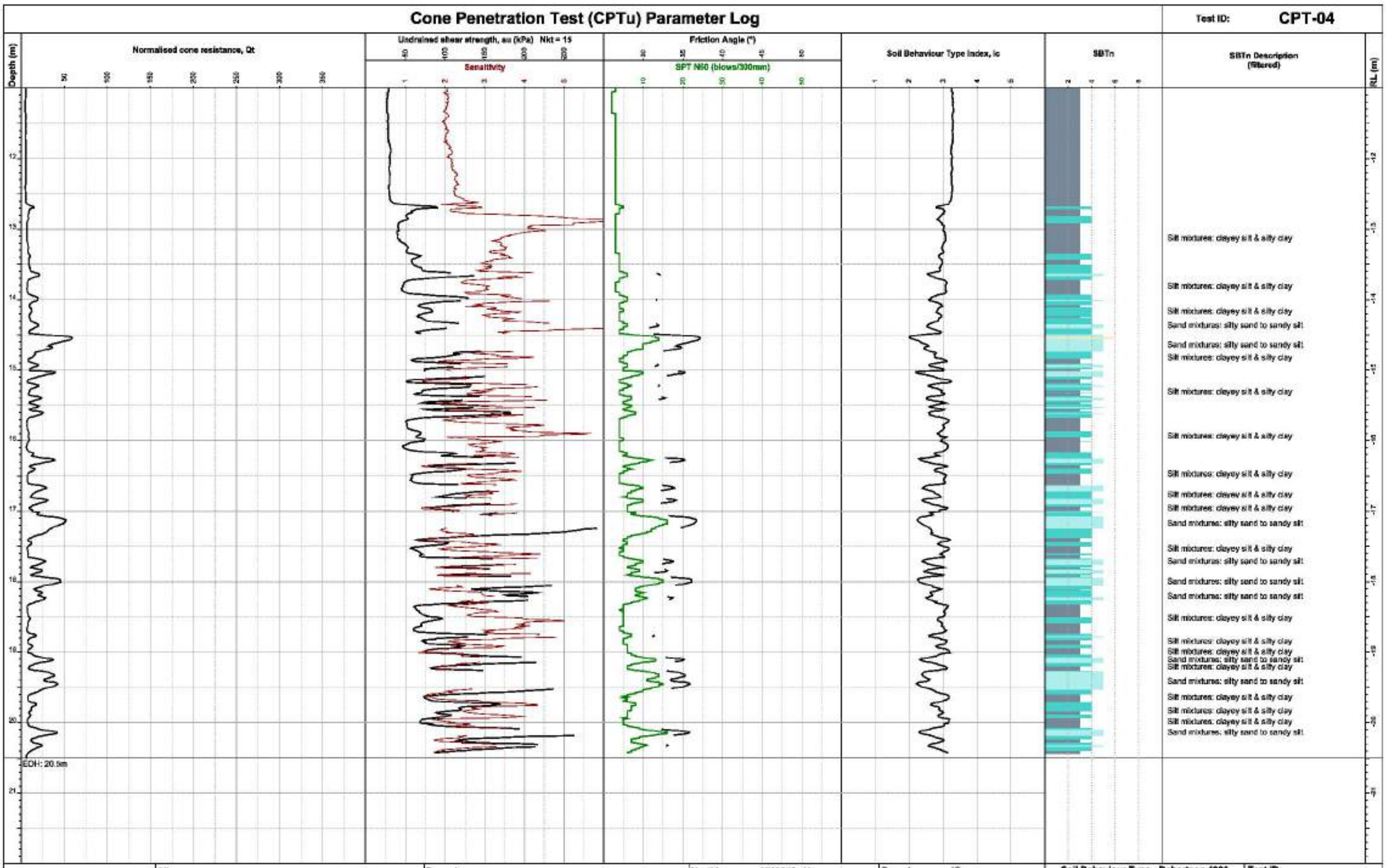
0	Undefined	5	Sand mixtures: silty sand to sandy silt
1	Sensitive fine-grained	6	Sands: clean sands to silty sands
2	Clay - organic soil	7	Dense sand to gravelly sand
3	Clays: clay to silty clay	8	Stiff sand to clayey sand
4	Silt mixtures: clayey silt & silty clay	9	Stiff fine-grained

Test ID:
CPT-04

Project ID:	24477
Depth:	20.5m
Sheet:	1 of 2
Date:	30/05/2023

Cone Penetration Test (CPTu) Parameter Log

Test ID: CPT-04



Generated with CORE-GS by Geroc - CPT Combined A3 v2 - 31/05/2023 9:14:13 am

LDE LAND DEVELOPMENT & ENGINEERING

Client: LDE Land Development & Engineering
Project: geotechnical Investigation
Location: 556-560 Abeerdeen Rd, Gisborne

Remarks:
Ground water level located at 2.34m
Test according to ISO 22476-1:12 (Class 2)

Termination Reason:
Target depth

Northing:	5709856mN
Easting:	2036093mE
System:	NZTM
Elevation:	Ground
Located By:	Phone GPS
Location:	As per site plan

Operator:	JC
Rig:	Pagani TG63-150
Cone ID:	Mks1042
Type:	Comp. piezo cone
Cone Area:	10 cm²
Sleeve Area:	150 cm²
Area Ratio:	0.8

Soil Behaviour Type - Robertson 1986

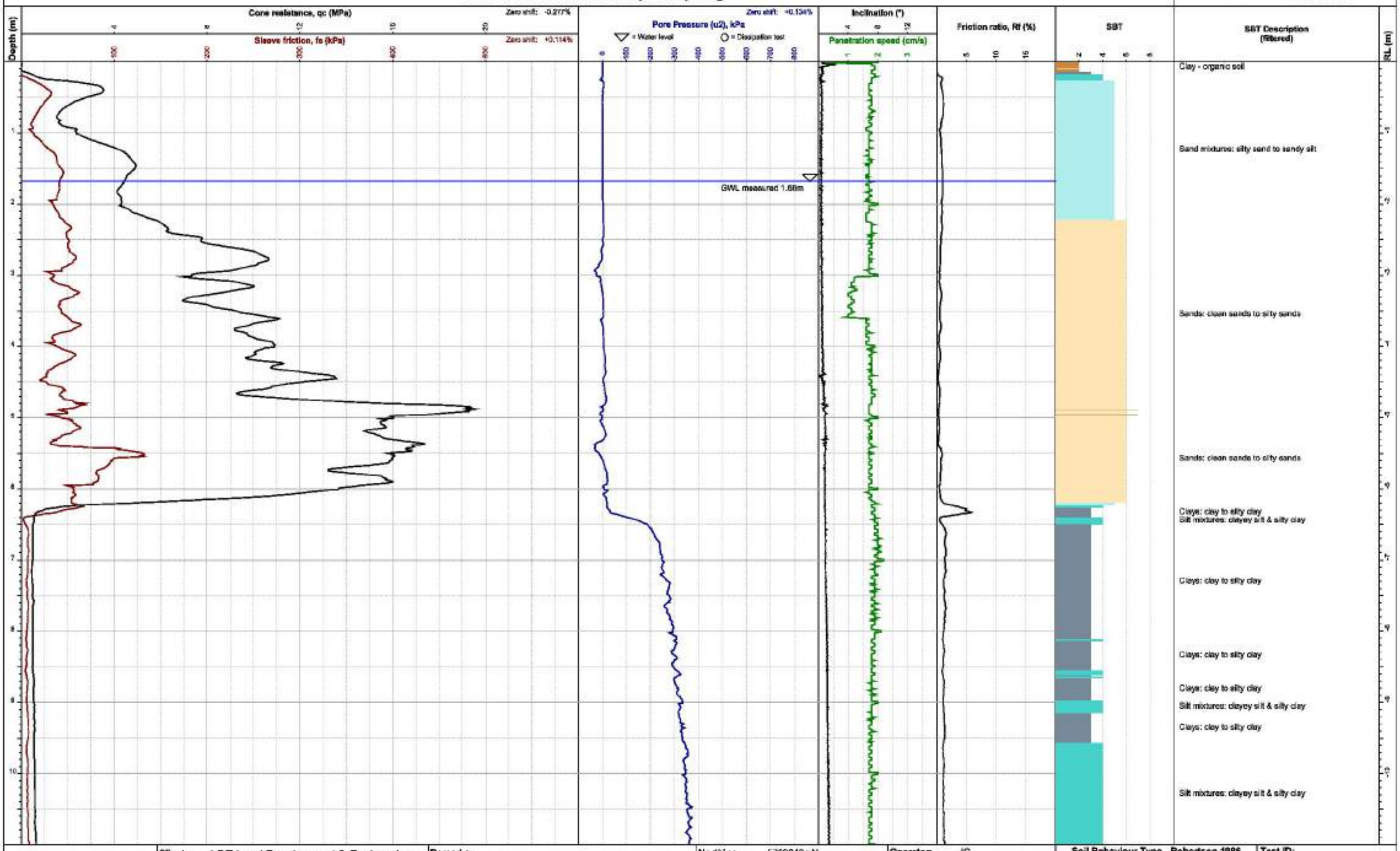
0	Undefined
1	Sensitive fine-grained
2	Clay - organic soil
3	Clays: clay to silty clay
4	Silt mixtures: clayey silt & silty clay
5	Sand mixtures: silty sand to sandy silt
6	Sands: clean sands to silty sands
7	Dense sand to gravelly sand
8	Stiff sand to clayey sand
9	Stiff fine-grained

Test ID: CPT-04

Project ID:	24477
Depth:	20.5m
Sheet:	2 of 2
Date:	30/05/2023

Cone Penetration Test (CPTu) Log

Test ID: CPT-05



Client:	LDE Land Development & Engineering
Project:	geotechnical Investigation
Location:	556-560 Abeerdeen Rd, Gisborne

Remarks:
Ground water level located at 1.68m
Test according to ISO 22476-1:12 (Class 2)

Termination Reason:
Target depth

Northing:	5709840mN
Easting:	2036107mE
System:	NZTM
Elevation:	Ground
Located By:	Phone GPS
Location:	As per site plan

Operator:	JC
Rig:	Pagani TG63-150
Cone ID:	Mks1042
Type:	Comp. piezo cone
Cone Area:	10 cm²
Sleeve Area:	150 cm²
Area Ratio:	0.8

Soil Behaviour Type - Robertson 1986

0	Undefined	5	Sand mixtures: silty sand to sandy silt
1	Sensitive fine-grained	6	Sands: clean sands to silty sands
2	Clay - organic soil	7	Dense sand to gravelly sand
3	Clays: clay to silty clay	8	Stiff sand to clayey sand
4	Silt mixtures: clayey silt & silty clay	9	Stiff fine-grained

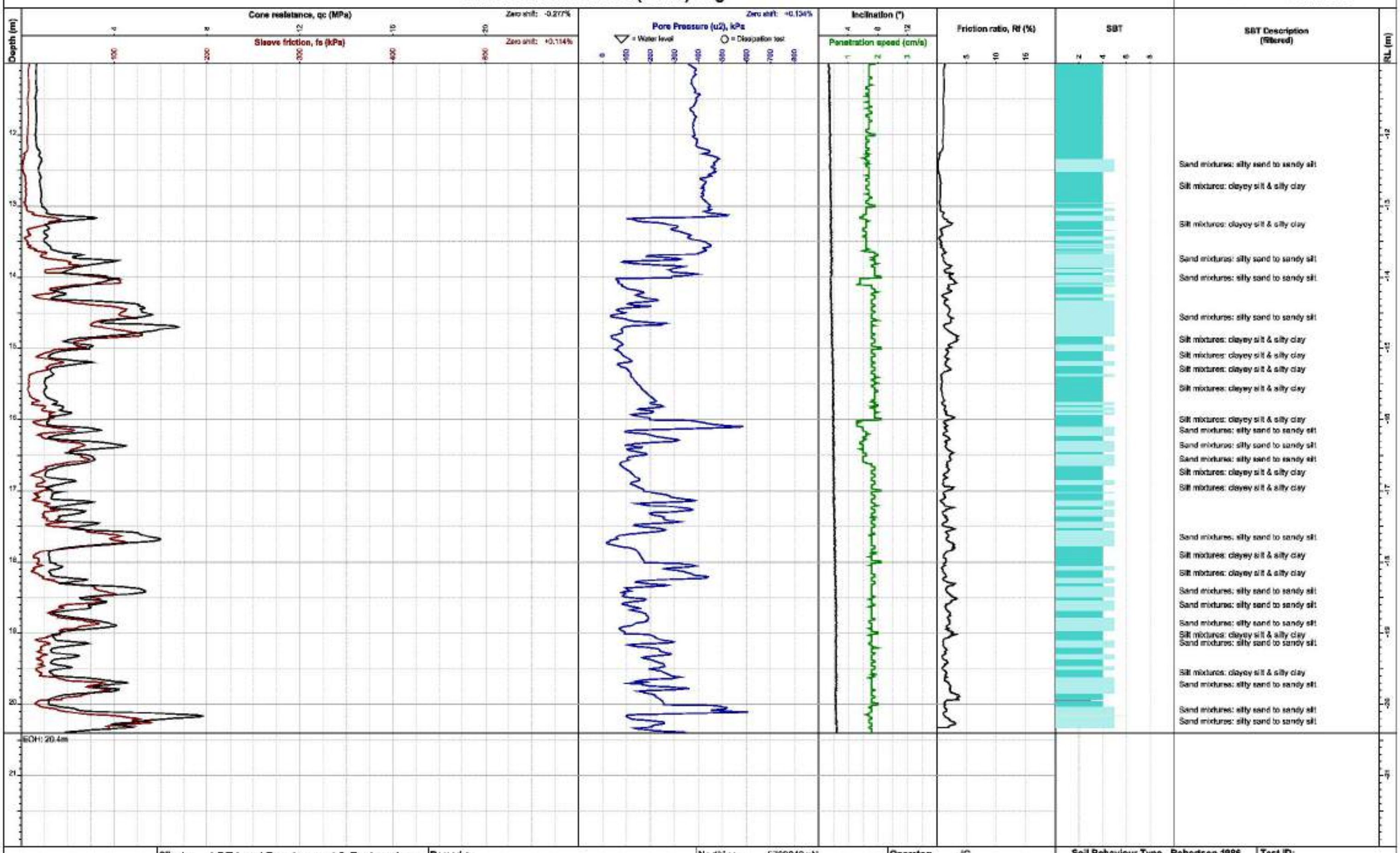
Test ID: CPT-05

Project ID:	24477
Depth:	20.4m
Sheet:	1 of 2
Date:	30/05/2023

Generated with CORE-GS by Geroc - CPT Combined A3 v2 - 31/05/2023 9:14:15 am

Cone Penetration Test (CPTu) Log

Test ID: CPT-05



Generated with CORE-GS by Geroc - CPT Combined A3 v2 - 31/05/2023 9:14:18 am

LAND DEVELOPMENT & ENGINEERING

Client: LDE Land Development & Engineering
Project: geotechnical Investigation
Location: 556-560 Abeerdeen Rd, Gisborne

Remarks:
Ground water level located at 1.68m
Test according to ISO 22476-1:12 (Class 2)

Termination Reason:
Target depth

Northing: 5709840mN
Easting: 2036107mE
System: NZTM
Elevation: Ground
Located By: Phone GPS
Location: As per site plan

Operator: JC
Rig: Pagani TG63-150
Cone ID: Mks1042
Type: Comp. piezo cone
Cone Area: 10 cm²
Sleeve Area: 150 cm²
Area Ratio: 0.8

Soil Behaviour Type - Robertson 1986

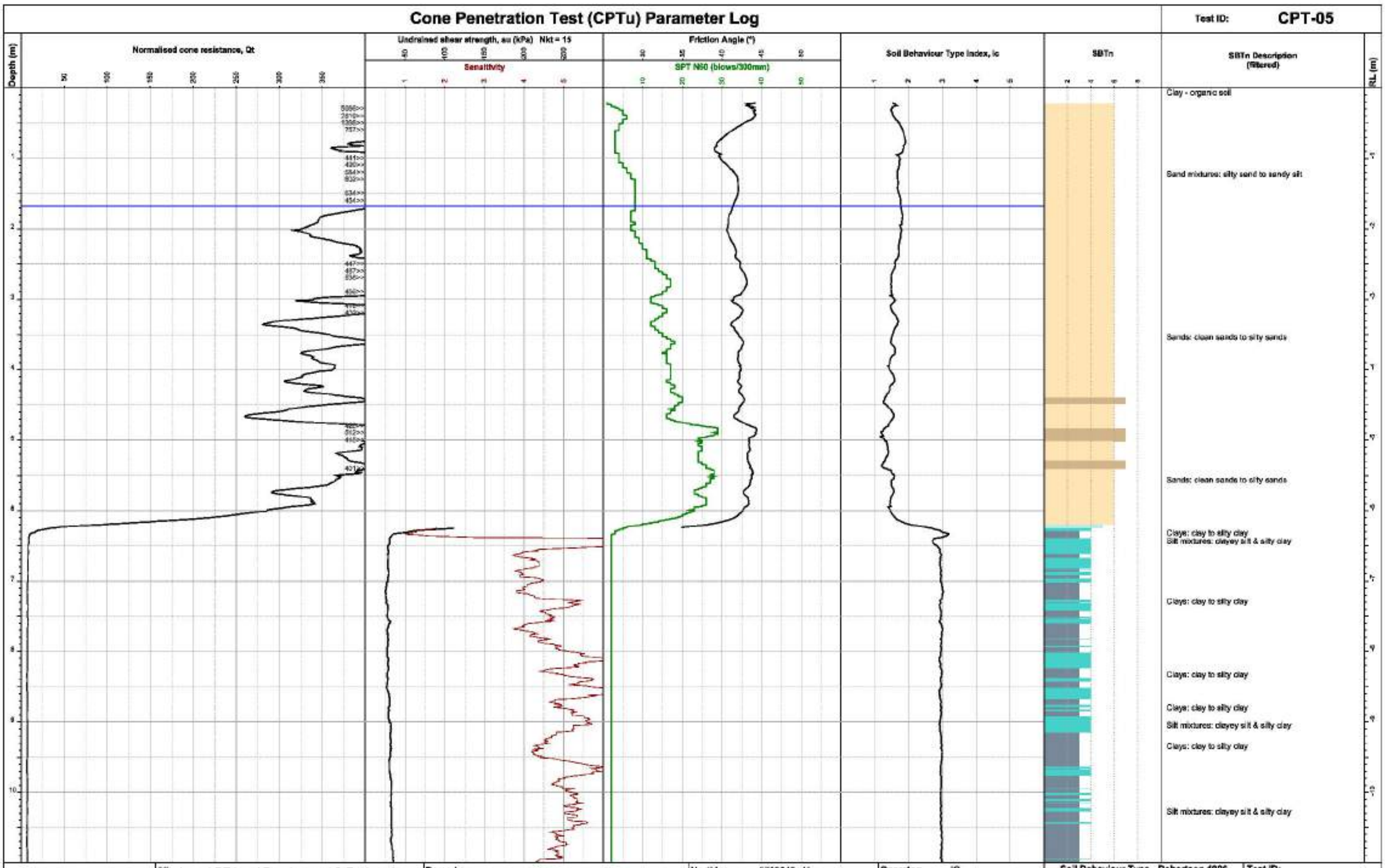
0	Undefined	5	Sand mixtures: silty sand to sandy silt
1	Sensitive fine-grained	6	Sands: clean sands to silty sands
2	Clay - organic soil	7	Dense sand to gravelly sand
3	Clays: clay to silty clay	8	Stiff sand to clayey sand
4	Silt mixtures: clayey silt & silty clay	9	Stiff fine-grained

Test ID: CPT-05

Project ID: 24477
Depth: 20.4m
Sheet: 2 of 2
Date: 30/05/2023

Cone Penetration Test (CPTu) Parameter Log

Test ID: CPT-05



Client:	LDE Land Development & Engineering
Project:	geotechnical Investigation
Location:	556-560 Abeerdeen Rd, Gisborne

Remarks:
Ground water level located at 1.68m
Test according to ISO 22476-1:12 (Class 2)

Termination Reason:
Target depth

Northing:	5709840mN
Easting:	2036107mE
System:	NZTM
Elevation:	Ground
Located By:	Phone GPS
Location:	As per site plan

Operator:	JC
Rig:	Pagani TG63-150
Cone ID:	Mks1042
Type:	Comp. piezo cone
Cone Area:	10 cm²
Sleeve Area:	150 cm²
Area Ratio:	0.8

Soil Behaviour Type - Robertson 1986

0	Undefined	5	Sand mixtures: silty sand to sandy silt
1	Sensitive fine-grained	6	Sands: clean sands to silty sands
2	Clay - organic soil	7	Dense sand to gravelly sand
3	Clays: clay to silty clay	8	Stiff sand to clayey sand
4	Silt mixtures: clayey silt & silty clay	9	Stiff fine-grained

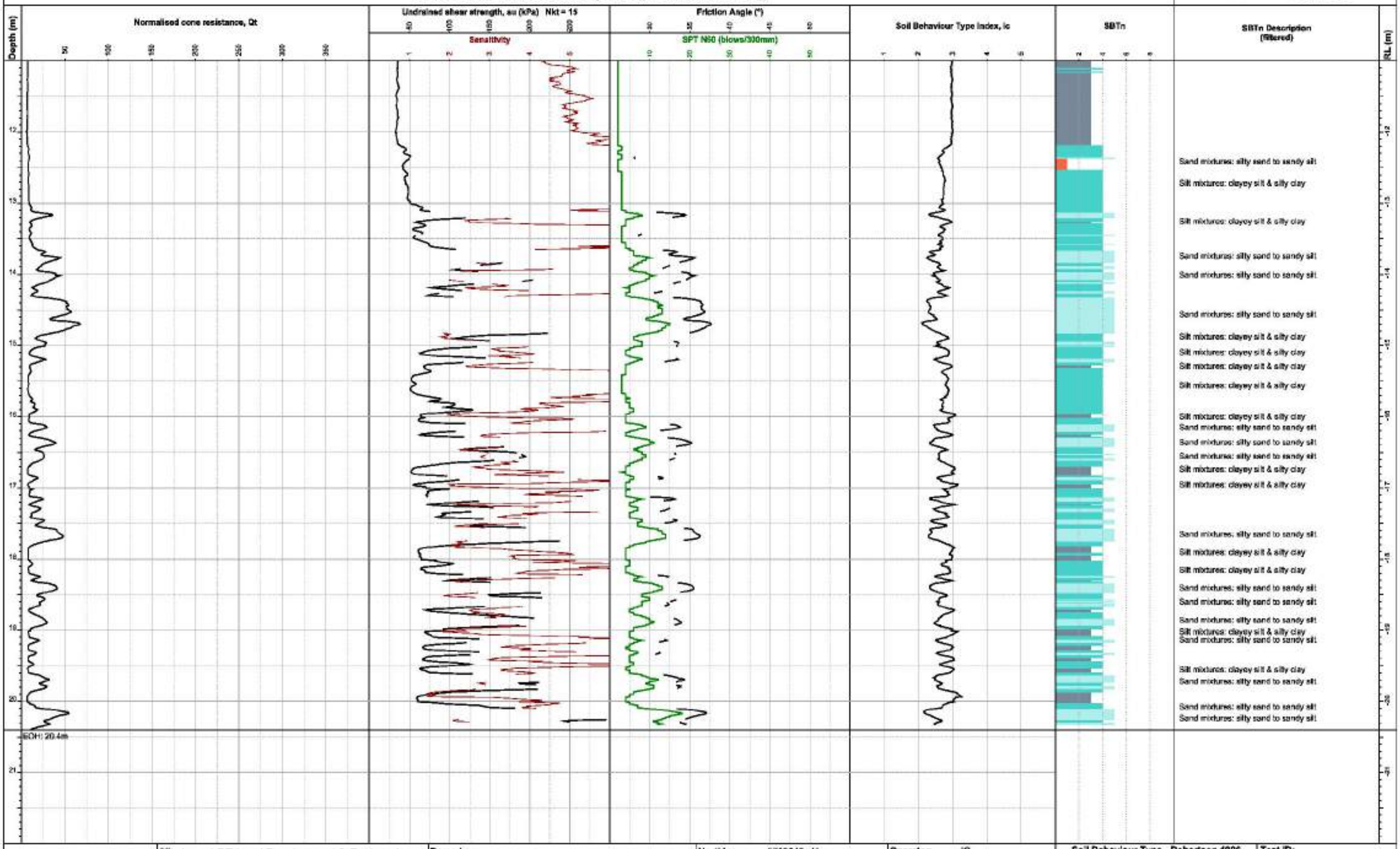
Test ID:

CPT-05

Project ID:	24477
Depth:	20.4m
Sheet:	1 of 2
Date:	30/05/2023

Cone Penetration Test (CPTu) Parameter Log

Test ID: **CPT-05**



Sand mixtures: silty sand to sandy silt
Silt mixtures: clayey silt & silty clay
Silt mixtures: clayey silt & silty clay
Sand mixtures: silty sand to sandy silt
Sand mixtures: silty sand to sandy silt
Sand mixtures: silty sand to sandy silt
Silt mixtures: clayey silt & silty clay
Silt mixtures: clayey silt & silty clay
Silt mixtures: clayey silt & silty clay
Silt mixtures: clayey silt & silty clay
Silt mixtures: clayey silt & silty clay
Sand mixtures: silty sand to sandy silt
Sand mixtures: silty sand to sandy silt
Sand mixtures: silty sand to sandy silt
Silt mixtures: clayey silt & silty clay
Silt mixtures: clayey silt & silty clay
Sand mixtures: silty sand to sandy silt
Silt mixtures: clayey silt & silty clay
Silt mixtures: clayey silt & silty clay
Sand mixtures: silty sand to sandy silt
Sand mixtures: silty sand to sandy silt
Sand mixtures: silty sand to sandy silt
Silt mixtures: clayey silt & silty clay
Sand mixtures: silty sand to sandy silt
Silt mixtures: clayey silt & silty clay
Sand mixtures: silty sand to sandy silt
Sand mixtures: silty sand to sandy silt
Sand mixtures: silty sand to sandy silt

LDE LAND DEVELOPMENT & ENGINEERING

Client: LDE Land Development & Engineering
Project: geotechnical Investigation
Location: 556-560 Abeerdeen Rd, Gisborne

Remarks:
Ground water level located at 1.68m
Test according to ISO 22476-1:12 (Class 2)

Termination Reason:
Target depth

Northing:	5709840mN
Easting:	2036107mE
System:	NZTM
Elevation:	Ground
Located By:	Phone GPS
Location:	As per site plan

Operator:	JC
Rig:	Pagani TG63-150
Cone ID:	Mks1042
Type:	Comp. piezo cone
Cone Area:	10 cm²
Sleeve Area:	150 cm²
Area Ratio:	0.8

Soil Behaviour Type - Robertson 1986

0	Undefined	5	Sand mixtures: silty sand to sandy silt
1	Sensitive fine-grained	6	Sands: clean sands to silty sands
2	Clay - organic soil	7	Dense sand to gravelly sand
3	Clays: clay to silty clay	8	Stiff sand to clayey sand
4	Silt mixtures: clayey silt & silty clay	9	Stiff fine-grained

Test ID: **CPT-05**

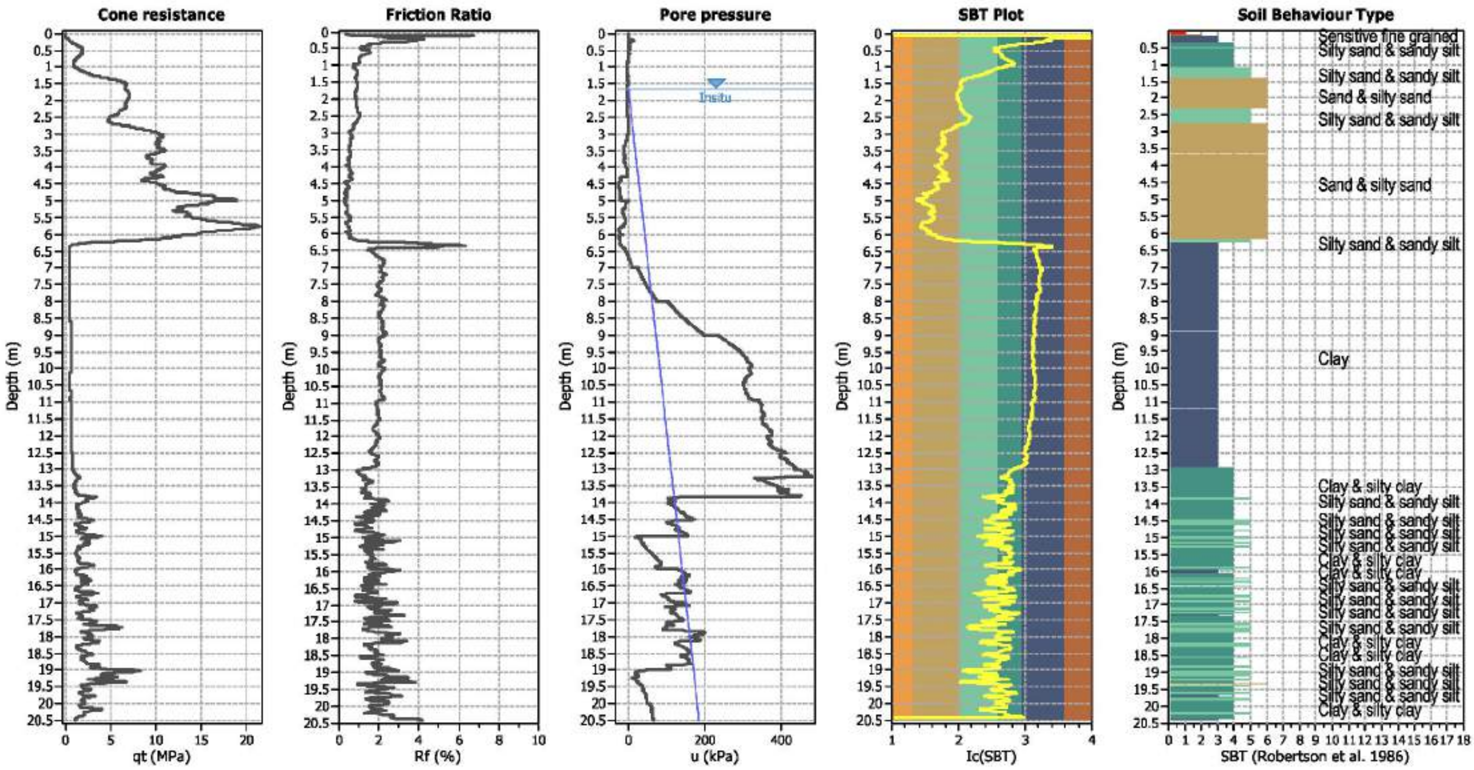
Project ID:	24477
Depth:	20.4m
Sheet:	2 of 2
Date:	30/05/2023

Generated with CORE-GS by Geroc - CPT Combined A3 v2 - 31/05/2023 9:14:16 am

APPENDIX D

LIQUEFATION ANALYSIS RESULTS

CPT basic interpretation plots



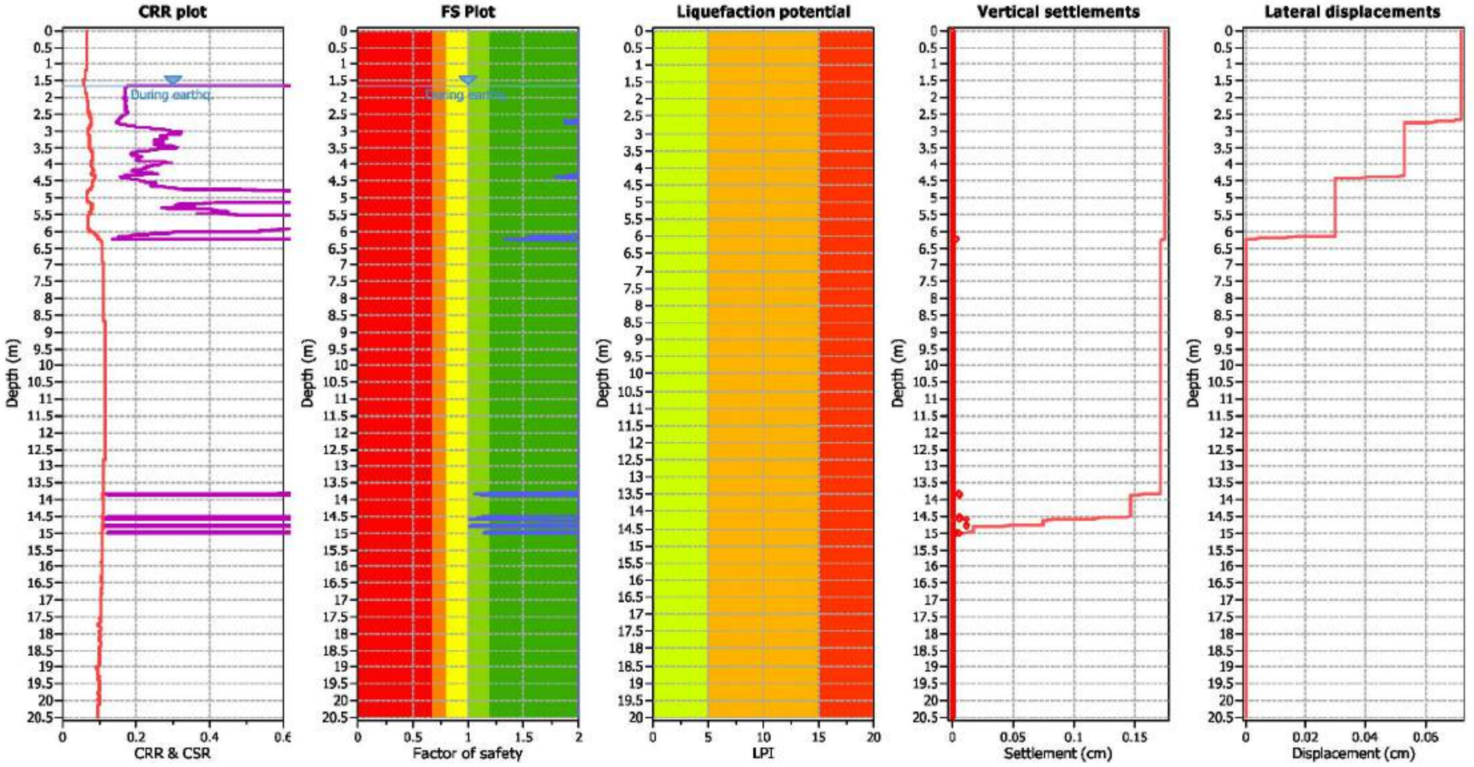
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.30	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.12	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	15.00 m

SBT legend

🟥 1. Sensitive fine grained	■ 4. Clayey silt to silty	🟧 7. Gravely sand to sand
🟫 2. Organic material	■ 5. Silty sand to sandy silt	■ 8. Very stiff sand to
🟦 3. Clay to silty clay	■ 6. Clean sand to silty sand	■ 9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.30	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.12	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	15.00 m

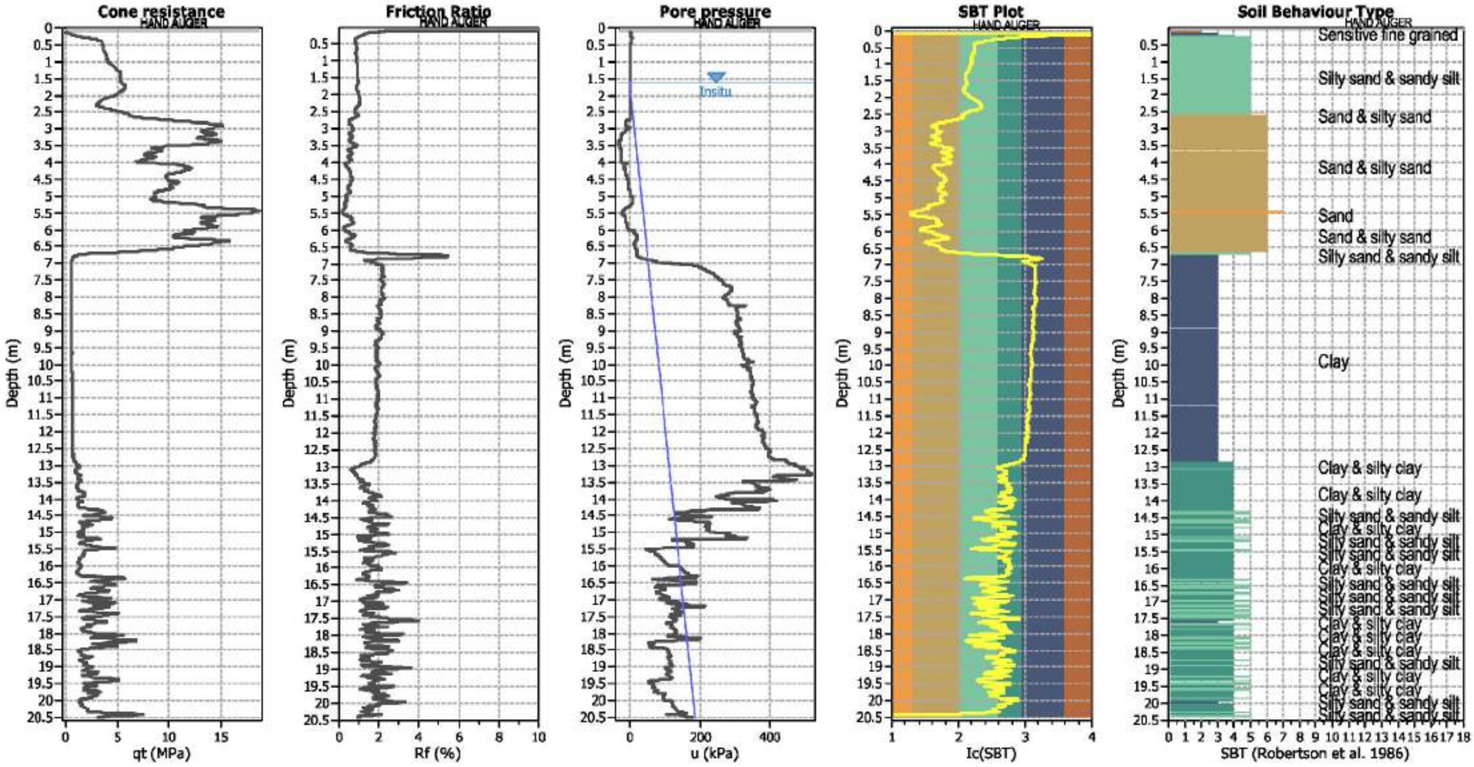
F.S. color scheme

- 🟥 Almost certain it will liquefy
- 🟧 Very likely to liquefy
- 🟨 Liquefaction and no liq. are equally likely
- 🟩 Unlike to liquefy
- 🟩 Almost certain it will not liquefy

LPI color scheme

- 🟥 Very high risk
- 🟧 High risk
- 🟨 Low risk

CPT basic interpretation plots



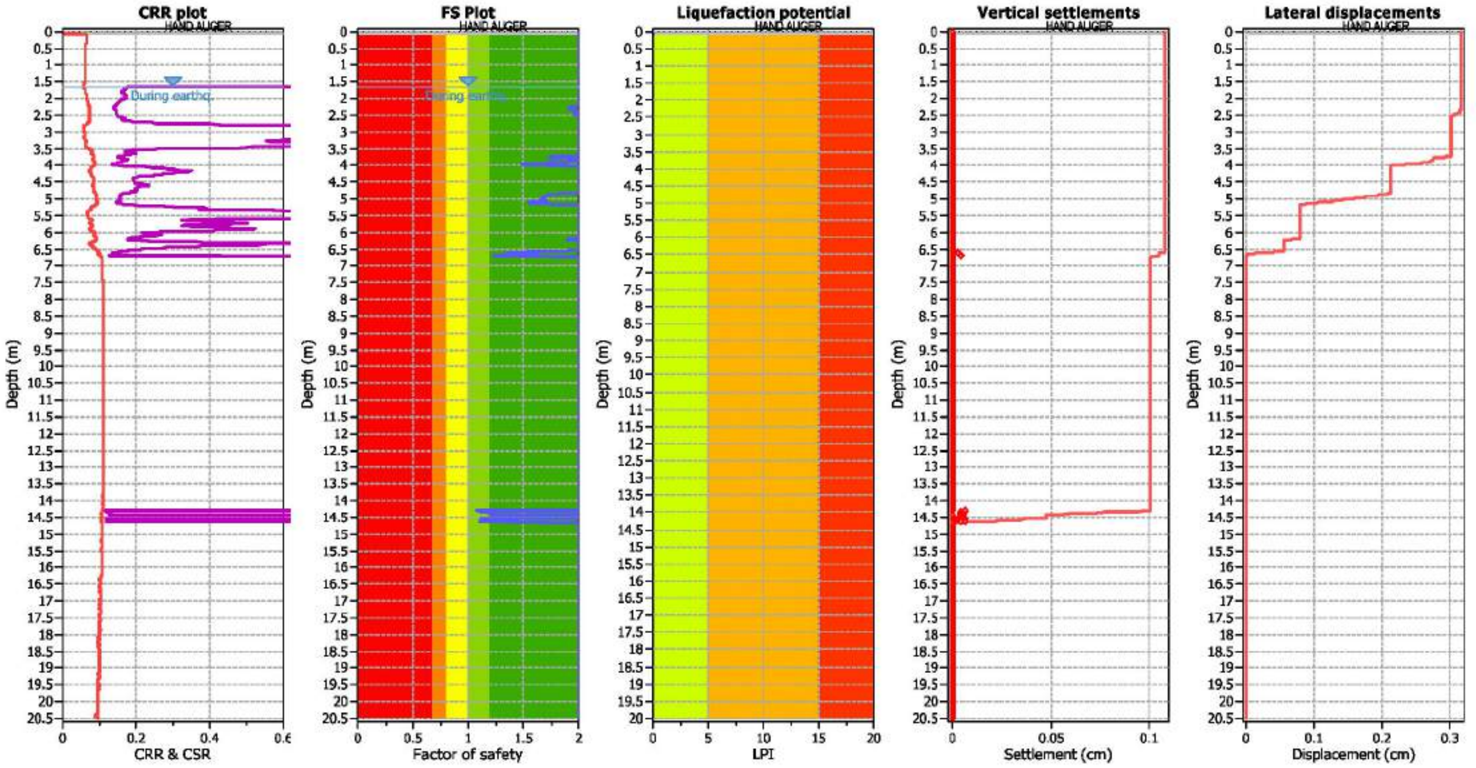
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.30	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.12	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	15.00 m

SBT legend

🟥	1. Sensitive fine grained	🟩	4. Clayey silt to silty	🟧	7. Gravely sand to sand
🟫	2. Organic material	🟩	5. Silty sand to sandy silt	⬜	8. Very stiff sand to
🟦	3. Clay to silty clay	🟨	6. Clean sand to silty sand	⬜	9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method: B&I (2014)
Fines correction method: B&I (2014)
Points to test: Based on Ic value
Earthquake magnitude M_w: 6.30
Peak ground acceleration: 0.12
Depth to water table (insitu): 1.65 m

Depth to GWT (erthq.): 1.65 m
Average results interval: 3
Ic cut-off value: 2.60
Unit weight calculation: Based on SBT
Use fill: No
Fill height: N/A

Fill weight: N/A
Transition detect. applied: No
K_σ applied: Yes
Clay like behavior applied: Sands only
Limit depth applied: Yes
Limit depth: 15.00 m

F.S. color scheme

- 🟥 Almost certain it will liquefy
- 🟧 Very likely to liquefy
- 🟨 Liquefaction and no liq. are equally likely
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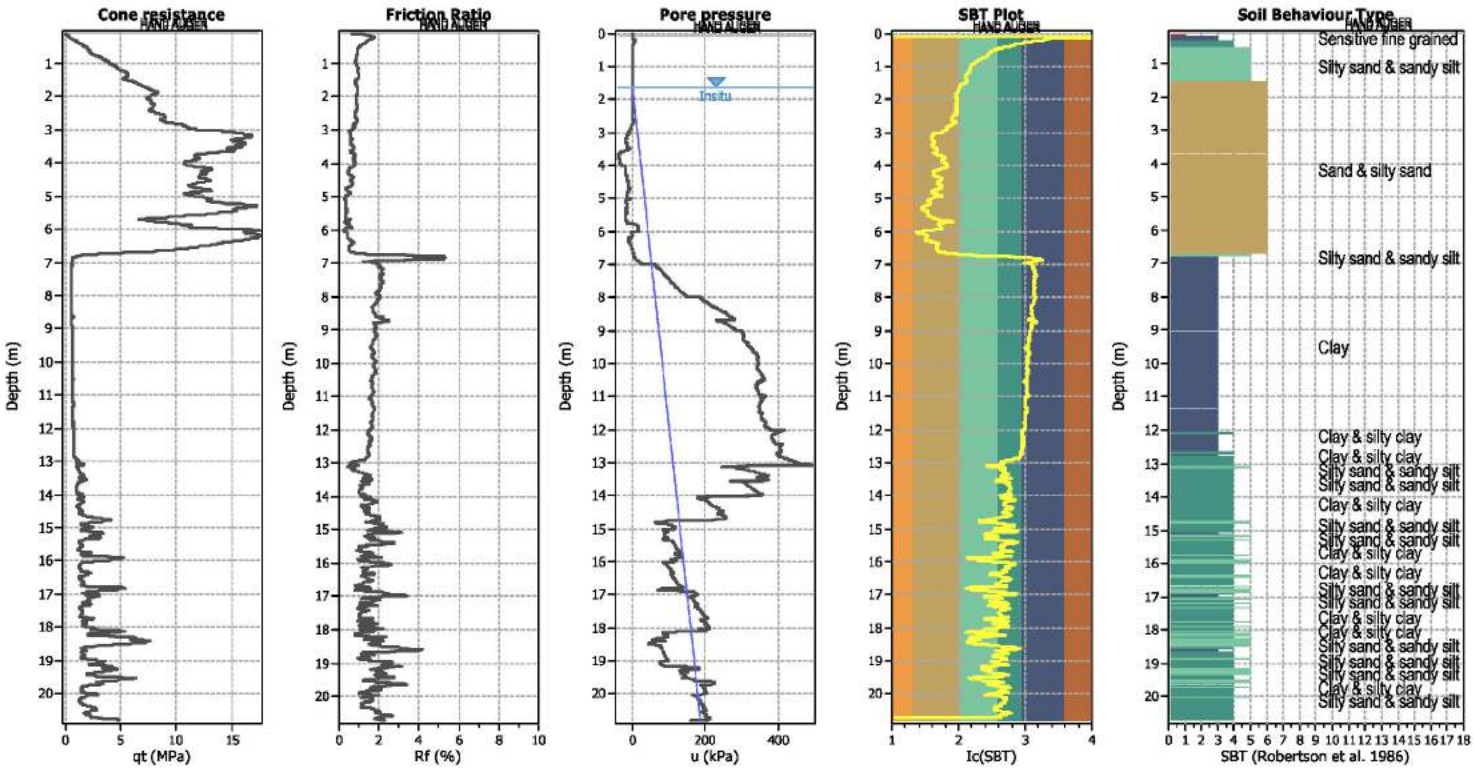
- 🟩 Almost certain it will not liquefy

LPI color scheme

- 🟥 Very high risk
- 🟧 High risk
- 🟨 Low risk

CPT basic interpretation plots



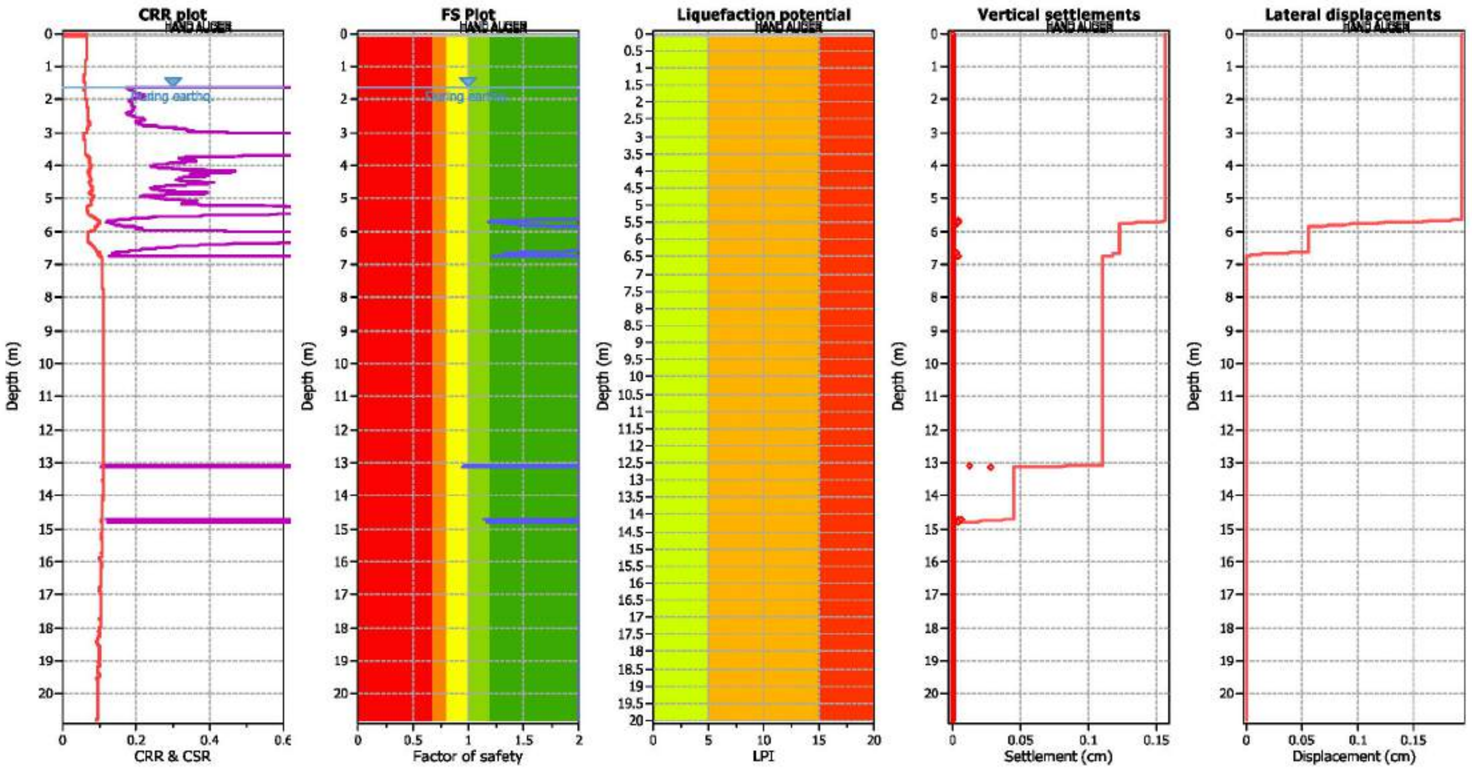
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.30	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.12	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	15.00 m

SBT legend

🟥 1. Sensitive fine grained	🟩 4. Clayey silt to silty	🟧 7. Gravely sand to sand
🟫 2. Organic material	🟩 5. Silty sand to sandy silt	⬛ 8. Very stiff sand to
🟦 3. Clay to silty clay	🟨 6. Clean sand to silty sand	⬜ 9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method: B&I (2014)
Fines correction method: B&I (2014)
Points to test: Based on Ic value
Earthquake magnitude M_w: 6.30
Peak ground acceleration: 0.12
Depth to water table (insitu): 1.65 m

Depth to GWT (erthq.): 1.65 m
Average results interval: 3
Ic cut-off value: 2.60
Unit weight calculation: Based on SBT
Use fill: No
Fill height: N/A

Fill weight: N/A
Transition detect. applied: No
K_σ applied: Yes
Clay like behavior applied: Sands only
Limit depth applied: Yes
Limit depth: 15.00 m

F.S. color scheme

- 🟥 Almost certain it will liquefy
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- 🟨 Liquefaction and no liq. are equally likely
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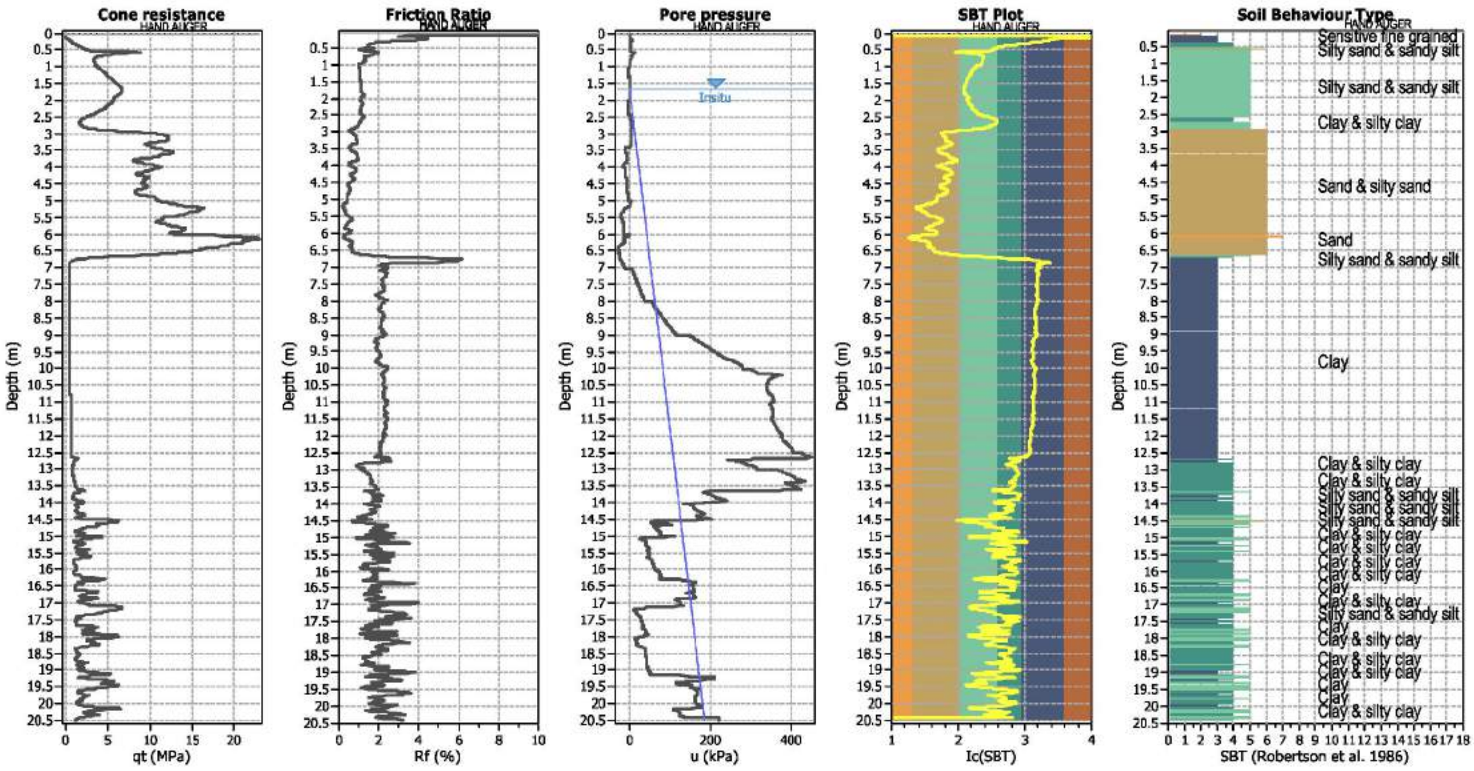
LPI color scheme

- 🟥 Very high risk
- 🟧 High risk
- 🟨 Low risk

CPT basic interpretation plots



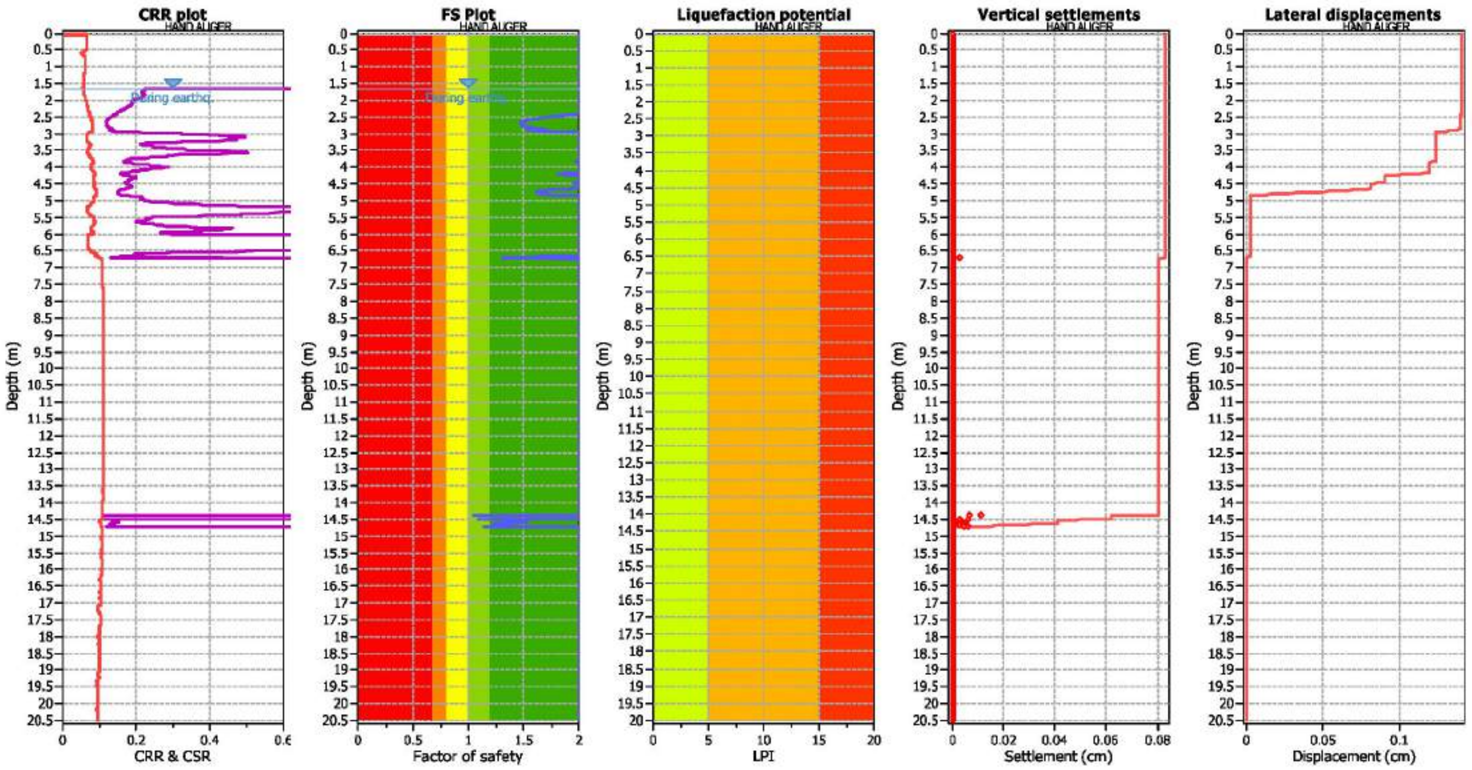
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.30	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.12	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	15.00 m

SBT legend

🟥 1. Sensitive fine grained
🟫 2. Organic material
🟦 3. Clay to silty clay
🟩 4. Clayey silt to silty
🟩 5. Silty sand to sandy silt
🟨 6. Clean sand to silty sand
🟧 7. Gravely sand to sand
⬛ 8. Very stiff sand to
⬜ 9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.30	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.12	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	15.00 m

F.S. color scheme

- 🟥 Almost certain it will liquefy
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- 🟩 Unlike to liquefy
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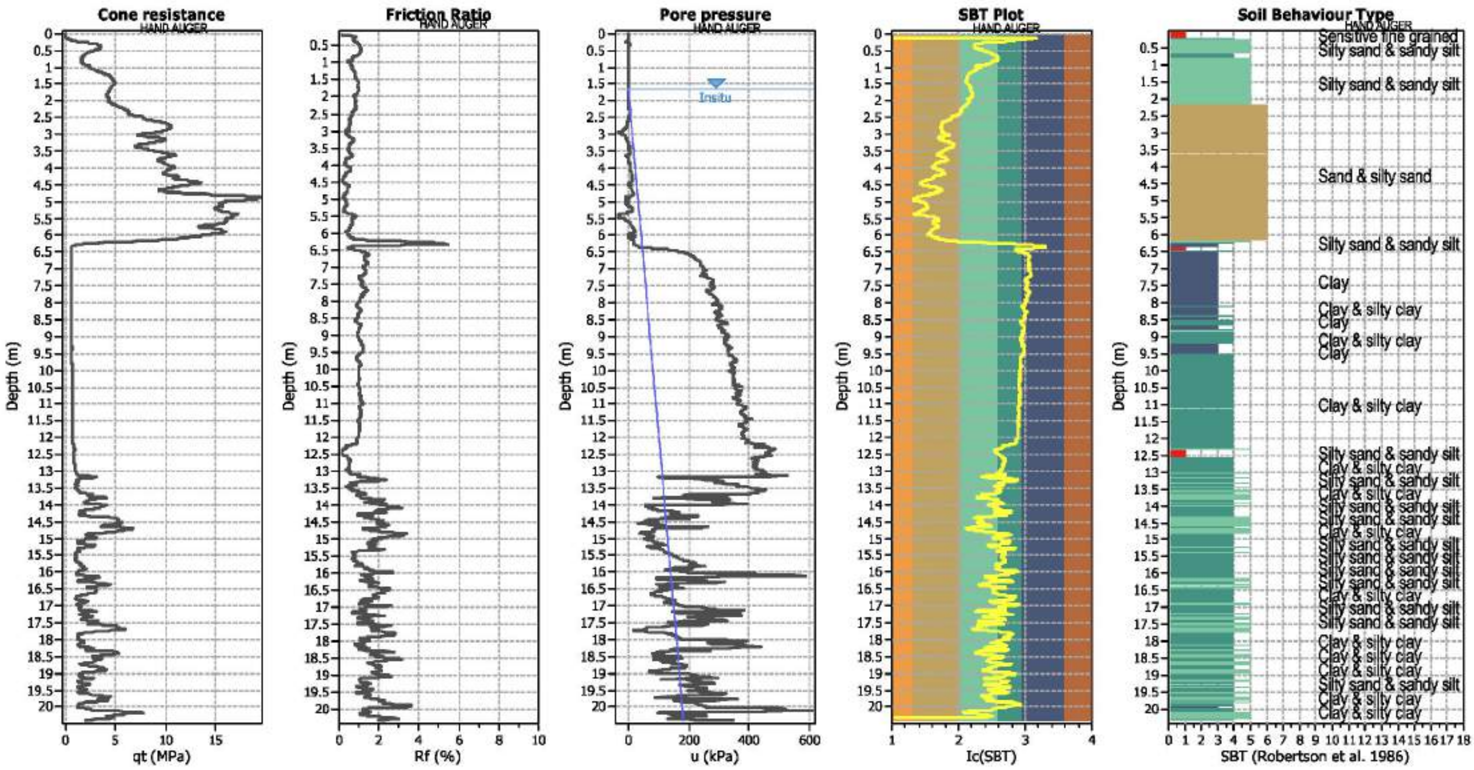
LPI color scheme

- 🟥 Very high risk
- 🟧 High risk
- 🟨 Low risk

CPT basic interpretation plots



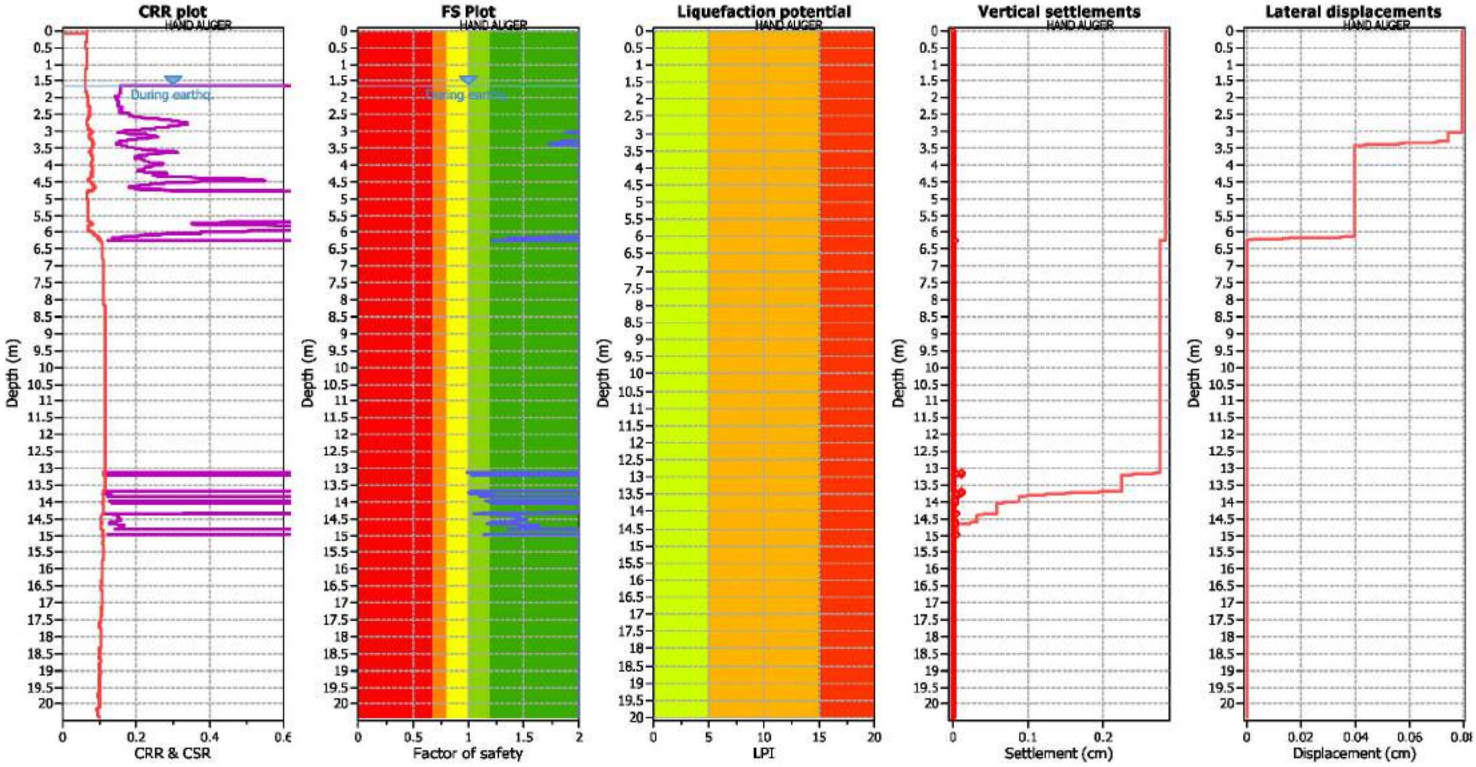
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.30	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.12	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	15.00 m

SBT legend

🟥 1. Sensitive fine grained	🟩 4. Clayey silt to silty	🟧 7. Gravely sand to sand
🟫 2. Organic material	🟩 5. Silty sand to sandy silt	⬜ 8. Very stiff sand to
🟦 3. Clay to silty clay	🟨 6. Clean sand to silty sand	⬜ 9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.30	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.12	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	15.00 m

F.S. color scheme

- 🟥 Almost certain it will liquefy
- 🟧 Very likely to liquefy
- 🟨 Liquefaction and no liq. are equally likely
- 🟩 Unlike to liquefy
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LPI color scheme

- 🟥 Very high risk
- 🟧 High risk
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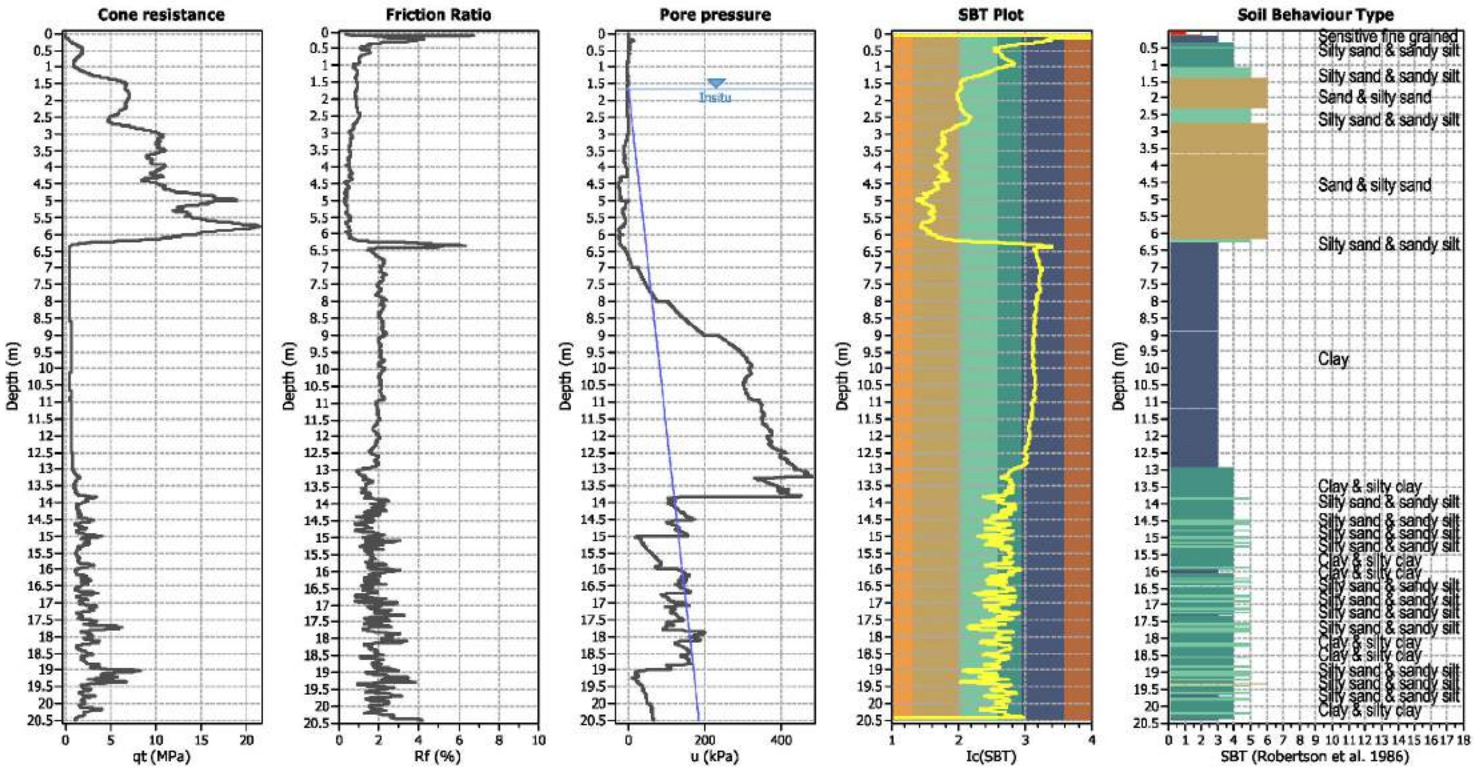
CPT basic interpretation plots



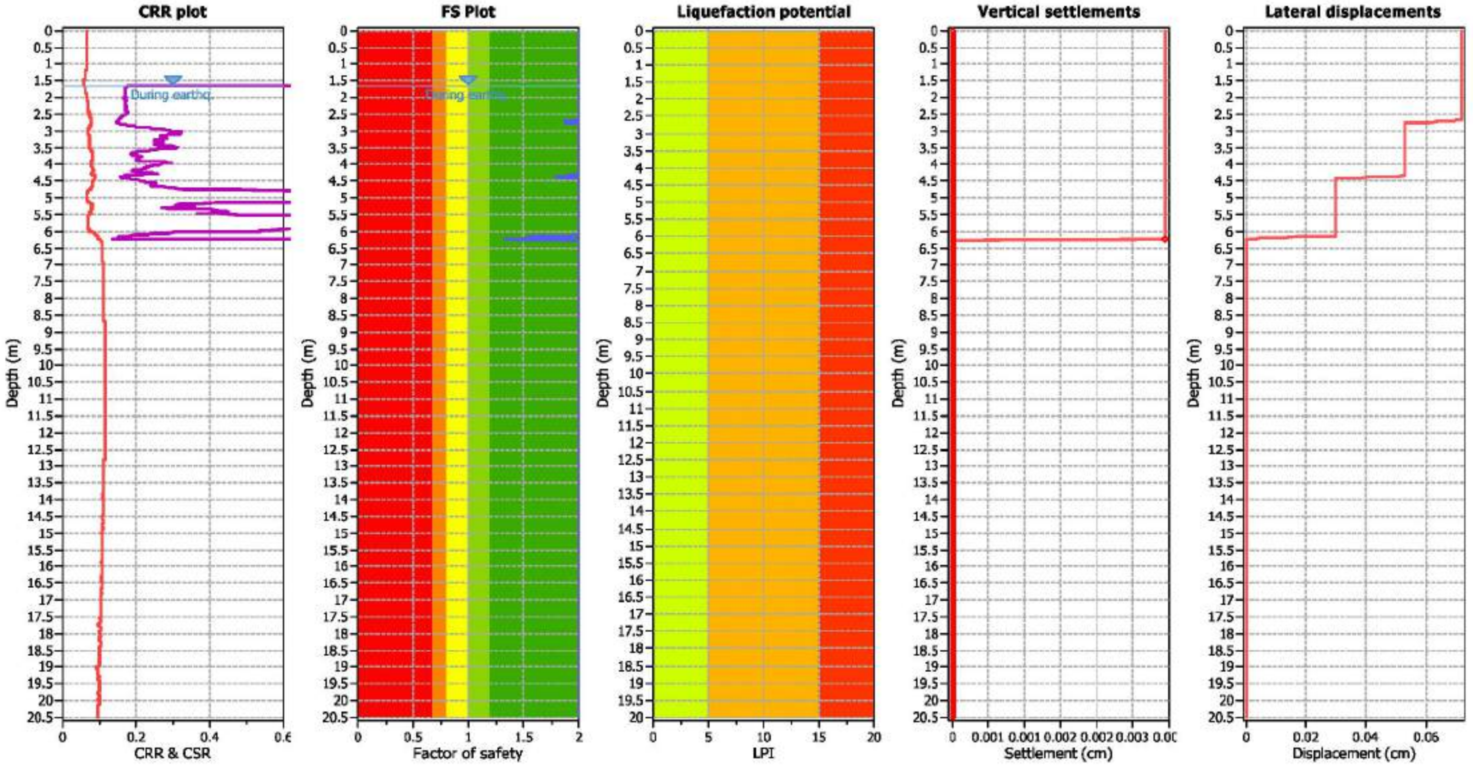
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_{σ} applied:	Yes
Earthquake magnitude M_w:	6.30	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.12	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	10.00 m

SBT legend

🟥	1. Sensitive fine grained	🟩	4. Clayey silt to silty	🟧	7. Gravely sand to sand
🟫	2. Organic material	🟩	5. Silty sand to sandy silt	⬛	8. Very stiff sand to
🟦	3. Clay to silty clay	🟨	6. Clean sand to silty sand	⬜	9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.30	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
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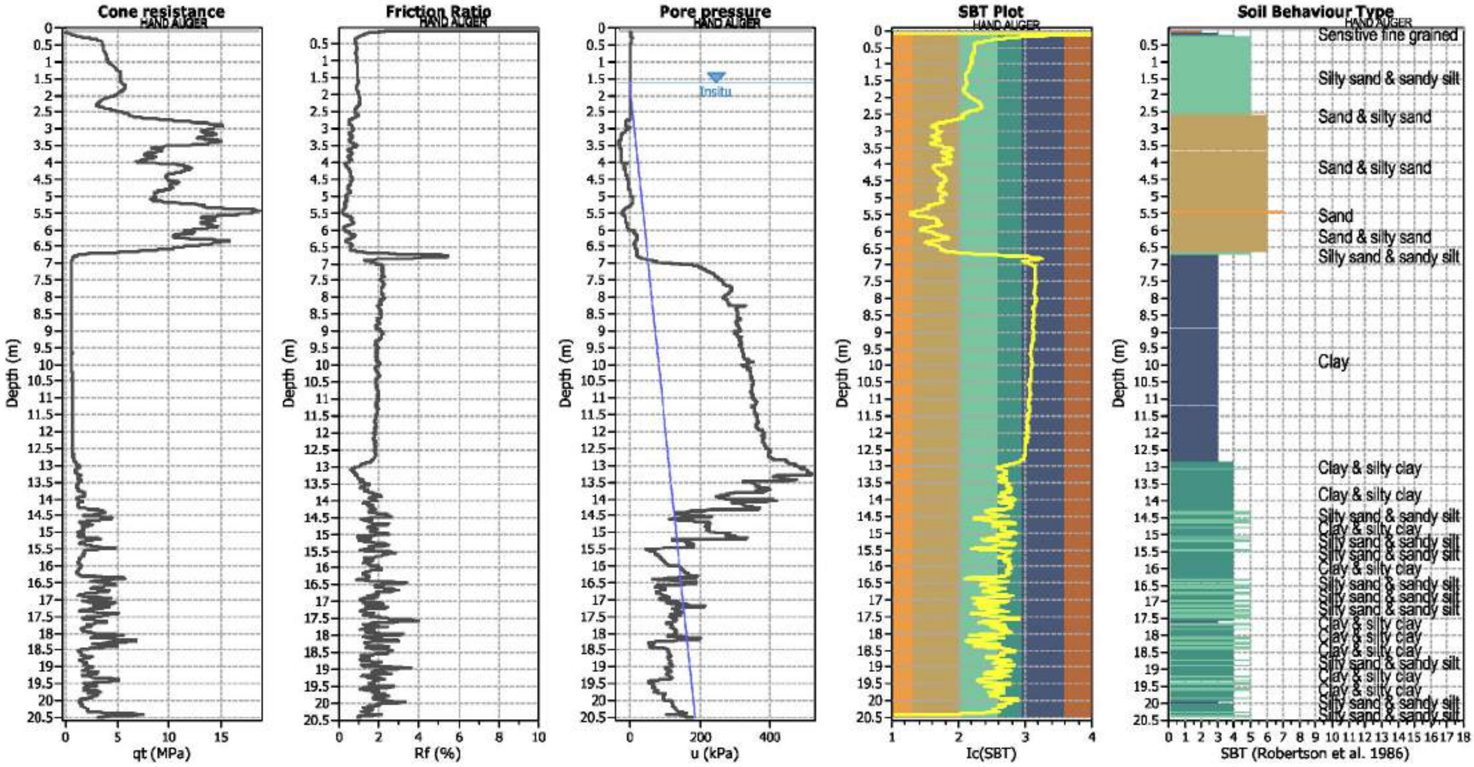
CPT basic interpretation plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.30	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.12	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	10.00 m

SBT legend

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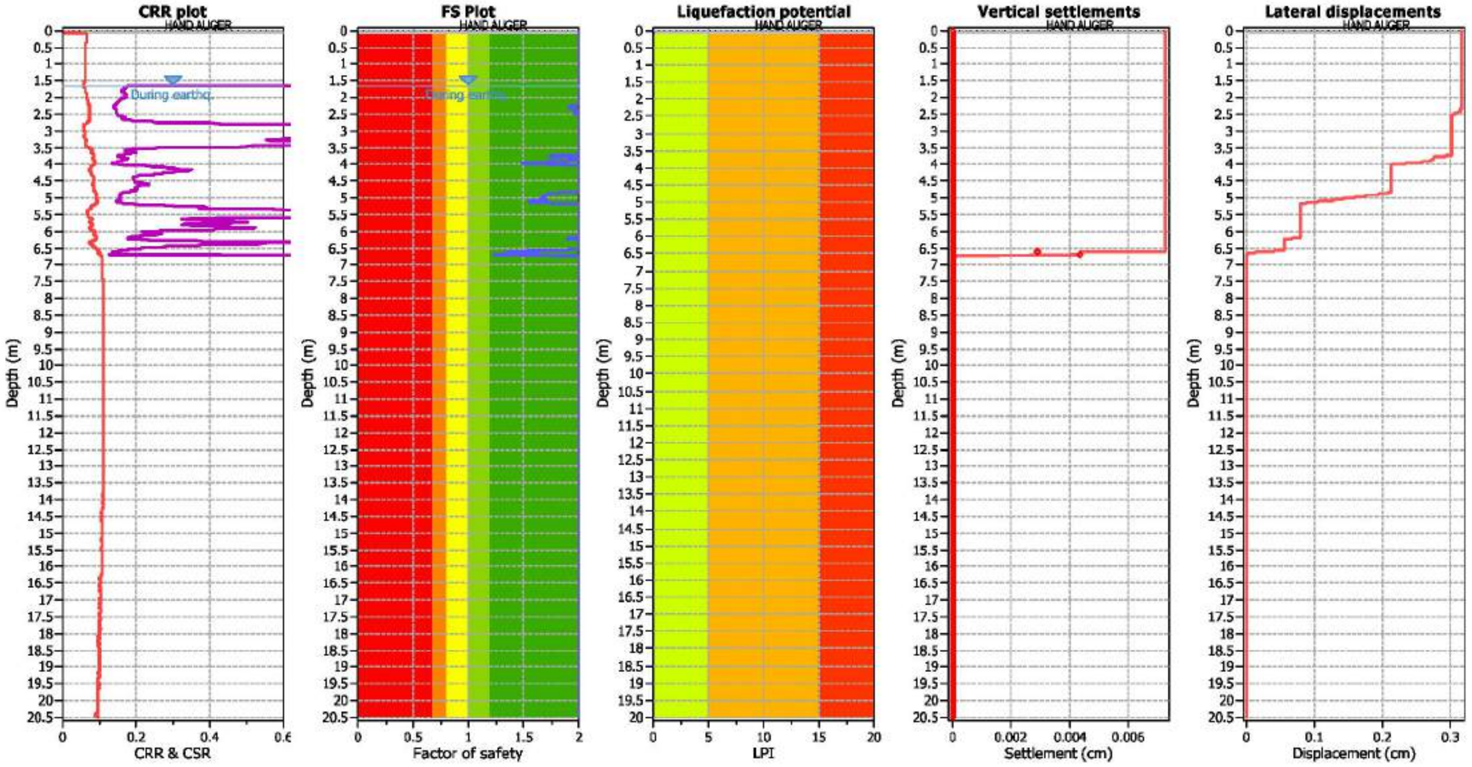
🟫 2. Organic material	🟩 5. Silty sand to sandy silt	⬛ 8. Very stiff sand to
🟦 3. Clay to silty clay	🟨 6. Clean sand to silty sand	⬜ 9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.30	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
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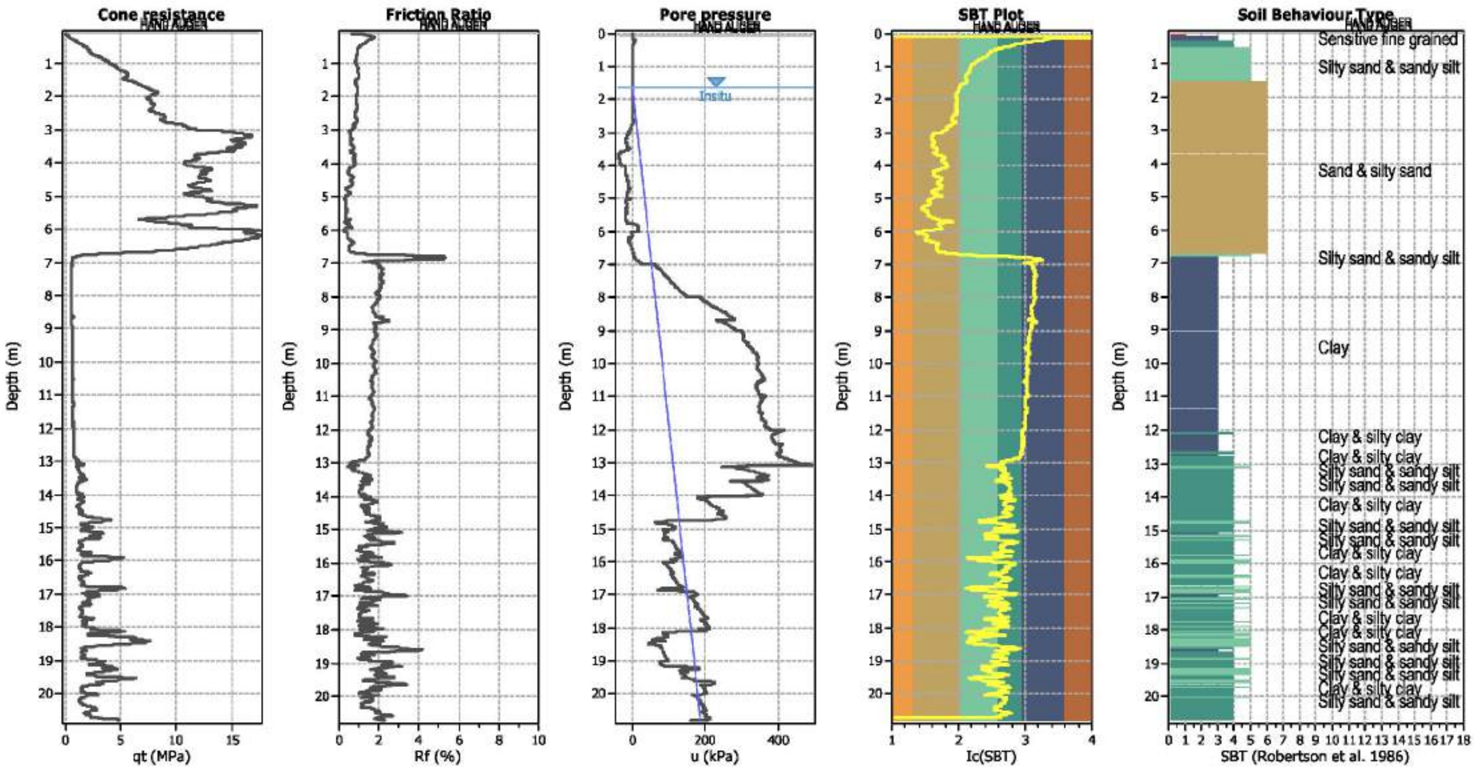
CPT basic interpretation plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.30	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
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Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	10.00 m

SBT legend

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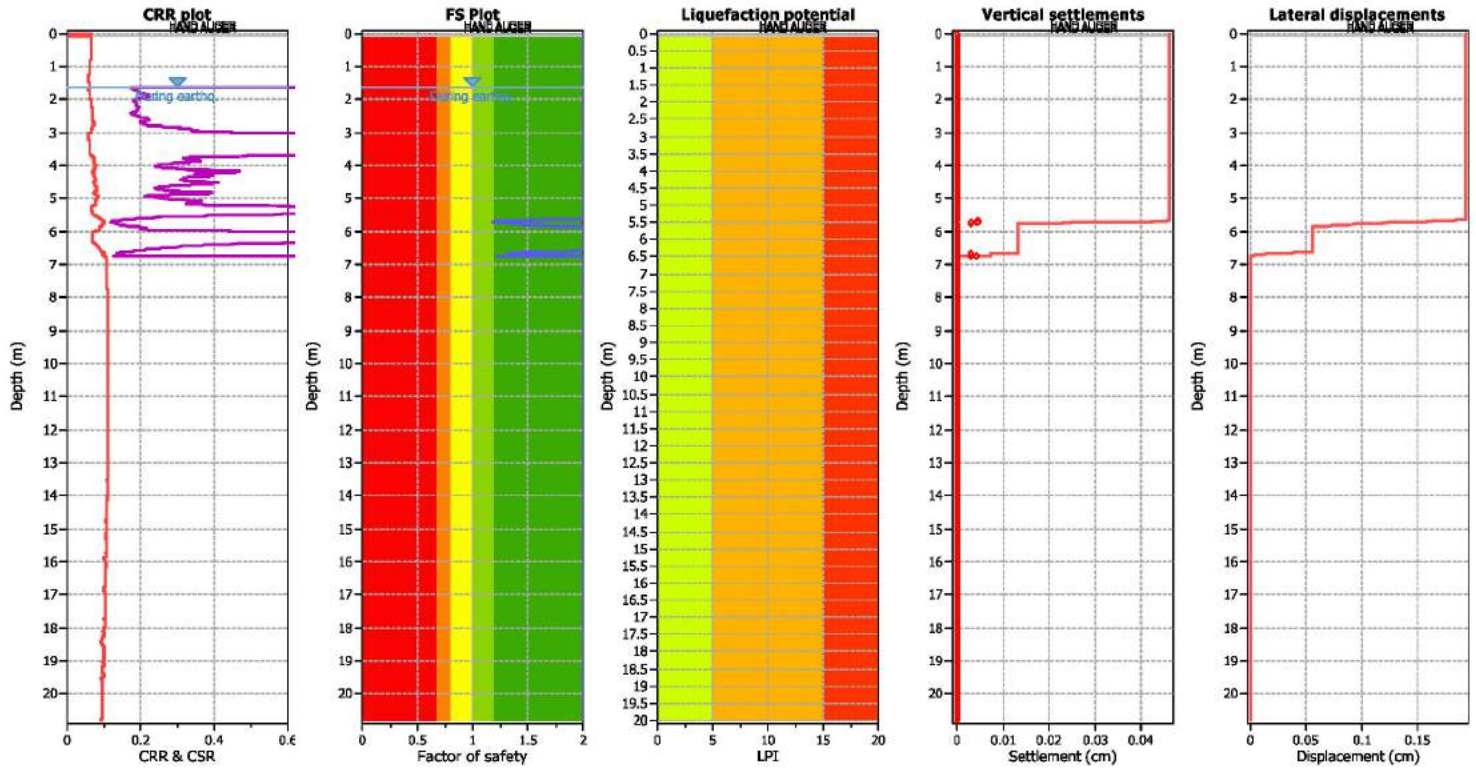
🟫	2. Organic material	🟩	5. Silty sand to sandy silt	⬛	8. Very stiff sand to
🟦	3. Clay to silty clay	🟨	6. Clean sand to silty sand	⬜	9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.30	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
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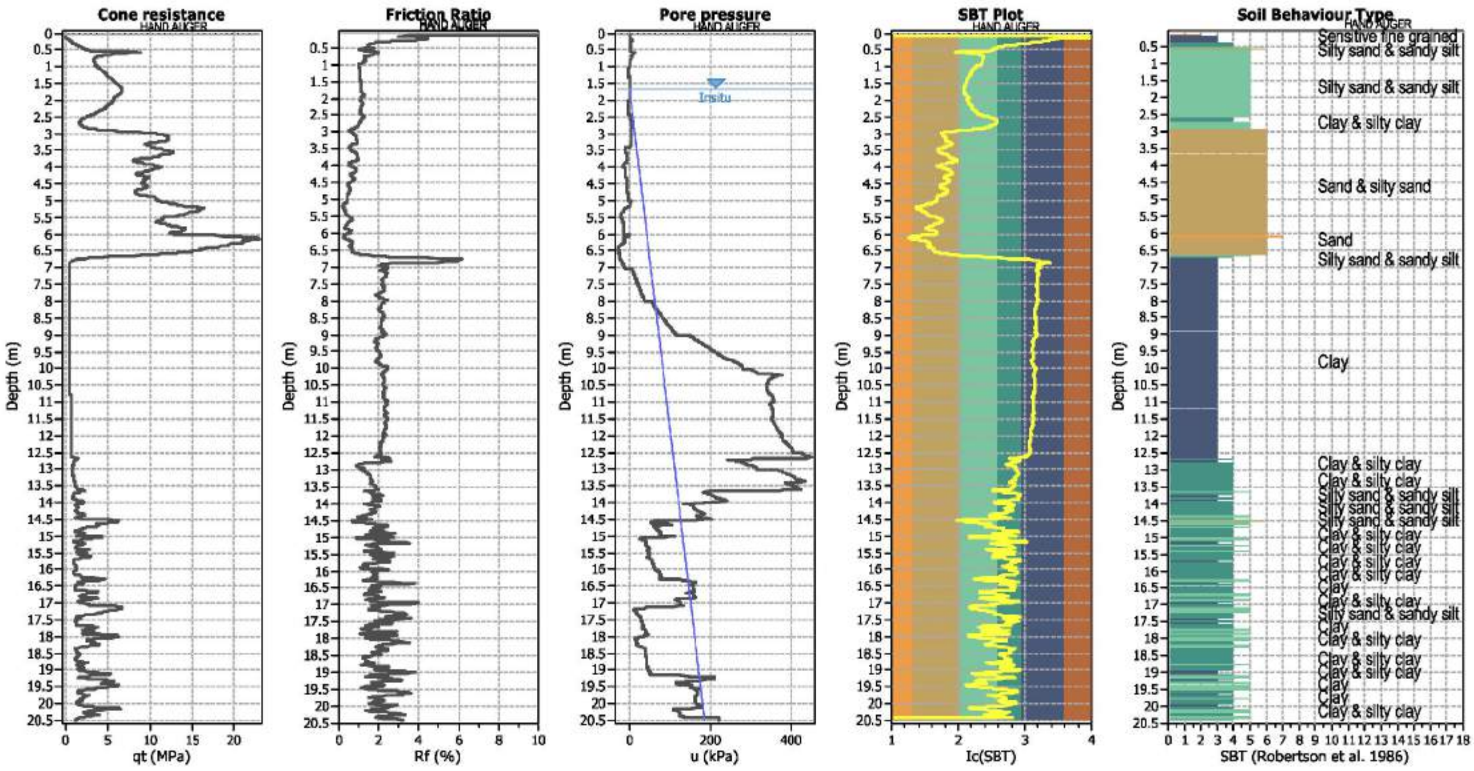
CPT basic interpretation plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.30	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.12	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	10.00 m

SBT legend

🟥 1. Sensitive fine grained	🟩 4. Clayey silt to silty	🟧 7. Gravely sand to sand
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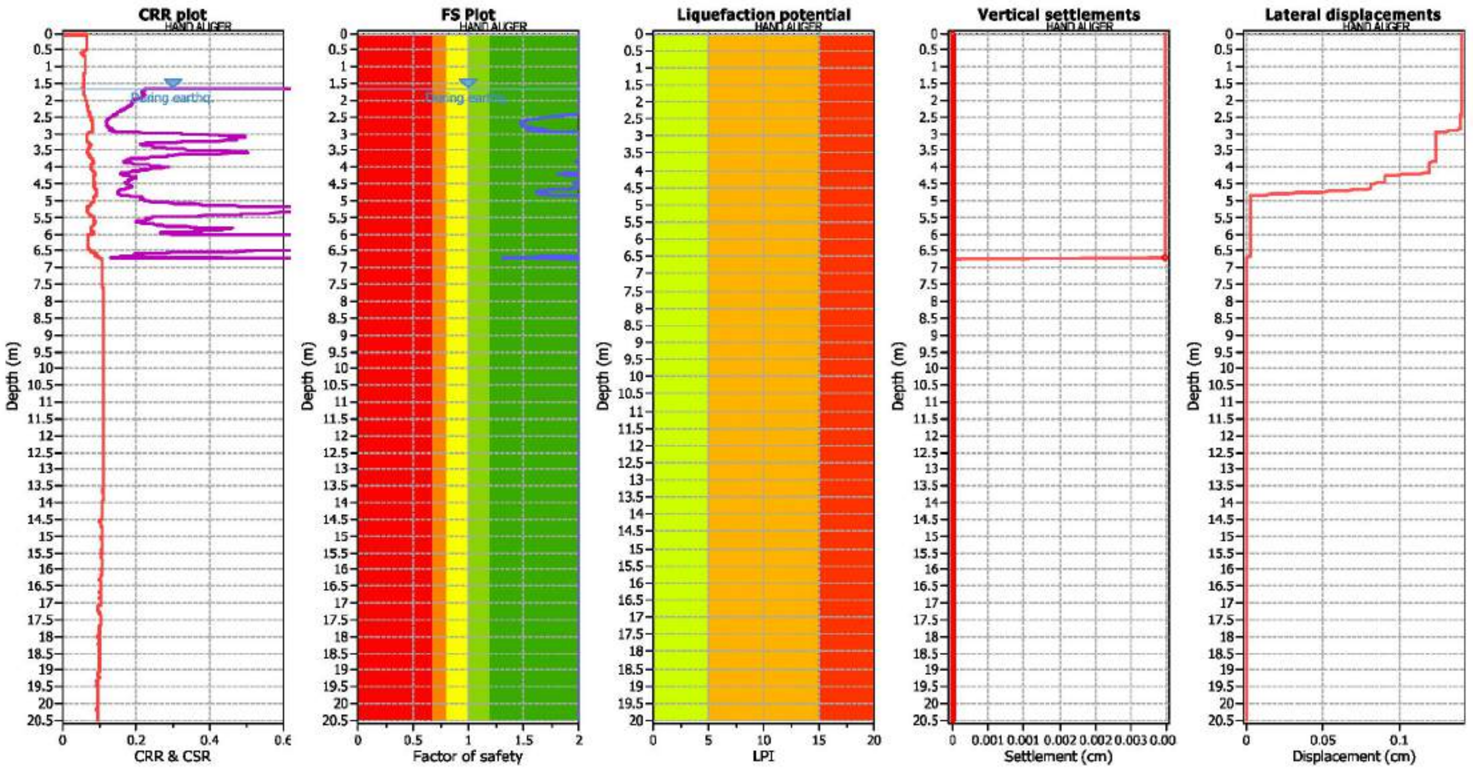
🟦 3. Clay to silty clay	🟨 6. Clean sand to silty sand	⬜ 9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.30	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.12	Use fill:	No	Limit depth applied:	Yes
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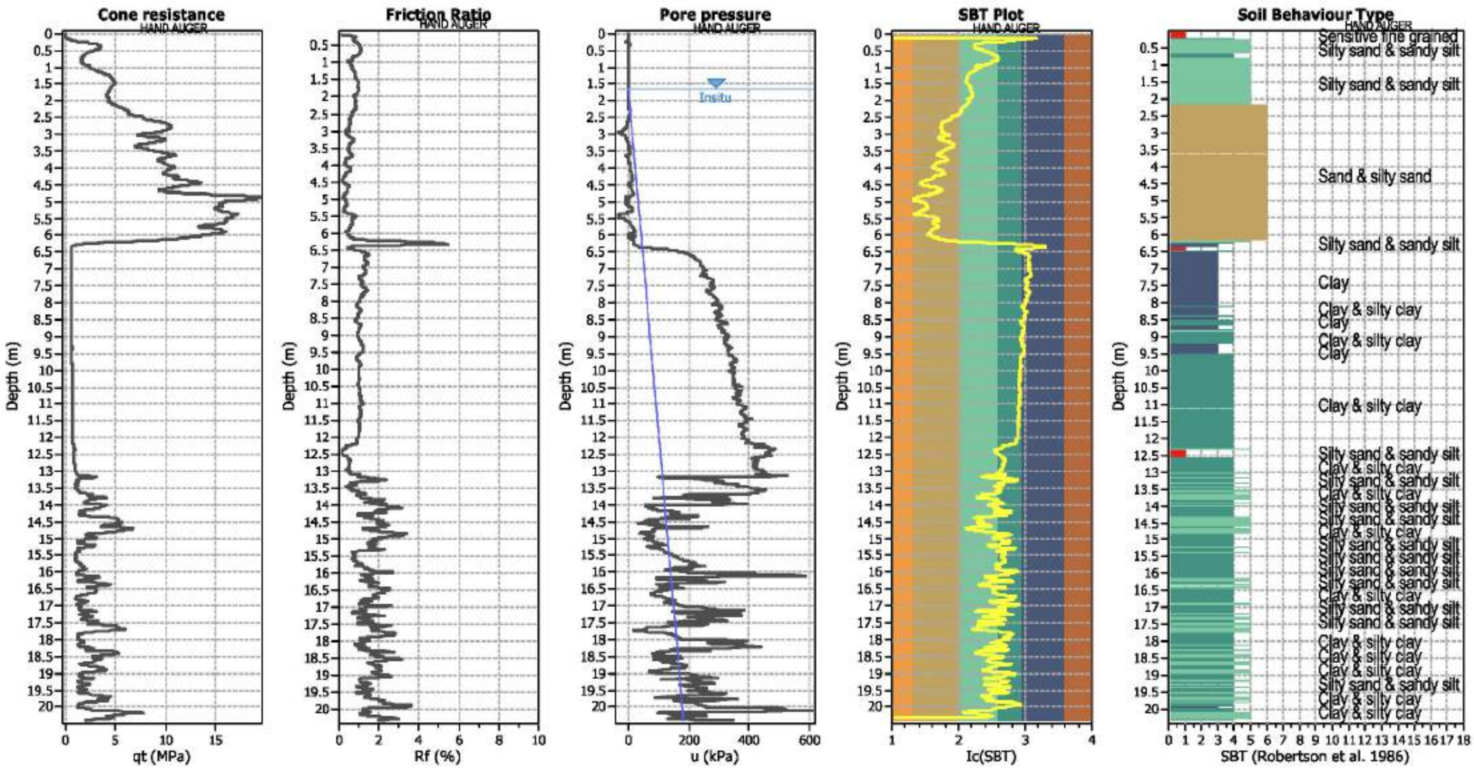
CPT basic interpretation plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.30	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.12	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	10.00 m

SBT legend

🟥	1. Sensitive fine grained	🟩	4. Clayey silt to silty	🟧	7. Gravely sand to sand
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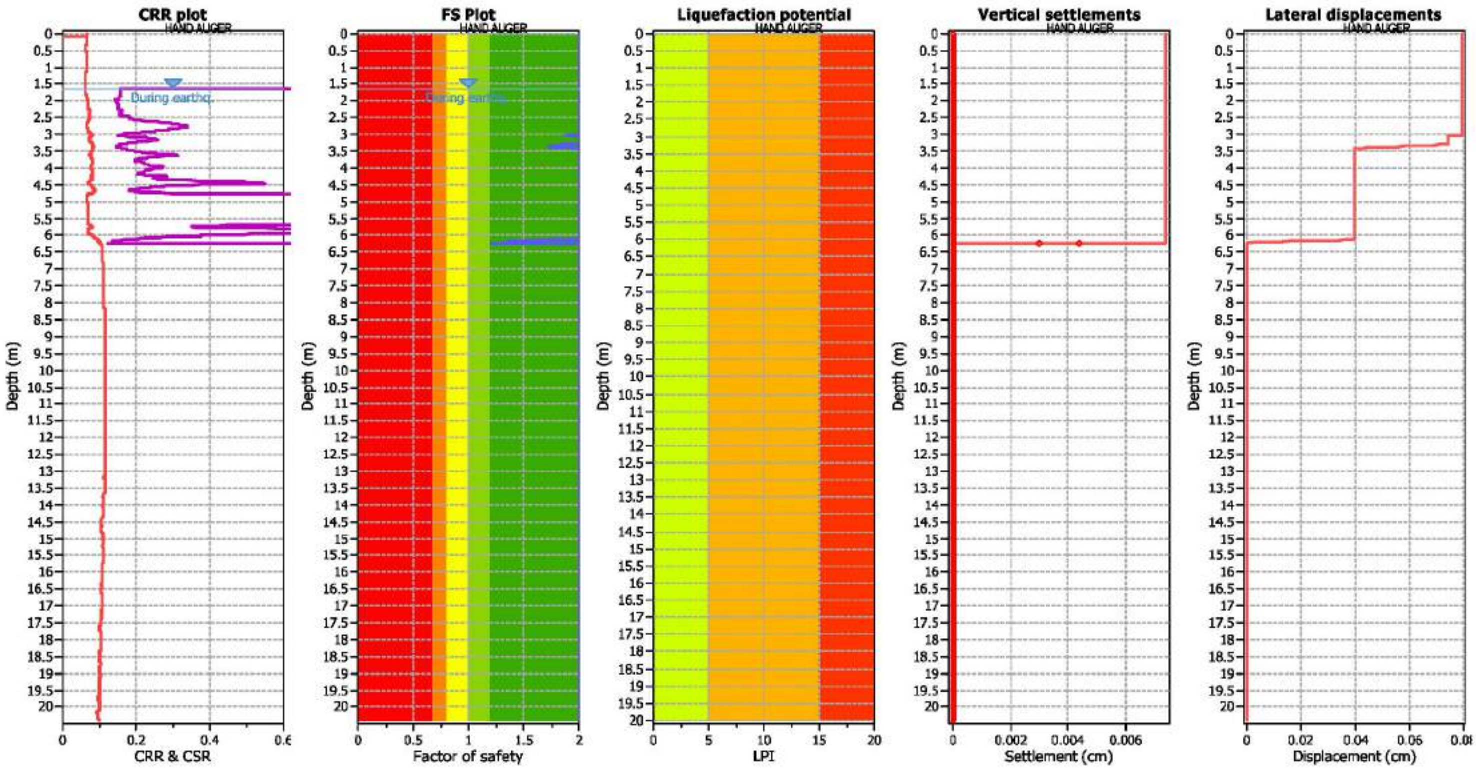
🟦	3. Clay to silty clay	🟨	6. Clean sand to silty sand	⬜	9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
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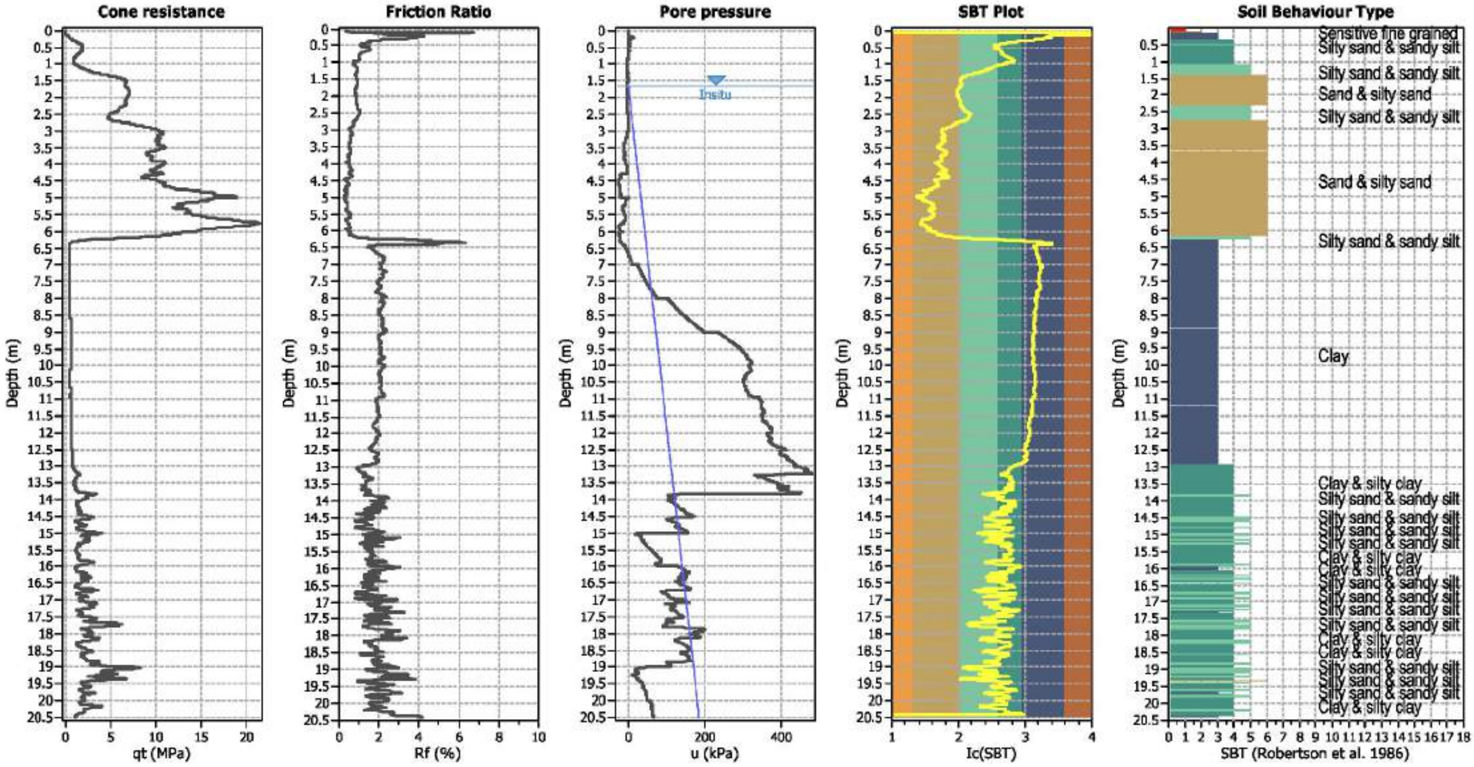
CPT basic interpretation plots



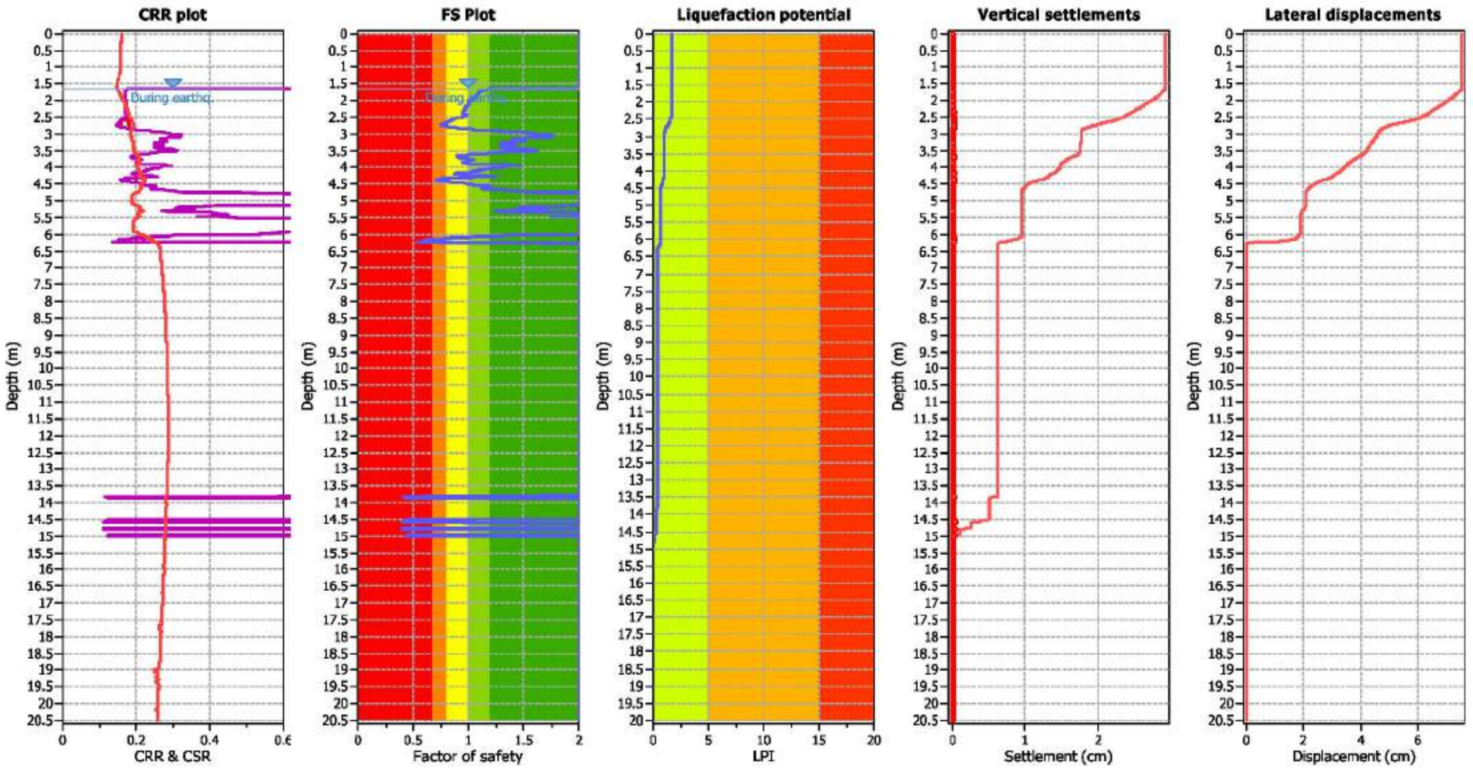
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.28	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	15.00 m

SBT legend

1. Sensitive fine grained	4. Clayey silt to silty	7. Gravely sand to sand
2. Organic material	5. Silty sand to sandy silt	8. Very stiff sand to
3. Clay to silty clay	6. Clean sand to silty sand	9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
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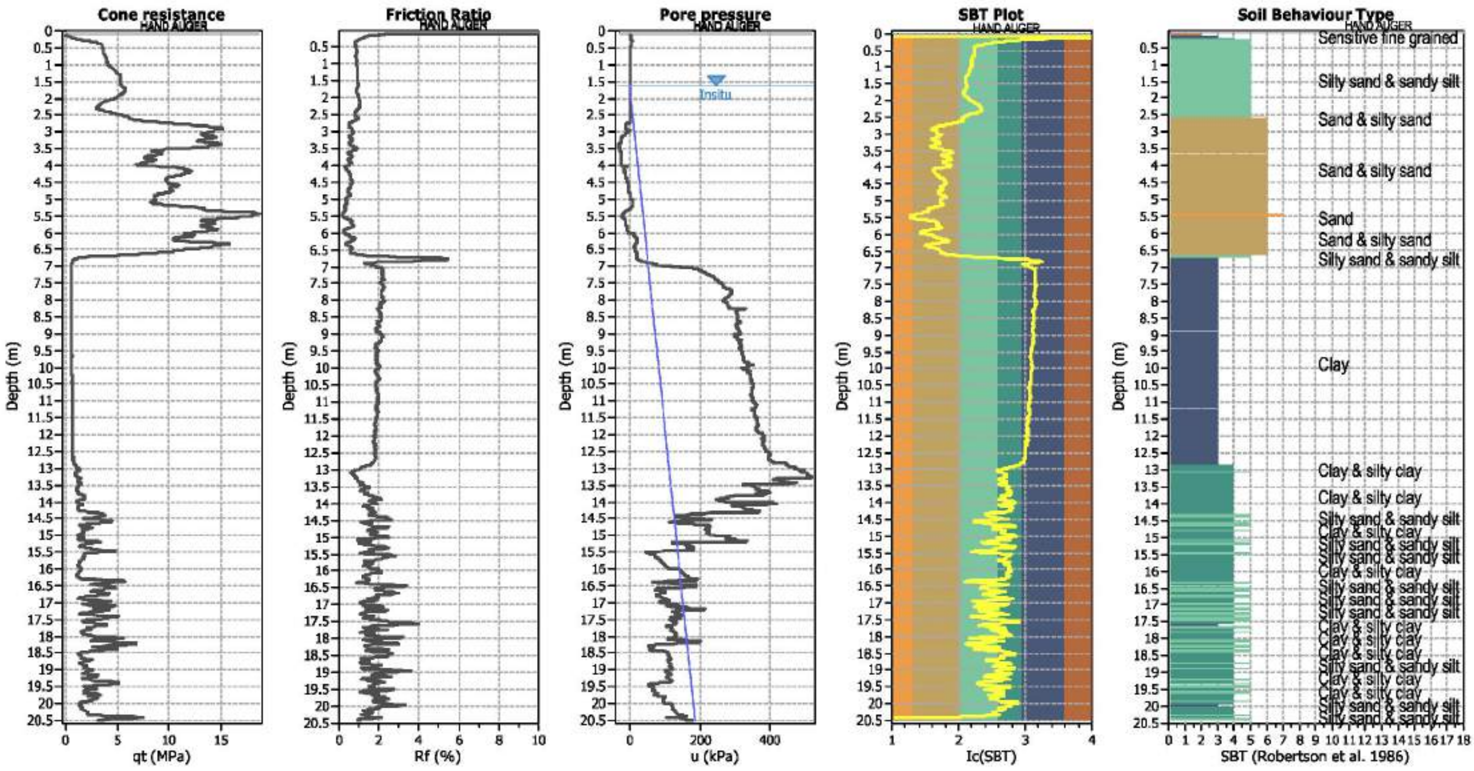
CPT basic interpretation plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
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Earthquake magnitude M_w:	6.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
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Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	15.00 m

SBT legend

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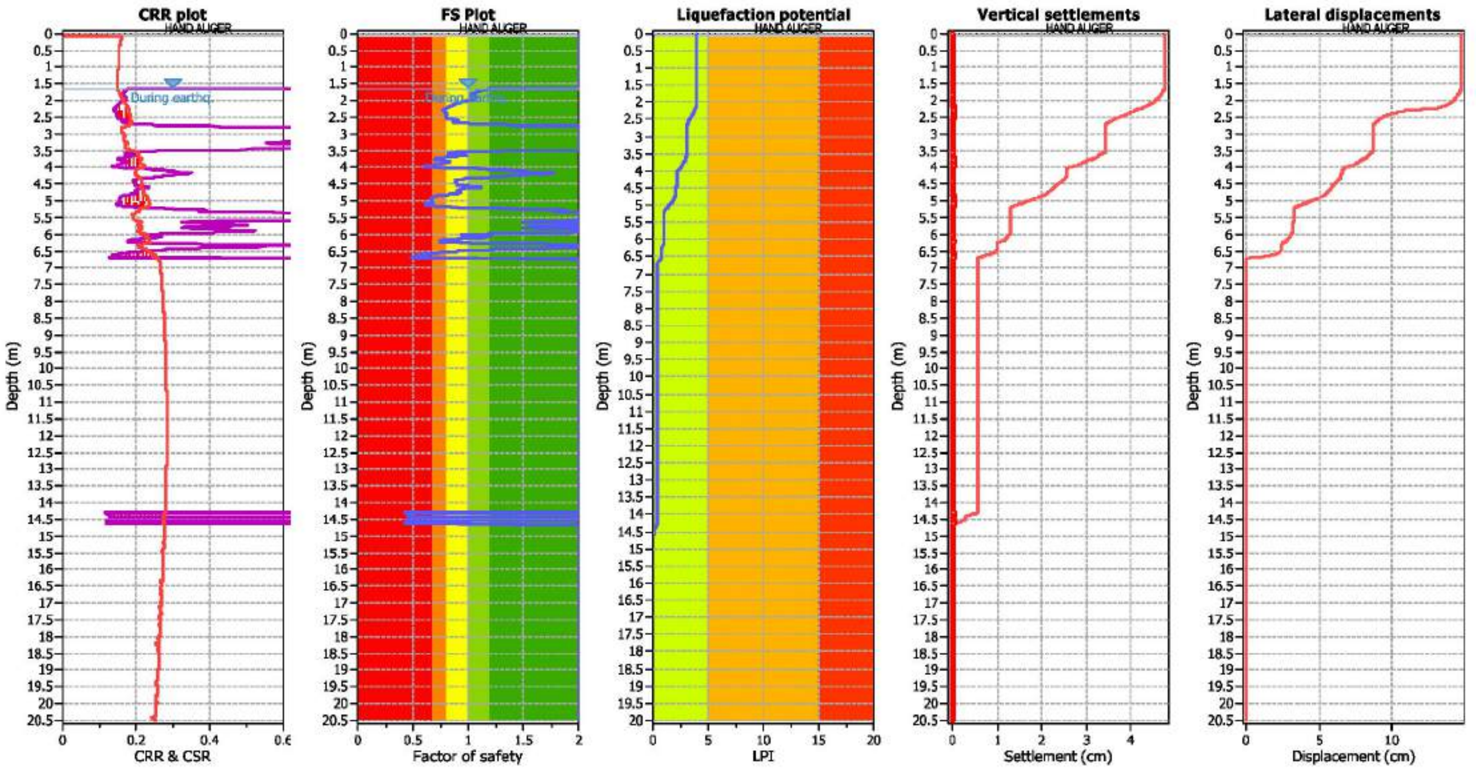
🟦 3. Clay to silty clay	🟨 6. Clean sand to silty sand	⬜ 9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
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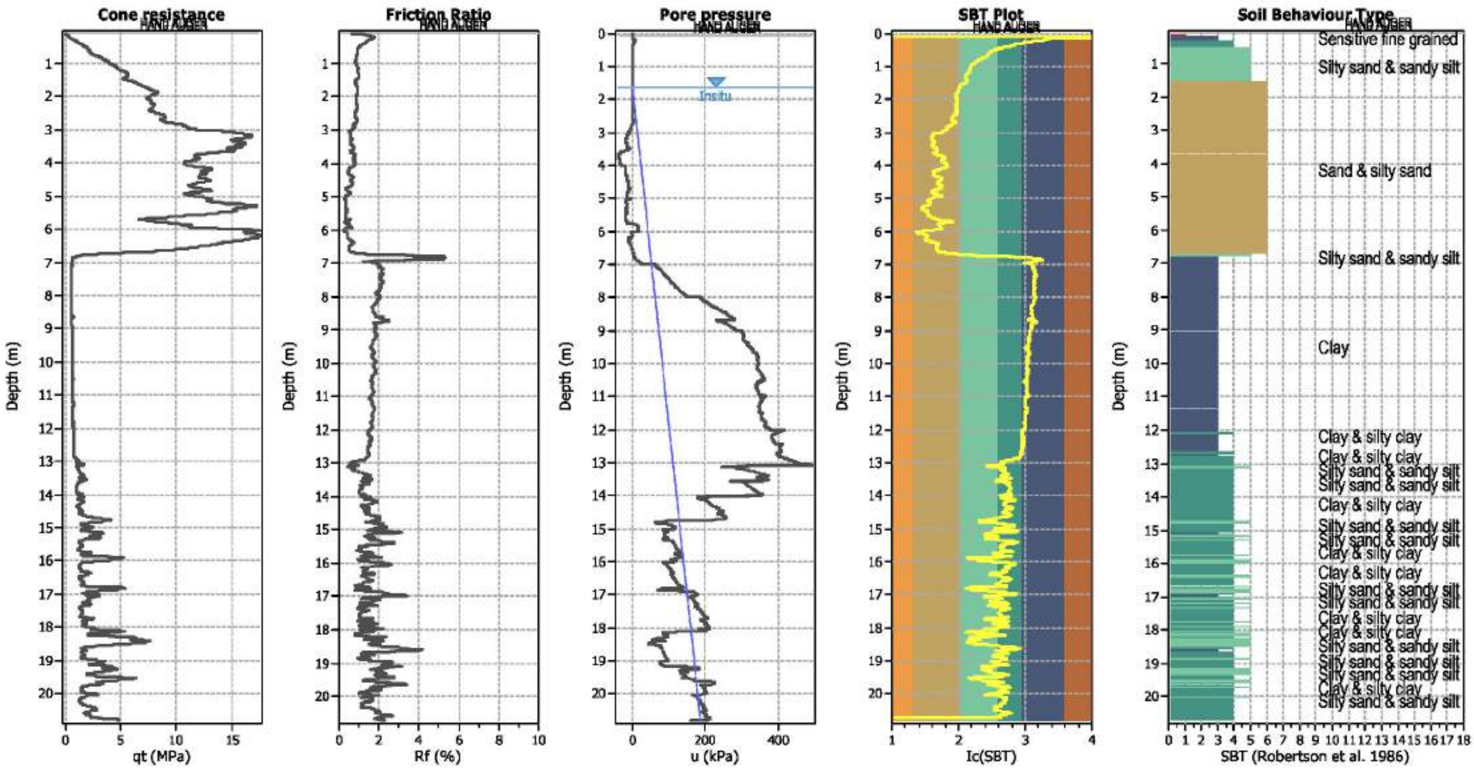
CPT basic interpretation plots



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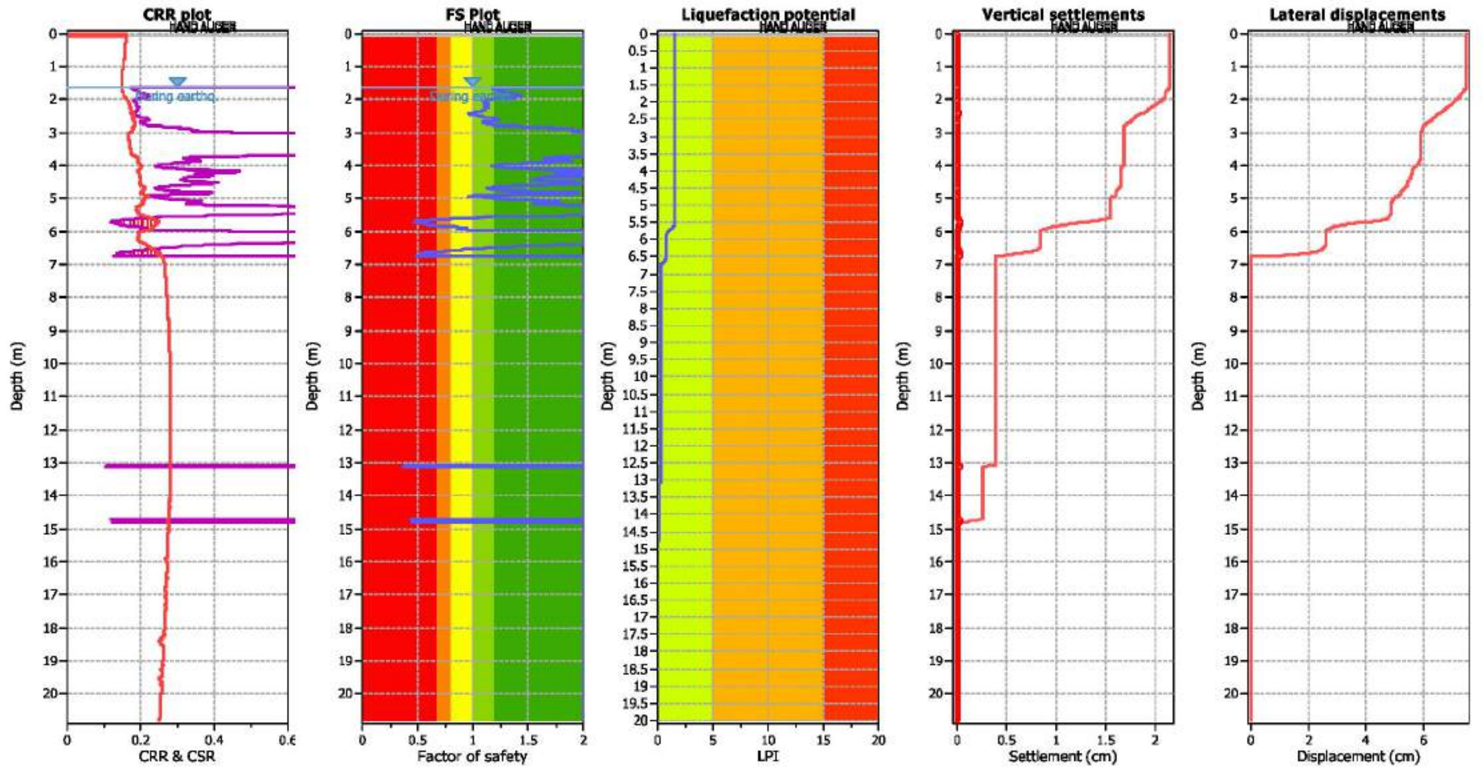
🟦 3. Clay to silty clay	🟨 6. Clean sand to silty sand	⬜ 9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
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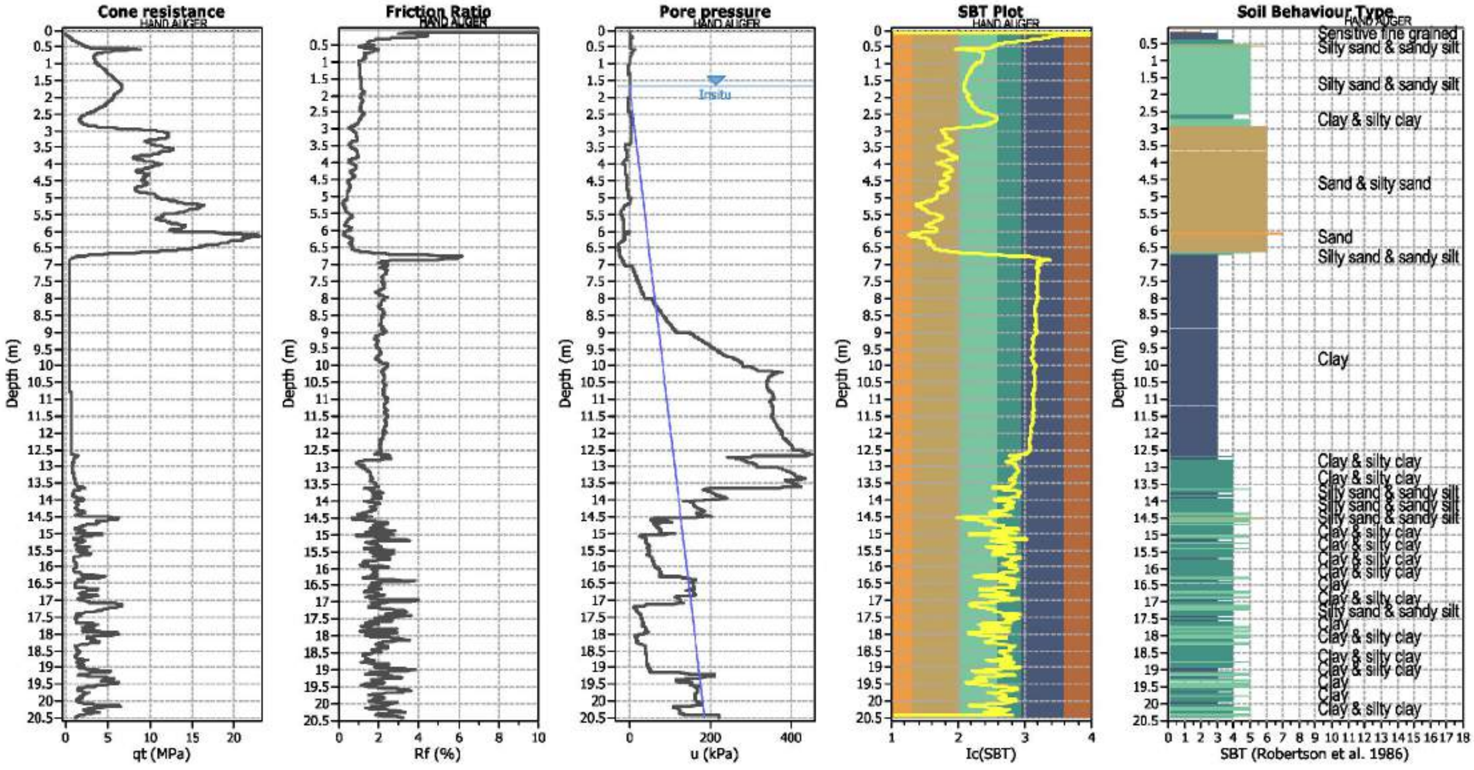
CPT basic interpretation plots



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Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
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SBT legend

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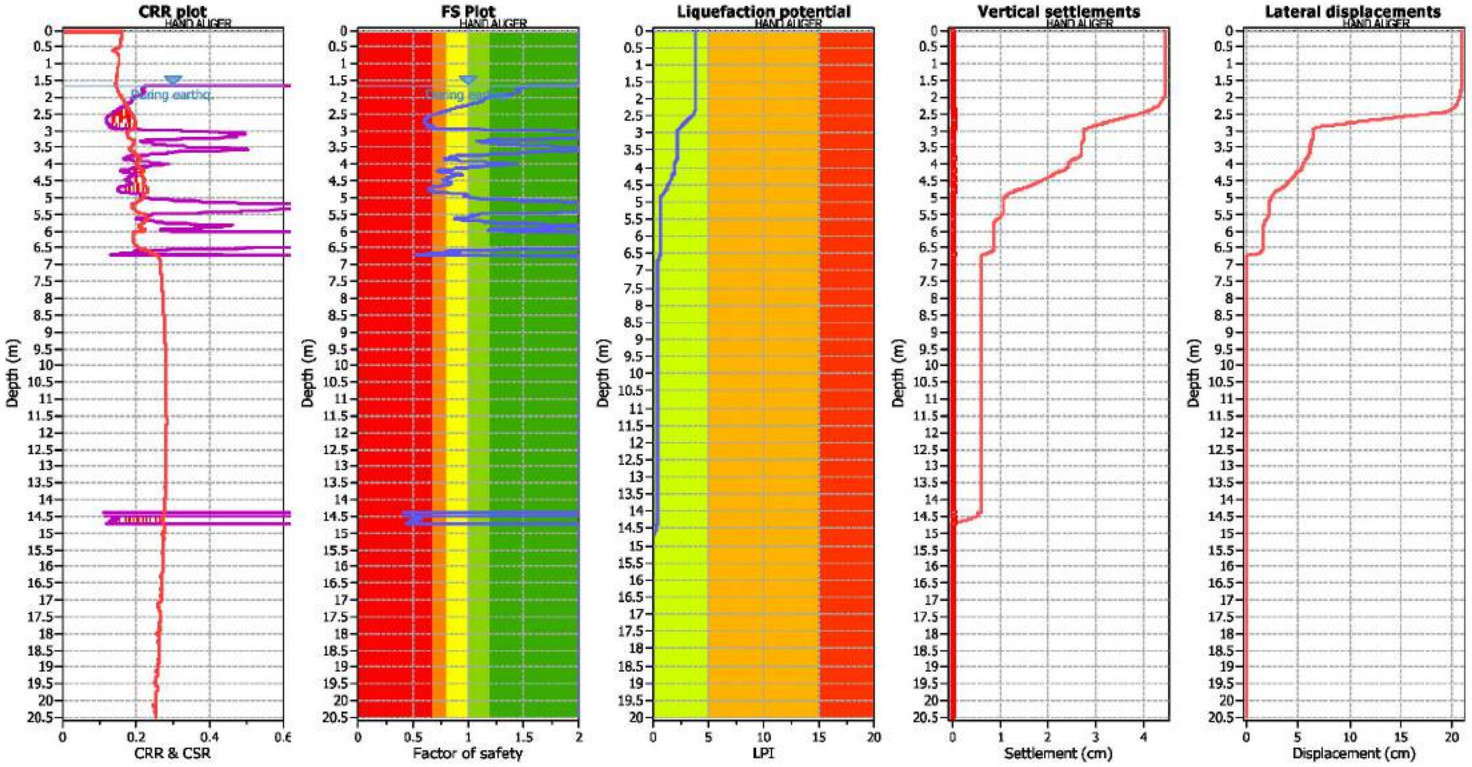
🟦 3. Clay to silty clay	🟨 6. Clean sand to silty sand	⬜ 9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

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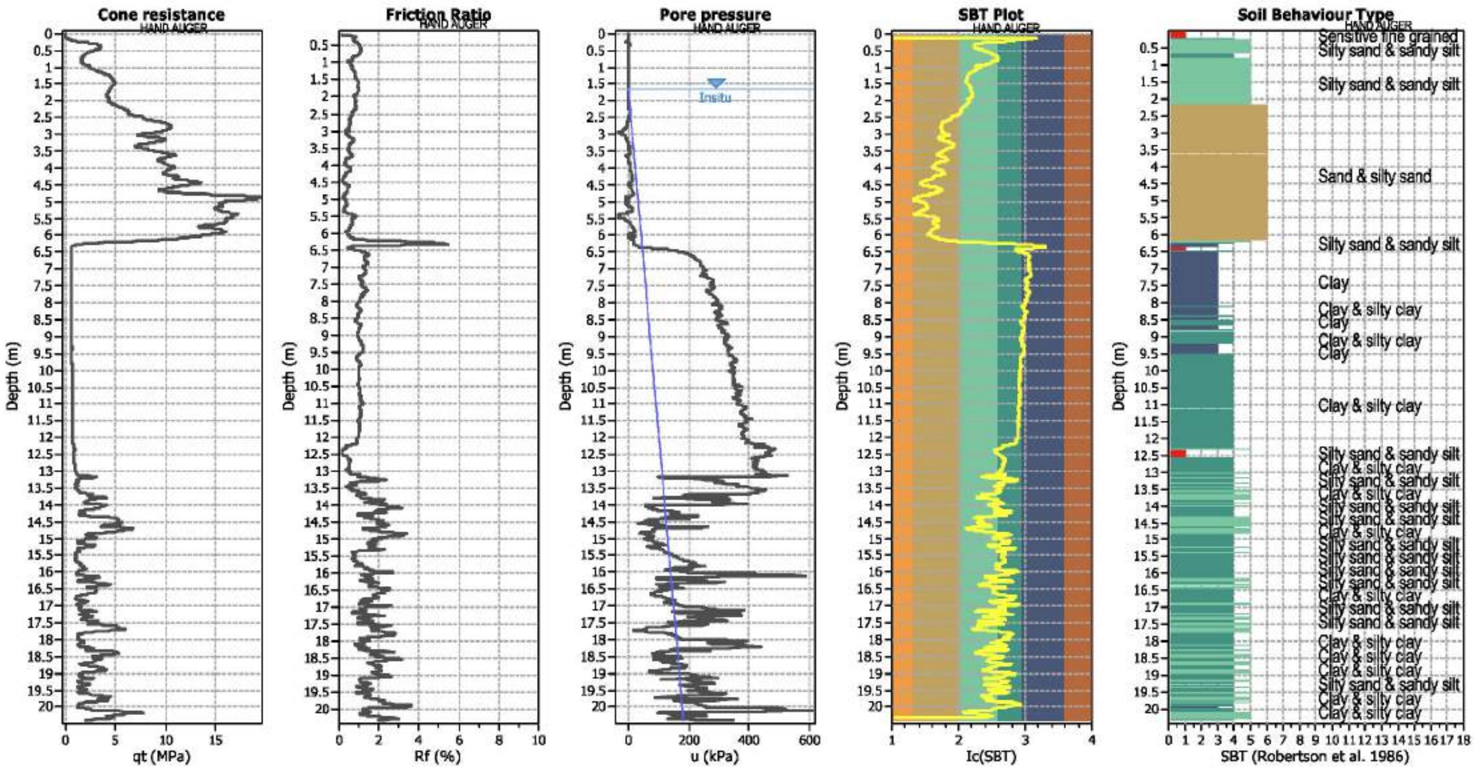
- 🟨 Low risk

CPT basic interpretation plots



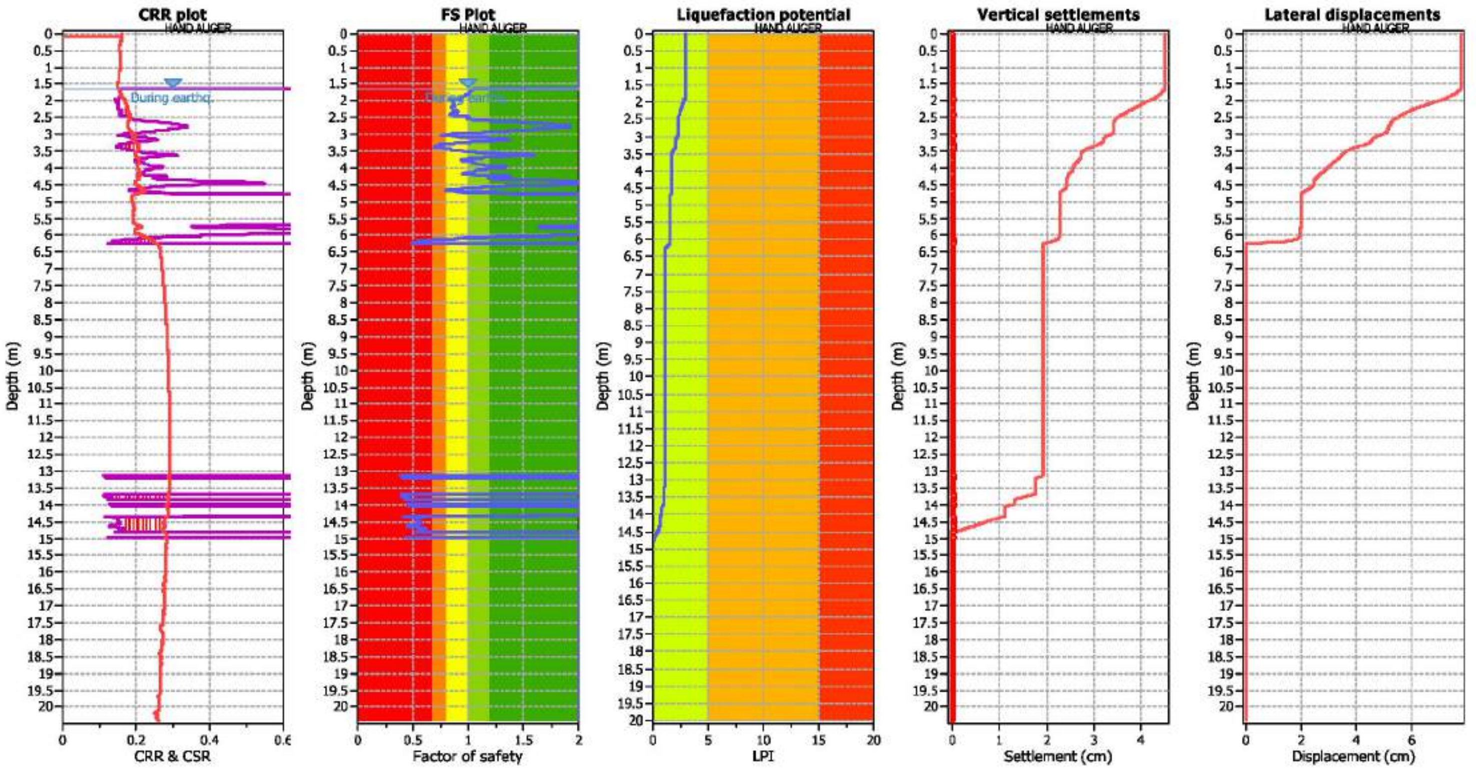
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.28	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	15.00 m

SBT legend

🟥 1. Sensitive fine grained	🟩 4. Clayey silt to silty	🟧 7. Gravely sand to sand
🟫 2. Organic material	🟩 5. Silty sand to sandy silt	⬜ 8. Very stiff sand to
🟦 3. Clay to silty clay	🟨 6. Clean sand to silty sand	⬜ 9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.28	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	15.00 m

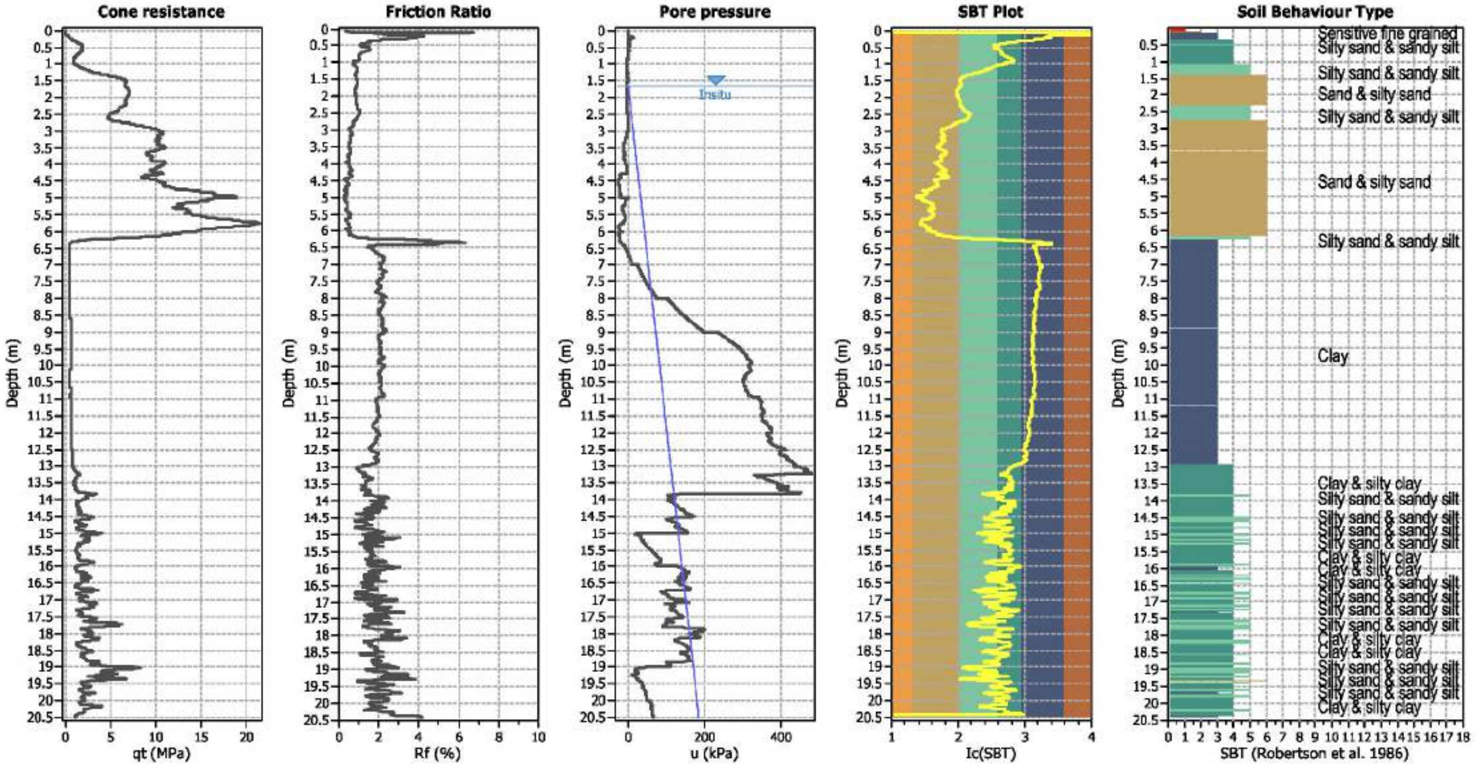
F.S. color scheme

- 🟥 Almost certain it will liquefy
- 🟧 Very likely to liquefy
- 🟨 Liquefaction and no liq. are equally likely
- 🟩 Unlike to liquefy
- 🟩 Almost certain it will not liquefy

LPI color scheme

- 🟥 Very high risk
- 🟧 High risk
- 🟨 Low risk

CPT basic interpretation plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
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Earthquake magnitude M_w:	6.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.28	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	10.00 m

SBT legend

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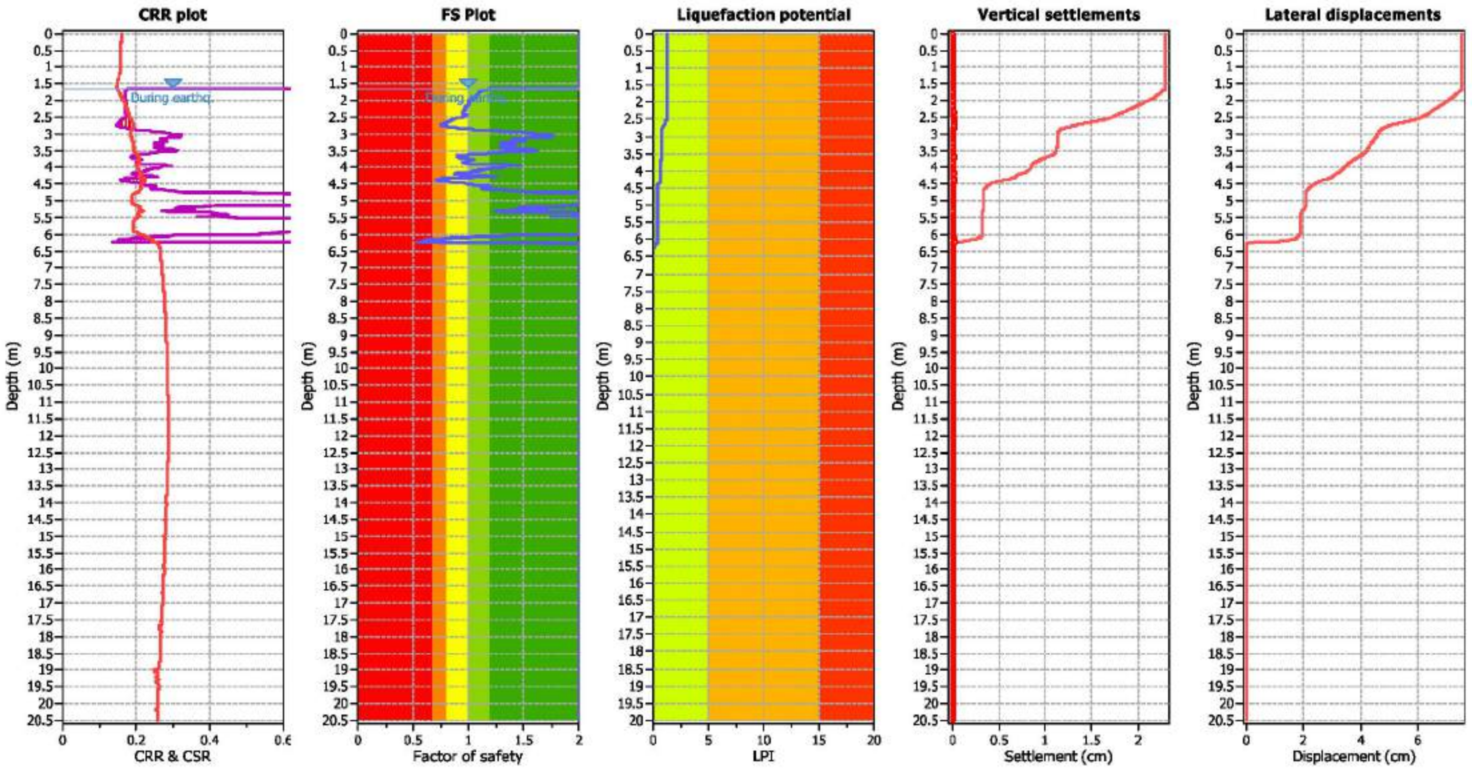
🟫 2. Organic material	🟩 5. Silty sand to sandy silt	⬛ 8. Very stiff sand to
🟦 3. Clay to silty clay	🟨 6. Clean sand to silty sand	⬜ 9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
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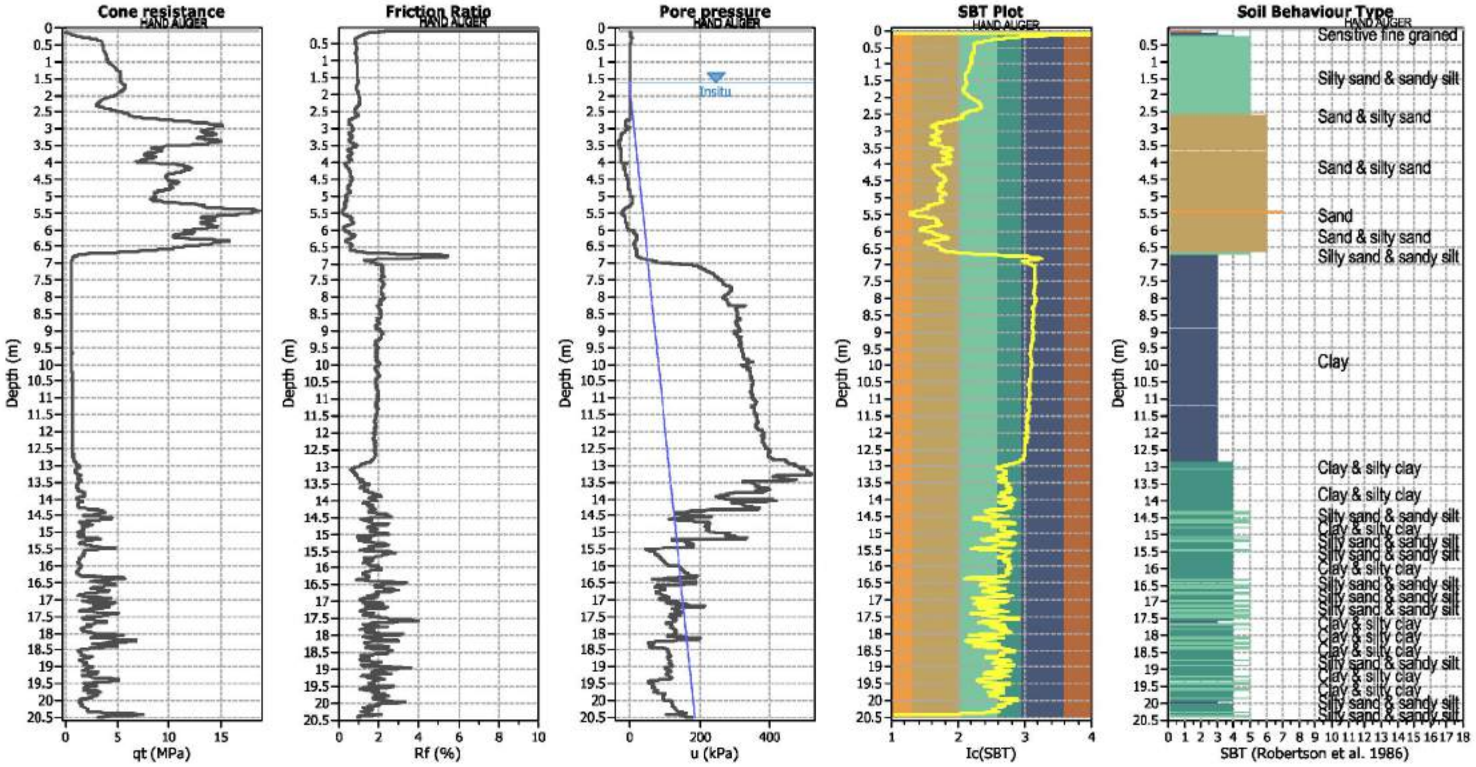
CPT basic interpretation plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
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Earthquake magnitude M_w:	6.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
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SBT legend

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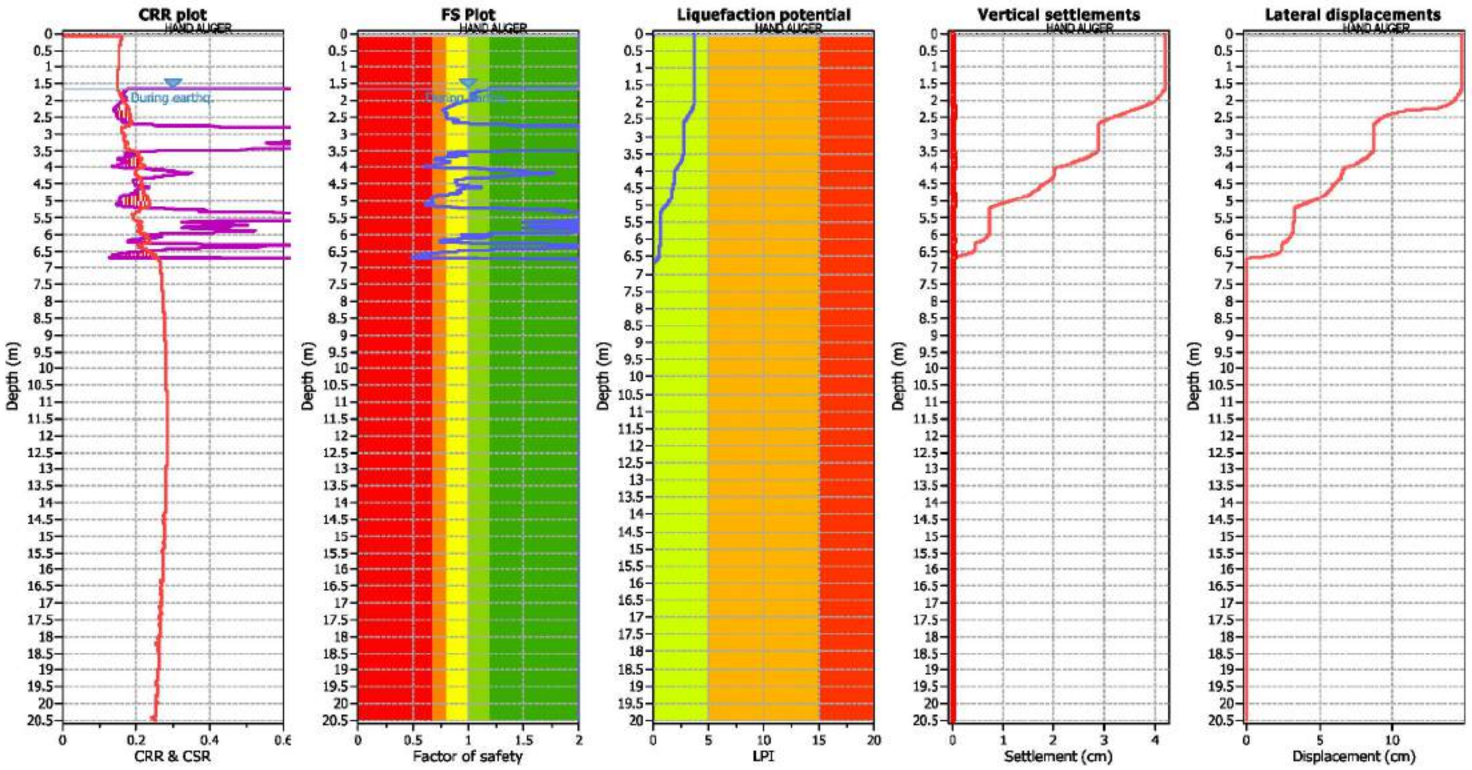
🟦 3. Clay to silty clay	🟨 6. Clean sand to silty sand	⬜ 9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
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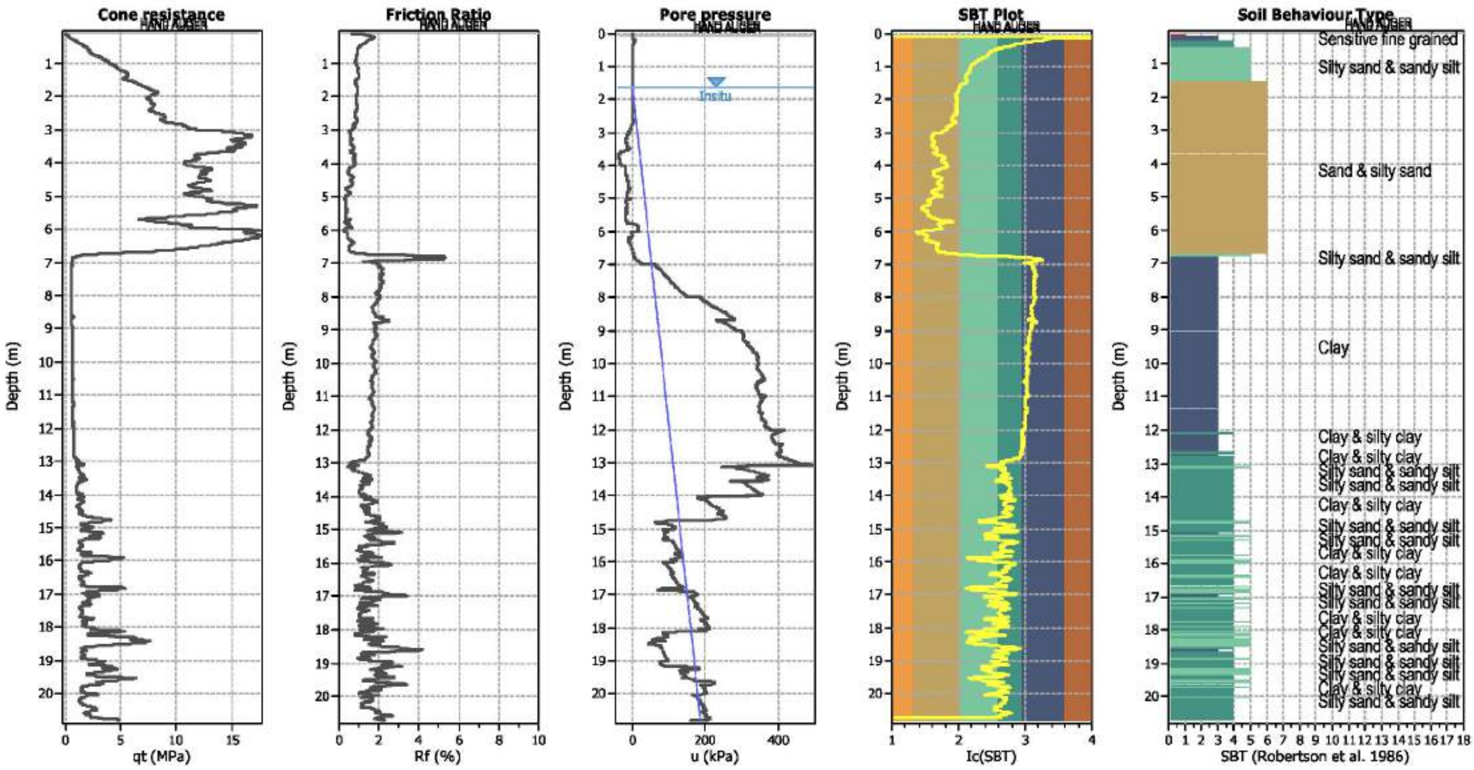
CPT basic interpretation plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
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Earthquake magnitude M_w:	6.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.28	Use fill:	No	Limit depth applied:	Yes
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SBT legend

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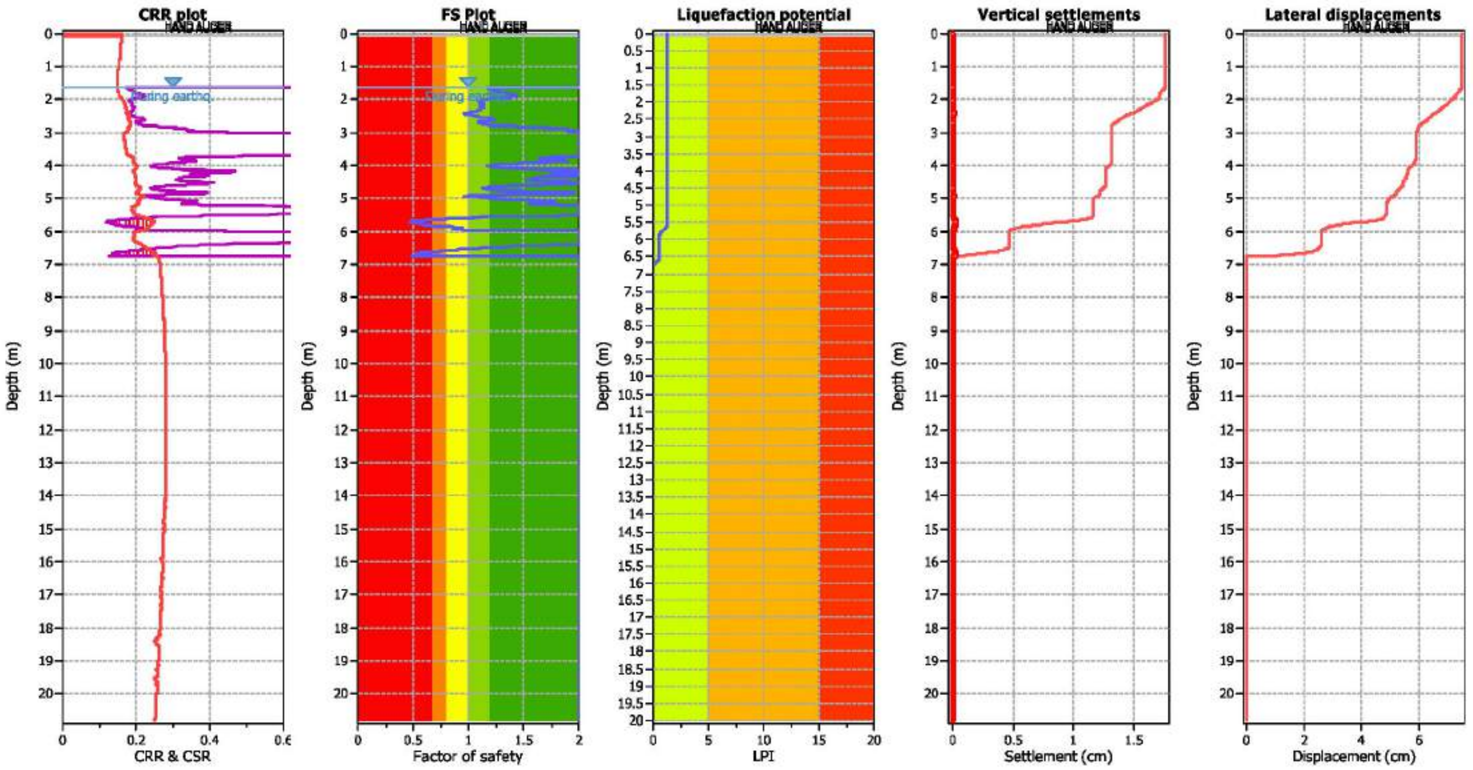
🟦 3. Clay to silty clay	🟨 6. Clean sand to silty sand	⬜ 9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
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LPI color scheme

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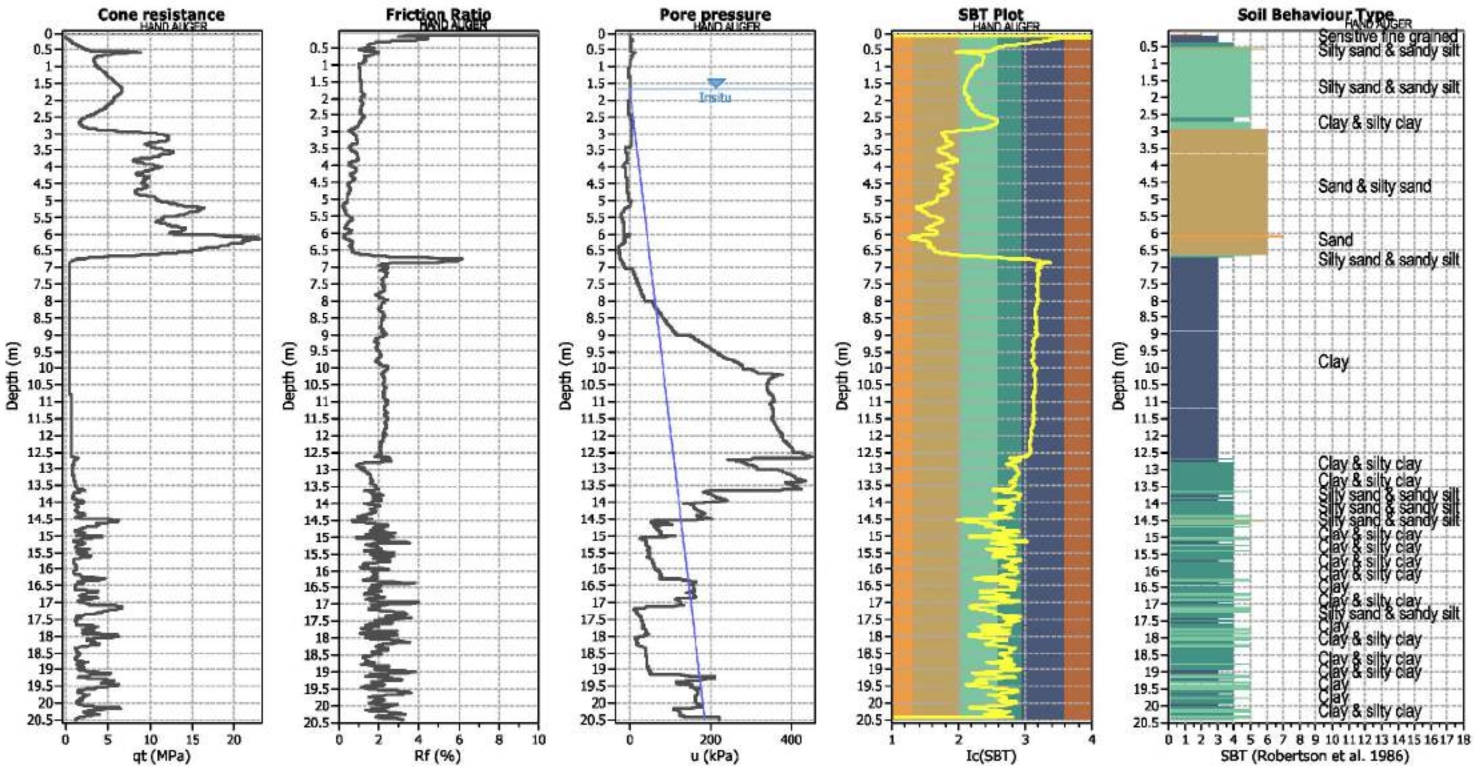
CPT basic interpretation plots



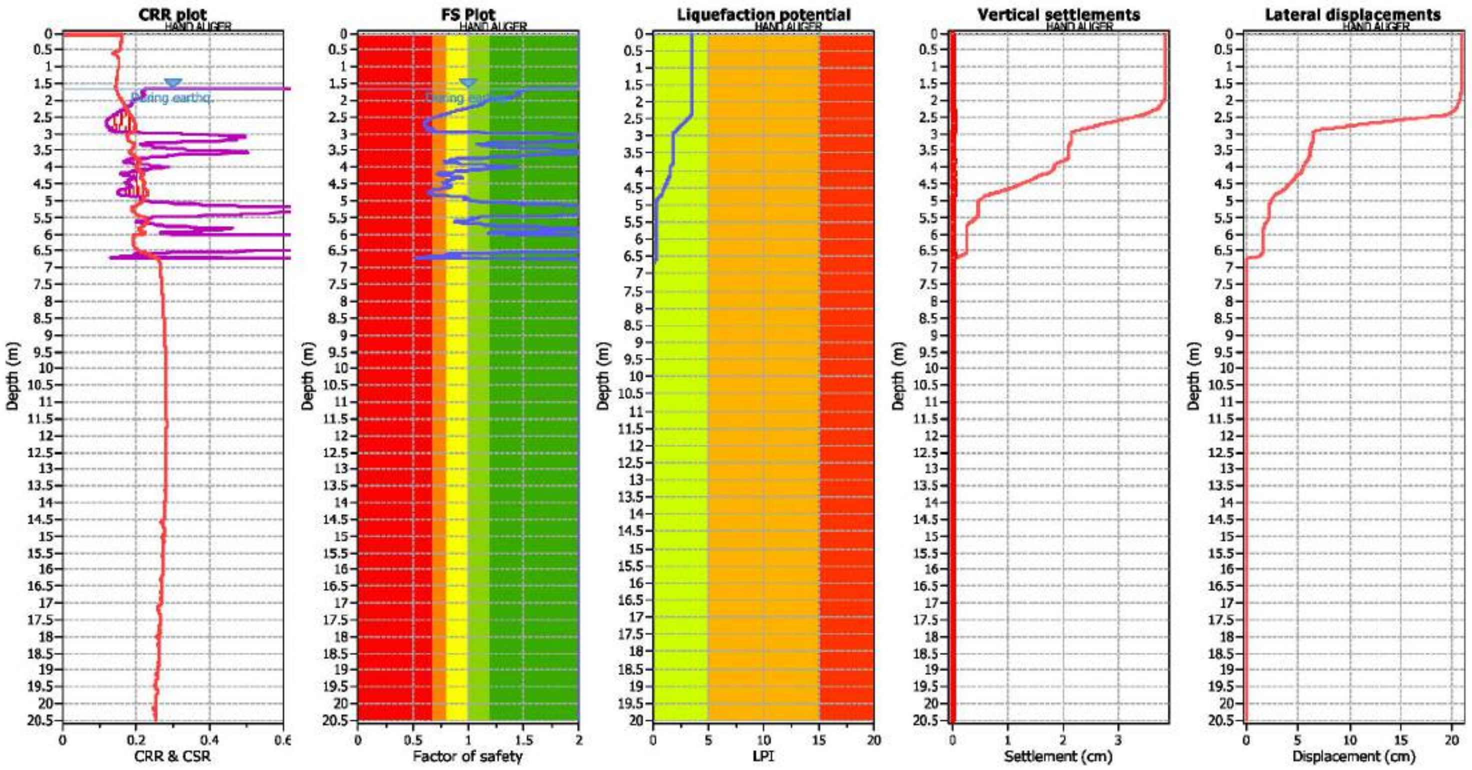
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.28	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	10.00 m

SBT legend

🟥	1. Sensitive fine grained	🟩	4. Clayey silt to silty	🟧	7. Gravely sand to sand
🟫	2. Organic material	🟩	5. Silty sand to sandy silt	⬛	8. Very stiff sand to
🟦	3. Clay to silty clay	🟨	6. Clean sand to silty sand	⬜	9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.28	Use fill:	No	Limit depth applied:	Yes
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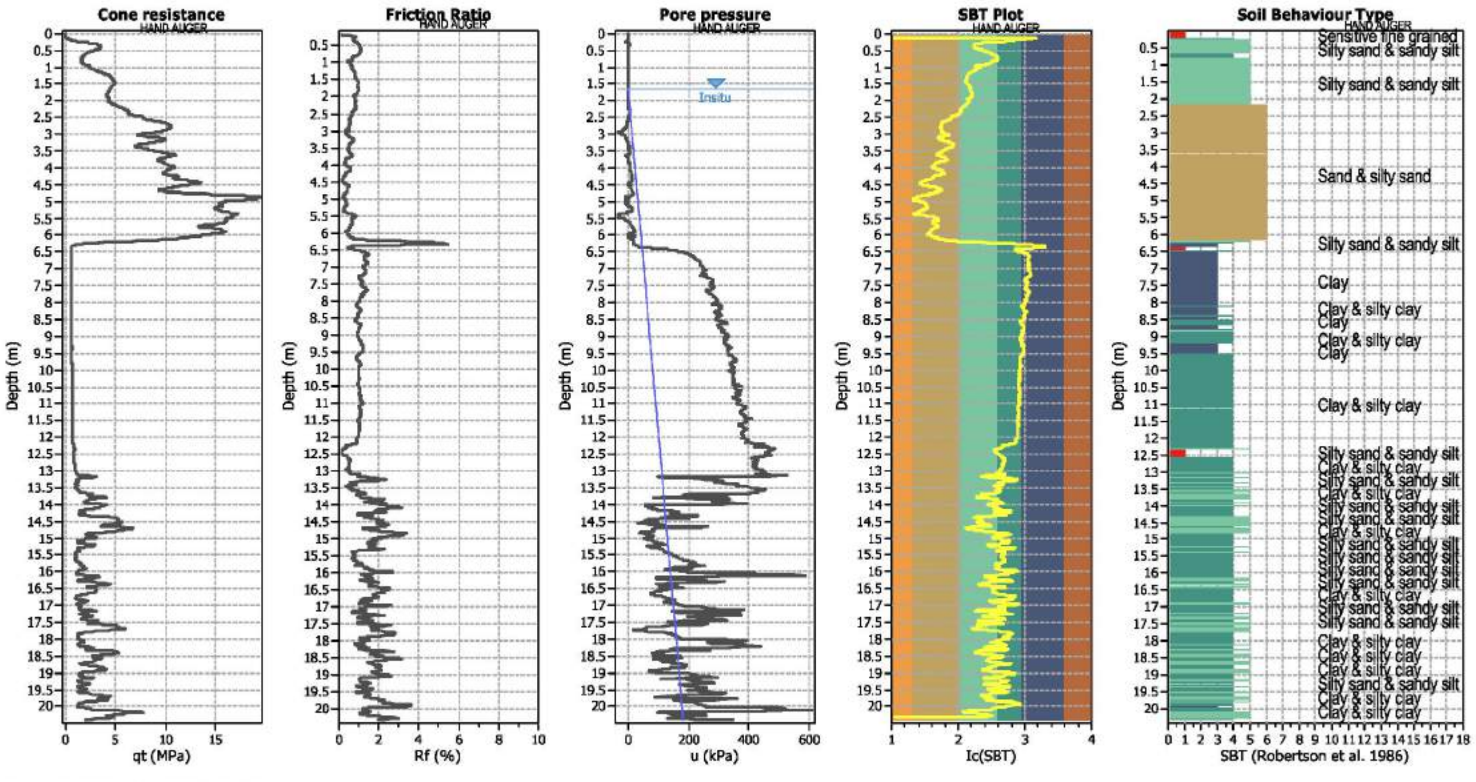
CPT basic interpretation plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	6.80	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
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SBT legend

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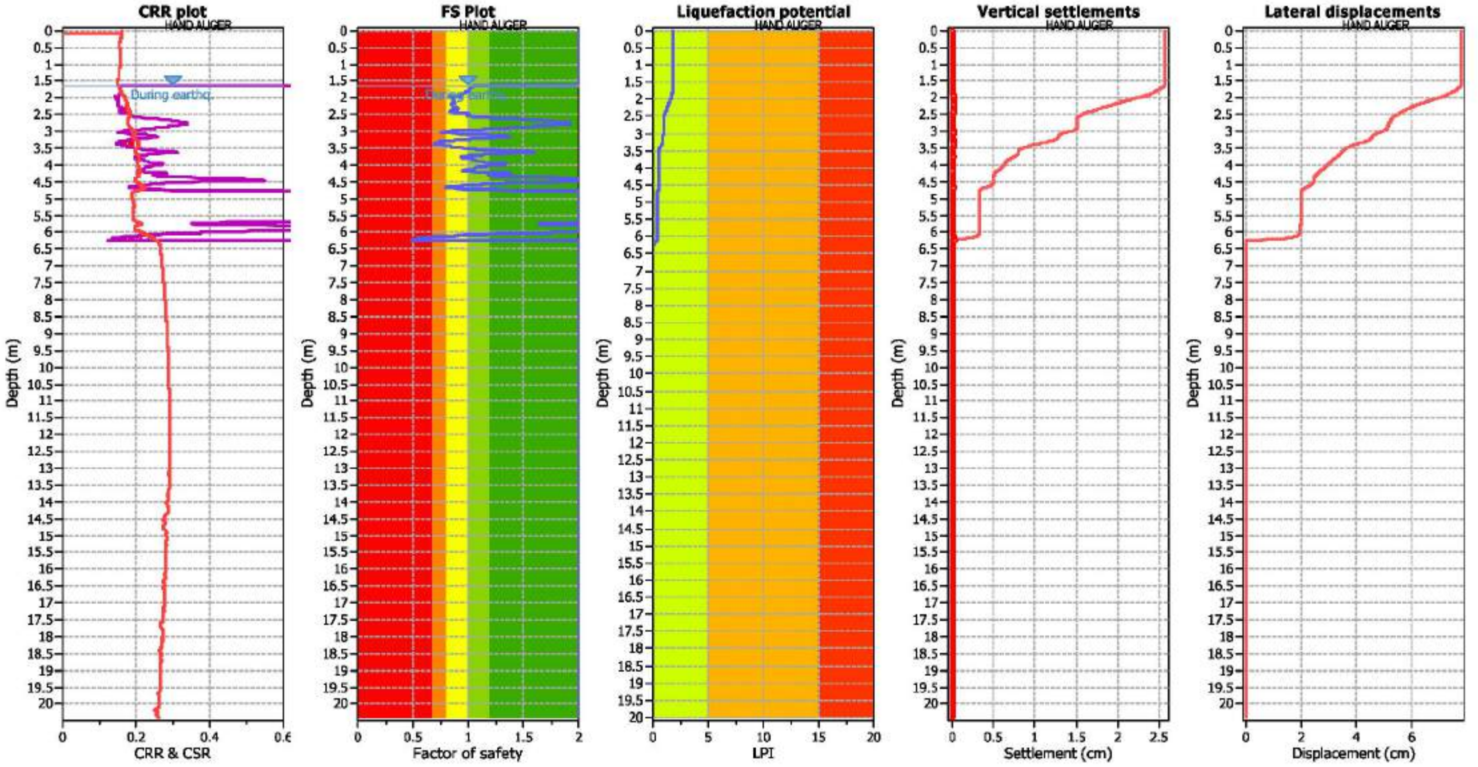
🟦 3. Clay to silty clay	🟨 6. Clean sand to silty sand	⬜ 9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method: B&I (2014)
Fines correction method: B&I (2014)
Points to test: Based on Ic value
Earthquake magnitude M_w: 6.80
Peak ground acceleration: 0.28
Depth to water table (insitu): 1.65 m

Depth to GWT (erthq.): 1.65 m
Average results interval: 3
Ic cut-off value: 2.60
Unit weight calculation: Based on SBT
Use fill: No
Fill height: N/A

Fill weight: N/A
Transition detect. applied: No
K_σ applied: Yes
Clay like behavior applied: Sands only
Limit depth applied: Yes
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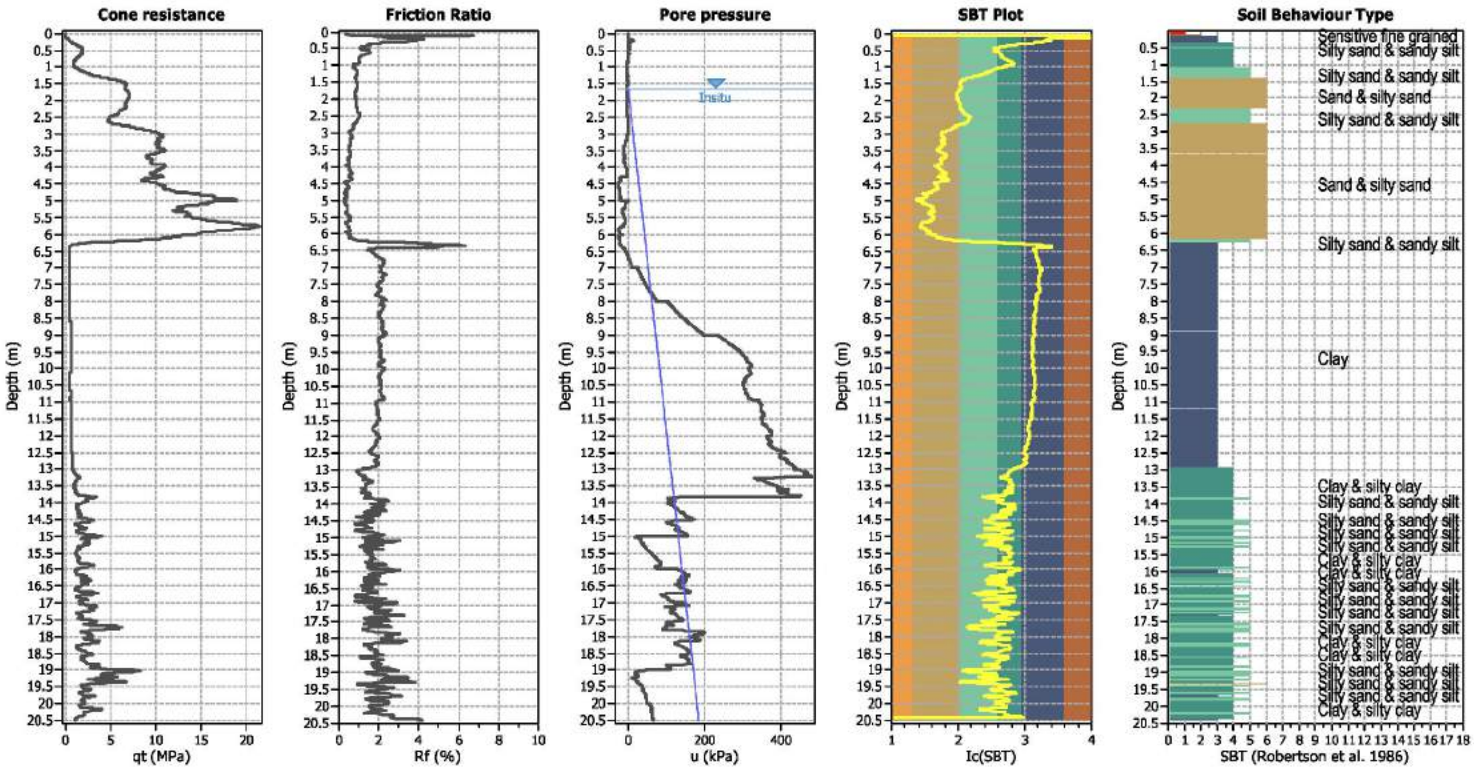
CPT basic interpretation plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.65	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	15.00 m

SBT legend

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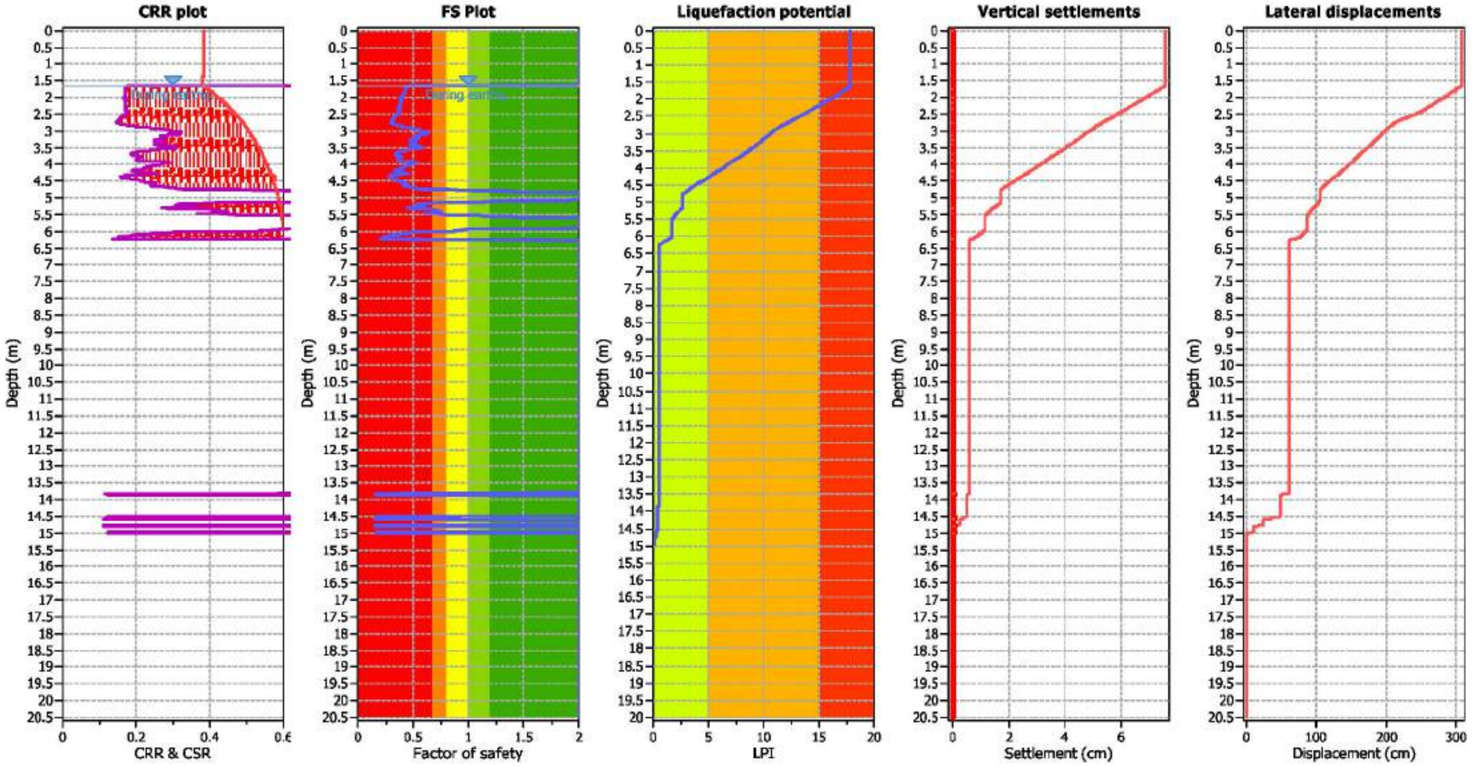
Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
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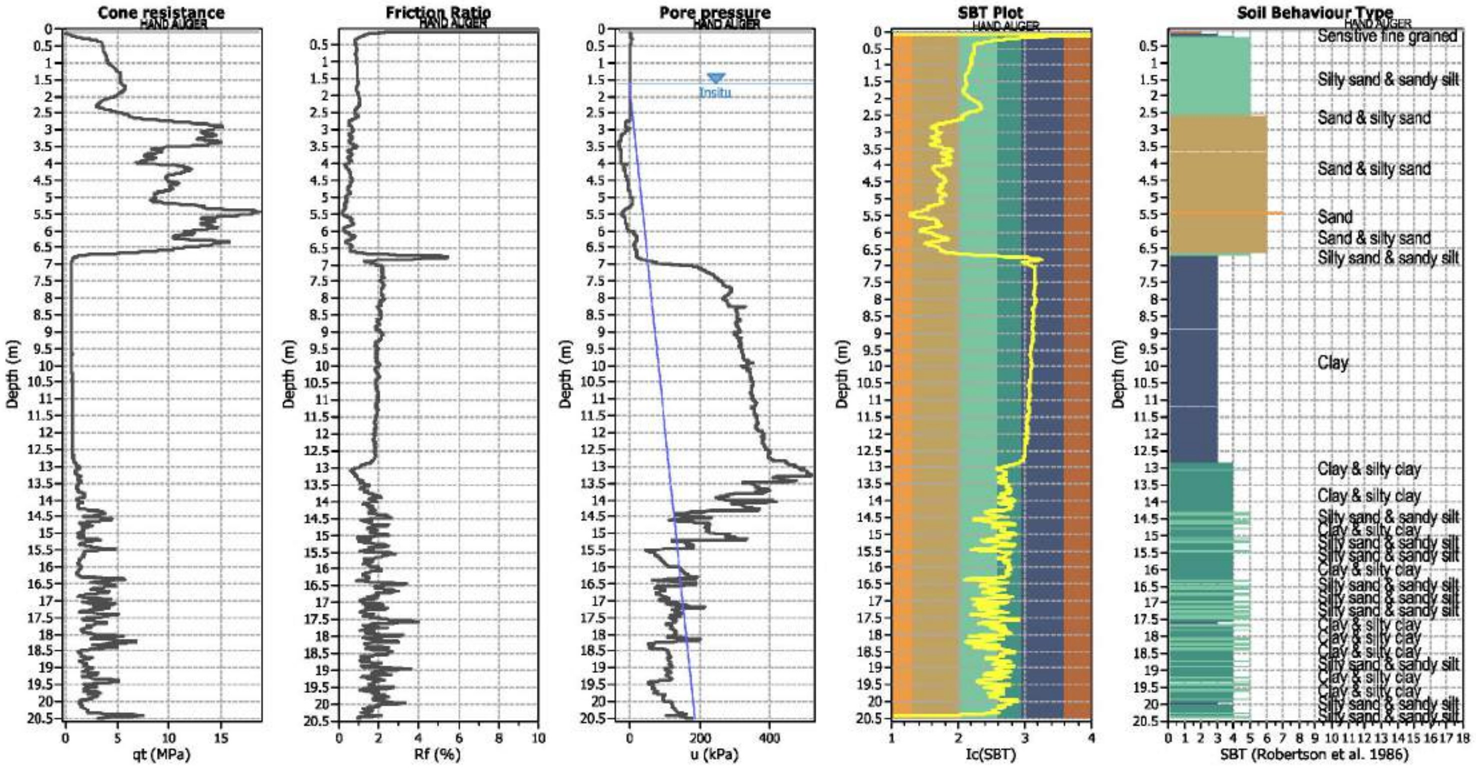
CPT basic interpretation plots



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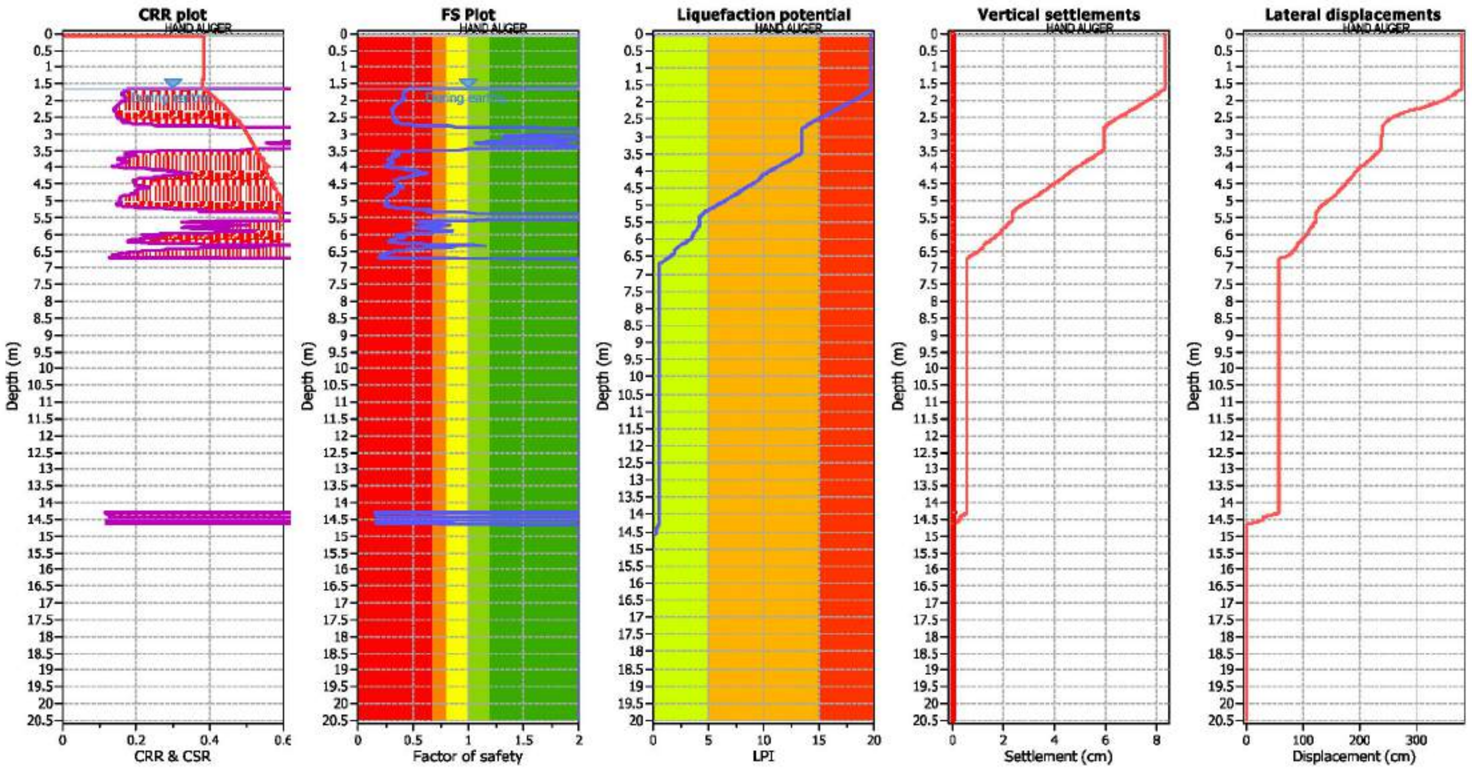
🟦 3. Clay to silty clay	🟨 6. Clean sand to silty sand	⬜ 9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
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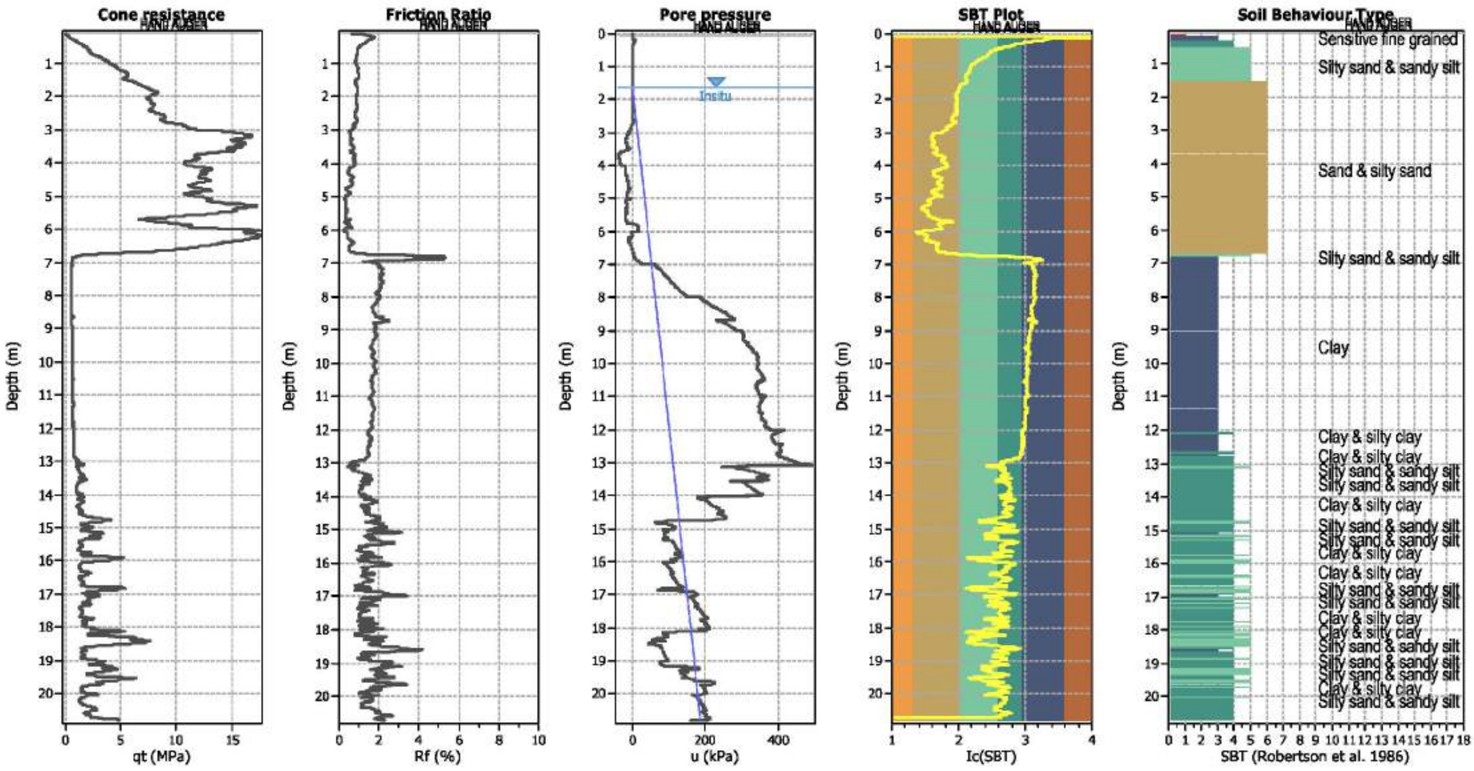

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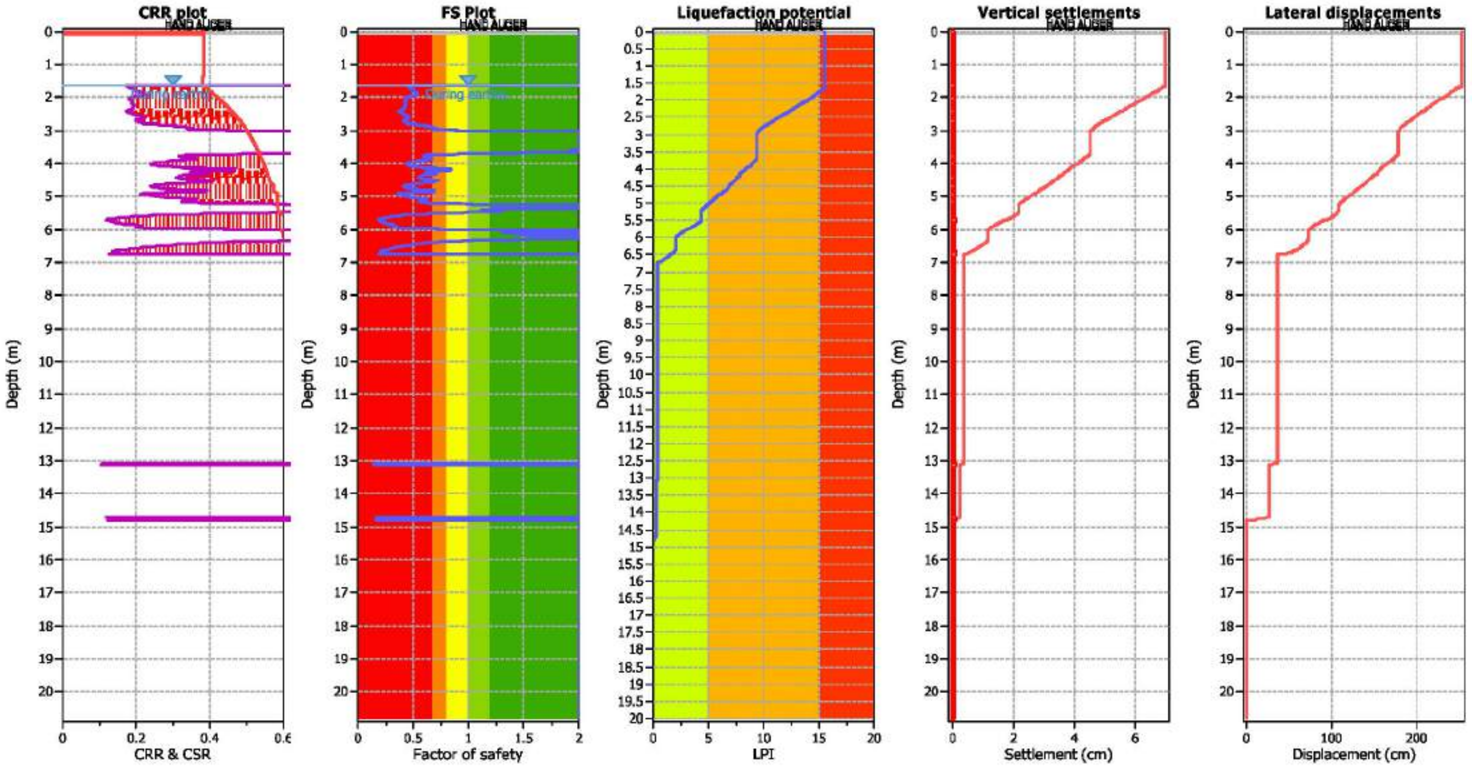
Liquefaction analysis overall plots



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Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
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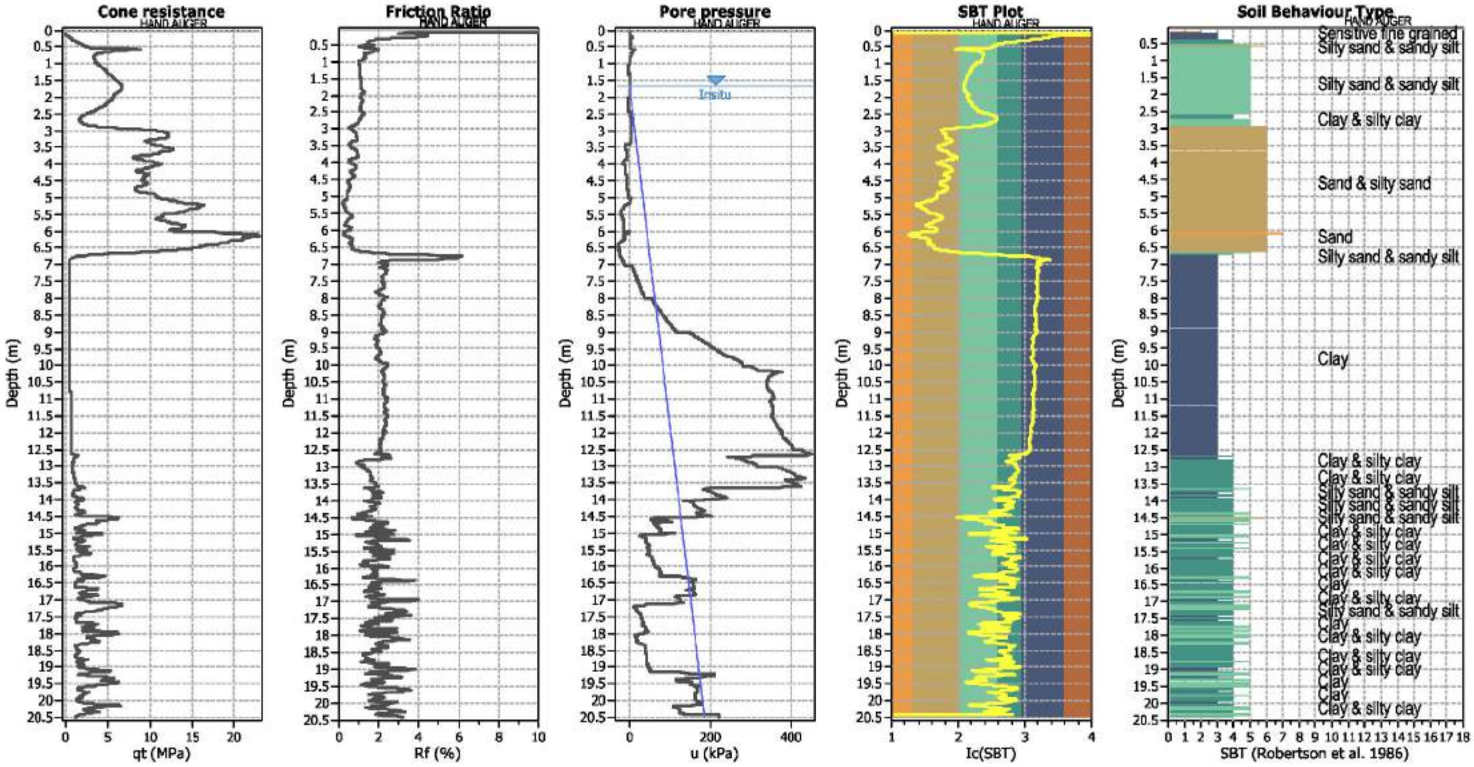
CPT basic interpretation plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
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SBT legend

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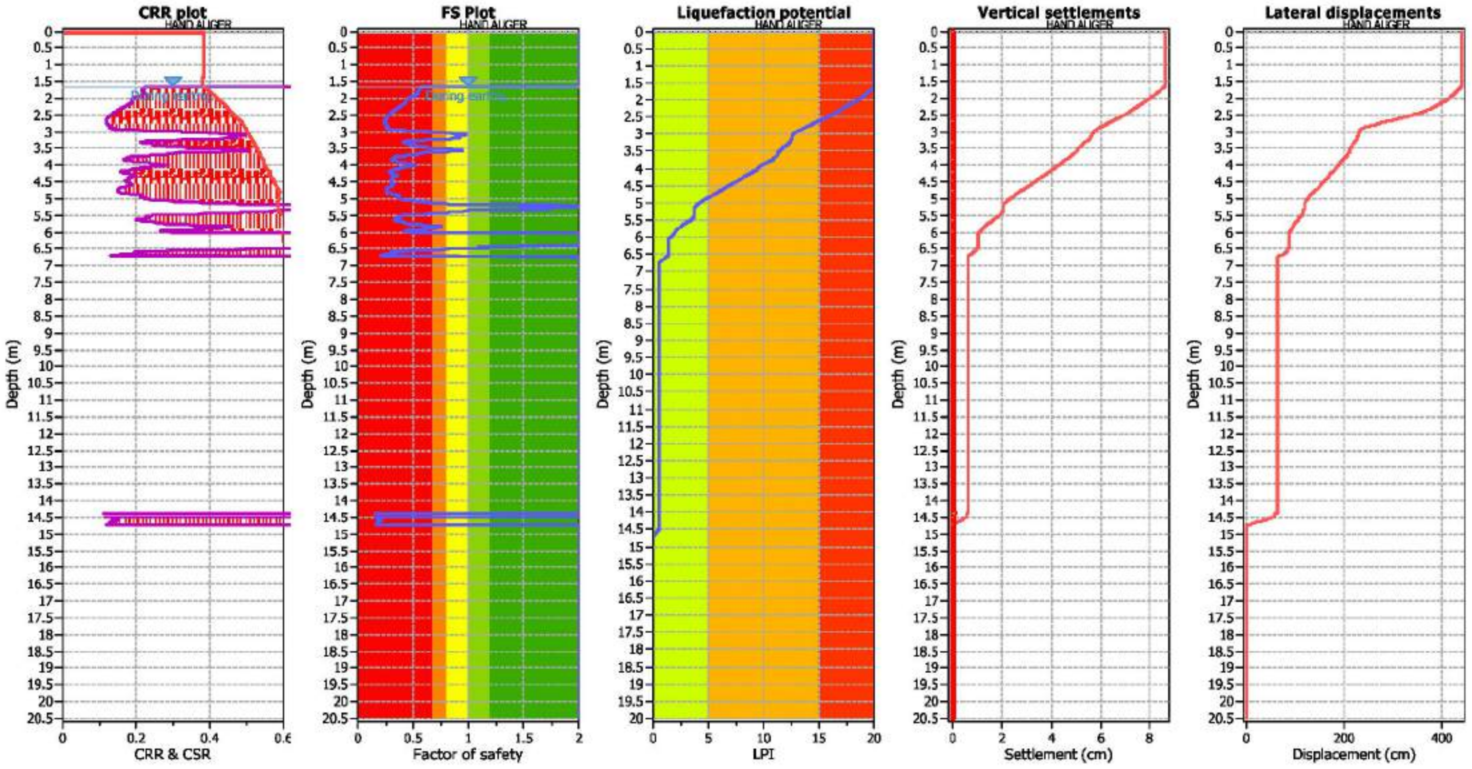
Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
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Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.65	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	15.00 m

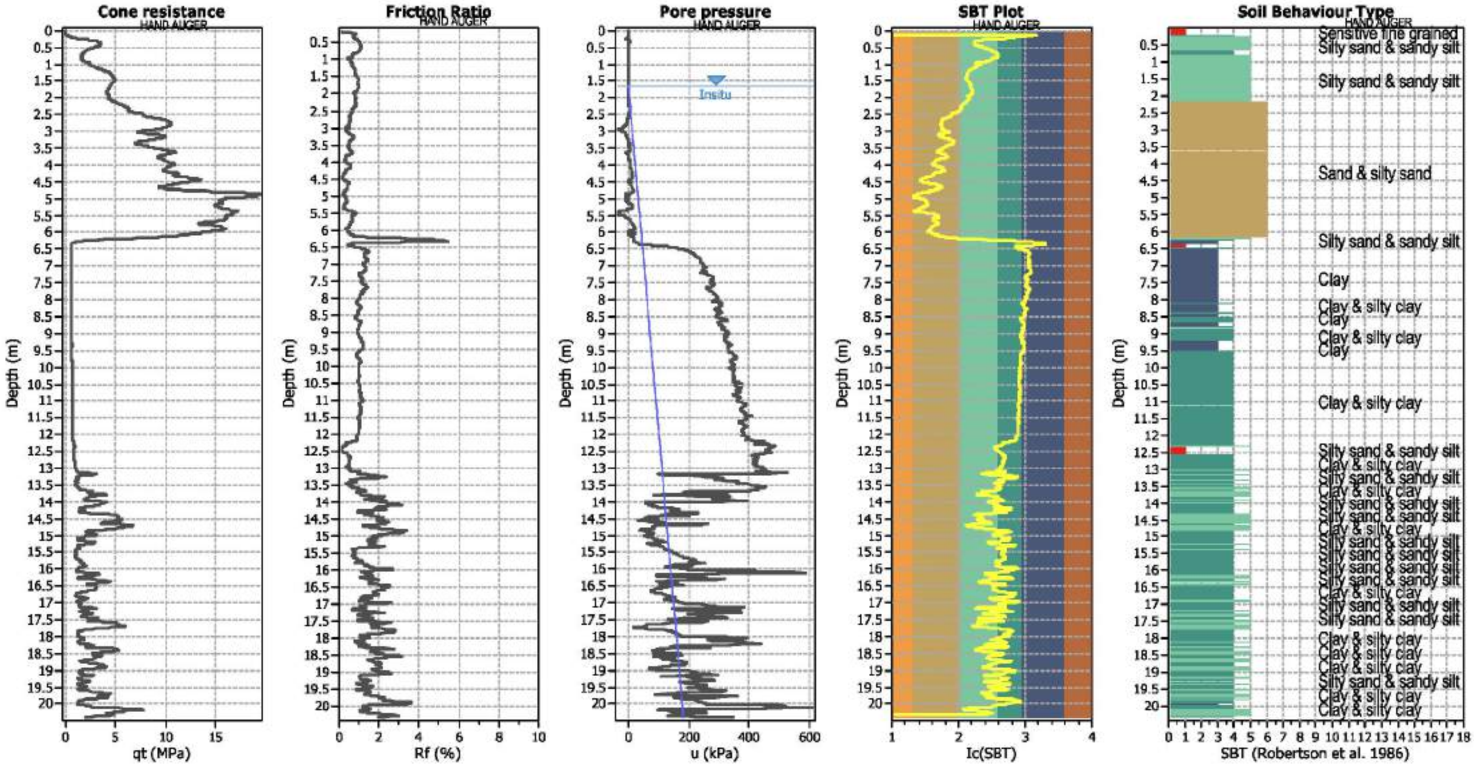
F.S. color scheme

- 🟥 Almost certain it will liquefy
- 🟧 Very likely to liquefy
- 🟨 Liquefaction and no liq. are equally likely
- 🟩 Unlike to liquefy
- 🟩 Almost certain it will not liquefy

LPI color scheme

- 🟥 Very high risk
- 🟧 High risk
- 🟨 Low risk

CPT basic interpretation plots



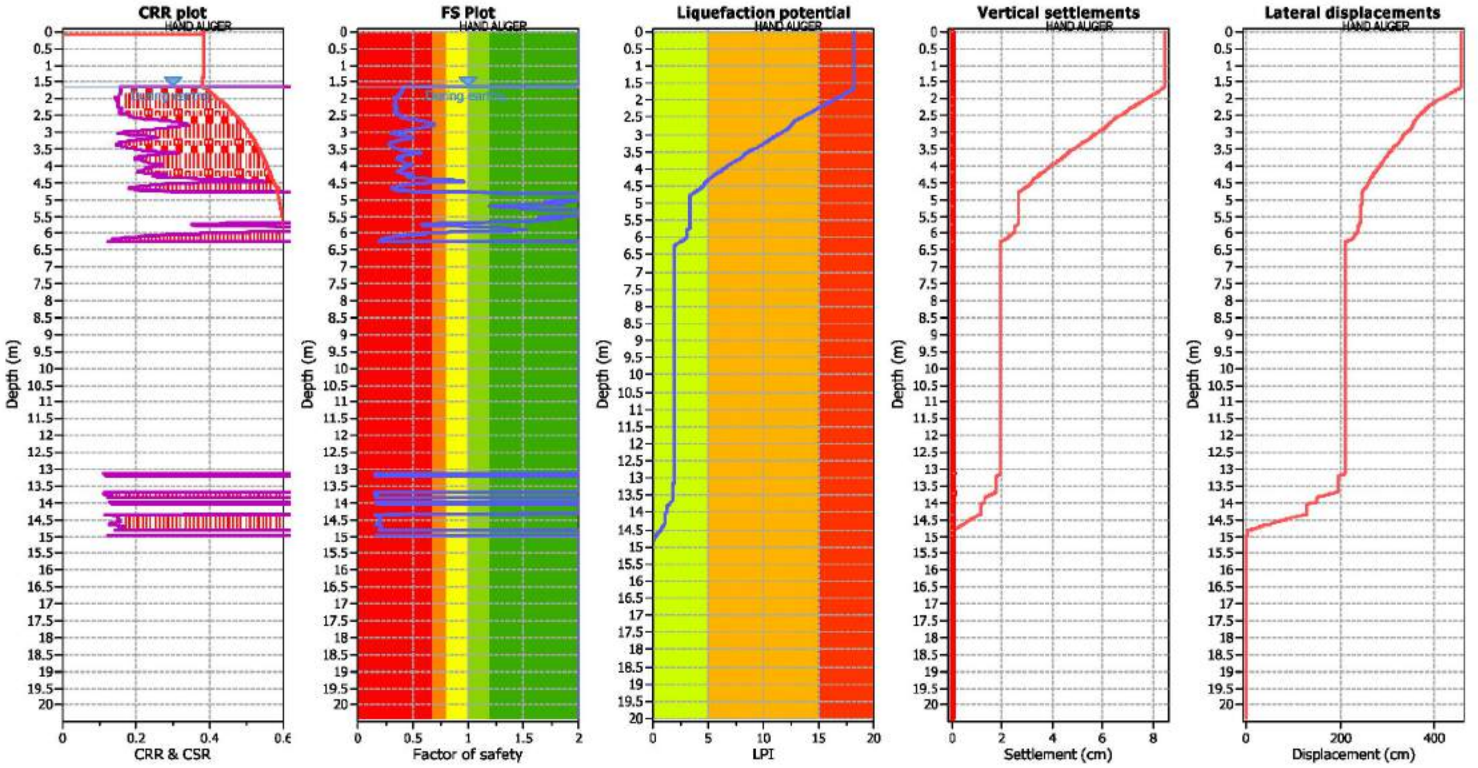
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.65	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	15.00 m

SBT legend

🟥 1. Sensitive fine grained	🟩 4. Clayey silt to silty	🟧 7. Gravely sand to sand
🟫 2. Organic material	🟩 5. Silty sand to sandy silt	⬛ 8. Very stiff sand to
🟦 3. Clay to silty clay	🟨 6. Clean sand to silty sand	⬜ 9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method: B&I (2014)
Fines correction method: B&I (2014)
Points to test: Based on Ic value
Earthquake magnitude M_w: 7.50
Peak ground acceleration: 0.65
Depth to water table (insitu): 1.65 m

Depth to GWT (erthq.): 1.65 m
Average results interval: 3
Ic cut-off value: 2.60
Unit weight calculation: Based on SBT
Use fill: No
Fill height: N/A

Fill weight: N/A
Transition detect. applied: No
K_σ applied: Yes
Clay like behavior applied: Sands only
Limit depth applied: Yes
Limit depth: 15.00 m

F.S. color scheme

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LPI color scheme

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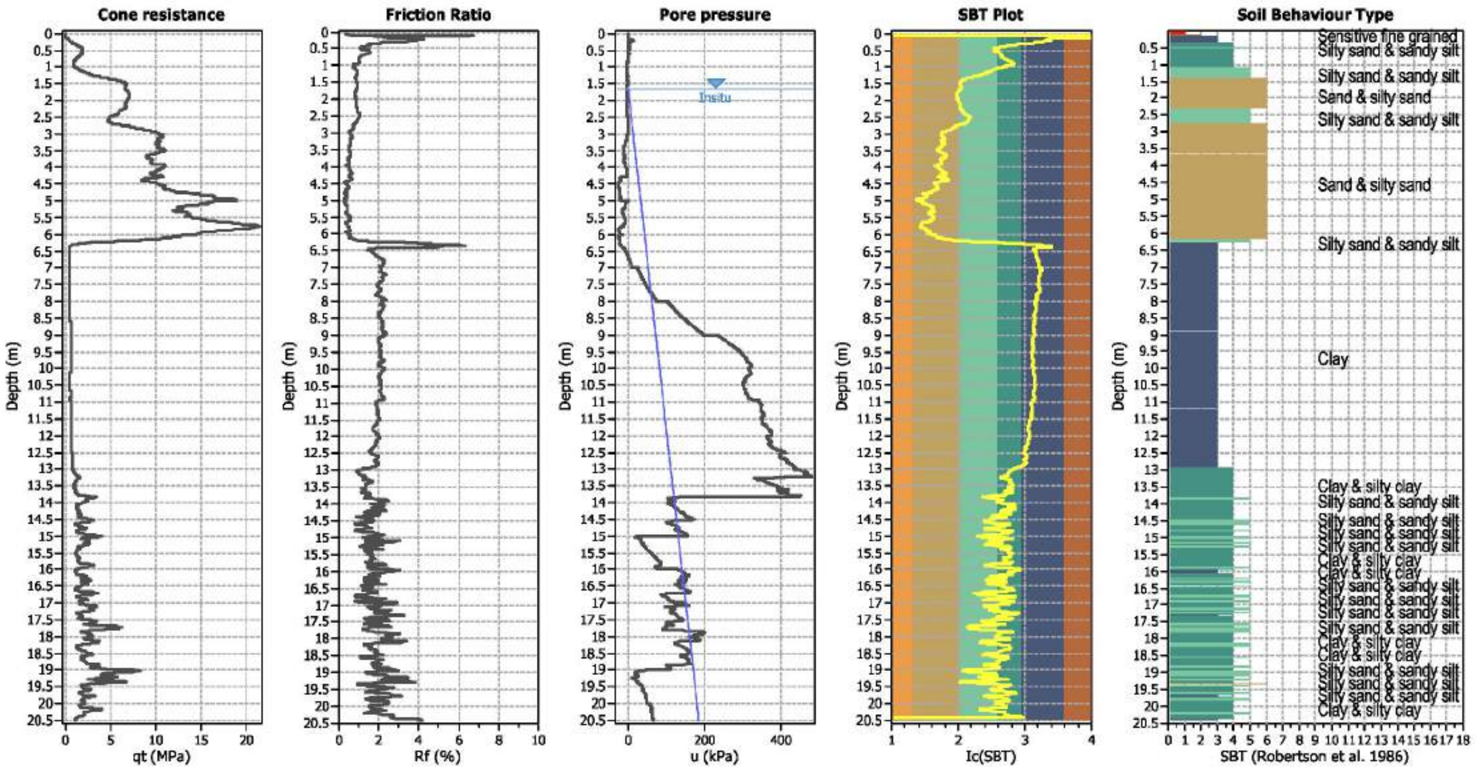
CPT basic interpretation plots



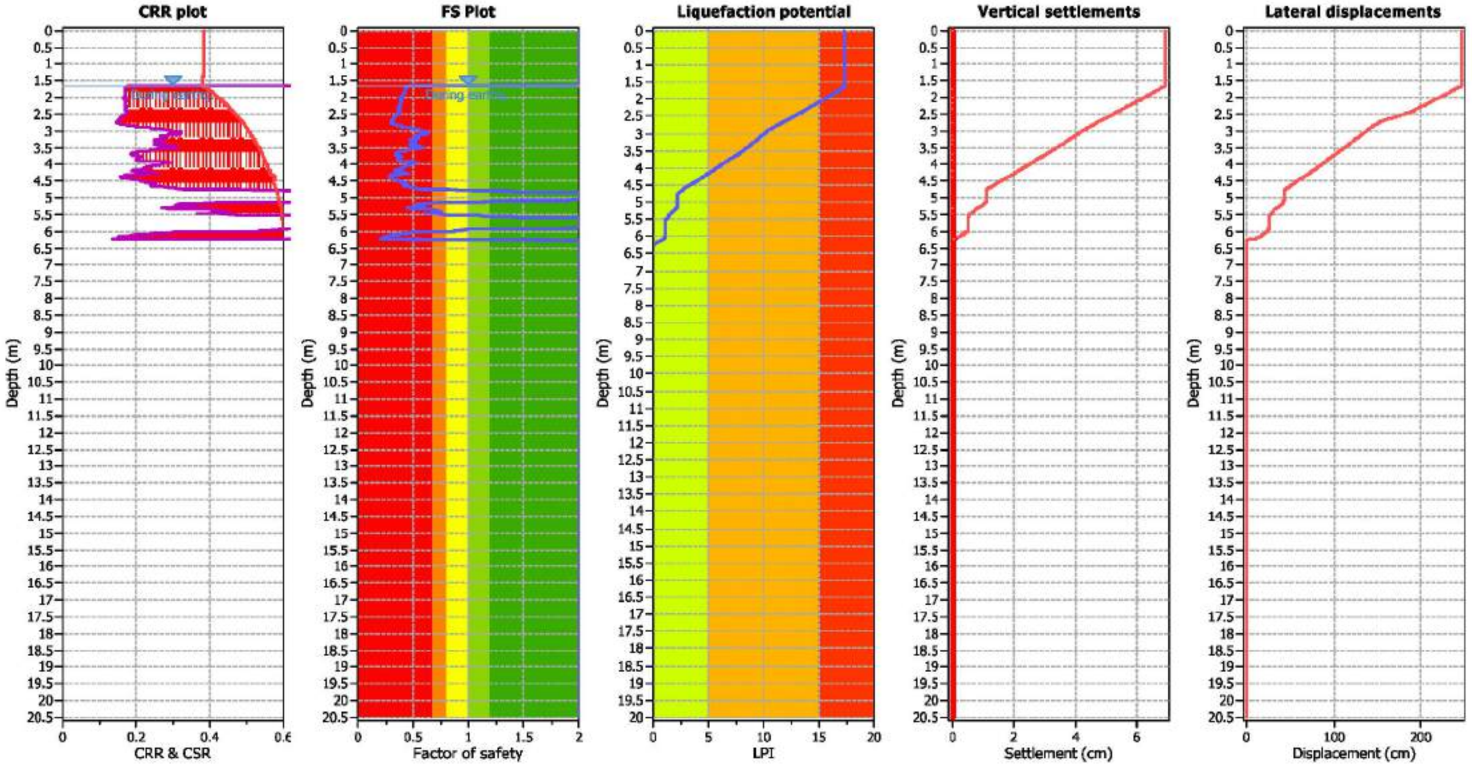
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.65	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	10.00 m

SBT legend

🟥 1. Sensitive fine grained	🟩 4. Clayey silt to silty	🟧 7. Gravely sand to sand
🟫 2. Organic material	🟩 5. Silty sand to sandy silt	⬛ 8. Very stiff sand to
🟦 3. Clay to silty clay	🟨 6. Clean sand to silty sand	⬜ 9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.65	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	10.00 m

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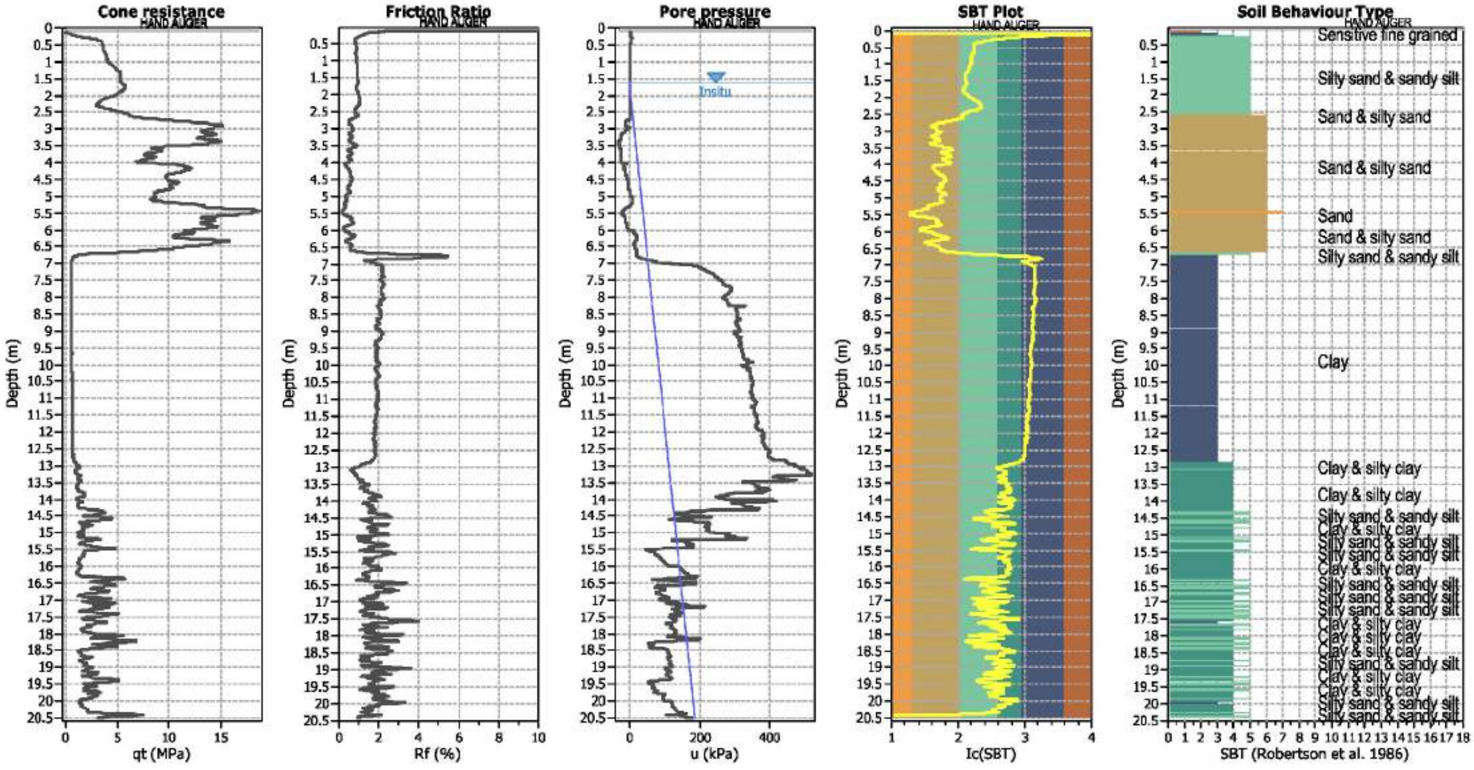
CPT basic interpretation plots



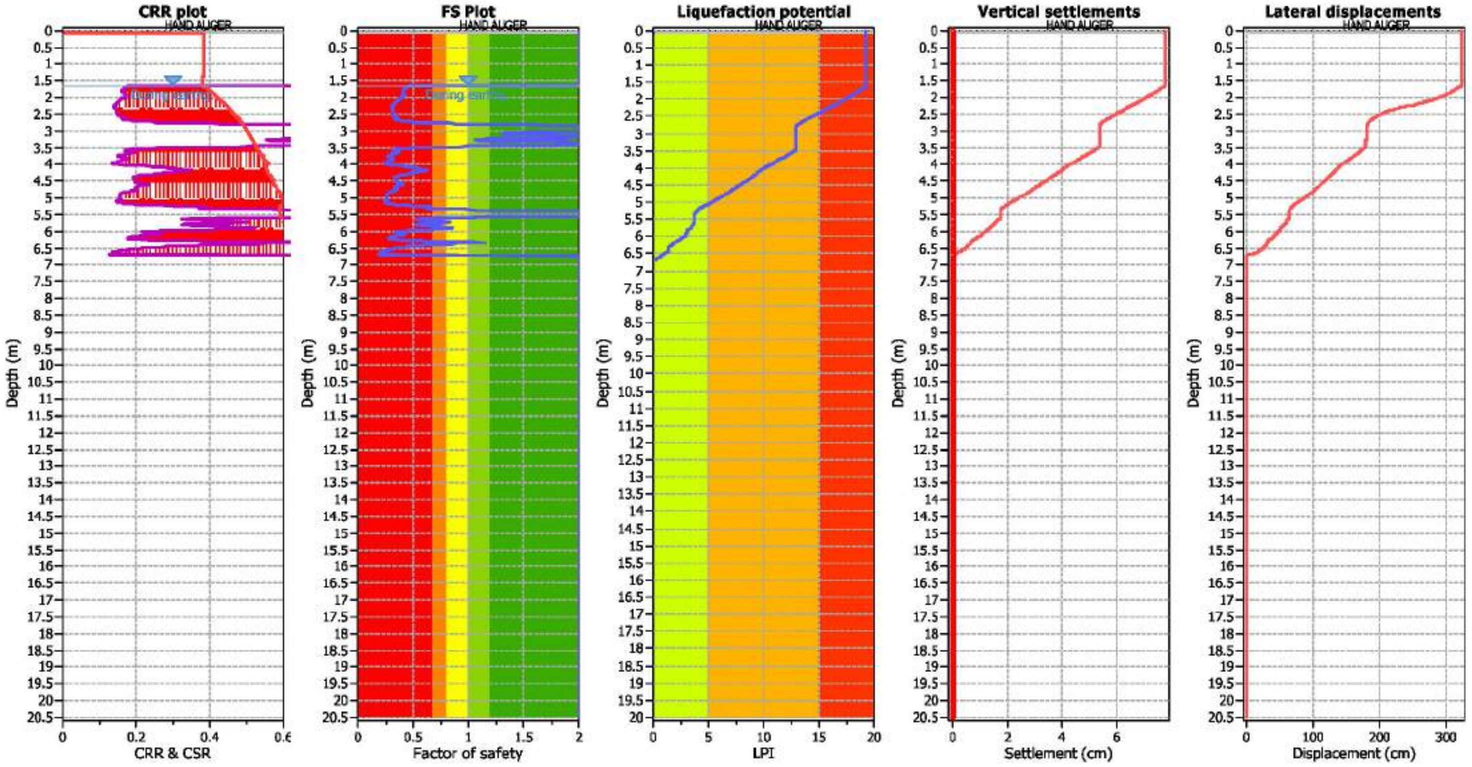
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.65	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	10.00 m

SBT legend

🟥 1. Sensitive fine grained	🟩 4. Clayey silt to silty	🟧 7. Gravely sand to sand
🟫 2. Organic material	🟩 5. Silty sand to sandy silt	⬜ 8. Very stiff sand to
🟦 3. Clay to silty clay	🟨 6. Clean sand to silty sand	⬜ 9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.65	Use fill:	No	Limit depth applied:	Yes
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LPI color scheme

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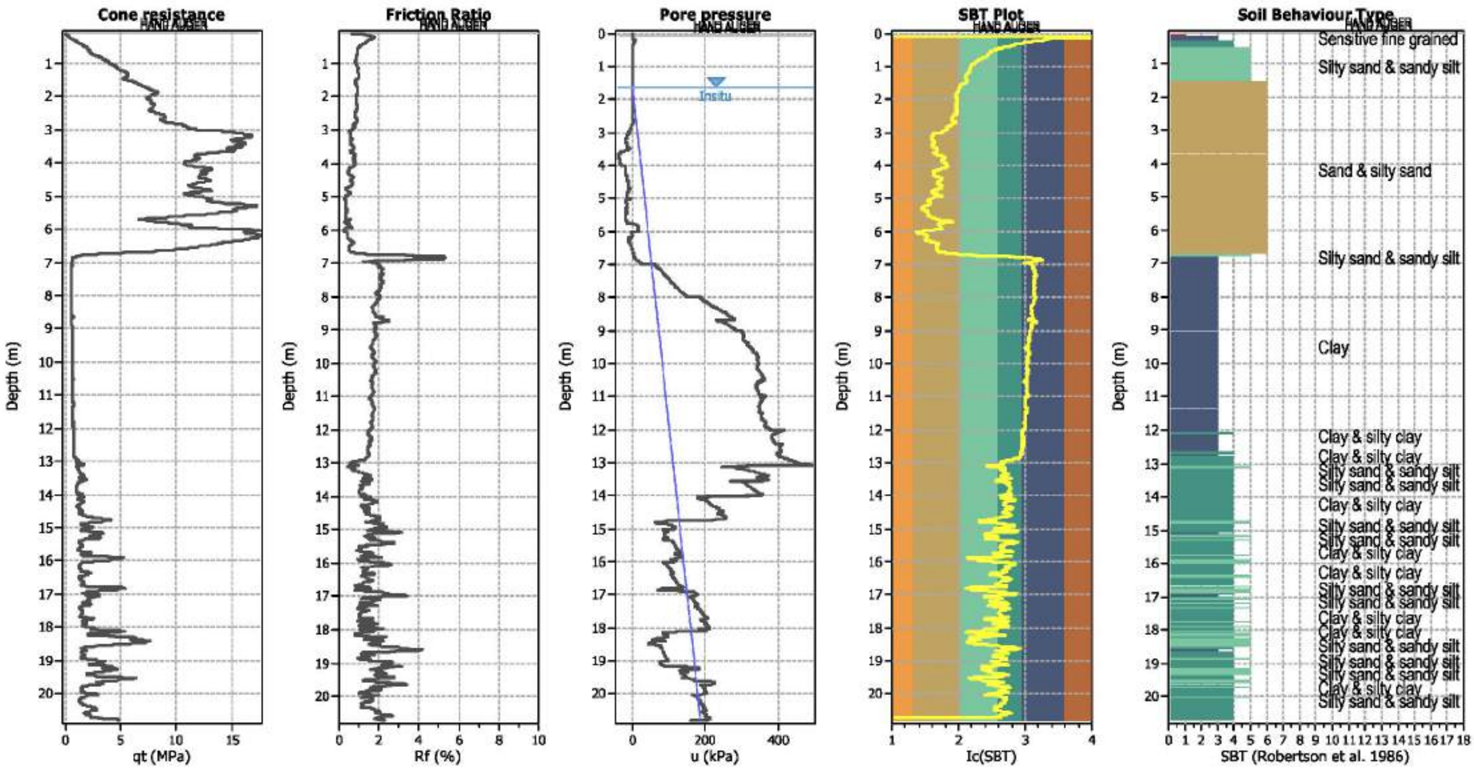
CPT basic interpretation plots



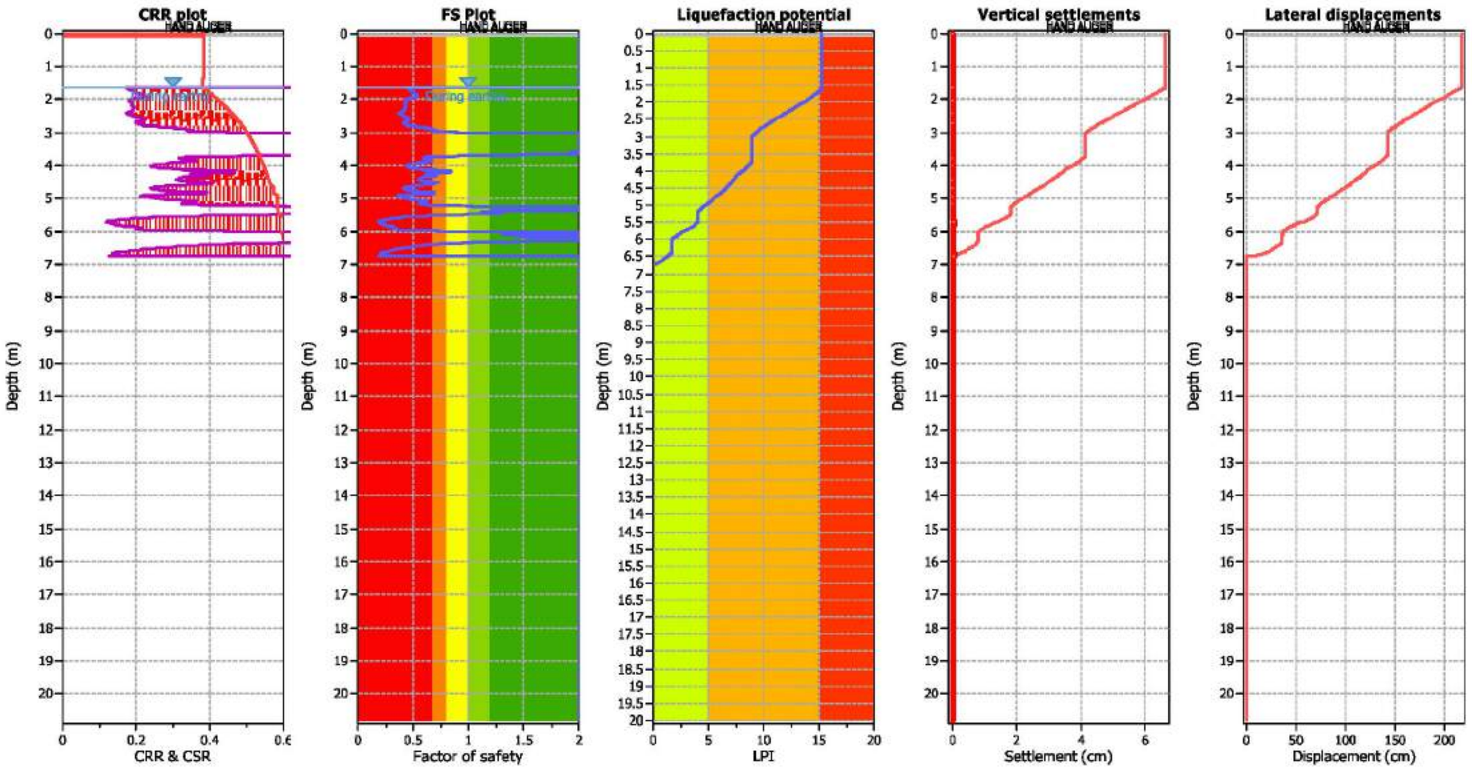
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.65	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	10.00 m

SBT legend

🟥 1. Sensitive fine grained	🟩 4. Clayey silt to silty	🟧 7. Gravely sand to sand
🟫 2. Organic material	🟩 5. Silty sand to sandy silt	⬛ 8. Very stiff sand to
🟦 3. Clay to silty clay	🟨 6. Clean sand to silty sand	⬜ 9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.65	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	10.00 m

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LPI color scheme

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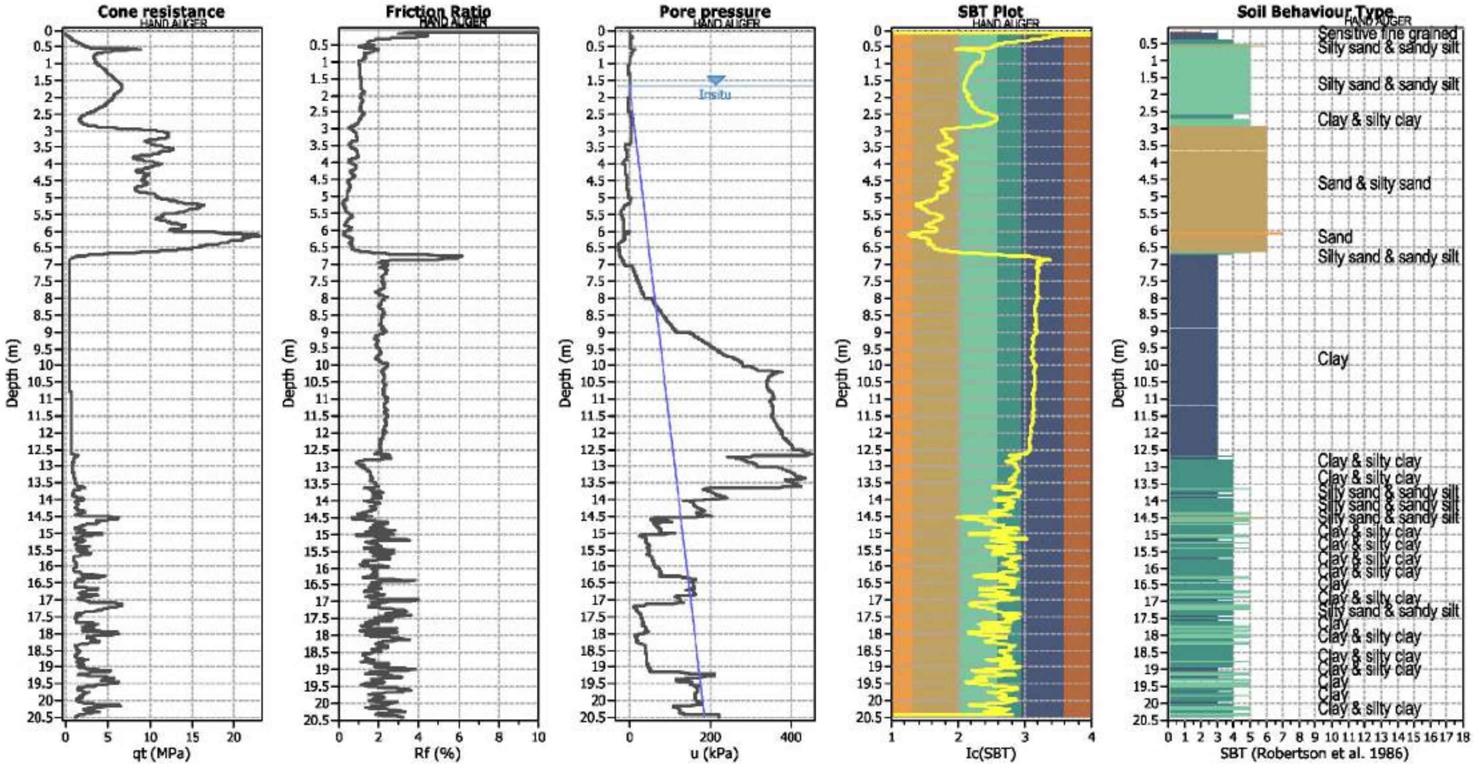
CPT basic interpretation plots



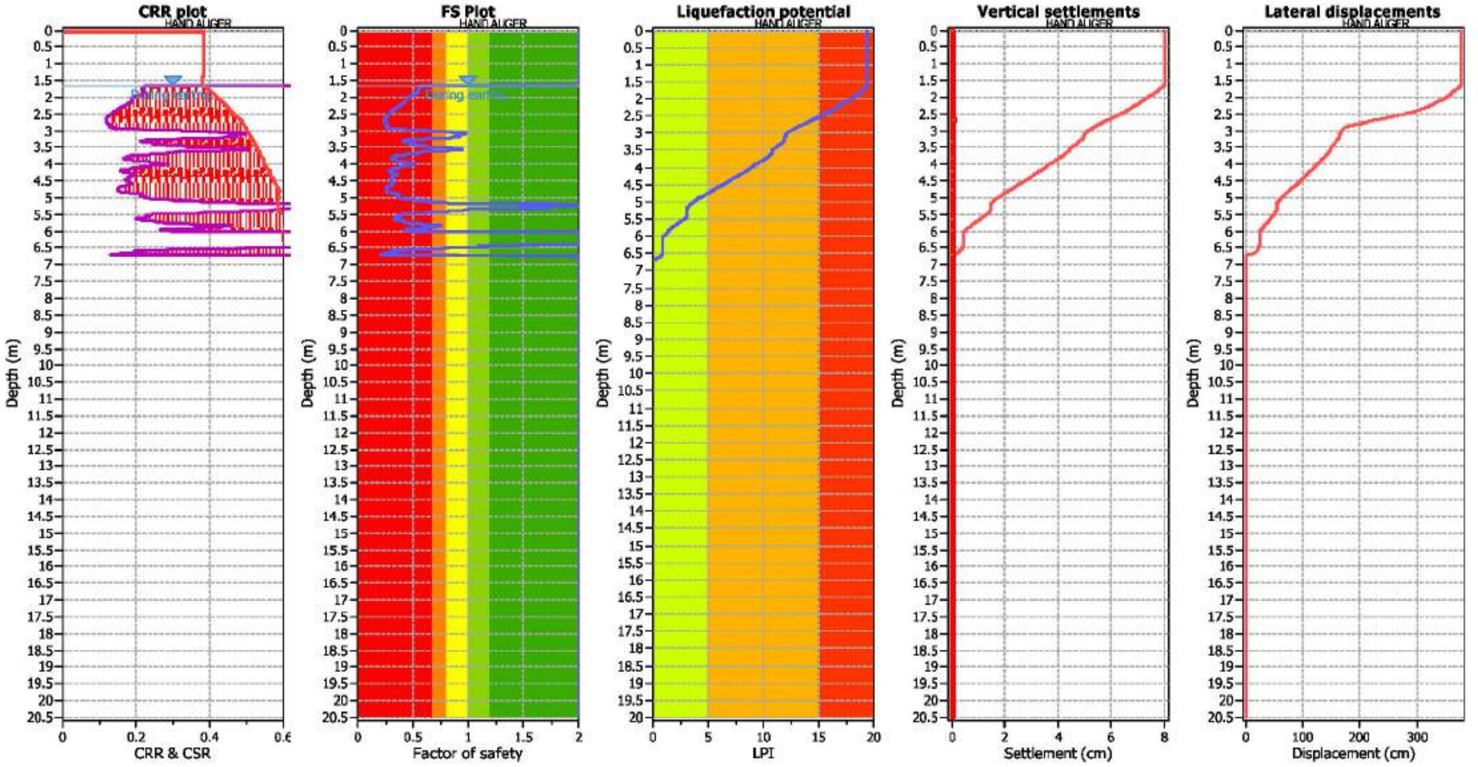
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.65	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	10.00 m

SBT legend

🟥 1. Sensitive fine grained	🟩 4. Clayey silt to silty	🟧 7. Gravely sand to sand
🟫 2. Organic material	🟩 5. Silty sand to sandy silt	⬛ 8. Very stiff sand to
🟦 3. Clay to silty clay	🟨 6. Clean sand to silty sand	⬜ 9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method: B&I (2014)
Fines correction method: B&I (2014)
Points to test: Based on Ic value
Earthquake magnitude M_w: 7.50
Peak ground acceleration: 0.65
Depth to water table (insitu): 1.65 m

Depth to GWT (erthq.): 1.65 m
Average results interval: 3
Ic cut-off value: 2.60
Unit weight calculation: Based on SBT
Use fill: No
Fill height: N/A

Fill weight: N/A
Transition detect. applied: No
K_σ applied: Yes
Clay like behavior applied: Sands only
Limit depth applied: Yes
Limit depth: 10.00 m

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LPI color scheme

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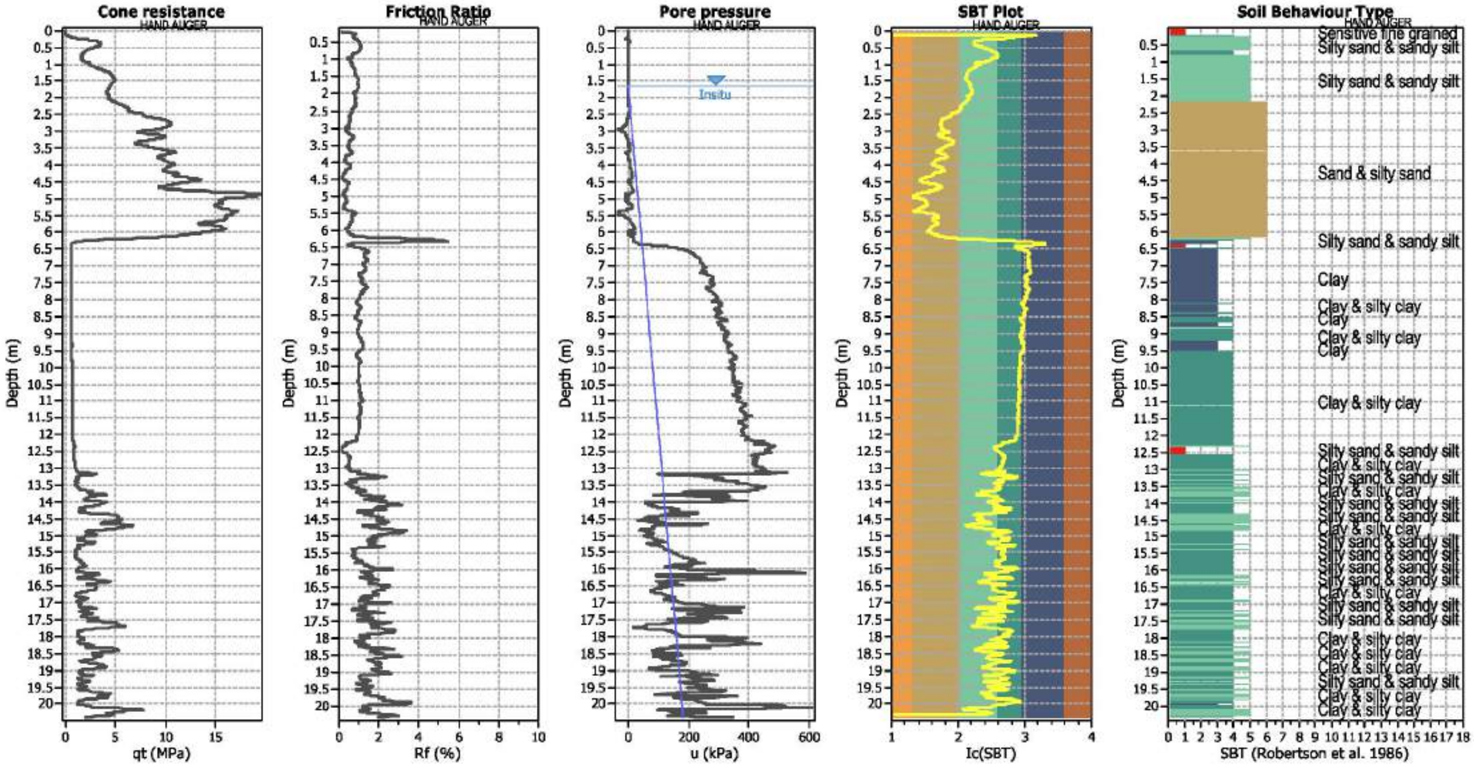
CPT basic interpretation plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.65	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	10.00 m

SBT legend

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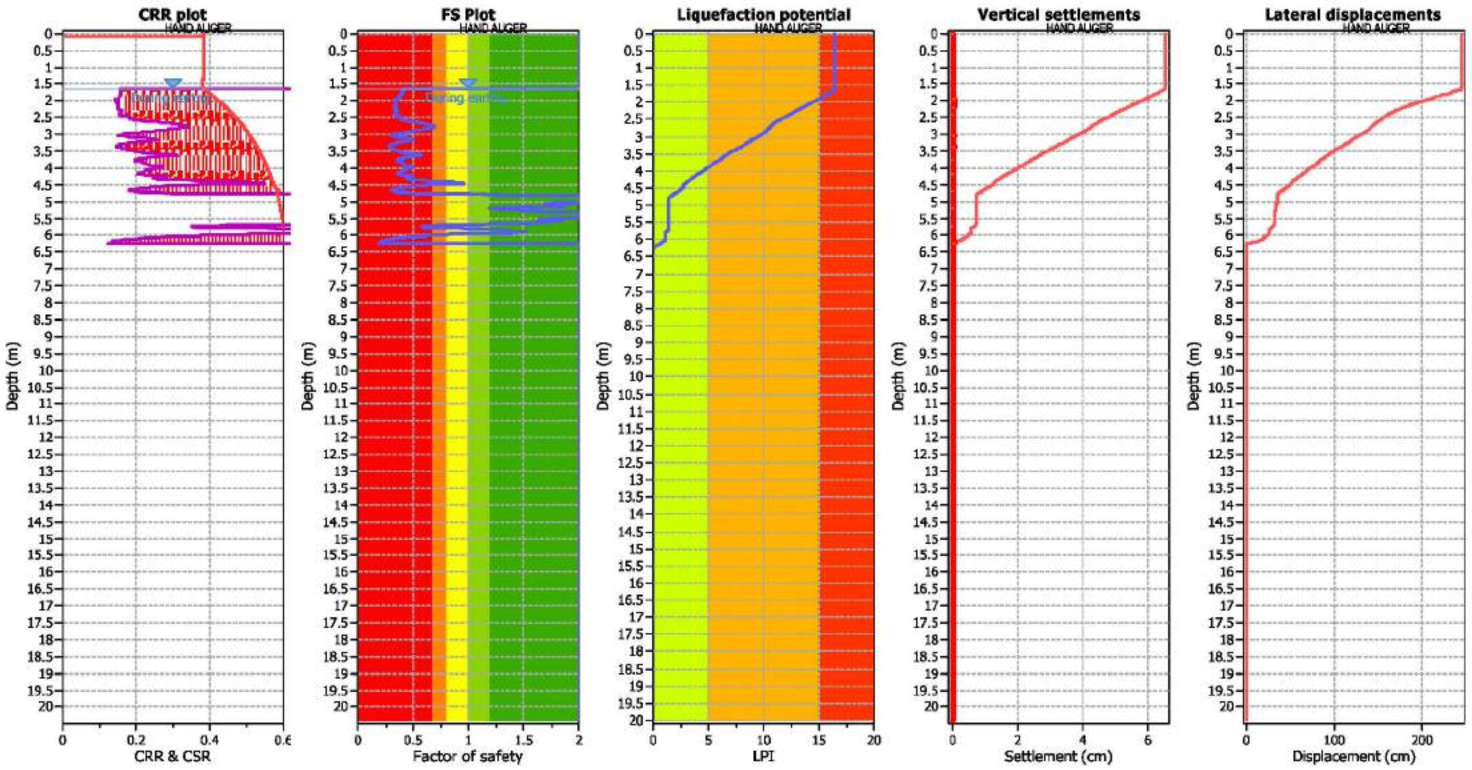
🟫 2. Organic material	🟩 5. Silty sand to sandy silt	⬛ 8. Very stiff sand to
🟦 3. Clay to silty clay	🟨 6. Clean sand to silty sand	⬜ 9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sands only
Peak ground acceleration:	0.65	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	10.00 m

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LPI color scheme

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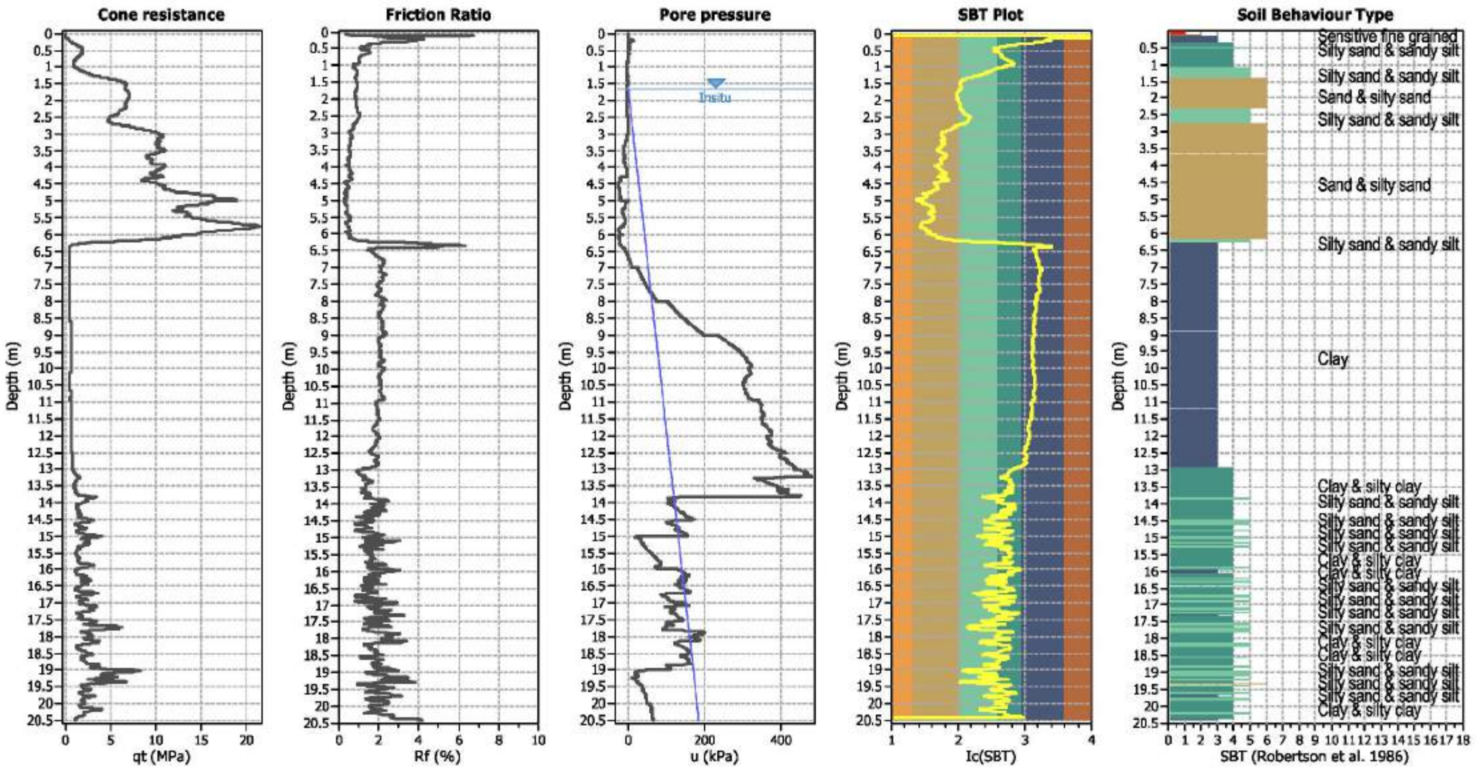
CPT basic interpretation plots



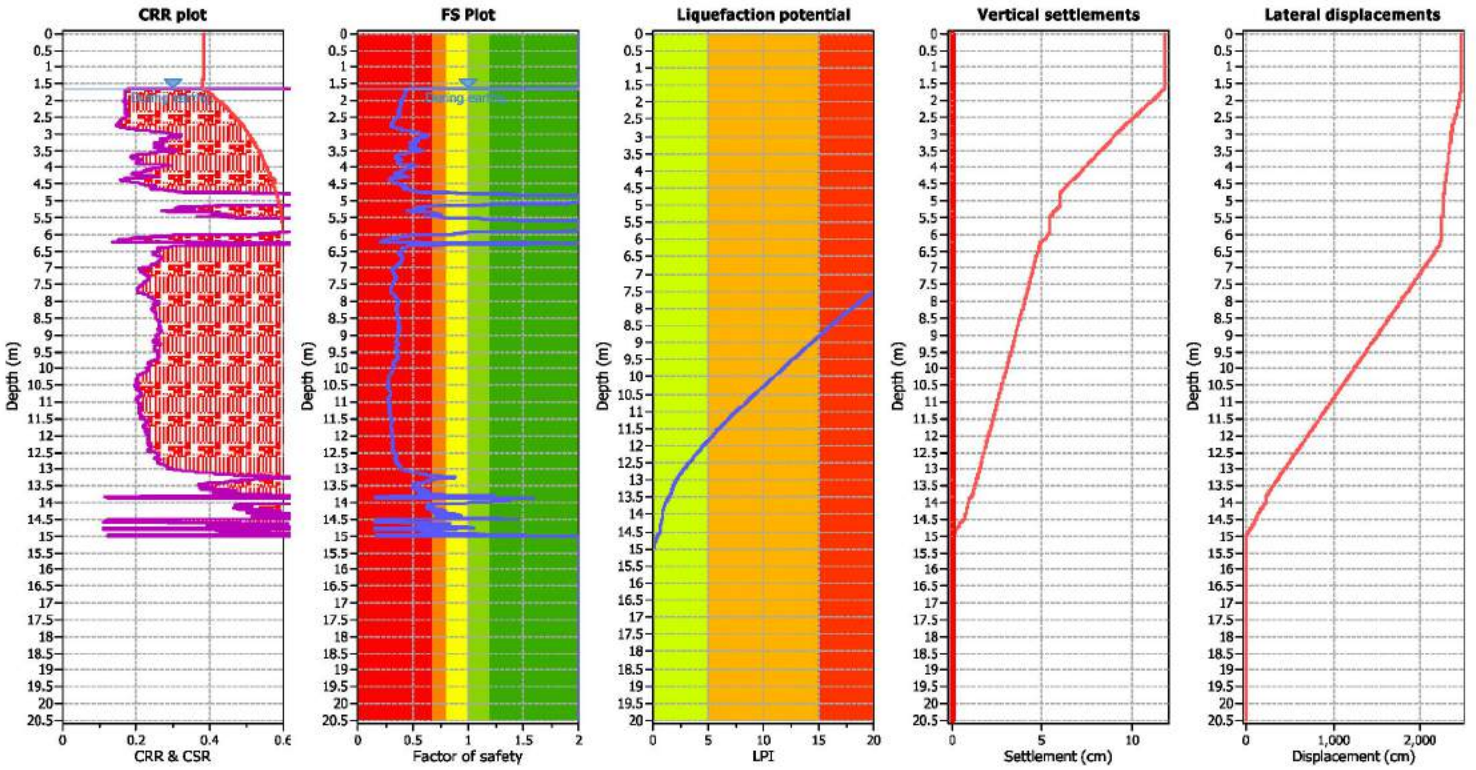
Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.65	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	15.00 m

SBT legend

🟥 1. Sensitive fine grained	🟩 4. Clayey silt to silty	🟧 7. Gravely sand to sand
🟫 2. Organic material	🟩 5. Silty sand to sandy silt	⬛ 8. Very stiff sand to
🟦 3. Clay to silty clay	🟨 6. Clean sand to silty sand	⬜ 9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.65	Use fill:	No	Limit depth applied:	Yes
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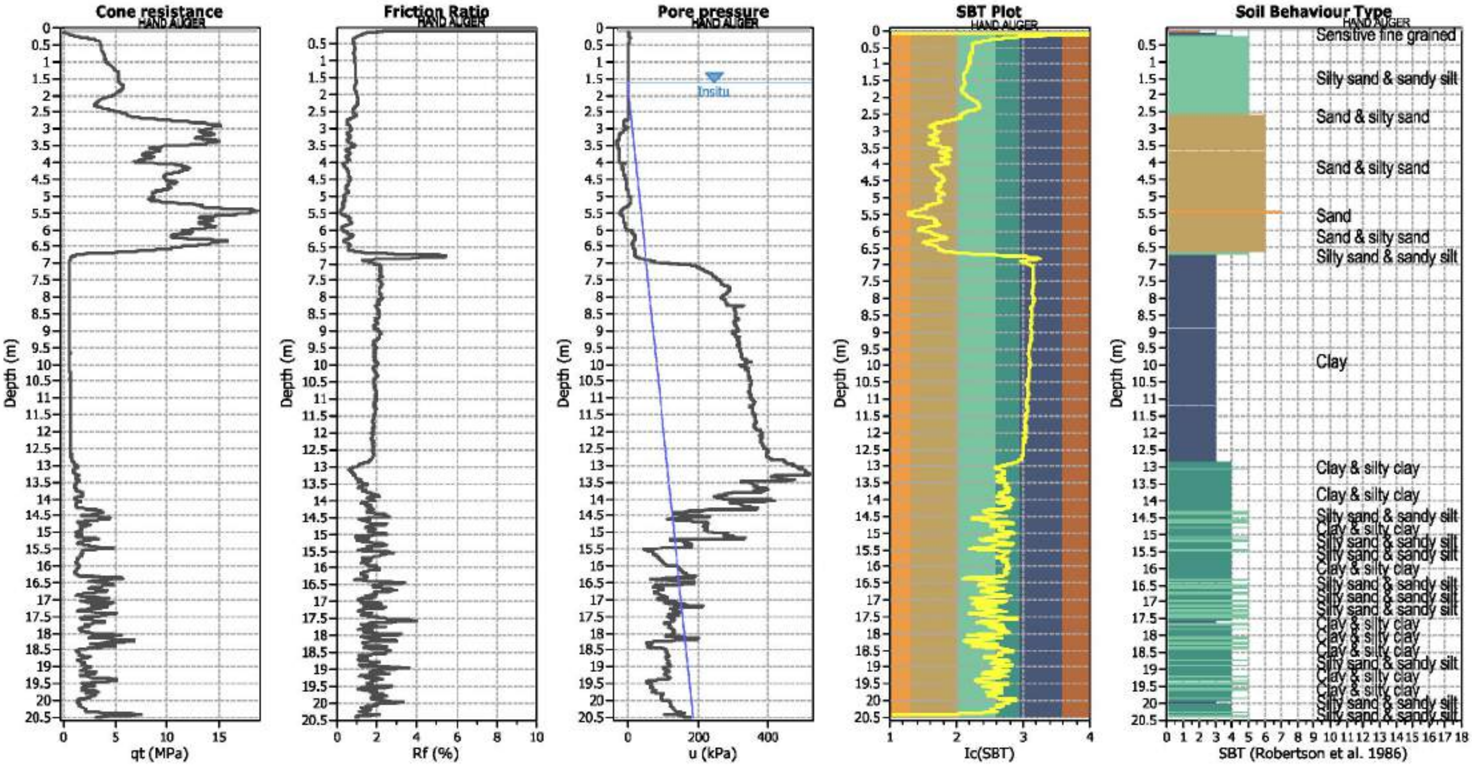
CPT basic interpretation plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.65	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	15.00 m

SBT legend

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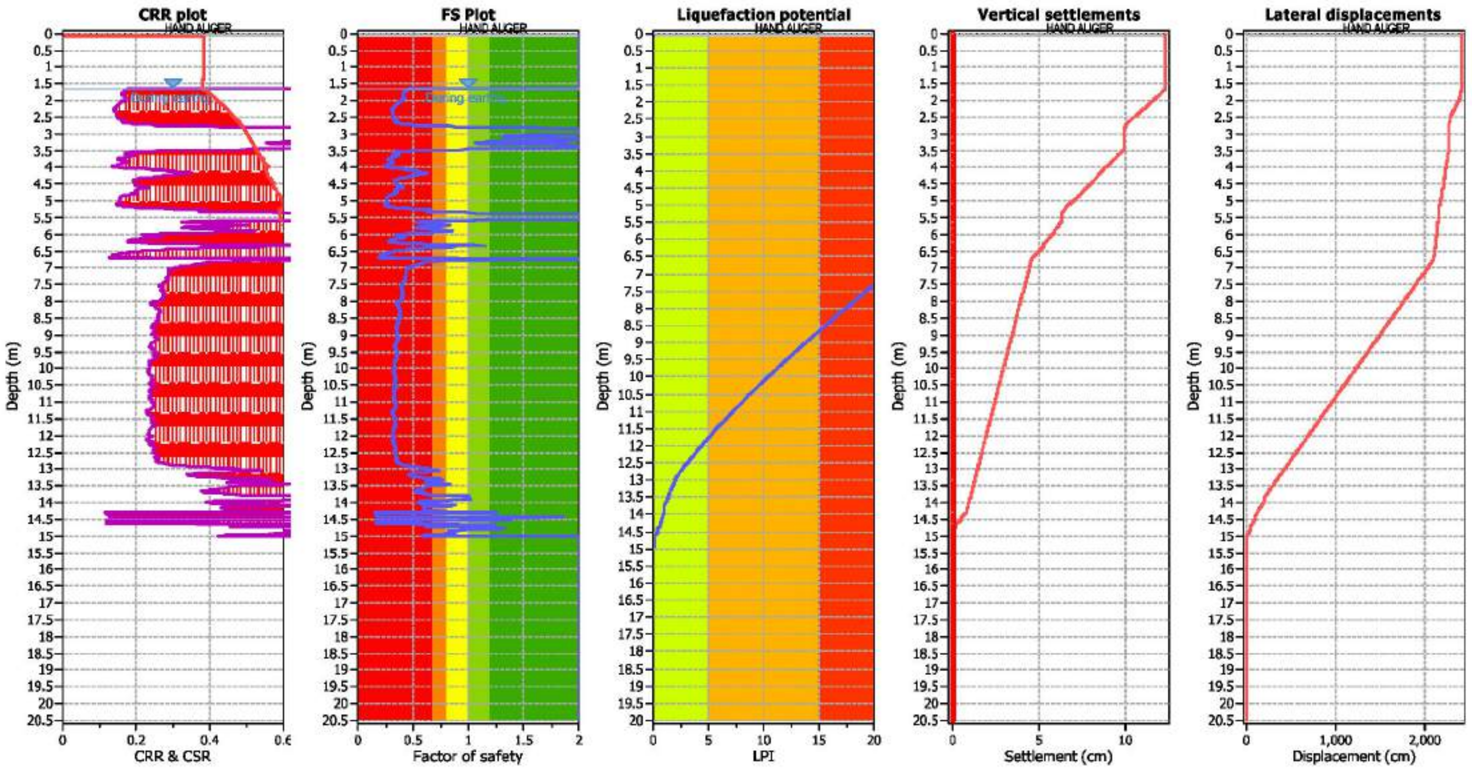
🟫 2. Organic material	🟩 5. Silty sand to sandy silt	⬜ 8. Very stiff sand to
🟦 3. Clay to silty clay	🟫 6. Clean sand to silty sand	⬜ 9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.65	Use fill:	No	Limit depth applied:	Yes
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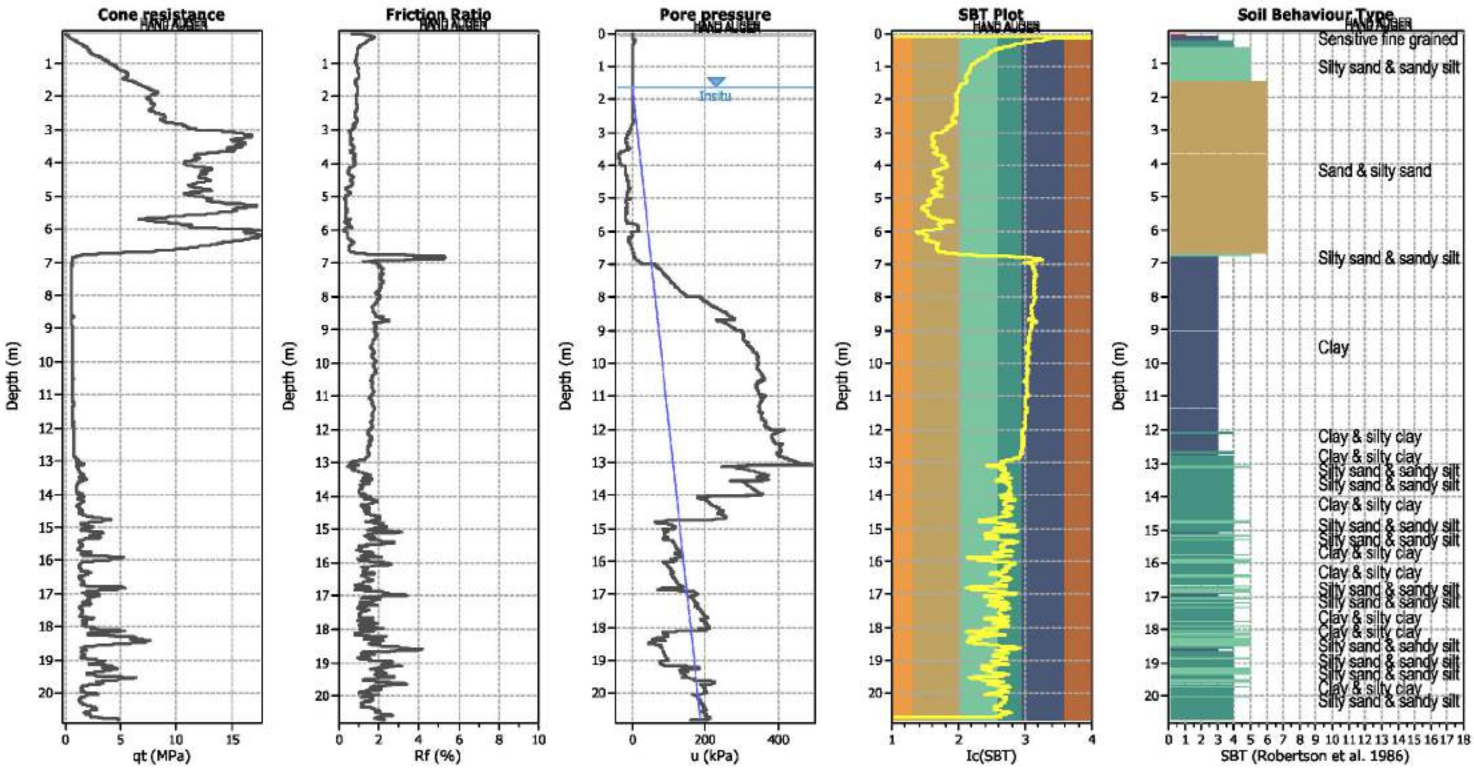
CPT basic interpretation plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.65	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	15.00 m

SBT legend

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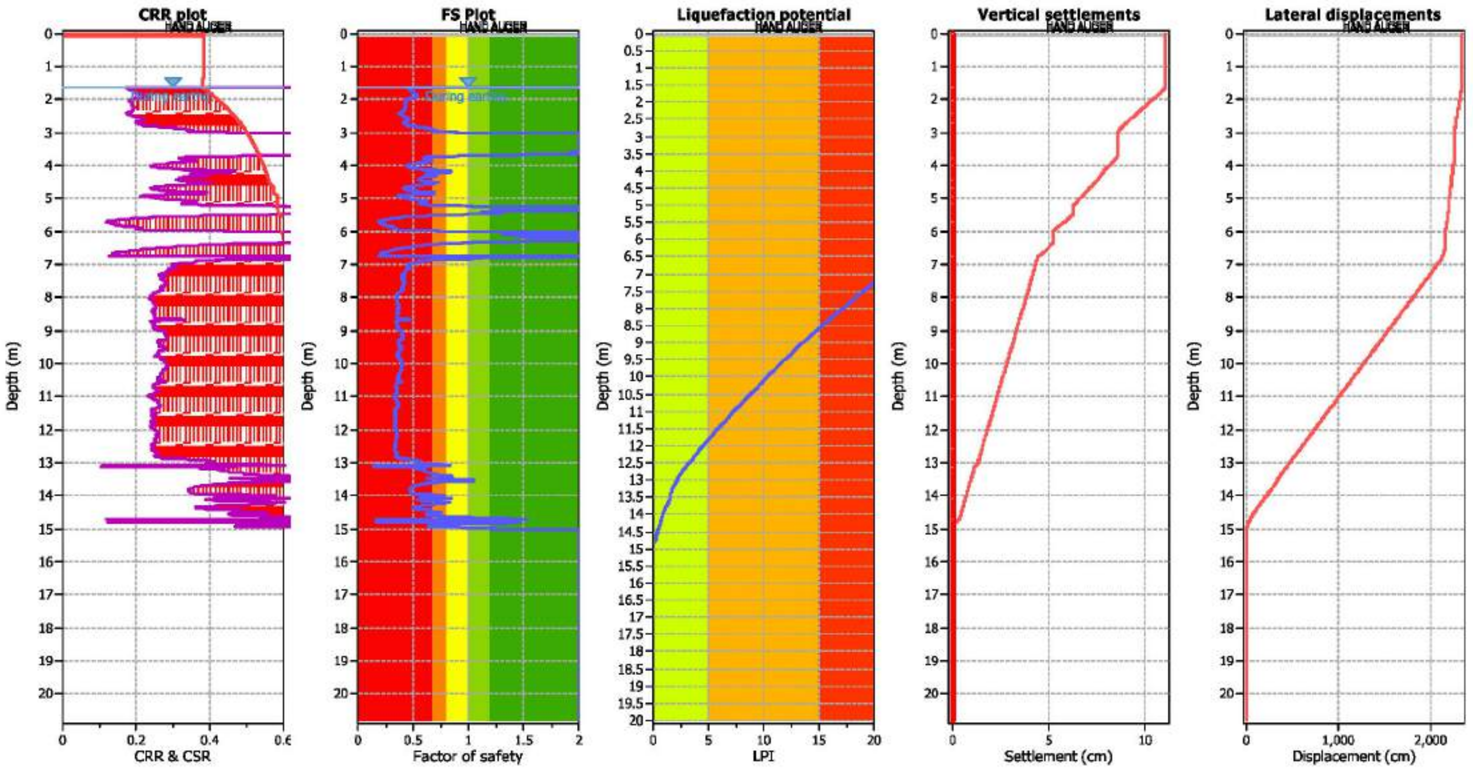
🟫 2. Organic material	🟩 5. Silty sand to sandy silt	⬛ 8. Very stiff sand to
🟦 3. Clay to silty clay	🟨 6. Clean sand to silty sand	⬜ 9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
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Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.65	Use fill:	No	Limit depth applied:	Yes
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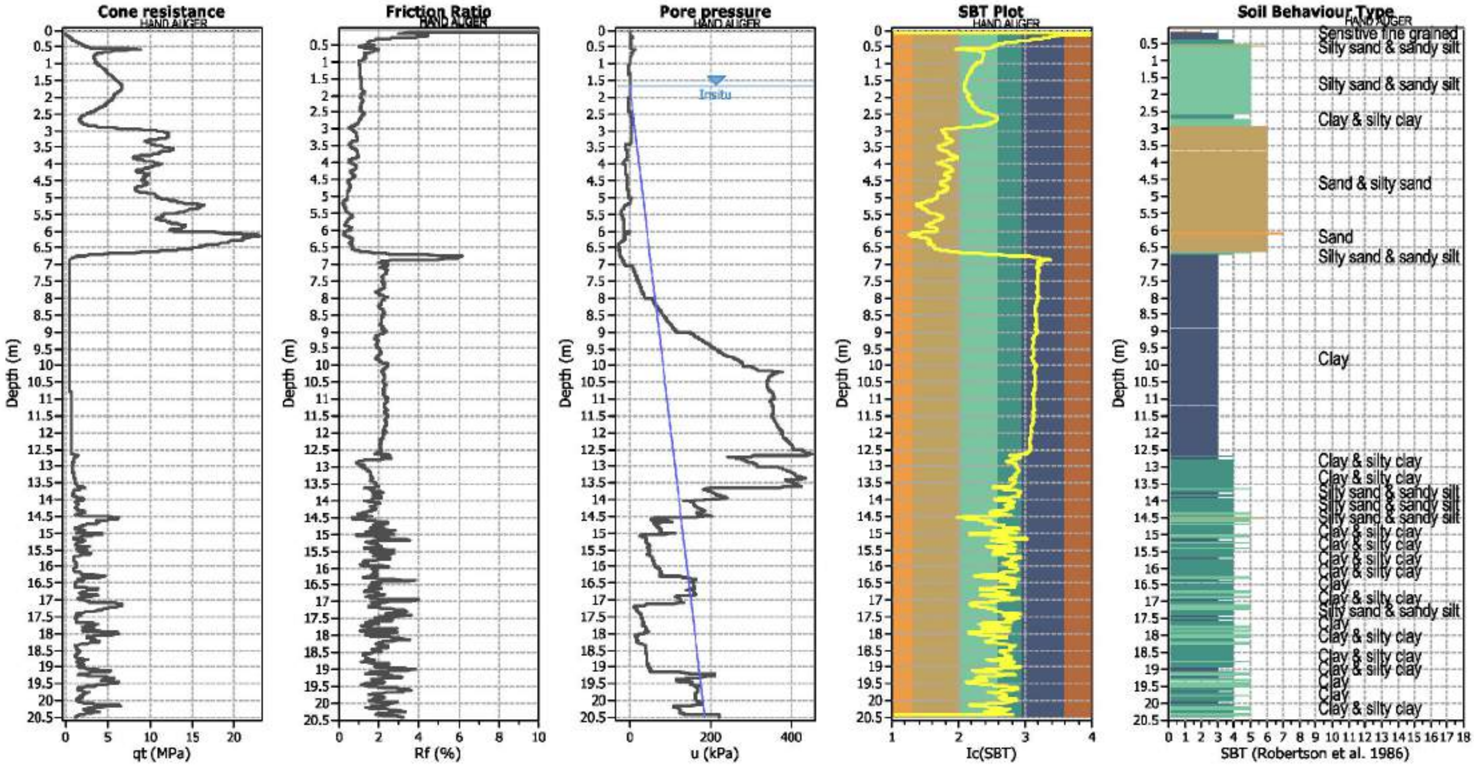
CPT basic interpretation plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.65	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	15.00 m

SBT legend

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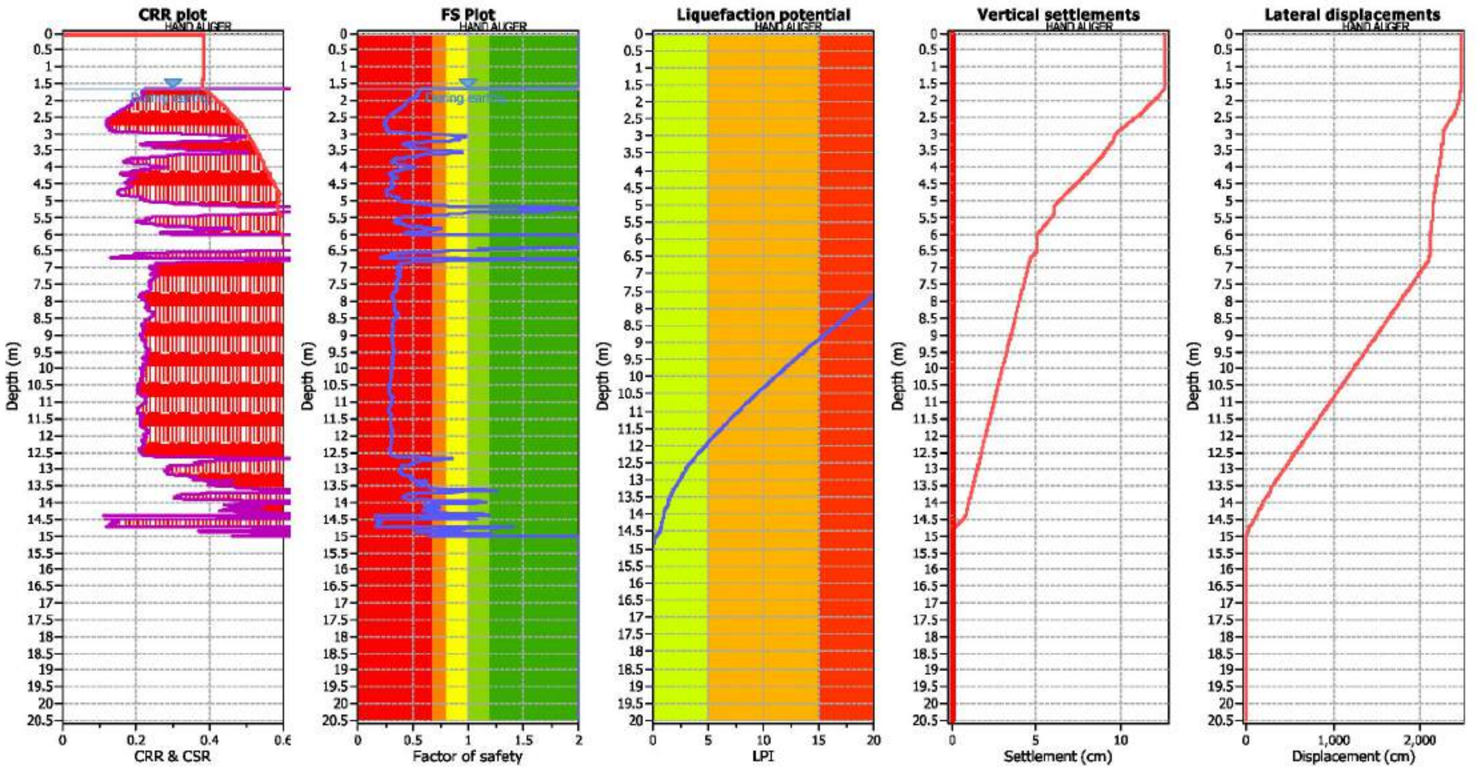
🟦 3. Clay to silty clay	🟫 6. Clean sand to silty sand	⬜ 9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method: B&I (2014)
Fines correction method: B&I (2014)
Points to test: Based on Ic value
Earthquake magnitude M_w: 7.50
Peak ground acceleration: 0.65
Depth to water table (insitu): 1.65 m

Depth to GWT (erthq.): 1.65 m
Average results interval: 3
Ic cut-off value: 2.60
Unit weight calculation: Based on SBT
Use fill: No
Fill height: N/A

Fill weight: N/A
Transition detect. applied: No
K_σ applied: Yes
Clay like behavior applied: Sand & Clay
Limit depth applied: Yes
Limit depth: 15.00 m

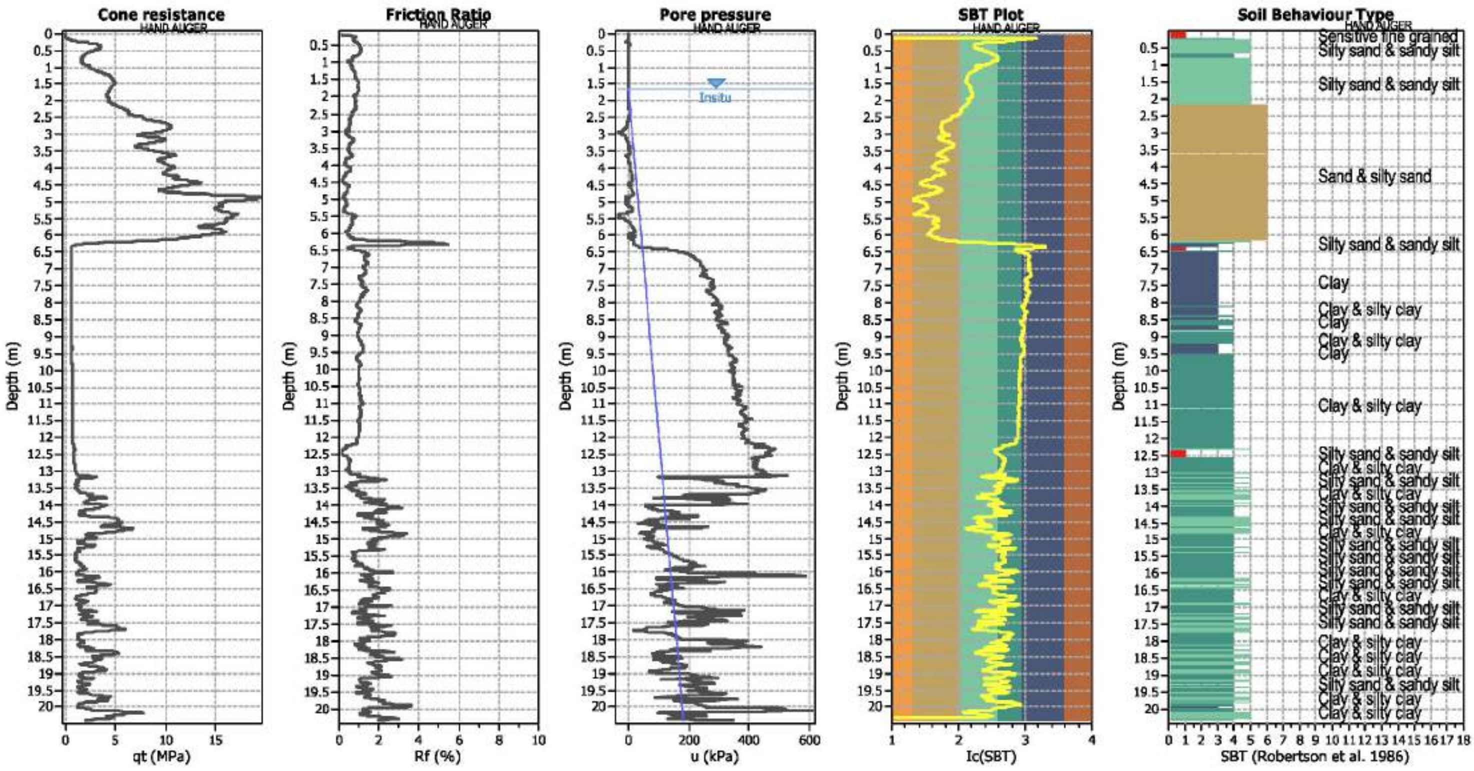
F.S. color scheme

- 🟥 Almost certain it will liquefy
- 🟧 Very likely to liquefy
- 🟨 Liquefaction and no liq. are equally likely
- 🟩 Unlike to liquefy
- 🟩 Almost certain it will not liquefy

LPI color scheme

- 🟥 Very high risk
- 🟧 High risk
- 🟩 Low risk

CPT basic interpretation plots



Input parameters and analysis data

Analysis method: B&I (2014)
Fines correction method: B&I (2014)
Points to test: Based on Ic value
Earthquake magnitude M_w: 7.50
Peak ground acceleration: 0.65
Depth to water table (insitu): 1.65 m

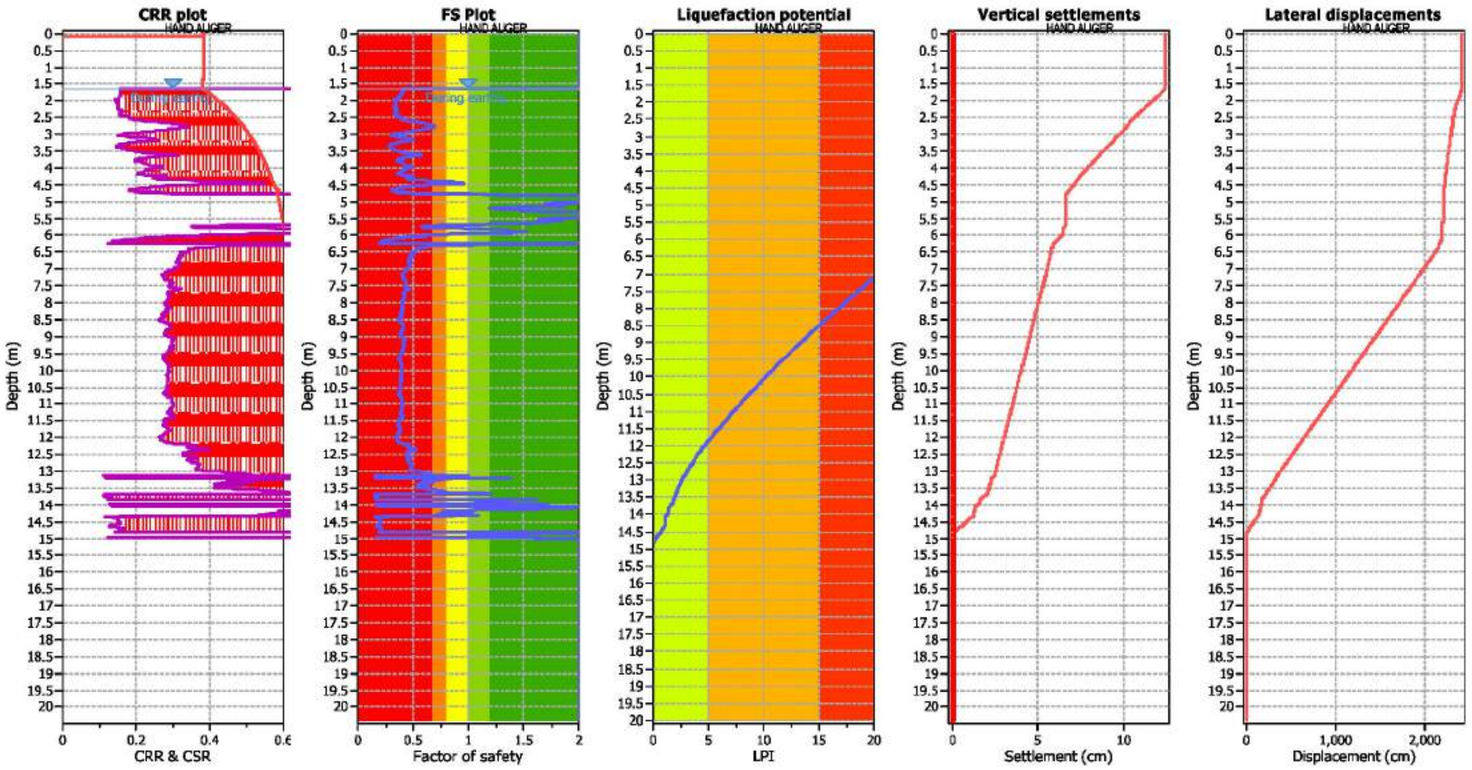
Depth to GWT (erthq.): 1.65 m
Average results interval: 3
Ic cut-off value: 2.60
Unit weight calculation: Based on SBT
Use fill: No
Fill height: N/A

Fill weight: N/A
Transition detect. applied: No
K_σ applied: Yes
Clay like behavior applied: Sand & Clay
Limit depth applied: Yes
Limit depth: 15.00 m

SBT legend

🟥 1. Sensitive fine grained
🟫 2. Organic material
🟦 3. Clay to silty clay
🟩 4. Clayey silt to silty
🟩 5. Silty sand to sandy silt
🟨 6. Clean sand to silty sand
🟧 7. Gravely sand to sand
⬜ 8. Very stiff sand to
⬜ 9. Very stiff fine grained

Liquefaction analysis overall plots



Input parameters and analysis data

Analysis method:	B&I (2014)	Depth to GWT (erthq.):	1.65 m	Fill weight:	N/A
Fines correction method:	B&I (2014)	Average results interval:	3	Transition detect. applied:	No
Points to test:	Based on Ic value	Ic cut-off value:	2.60	K_σ applied:	Yes
Earthquake magnitude M_w:	7.50	Unit weight calculation:	Based on SBT	Clay like behavior applied:	Sand & Clay
Peak ground acceleration:	0.65	Use fill:	No	Limit depth applied:	Yes
Depth to water table (insitu):	1.65 m	Fill height:	N/A	Limit depth:	15.00 m

F.S. color scheme

- 🟥 Almost certain it will liquefy
- 🟧 Very likely to liquefy
- 🟨 Liquefaction and no liq. are equally likely
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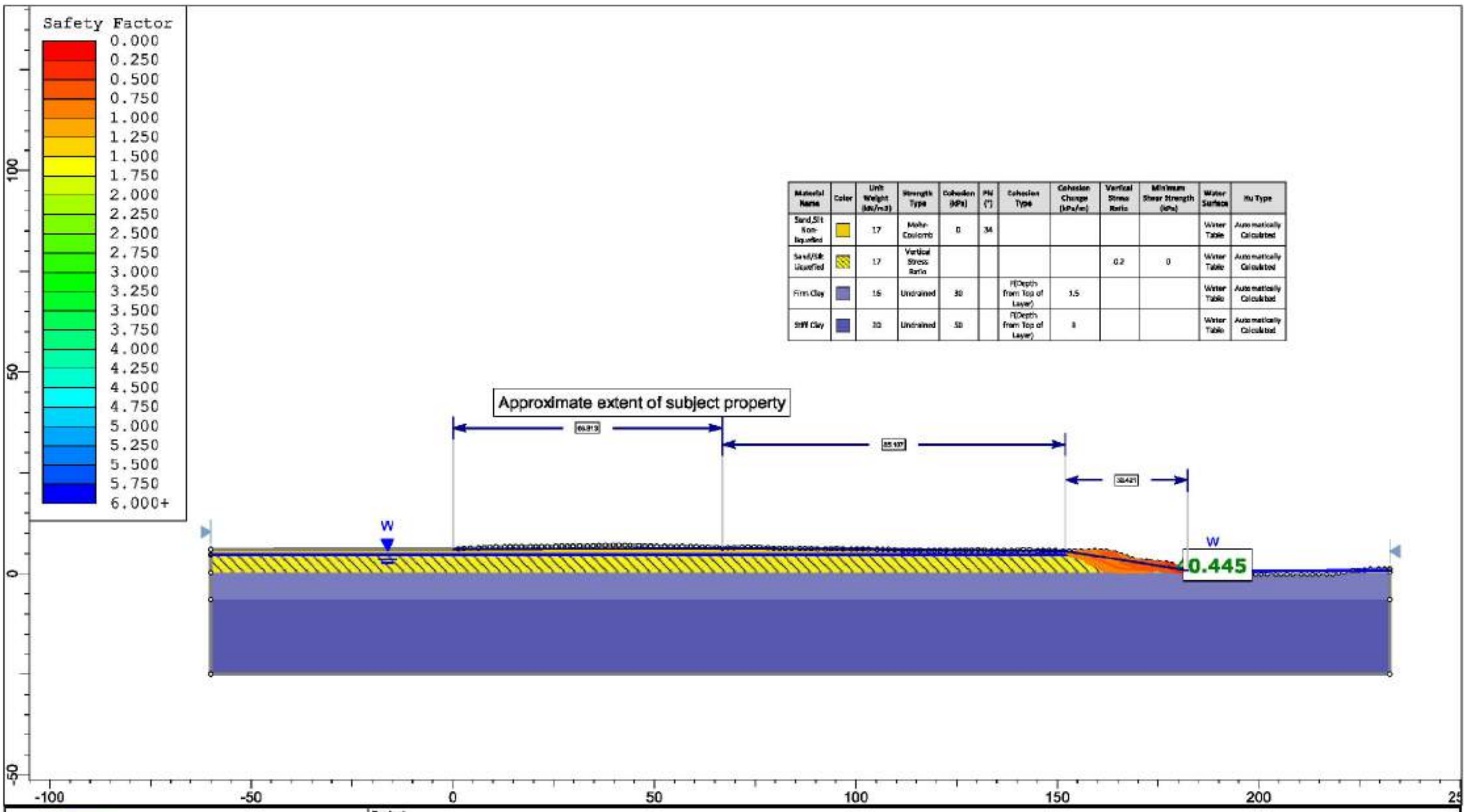
- 🟩 Almost certain it will not liquefy

LPI color scheme

- 🟥 Very high risk
- 🟧 High risk
- 🟨 Low risk

APPENDIX E

SLOPE STABILITY OUTPUTS



Material Name	Color	Unit Weight (kN/m3)	Strength Type	Cohesion (kPa)	Phi (°)	Cohesion Type	Cohesion Change (kPa/m)	Vertical Stress Ratio	Minimum Shear Strength (kPa)	Water Surface	Hu Type
Sand,Silt Non-liquefied	🟨	17	Mohr-Coulomb	0	34					Water Table	Automatically Calculated
Sand/Silt Liquefied	▨	17	Vertical Stress Ratio					0.2	0	Water Table	Automatically Calculated
Firm Clay	🟪	16	Undrained	30		f(Depth from Top of Layer)	1.5			Water Table	Automatically Calculated
Stiff Clay	🟦	20	Undrained	50		f(Depth from Top of Layer)	8			Water Table	Automatically Calculated

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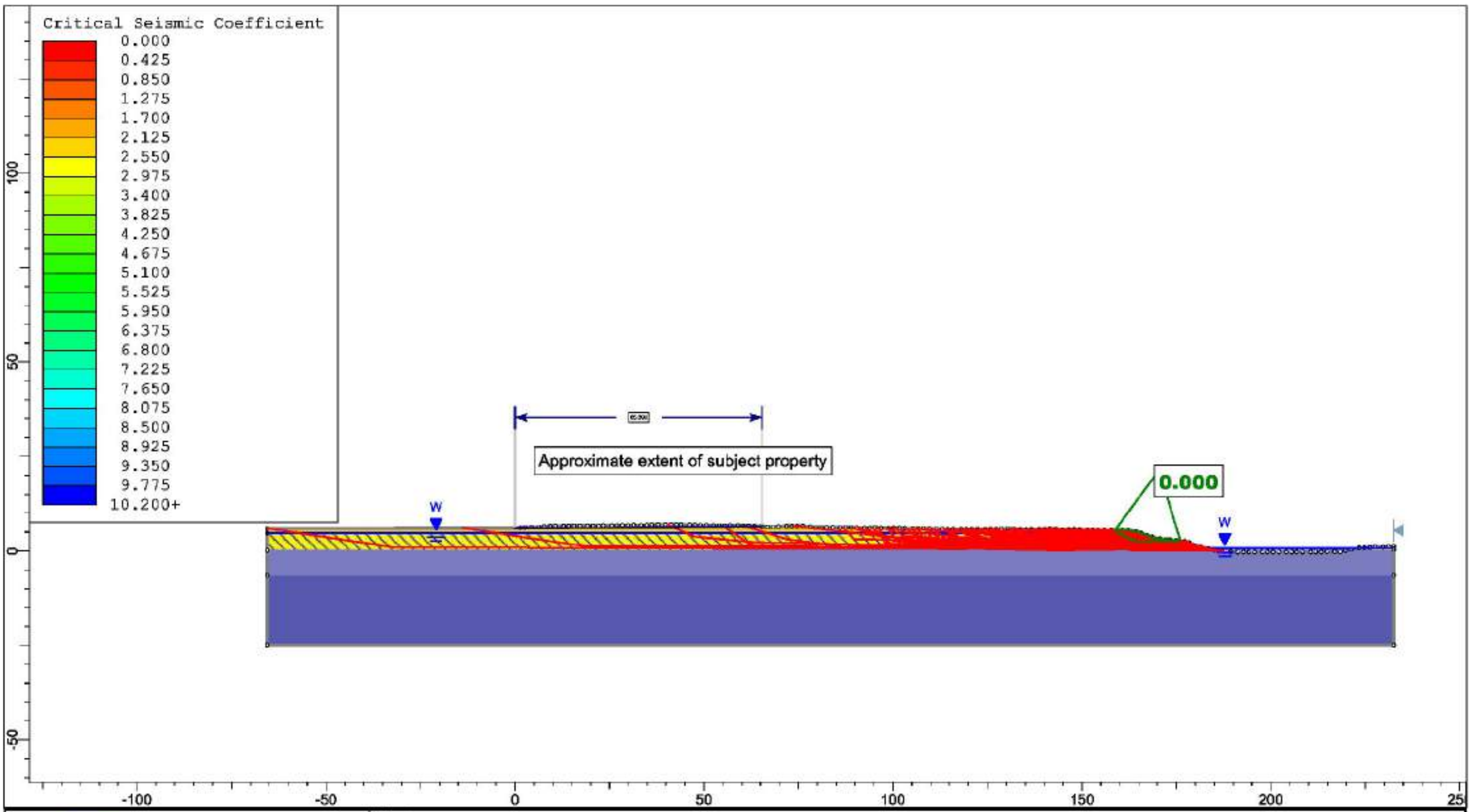
& ENGINEERING
SLIDEINTERPRET 9.028

Project	Slide2 - An Interactive Slope Stability Program		
Group	Group 1	*Scenario*	T/S ratio 0.2 - Static Flow
Drawn By	SS	*Company*	LDE Ltd
Date	31/08/2023	*File Name*	Lateral Spreading Analysis.slmd



Project	Slide2 - An Interactive Slope Stability Program		
Group	Group 4	*Scenario*	T/S ratio 0.2 - Yield Seismic
Drawn By	SS	*Company*	LDE Ltd
Date	31/08/2023	*File Name*	Lateral Spreading Analysis.slmd

SLIDEINTERPRET 9.028

Appendix 5

Detailed Site Investigation

DETAILED SITE INVESTIGATION

556-560 ABERDEEN ROAD
GISBORNE

PROJECT NO. EAM2410-01

PREPARED FOR
TW GROUP

PREPARED BY
KAREN TOULMIN
SEPTEMBER 2023

EAM NZ LTD – ENVIRONMENTAL CONSULTANTS
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Principal Environmental Scientist
EAM NZ Limited

EAM
ENVIRONMENTAL
CONSULTANTS

TABLE OF CONTENTS

1 INTRODUCTION

EAM NZ Limited (EAM) has been engaged by TW GROUP to undertake a Detailed Site Investigation (DSI), at 556-560 Aberdeen Road, Gisborne (hereon in referred to as the Site). It is our understanding that the site is proposed for residential re-development.

This DSI has been undertaken to provide a contamination assessment of the Site and to evaluate human health risks at the Site. A phased approach has been adopted for this investigation with an initial investigation, assembling background information to identify potential sources of contamination from past and present activities. This information is then used to develop a conceptual Site model and investigation strategy.

This report provides the following information:

- Background information.
- Site history.
- A conceptual Site model.
- Site visit and sampling
- Laboratory results.
- Conclusions and recommendations.

This investigation has been carried out in accordance with the Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011 (NES).

1.1 SUITABLY QUALIFIED ENVIRONMENTAL PRACTITIONERS

EAM are Suitably Qualified and Experienced Practitioners (SQEP) in the field of contaminated sites. We offer 20+ years' experience in the contaminated site and environmental science fields. EAM routinely carry out contaminated land assessments in both the North and South Islands over many different Council jurisdictions.

Jason Strong (Principle Environmental Scientist - MSc Environmental Science1st Class)

Jason has undertaken literally hundreds of contaminated site assessments and remediation over the past 15 years. He has an MSc in Environmental Science where his thesis was based around trace metal contamination of soils/sediment.

Karen Toulmin (Senior Environmental Scientist – BSc Environmental Science)

Karen has 8 years' experience in contaminated land assessments and remediation, in both Australia and New Zealand.

1.2 SCOPE

The following scope of work was completed:

- Review of available information from Gisborne District Council, namely, the Listed Land Use Register (LLUR), historical aerial photographs, and available environmental reports.
- Review of the environmental setting of the site.
- Collection of surface soil samples across the site.
- Analysis of soil samples at an accredited laboratory for:
    - Heavy metals
- Preparation of a DSI report, including presentation and interpretation of results in accordance with the requirements of the NESCS and with the current 2021 edition of the MfE Contaminated Land Management Guidelines No. 1 and No. 5.

1.3 LIMITATIONS

This report: has been prepared by EAM for TW GROUP and may only be used and relied on by Gisborne District Council for the purpose agreed between EAM and TW GROUP as set out in section 1.1 of this report. EAM otherwise disclaims responsibility to any person other than TW GROUP arising in connection with this report. EAM also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by EAM in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. EAM has no responsibility or obligation to update this report to account for events or changes occurring after the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by EAM described in this report (refer section(s) 1.3 of this report). EAM disclaims liability arising from any of the assumptions being incorrect.

The opinions, conclusions and any recommendations in this report are based on information obtained from, and testing undertaken at or in connection with, specific sample points. Site conditions at other parts of the site may be different from the site conditions found at the specific sample points.

Investigations undertaken in respect of this report are constrained by the site conditions, such as the location of buildings, services, and vegetation. As a result, not all relevant site features and conditions may have been identified in this report.

Site conditions (including the presence of hazardous substances and/or site contamination) may change after the date of this Report. EAM does not accept responsibility arising from, or in connection with, any change to the site conditions. EAM is also not responsible for updating this report if the site conditions change.

EAM has prepared this report based on information provided TW GROUP and others who provided information to EAM (including Government authorities), which EAM has not independently verified or checked beyond the agreed scope of work. EAM does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

Notwithstanding the Report Limitations, we confirm that Gisborne District Council can rely on this report for the purposes of determining compliance with the NES guidelines with respect to the development identified in this assessment.

1.4 ASSUMPTIONS

EAM has made the following assumptions during the preparation of this report:

- Information obtained from third parties and TW GROUP is complete and accurate.
- The observed and inferred conditions are representative of the actual conditions associated with HAIL sites and / or other sites not directly assessed.
- That the future land use of the site will remain residential.

2 SITE DETAILS

2.1 SITE DESCRIPTION

The Site is located at 99a Stanley Road, Gisborne. The legal descriptions are presented here.

TABLE 1. SITE DETAILS

Address	556-560 Aberdeen Road, Gisborne
Valuation Number	0853055400, 0853055300
Legal Descriptions	Lot 2 Pt 1 DP1585. Lot 1 DP1817
Land area	0.1659 ha, 0.1012 ha
Land Use	Residential

Figure 1 and 2 of Appendix A details the current site boundaries and the proposed development scheme plan.

3 ENVIRONMENTAL SETTING

3.1 TOPOGRAPHY

The site is in a residential zoned area. The topography of the site is low gradient flat land.

3.2 SOIL

Soils at the site are described by Manaaki Whenua[1] (2019) Brown Soils. Soils at the Site are described by Landcare Research (2020) as being Brown Soils. Brown soils are typically found in areas where and soils remain damp throughout the year. They are found in areas of high rainfall; hence soils are prone to leaching of nutrients, which makes them acidic. Brown soils have limited fertility and they typically present as dark grey-brown topsoils, caused by thin coatings of oxides weathered from parent material. Sub soils are brown, or yellow brown in colour.

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[1] Manaaki Whenua- Landcare Research 2019. S-map - New Zealand's national digital soil map. 10.7931/L1WC7

The Manaaki Whenua, Landcare Research S map portal describes the soil at the sites as Wiku_15 (100) %, which is a well-drained loam over sand.

3.3 HYDROGEOLOGY

Groundwater in the area is sourced from the Te Hapara Sands Aquifer, a shallow sand aquifer that can be encountered just below the topsoil. The aquifer extends up to 20 metres thick in places and forms an unconfined to confined shallow water table aquifer. This aquifer extends inland for approximately 5 km from the coast. The Sands aquifer becomes confined by river silts inland, with sands interfinger with Waipaoa gravels and shallow fluvial deposits. The permeability of the aquifer decreases to the southwest, with the silt content of the sand increasing towards the Waipaoa Channel. Water takes within the aquifer range from 45- 1850m3/day, with variable water quality. Seasonal water level fluctuations tend to be within 0.5-1 metres; therefore, surface pumps are usually sufficient to extract water.

3.4 SURFACE WATER

The nearest surface waterway is the Taruheru River. The Taruheru River is located directly north of the site, approximately 100m distance from the site at its closest point. It commences in the hills of Waihirere and drains surface water to the east where it joins the Waimata River and flows into the Pacific Ocean.

4 PROPERTY HISTORY

A desktop study was undertaken to gain an understanding of the history of the site. The review looks to determine potential contaminants which may be present at the site because of past and present land uses. The following information was sourced to establish the history of the site:

- Gisborne District Council Property Search
- Historical Aerial Photographs
- HAIL review
- Site Visit

4.1 GISBORNE DISTRICT COUNCIL PROPERTY SEARCH

A review of Gisborne District Council Property records found the following documents on file:

556 ABERDEEN ROAD		
DATE	CONSENT/PERMIT	DESCRIPTION
1970	CO37570	Alterations and additions to dwelling
1981	12015689	Erect Garage
1983	BCS0000149	Install Kent fireplace
		Drainage plans
1998	9800677	Erect carport
560 ABERDEEN ROAD		
DATE	CONSENT/PERMIT	DESCRIPTION
1995	BC9510766	Extend Shed
2005	5464	Demolish Shed
		Drainage Plans

No files referring to potentially contaminating activities were found for this site.

4.2 HISTORICAL AERIAL PHOTOGRAPHS

Historical aerial photographs of the site, from 1942 through to 2023, were sourced from Retrolens, Google earth, Google maps and Gisborne District Council. Aerial photographs for the years 1942, 1951, 1965, 1972, and 1988, 2001, 2010 and 2018 and 2022 are presented in Appendix C.

The earliest available aerial imagery is from 1942 and shows presence of dwellings on both 556 and 560 Aberdeen Road. A garage is present south of the dwelling on 560 Aberdeen Road, and a small shed is present in the far south of 556 Aberdeen Road.

No changes are noted to the site in imagery from 1951.

By 1965, the garage on 560 Aberdeen Road has been removed, and a small garage has been erected south of the dwelling on 556 Aberdeen Road. The garage in the far south of 556 Aberdeen has been removed.

Imagery from 1972 shows the construction of a very large shed in the far south of 556 Aberdeen Road.

By 1988, a small garage has been erected on 560 Aberdeen Road, south of the dwelling.

No significant changes are noted to the site through to the present day.

4.3 HAZARDOUS ACTIVITIES AND INDUSTRIES LIST

In accordance with Appendix C: Hazardous Activities and Industries List (HAIL) of the MfE NES for Assessing and Managing Contaminants in Soil to Protect Human Health, the site is considered HAIL under:

Section I: Any other land that has been subject to the intentional or accidental release of a hazardous substance in sufficient quantity that it could be a risk to human health or the environment.

The presence of two aged dwellings on the site, present from at least 1942 suggests the probable use of lead-based paints on building exteriors. Lead based paint contributes to soil contamination through weathering, sanding, and redecoration.

4.4 SITE VISIT

A site visit was completed on 5th September 2023. The following observations were made:

- The dwelling on 556 Aberdeen Road is constructed of painted timber weatherboard, corrugated iron roof and timber window frames. It has some asbestos cladding on the rear of the dwelling.
- A modern corrugated iron garage is located directly south of the dwelling on 556 Aberdeen Road. It has concrete floor. A small garden shed, also of corrugated iron construction is located immediately south-west of this garage.
- A large painted corrugated iron shed with concrete flooring is in the far south of 556 Aberdeen Road. The paint on the exterior iron is peeling.
- The section around 556 Aberdeen is mainly grassed, with small gardens.
- The dwelling on 560 Aberdeen Road is a timber weatherboard home with a corrugated iron roof which appears to be painted. Paintwork on the dwelling is in very poor, peeling condition.
- A sleepout/garage is situated along the eastern boundary of 560 Aberdeen Road. It is of timber and corrugated iron construction.

- The southern half of 560 Aberdeen is grassed with gardens, and children's play equipment.

No visual or olfactory evidence of contamination or contaminating activities were observed during the site visit. Site photographs are presented in Appendix C.

5 CONCEPTUAL SITE MODEL

5.1 RATIONALE

The overall rationale for the site investigation was to determine whether historical activities on the Site may have caused soil contamination that would affect the proposed residential land use. The following is an analysis of potential contaminants, receptors, and pathways between potentially contaminated soils, and the proposed residential land use.

5.1.1 HAZARDOUS SUBSTANCES AND POTENTIAL CONTAMINANTS OF CONCERN

For the purposes of this investigation, the following contaminants were considered.

- Metals

Metals occur naturally in the soil environment from the process of weathering of parent materials. Soils may become contaminated by the accumulation of metals and through leaded paints, land application of fertilisers, animal manures, sewage, pesticides, leaching from treated timber and wastewater irrigation. Most metals do not undergo microbial or chemical degradation hence, their total concentration in soils persists forever. Metals are associated with human illness, particularly nervous system damage from long term exposure in humans.

The main source of metal contamination within residential sections is lead based paint. The domestic paints available today contain only very small quantities of lead and are unlikely to be a hazard. However, the lead content of paints used in the past was generally much higher. When lead-based paint is sanded or power blasted during redecoration, high concentrations of lead dust become widely dissipated. Dust particles are deposited on surrounding surfaces, and in the soil, and may affect those exposed to dust and fragments long after the work is completed.

5.1.2 POTENTIALLY RELEVANT SENSITIVE HUMAN AND ECOLOGICAL RECEPTORS

The site is proposed for residential land use (10% produce), which is considered one of the most sensitive of land uses. The MFEs National Environmental Standard (NESCS) for soil contaminants, considers that residential landowners may use the land for activities such as vegetable gardening or fruit trees. These activities pose a risk to the consumer/landowner's where contaminated soils are involved in an exposure pathway.

The following potential receptors were identified as being relevant to the Site:

- Earthworks, construction, maintenance, and excavation contractors who may encounter potentially contaminated soil during the proposed works via inhalation (dusts).
- Future residents at the Site via inhalation (dusts) and/or ingestion of contaminated soil.

5.1.3 EXPOSURE PATHWAYS

A human health risk can only occur when there is a direct link between contaminant source and receptor. Potential complete pathways for this Site may include:

- Dermal (skin) contact with soil, for gardening, construction.

- Direct contact and inhalation of dusts and soil during construction and site works.
- Consumption of foods grown in contaminated soils.
- Consumption of soils, particularly by small children.

6 FIELD INVESTIGATION

6.1 RATIONALE OF SAMPLE COLLECTION

Sampling locations across the Site were established using reference to the "Contaminated Land Guidelines No. 5" (MfE 2021). These guidelines set out (in Table B1; p91), indicate the *"number of samples required to detect hotspot with 95 percent confidence"*.

Twelve samples were taken systematically across the site, with the locations presented in Figure 3, Appendix A.

Samples were collected using a 150mm soil augur and collected from the 0-150mm depth interval. Two duplicates were collected during sampling for statistical accuracy and precision of results.

Samples were collected directly into laboratory supplied containers and were placed in a chilly bin with ice packs for transport. Samples were couriered to an IANZ accredited laboratory (Hills Laboratories) under standard chain of custody procedures.

6.2 SITE LITHOLOGY

Site soils were observed to be consistent across the site as consisting of dark brown topsoil.

6.2.1 FIELD QUALITY ASSURANCE AND QUALITY CONTROL (QA/QC)

Quality Assurance and Quality Control procedures undertaken during sampling included the following:

- Changing of disposable gloves after each sample.
- Decontamination and rinsing of augur between each sample.
- Collection of soil samples in new, clean, appropriately labelled sample bags and jars.
- 10% Duplicate analysis (collection of two duplicates).
- Use of chain of custody procedures and forms.
- Use of IANZ accredited laboratories with in-house QA/QC procedures for the analyses requested.

7 ASSESSMENT CRITERIA

The following soil assessment criteria have been selected for the site.

7.1 THE NATIONAL ENVIRONMENTAL STANDARD FOR ASSESSING AND MANAGING CONTAMINANTS IN SOIL TO PROTECT HUMAN HEALTH (NESCS)

The NESCS sets national standards for contaminants in soil to protect human health. It contains a national set of soil contaminant standards (SCS) for 12 priority contaminants for five standard land use scenarios. The land use category selected for this investigation was Residential (10% Produce) as described in the NES CS User Guide.

7.2 THE NATIONAL ENVIRONMENTAL PROTECTION MEASURE

In the absence of New Zealand specific risk-based human health criteria for beryllium, nickel and zinc, the Australian National Environment Protection Measure 2013 (NEPM) guidelines have been adopted for this investigation. The intention of the NEPM is to enable safe use of contaminated land to ensure that contaminated land is appropriately assessed prior to development. The NEPM covers a range of land uses. For the purposes of this assessment, the NEPM Health-based Investigation Level A (Residential land use) have been selected based on the land use and Site attributes.

7.3 BACKGROUND CONCENTRATIONS OF HEAVY METALS

In the absence of available published data for uncontaminated background soils in the Gisborne region, a control sample was collected. The control sample was collected from the Gisborne A & P Showgrounds. The sample was collected from an undisturbed and undeveloped area of grass. If concentrations of contaminants are found to be at or less than typical background concentrations, then the NES CS does not apply.

7.4 ECOLOGICAL SOIL GUIDELINE VALUES

To assess potential risk to environmental receptors, the criteria for Residential / Recreational area developed for protection of ecological receptors from the updated, Development of soil guideline values for the protection of ecological receptors (Eco-SGVs): Technical Document (Manaaki Whenua Landcare Research, 2019) were used. Criteria were selected assuming a typical soil, aged contamination source, and a residential land use.

8 ANALYTICAL RESULTS

The following sections discusses the analytical results by analyte and compares against the adopted human health guideline criteria. In this case, the most appropriate SCS is likely to be those for the NES land use scenario of Residential (10% Produce). The NES description of this land use is as follows:

"Standard residential Lot, for single dwelling sites with gardens, including homegrown produce consumption (10 percent)".

The analytical results are summarised in Table 1 in Appendix D, along with the laboratory reports. The results of analysis have been compared directly against appropriate (where available) Soil Contaminant Standards (SCS) from the NES Priority contaminants list (MfE, 2012).

8.1 BACKGROUND SOIL CONCENTRATIONS

Soils at the site were compared with the background soil concentrations of a control sample, collected from parkland within the A & P Showgrounds in Gisborne by EAM. The soil here is considered unlikely to have been exposed to potentially contaminating activities.

The control sample shows very low concentrations of all metals. The sample results which were found to be "at or about the value" of the concentrations of the control sample were considered background.

All samples collected at the site exceed the Gisborne control sample value of 38mg/kg for lead. Concentrations range from111mg/kg to 2,600mg/kg.

Zinc concentrations exceed the Gisborne control sample value of 56mg/kg in all sample locations, ranging from 91mg/kg to 720 mg/kg.

Mild chromium, copper, cadmium, and nickel exceedance were reported in sample locations #7, #10, #11 and #12.

Arsenic exceeds the background value of 4mg/kg in sample location #4, reporting 12mg/kg, and in sample location #10, reporting 32mg/kg.

8.2 METALS/METALLOIDS

Soil metal analysis was compared with the NES standards for Residential land use (10% produce). All sample locations except #2 and #5 reported concentrations of lead in exceedance of the NES residential standards of 210 mg/kg. Samples reported concentrations of lead of 1070mg/kg (#1), 230mg/kg (#3), 1010mg/kg (#4), 2600mg/kg (#6), 730 mg/kg (#7), 240 mg/kg, (#8), 380mg/kg (#9), 620 mg/kg (#10), 1130mg/kg (#11) and 1090mg/kg (#12).

Arsenic was reported above the NES standard of 20mg/kg in sample location #10, reporting a concentration of 32mg/kg.

Sample locations #2 and #5 reported concentrations of metals within the NES standards, being 210mg/kg and 111mg/kg, respectively.

8.3 ECOLOGICAL SOIL GUIDELINE VALUES

Sample locations #1, #4, #6 #11 and #12 exceeds the Landcare Updated Development of Soil Guideline Values for Protection of Ecological Receptors (Eco-SGVs) for lead (900mg/kg), reporting concentrations of 1070mg/kg, 1010 mg/kg, 2600 mg/kg, 1130 mg/kg, and 1090mg/kg.

Sample locations #1, #3. #4, #6, #7, #11 and #12 exceeds the Landcare Updated Development of Soil Guideline Values for Protection of Ecological Receptors (Eco-SGVs) for zinc (300mg/kg), reporting concentrations of 340mg/kg, 580 mg/kg, 460mg/kg, 530mg/kg,720mg/kg, and 390mg/kg, respectively.

8.4 QUALITY ASSURANCE AND QUALITY CONTROL

8.4.1 FIELD DUPLICATES

Duplicate analysis was completed as a means for determining uncertainty, accuracy, and precision of laboratory analysis. Two duplicate samples were collected during sampling at the same sample location and depth interval as Sample #1 and Sample #9 and labelled as #1a, and #9a, respectively.

The RPD between samples was calculated according to the following formula:

$$RPD = \frac{(Result\ No.1 - Result\ No.2)\ x\ 100}{(Mean\ of\ result\ No.1 + result\ No.2)}$$

The typical data quality objective is for an RPD to be within 30 – 50% (MfE, 2021). The RPD results were reported within the data quality objective. Mean RPD for sample location #1 was reported as 7%, and for sample location #9 duplicate pair was 10%. RPD calculations are presented in Appendix D.

8.5 RISK ASSESSMENT

A hazard – pathway – receptor pollution linkage is considered to aid assessment of risk associated with results of the site investigation.

For contaminated soils to pose a risk to a receptor, a complete pathway must exist between the contamination source and the identified receptor(s). If there is an incomplete pathway, then there is no risk. In this instance, there is a risk to human health across the site to lead and arsenic exposure.

9 CONCLUSIONS AND RECOMMENDATIONS

EAM was engaged to undertake a Detailed Site Investigation of 556-560 Aberdeen Road, Gisborne. The objectives of the investigation were to evaluate:

1. The type, extent, and level of contamination, if any, within the proposed subdivision sites.
2. Whether contaminants of concern identified present an unacceptable risk to human health or identified environmental receptors.
3. Whether the soils remaining on-site are suitable for the proposed end use.

A detailed site history was undertaken to review the historical land use at the site. The site has been a residential section since at least 1942.

This investigation identified one potential site activities included on the HAIL (Ministry for the Environment, 2011):

- Section I: Any other land that has been subject to the intentional or accidental release of a hazardous substance in sufficient quantity that it could be a risk to human health or the environment – This was considered based on the potential for lead-based paint which was likely used on the buildings to contaminate site soils.

Due to the potential HAIL activities at the site, twelve soil samples were collected systematically across the site and analysed for heavy metals.

Laboratory analysis results and comparison with relevant NZ guidelines indicate that:

- Lead and zinc concentrations were reported well above regional background concentrations for the Gisborne area, when compared with a control sample.
- All sample locations except #2 and #5 reported concentrations of lead in exceedance of the NES residential standards of 210 mg/kg. Samples reported concentrations of lead of 1070mg/kg (#1), 230mg/kg (#3), 1010mg/kg (#4), 2600mg/kg (#6), 730 mg/kg (#7), 240 mg/kg, (#8), 380mg/kg (#9), 620 mg/kg (#10), 1130mg/kg (#11) and 1090mg/kg (#12).
- Arsenic was reported above the NES standard of 20mg/kg in sample location #10, reporting a concentration of 32mg/kg.
- Sample locations #2 and #5 reported concentrations of metals within the NES standards, being 210mg/kg and 111mg/kg, respectively.
- Sample locations #1, #4, #6 #11 and #12 exceeds the Landcare Updated Development of Soil Guideline Values for Protection of Ecological Receptors (Eco-SGVs) for lead (900mg/kg), reporting concentrations of 1070mg/kg, 1010 mg/kg, 2600 mg/kg, 1130 mg/kg, and 1090mg/kg.
- Sample locations #1, #3. #4, #6, #7, #11 and #12 exceeds the Landcare Updated Development of Soil Guideline Values for Protection of Ecological Receptors (Eco-SGVs)

for zinc (300mg/kg), reporting concentrations of 340mg/kg, 580 mg/kg, 460mg/kg, 530mg/kg,720mg/kg, and 390mg/kg, respectively.
- The RPD results were reported within the data quality objective.

Elevated metals of lead, and in one location, arsenic, are above NES residential standards, thus there is a human health risk unless addressed through remediation. While further investigation is required, we would expect remediation to be possible and for the site to be redeveloped for residential purposes.

Based on the exceedance of background soil concentrations, and ecological soil guideline values, off-site disposal options, should they be required as part of development will require planning, consideration, and possible resource consent approval.

Any soils exceeding uncontaminated background values, have a degree of anthropogenic contamination. Should offsite disposal be required, this can only be through resource consent for an alternative land use; or disposed to appropriate landfill facility. Soils may be required to go to a licenced A Class landfill facility.

The best option is for excavated soils to be retained on site, in either noise bund, or garden areas, however we appreciate that due to the density of development, this option is unlikely. Options to enable soils to remain on site would be to pile foundations for the new buildings rather than excavate for concrete rafts. Alternatively, topsoil could be geotechnically engineered to create structurally compliant building platforms.

This investigation confirms that the site is highly likely to pose a risk to human health, and remediation will be required to ensure its suitability for the proposed development.

10 REFERENCES

MfE 2021 Contaminated Land Management Guidelines No.1 Reporting on Contaminated Sites in New Zealand. Ministry for the Environment.

MfE 2012 Users' Guide National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health. Ministry for the Environment.

MfE 2021 Contaminated Land Management Guidelines No.5; Site Investigation and Analysis of Soil. Ministry for the Environment.

Hawkes Bay Region: Background Soil Concentrations for Managing Soil Quality, Landcare Research, 2014.

https://soils-maps.landcareresearch.co.nz (2020)

NZGS. (2005). New Zealand Geotechnical Society December 2005 - Guidelines for the classification and description of soil and rock for engineering purposes.

APPENDIX A-FIGURES

FIGURE 1. SITE LAY OUT PLAN FOR 556-560 ABERDEEN ROAD, GISBORNE

FIGURE 2(a). DRAFT SCHEME PLAN FOR DEVELOPMENT

Site Planting

2D Plan Preview	Element ID	Common Name	PB Size	Clearance / Spacing	Mature (H)	Mature (W)	Sun or Shade
●	Large Underplant: Arthropodium Cirratum	Rengarenga	3	600	1,000	1,000	Part shade / full shade
●	Large Underplant: Astelia Nervosa	Mountain Astelia	3	800	1,000	1,000	Full sun / part shade
●	Large Underplant: Hebe Topiara	Hebe	3	600	1,000	1,000	Full sun
●	Large Underplant: Phormium Cookianum 'Emerald Green'	Dwarf Mountain Flax	3	750	800	800	Part shade / full shade
●	Large Underplanting: Coprosma Repens 'Middlemore'	Mirror Plant	3	700	1000	1000	Part Shade
▬	Screening: Carexia Virgata	Gannia	22	1,000	1,8000	1,000	Full sun / part shade
●	Small Underplant: Libertia Peregrinans	Tukauki	3	500	500	500	Full sun / part shade / full shade
●	Small Underplant: Phormium Tenax 'Sweet Mist'	Sweet Mist	3	400	400	400	Full sun / part shade
●	Specimen Tree: Citrus 'Harwood's Lots'	Orange	40	750	2,000	2,000	Full sun / part shade

AHA
ATKINSON HARWOOD
ARCHITECTURE

Rev	Revision	Date

Fence
1.2m Timber Palling Fence

Fence
1.85m Timber Palling Fence

Fence
1.85m Timber Fence with visually permeable upper section
- 1.55m Timber Palling Fence
- 300mm high Timber Battens to top

Landscaping and
Fencing Plan

15% Review

TW Aberdeen Road
556 - 560 Aberdeen Road
Revision:
Scale at A3: 1:300, 1:1
Date Issued: 3/08/2025

e: [illegible]
p: 027 405 9236

05

FIGURE 2(b). DRAFT SCHEME PLAN FOR DEVELOPMENT

FIGURE 3. SAMPLE LOCATIONS SHOWING NES EXCEEDANCE IN RED

APPENDIX B- AERIAL PHOTOGRAPHY

1942- Source, Retrolens

1951- Source, Retrolens

1965- Source, Retrolens

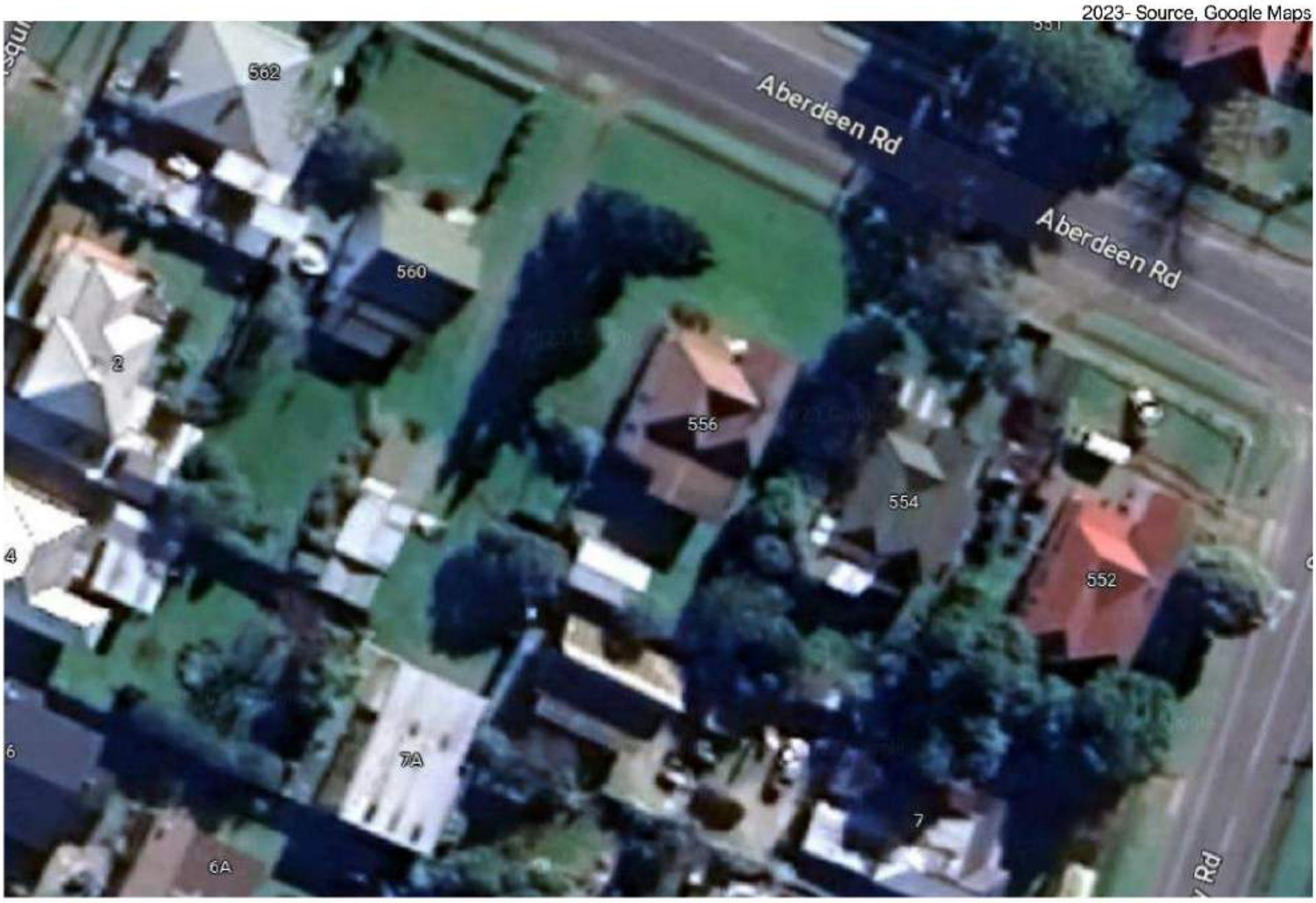
1972- Source, Retrolens

1988- Source, Retrolens

2007- Source, Google Earth

2018- Source, Google Earth

2023- Source, Google Maps



APPENDIX C- SITE PHOTOGRAPHS

Above. Front of 560 Aberdeen Road.

Top. Looking east towards rear of dwelling on 556 Aberdeen Road. **Middle.** Back of 560 Aberdeen Road dwelling. **Bottom.** Garage at 556 Aberdeen Road.

Top and middle. Large garage in far south of 556 Aberdeen Road. **Bottom.** Small garden shed on 560 Aberdeen Road.

Top. Front of 560 Aberdeen Road. **Middle**. Sheds on eastern boundary of 560. **Bottom**. Photo looking north-west at side of dwelling on 560 Aberdeen Road.

APPENDIX D- LABORATORY ANALYSIS AND REPORTS

TABLE 1. SOIL METAL RESULTS (mg/kg)

Sample Name:	Arsenic mg/kg	Cadmium mg/kg	Chromium mg/kg	Copper mg/kg	Lead mg/kg	Nickel mg/kg	Zinc mg/kg
Aberdeen #1 05-Sep-2023	5	0.23	8	9	1,070	6	340
Aberdeen #2 05-Sep-2023	4	0.14	6	7	210	5	194
Aberdeen #3 05-Sep-2023	9	0.25	6	16	230	5	580
Aberdeen #4 05-Sep-2023	12	0.46	15	28	1,010	9	460
Aberdeen #5 05-Sep-2023	3	< 0.10	5	9	111	6	91
Aberdeen #6 05-Sep-2023	8	0.42	11	16	2,600	9	530
Aberdeen #7 05-Sep-2023	9	0.89	17	52	730	8	820
Aberdeen #8 05-Sep-2023	5	0.19	8	15	240	7	240
Aberdeen #9 05-Sep-2023	6	0.45	16	37	380	7	380
Aberdeen #10 05-Sep-2023	32	1.09	33	64	620	11	690
Aberdeen #11 05-Sep-2023	6	0.87	11	42	1,130	9	720
Aberdeen #12 05-Sep-2023	7	0.5	16	33	1,090	7	390
Aberdeen #1a 05-Sep-2023	6	0.32	9	14	700	6	300
Aberdeen #9a 05-Sep-2023	6	0.47	19	45	410	8	420
Gisborne Uncontaminated Background Soil [1]	4	0.21	8	9	38	7	56
NES Residential [2]	20	3	460	>10,000	210		
NEPM Residential [3]						400	7400
Landcare Eco SGV's [4]	60	12	390	240	900	NGV	300

▨	Exceeds Gisborne Uncontaminated Background Soil, Control sample collected Gisborne A & P Showgrounds.
123	Exceeds Ecological SGV's
RED	Exceeds NES Residential

[1]-Gisborne Control sample. Collected from Gisborne A & P showgrounds in an undeveloped area.

[2] -MfE, June 2011. Resource Management (National Environmental Standard for Assessing and managing contaminants in Soil to Protect Human Health) Regulations 2011

[3]-National Environmental Protection (Assessment of Site Contamination) Measure, 1999.

[4] Landcare updated Development of Soil Guideline Values for Protection of Ecological Receptors (Eco SGVs). Assumes residential/recreational area, aged source, typical soil

TABLE 2. RELATIVE PERCENTILE DIFFERENCES

Sample Name:	Arsenic mg/kg	Cadmium mg/kg	Chromium mg/kg	Copper mg/kg	Lead mg/kg	Nickel mg/kg	Zinc mg/kg
Aberdeen #1 05-Sep-2023	5	0.23	8	9	1,070	6	340
Aberdeen #1a 05-Sep-2023	6	0.32	9	14	700	6	300
Mean	6	0	9	12	885	6	320
RPD (%)	-18	-33	-12	-43	42	0	13
Aberdeen #9 05-Sep-2023	6	0.45	16	37	380	7	380
Aberdeen #9a 05-Sep-2023	6	0.47	19	45	410	8	420
Mean	6	0	18	41	395	8	400
RPD (%)	0	-4	-17	-20	-8	-13	-10

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28 Duke Street Frankton 3204
Private Bag 3205
Hamilton 3240 New Zealand

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+64 7 858 2000
mail@hill-labs.co.nz
www.hill-labs.co.nz

Job Information Summary

Page 1 of 1

Client: EAM NZ Limited
Contact: Karen Toulmin
C/- EAM NZ Limited
233B Thompson Road
RD 10
Hastings 4180

Lab No: 3358681
Date Registered: 06-Sep-2023 2:50 pm
Priority: High
Quote No: 72316
Order No:
Client Reference: Aberdeen Road
Add. Client Ref:
Submitted By: Karen Toulmin
Charge To: EAM NZ Limited
Target Date: 08-Sep-2023 4:30 pm

Samples

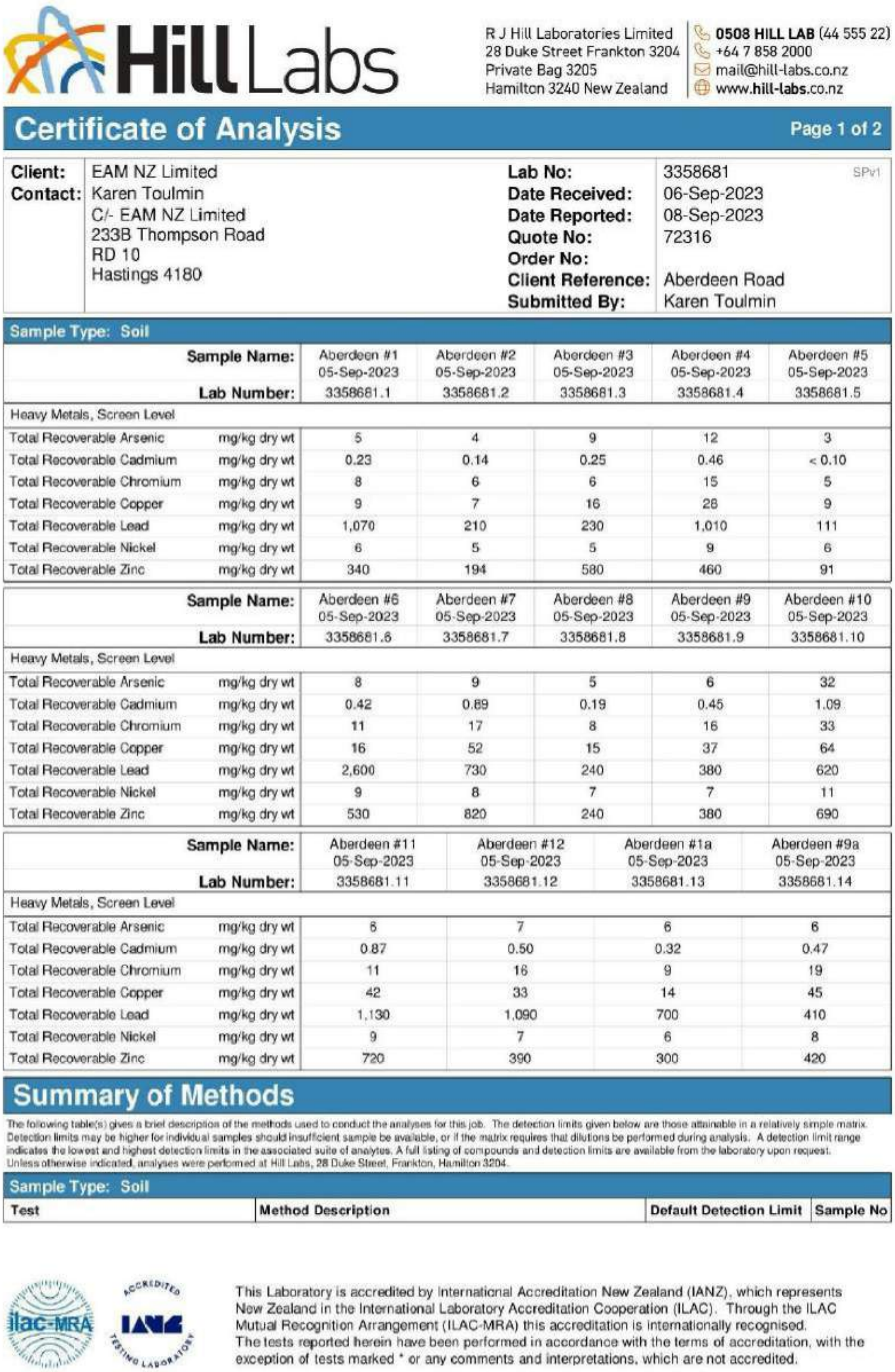
No	Sample Name	Sample Type	Containers	Tests Requested
1	Aberdeen #1 05-Sep-2023	Soil	cpBag	Heavy Metals, Screen Level
2	Aberdeen #2 05-Sep-2023	Soil	cpBag	Heavy Metals, Screen Level
3	Aberdeen #3 05-Sep-2023	Soil	cpBag	Heavy Metals, Screen Level
4	Aberdeen #4 05-Sep-2023	Soil	cpBag	Heavy Metals, Screen Level
5	Aberdeen #5 05-Sep-2023	Soil	cpBag	Heavy Metals, Screen Level
6	Aberdeen #6 05-Sep-2023	Soil	cpBag	Heavy Metals, Screen Level
7	Aberdeen #7 05-Sep-2023	Soil	cpBag	Heavy Metals, Screen Level
8	Aberdeen #8 05-Sep-2023	Soil	cpBag	Heavy Metals, Screen Level
9	Aberdeen #9 05-Sep-2023	Soil	cpBag	Heavy Metals, Screen Level
10	Aberdeen #10 05-Sep-2023	Soil	cpBag	Heavy Metals, Screen Level
11	Aberdeen #11 05-Sep-2023	Soil	cpBag	Heavy Metals, Screen Level
12	Aberdeen #12 05-Sep-2023	Soil	cpBag	Heavy Metals, Screen Level
13	Aberdeen #1a 05-Sep-2023	Soil	cpBag	Heavy Metals, Screen Level
14	Aberdeen #9a 05-Sep-2023	Soil	cpBag	Heavy Metals, Screen Level

Summary of Methods

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively simple matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request. Unless otherwise indicated, analyses were performed at Hill Labs, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Soil

Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Drying	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%.	-	1-14
Heavy Metals, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	1-14



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Certificate of Analysis

Page 1 of 2

SPv1

Client: EAM NZ Limited
Contact: Karen Toulmin
C/- EAM NZ Limited
233B Thompson Road
RD 10
Hastings 4180

Lab No: 3358681
Date Received: 06-Sep-2023
Date Reported: 08-Sep-2023
Quote No: 72316
Order No:
Client Reference: Aberdeen Road
Submitted By: Karen Toulmin

Sample Type: Soil

Sample Name:		Aberdeen #1 05-Sep-2023	Aberdeen #2 05-Sep-2023	Aberdeen #3 05-Sep-2023	Aberdeen #4 05-Sep-2023	Aberdeen #5 05-Sep-2023
Lab Number:		3358681.1	3358681.2	3358681.3	3358681.4	3358681.5
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	5	4	9	12	3
Total Recoverable Cadmium	mg/kg dry wt	0.23	0.14	0.25	0.46	< 0.10
Total Recoverable Chromium	mg/kg dry wt	8	6	6	15	5
Total Recoverable Copper	mg/kg dry wt	9	7	16	28	9
Total Recoverable Lead	mg/kg dry wt	1,070	210	230	1,010	111
Total Recoverable Nickel	mg/kg dry wt	6	5	5	9	6
Total Recoverable Zinc	mg/kg dry wt	340	194	580	460	91

Sample Name:		Aberdeen #6 05-Sep-2023	Aberdeen #7 05-Sep-2023	Aberdeen #8 05-Sep-2023	Aberdeen #9 05-Sep-2023	Aberdeen #10 05-Sep-2023
Lab Number:		3358681.6	3358681.7	3358681.8	3358681.9	3358681.10
Heavy Metals, Screen Level						
Total Recoverable Arsenic	mg/kg dry wt	8	9	5	6	32
Total Recoverable Cadmium	mg/kg dry wt	0.42	0.89	0.19	0.45	1.09
Total Recoverable Chromium	mg/kg dry wt	11	17	8	16	33
Total Recoverable Copper	mg/kg dry wt	16	52	15	37	64
Total Recoverable Lead	mg/kg dry wt	2,600	730	240	380	620
Total Recoverable Nickel	mg/kg dry wt	9	8	7	7	11
Total Recoverable Zinc	mg/kg dry wt	530	820	240	380	690

Sample Name:		Aberdeen #11 05-Sep-2023	Aberdeen #12 05-Sep-2023	Aberdeen #1a 05-Sep-2023	Aberdeen #9a 05-Sep-2023
Lab Number:		3358681.11	3358681.12	3358681.13	3358681.14
Heavy Metals, Screen Level					
Total Recoverable Arsenic	mg/kg dry wt	6	7	6	6
Total Recoverable Cadmium	mg/kg dry wt	0.87	0.50	0.32	0.47
Total Recoverable Chromium	mg/kg dry wt	11	16	9	19
Total Recoverable Copper	mg/kg dry wt	42	33	14	45
Total Recoverable Lead	mg/kg dry wt	1,130	1,090	700	410
Total Recoverable Nickel	mg/kg dry wt	9	7	6	8
Total Recoverable Zinc	mg/kg dry wt	720	390	300	420

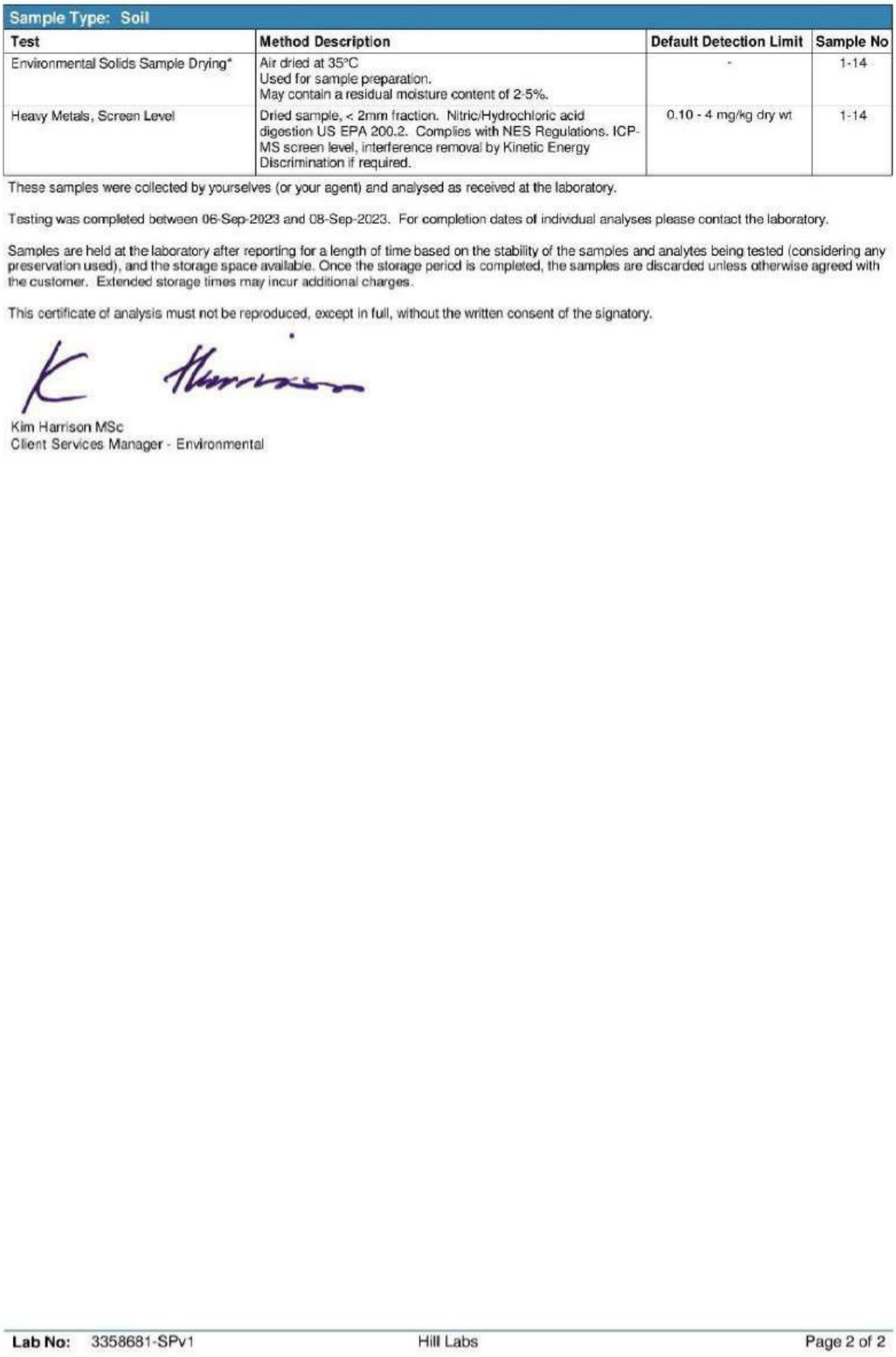
Summary of Methods

The following table(s) gives a brief description of the methods used to conduct the analyses for this job. The detection limits given below are those attainable in a relatively simple matrix. Detection limits may be higher for individual samples should insufficient sample be available, or if the matrix requires that dilutions be performed during analysis. A detection limit range indicates the lowest and highest detection limits in the associated suite of analytes. A full listing of compounds and detection limits are available from the laboratory upon request. Unless otherwise indicated, analyses were performed at Hill Labs, 28 Duke Street, Frankton, Hamilton 3204.

Sample Type: Soil

Test	Method Description	Default Detection Limit	Sample No

This Laboratory is accredited by International Accreditation New Zealand (IANZ), which represents New Zealand in the International Laboratory Accreditation Cooperation (ILAC). Through the ILAC Mutual Recognition Arrangement (ILAC-MRA) this accreditation is internationally recognised. The tests reported herein have been performed in accordance with the terms of accreditation, with the exception of tests marked * or any comments and interpretations, which are not accredited.



Sample Type: Soil

Test	Method Description	Default Detection Limit	Sample No
Environmental Solids Sample Drying*	Air dried at 35°C Used for sample preparation. May contain a residual moisture content of 2-5%.	-	1-14
Heavy Metals, Screen Level	Dried sample, < 2mm fraction. Nitric/Hydrochloric acid digestion US EPA 200.2. Complies with NES Regulations. ICP-MS screen level, interference removal by Kinetic Energy Discrimination if required.	0.10 - 4 mg/kg dry wt	1-14

These samples were collected by yourselves (or your agent) and analysed as received at the laboratory.

Testing was completed between 06-Sep-2023 and 08-Sep-2023. For completion dates of individual analyses please contact the laboratory.

Samples are held at the laboratory after reporting for a length of time based on the stability of the samples and analytes being tested (considering any preservation used), and the storage space available. Once the storage period is completed, the samples are discarded unless otherwise agreed with the customer. Extended storage times may incur additional charges.

This certificate of analysis must not be reproduced, except in full, without the written consent of the signatory.

K Harrison

Kim Harrison MSc
Client Services Manager - Environmental

APPENDIX E- REMEDIAL ACTION PLAN

REMEDIAL ACTION PLAN

REMEDIAL AREAS

Based on the observations and results of the DSI, lead contamination was identified above the NES of 210mg/kg in all sample locations except #2 and #5. Samples reported concentrations of lead of 1070mg/kg (#1), 230mg/kg (#3), 1010mg/kg (#4), 2600mg/kg (#6), 730 mg/kg (#7), 240 mg/kg, (#8), 380mg/kg (#9), 620 mg/kg (#10), 1130mg/kg (#11) and 1090mg/kg (#12).

Arsenic was reported above the NES standard of 20mg/kg in sample location #10, reporting a concentration of 32mg/kg.

EAM recommend a XRF investigation is completed to delineate the boundaries of soil contamination across the site. XRF is a handheld X-Ray Fluorescence (XRF) analyser used to measure metal concentrations within the soil. XRF provides fast, accurate, and non-destructive alloy identification and elemental analysis. It is considered highly accurate in relation with laboratory analysis.

XRF should be utilised to assess both the depth and lateral extent of contamination.

Establishment of depth and lateral contamination will provide approximate volumes of soil requiring remediation, and volumes of soil above uncontaminated background values.

REMEDIATION OPTIONS ASSESSMENT

Options which may be considered feasible are as follows, although again, may be dependent on the volume of contaminated soil established.

1. In-situ vertical mixing of impacted material with underlying clean soil, and re-use.
2. Excavation for disposal to landfill.
3. A combination of 3 and 4.

As a rule of thumb, soil mixing is only considered feasible providing soil concentrations are within 2-3 times the acceptable concentrations set out by the NES. Based on the present findings, soil lead concentrations are well above the feasible soil mixing fractions and therefore only areas with concentrations <600mg/kg may be acceptable to achieve sufficient dilution.

Excavation and disposal of contaminated material to landfill is the least preferred option due to cost and environmental impacts from haulage and use of landfill space, however where concentrations of lead contamination present are too high for mixing, then this is likely to be the only practical option.

REMEDIAL CRITERIA

The proposed remedial assessment criteria for lead and arsenic in a residential (10% produce) land use are shown in Table 1.

Table 1. Summary of Remedial Criteria

CONTAMINANT	NES (mg/kg)
Lead	210
Arsenic	20mg/kg

REMEDIAL ACTION PLAN

Prior to any remedial activities commencing, the SQEP will screen the surface soils at the site with a hand-held Olympus Vanta X-Ray Fluorescence spectrometer at the site to delineate the lateral extent of contamination. Depth analysis will be completed across the site by excavating augur holes to access deeper soils for screening. Boundaries will be marked. Approximate volumes of contaminated soil will be estimated, and recordings of lead and arsenic concentrations will be taken to establish the best method of remedial action.

The following methodologies are proposed to remediate the site to National Environmental standards for Residential land use. The remedial works will be supervised by a Suitably Qualified Environmental Practitioner (SQEP) and will be completed in accordance with the earthwork's procedures and unexpected discovery of contamination protocols as discussed in this plan.

In situ vertical mixing of contaminated soil

Should the XRF investigation find depth and concentrations of the contaminated material suitable for soil mixing, then the following procedures will be followed:

1. The SQEP will mark out the remedial area on the ground surface.
2. Soils will be blended during dry conditions, and not after recent heavy rain.
3. Soils in the remedial area will be blended using either a tractor towing a disc plough, or an excavator with a bucket large enough to achieve a cutting depth of at least 0.3 m bgl. The tractor or excavator will mix the soil in multiple directions until site soils are thoroughly mixed.
4. The SQEP will regularly check the mixed soils using the XRF. Mixing will continue until all soils achieve NES.
5. Upon completion of mixing, the SQEP will validate the remediated area on an approximate 2m x 2m grid using the XRF.
6. The SQEP will collect 10% validation samples for laboratory analysis.

Excavation and removal of contaminated soil to landfill.

1. The SQEP will mark out the remedial areas on the ground surface
2. Machinery / vehicles will not enter the remedial zones.
3. The remedial areas will be excavated to their target depth as instructed by the SQEP. The SQEP will continually screen the base and sides of the excavation to ensure that remaining concentrations meet NES. Further excavation will be completed as required.
4. Material will be loaded directly into trucks, which will be covered for transportation to landfill.
5. Upon completion of excavation, the SQEP will map and record lead concentrations using XRF in a 2m x 2m grid pattern across the excavated area.
6. The SQEP will collect 10% validation samples for laboratory validation analysis.

REMEDIAL PLAN-GENERAL

EARTHWORKS MANAGEMENT

To ensure the site is effectively remediated, removed/ and tracked, a detailed earthworks management plan has been developed.

WASTE MANAGEMENT

Contaminated soil excavated from the site and disposed of to an appropriate landfill facility, will be subject to leachate testing.

VALIDATION

Sampling at the base and edges of the stripped areas is required to confirm that soil contamination has been removed, and that any remaining contamination levels are below the Soil contamination standards for Residential land use.

A detailed report will be prepared after contaminated soils have been removed/mixed and laboratory analysis has verified that validation samples across the site are within the acceptable standards. This Site Validation Report will confirm the adherence to the Site Remedial Action Plan. The report will detail the remedial actions and processes carried out, present photographs documenting site activities, soil sample locations and will include laboratory results.

HEALTH AND SAFETY

This section relates only to those occupational health and safety issues resulting from the elevated levels of lead and arsenic associated with site soils and does not cover general site working requirements. The following key Health and Safety precautions should be implemented:

1. All workers at the site should be made aware of the presence of elevated concentrations of metals.
2. A consideration of the elevated lead levels is the potential for the site works to generate dust. Dust generation increases the likelihood of direct skin contact, and ingestion through inhalation. Therefore, adherence to the following site working precautions is essential. Dust minimisation measures are required, including, but not limited to:
    - Ensuring earthworks are undertaken only during low wind conditions.
    - Installation of high mesh fencing around the perimeter of the site to prevent dust drift into neighbouring residential properties.
    - Use of appropriate dust filters in excavation machinery and closed in cab.
3. Personal Protective Equipment (PPE) is required, the minimum being:
    - Safety Vest and Safety boots
    - Gloves for soil handling
    - High quality ventilation mask
    - Goggles or safety glasses
    - First aid and eye wash kits should be available on site.
4. Good hygiene should always be observed:
    - Follow measures to avoid skin contact, inhalation, and ingestion
    - No eating, drinking of smoking during site remedial works
    - Thorough hand washing before eating, drinking, or smoking, prior to leaving site.
    - Changing of clothing on completion of daily site works prior to leaving the site.
5. Silt/Mud controls. To ensure mud is not spread onto public roads from vehicles and machinery, (including around the source site to avoid transfer of contamination), earthworks will only occur in dry weather.

UNEXPECTED DISCOVERY OF CONTAMINATION PROTOCOL

Should unexpected contamination be encountered during site remedial works all site work must immediately stop, and the potential hazards must be assessed. Report the discovery to the SQEP or manager on site. Contamination may present as:

- Staining and/or discolouration of soil
- Refuse and/or debris such as brick, glass, rubble, timber, domestic waste
- Drums or underground storage tanks
- Odour, such as hydrocarbons, sewage or rotting material.
- Presence of discoloured surface water or leachate
- Oils, grease, oily substances
- Asbestos

Should asbestos be observed or suspected during the excavation works, all work shall cease and Guidelines for the Management and Removal of Asbestos (revised 1999) for the Department of Labour, and the Health & Safety in Employment (Asbestos) Regulations (1998) will be followed. Works can recommence once all asbestos has been removed safely. Any such asbestos works (assessment, delineation, removal, and verification) would be undertaken by a specialist asbestos contractor.

A first response protocol for unexpected contamination is as follows:

1. Stop work immediately. Assess the potential immediate hazards. • If the discovery is assessed as presenting an imminent hazard or danger, notify emergency services dialling 111. If unsafe, move away, secure the area, and notify workers in the nearby area.

2. Advise SQEP, site manager or client representative

3. Work will not resume or commence until the SQEP has provided clearance.

SITE VALIDATION REPORT

A SVR will be produced and provided to council, summarising the works completed and confirming that the remediated areas are suitable for residential (10% produce) land use. The SVR will include a plan showing final extent of remedial areas and validation sample locations, validation sample results, unexpected discovery of contamination and how it was managed (if any), copies of receipts for waste disposal and information about imported material.

Appendix 6

Servicing Report

556 - 560 ABERDEEN ROAD, GISBORNE SERVICING REPORT – J23215-1

Report prepared by Scott Estcourt

10 October 2023

PREPARED BY		
Scott Estcourt	10 October 2023	
REVIEWED BY		
Johan Ehlers	10 October 2023	

NO.	DATE	DESCRIPTION	PREPARED BY	REVIEWED BY	SIGNED

1 Executive Summary

This report has been prepared to submit to the Gisborne District Council for Resource Consent Purposes.

This document details the proposed civil engineering works, assessment of effects and associated mitigation measures for the proposed residential subdivision at 556 - 560 Aberdeen Road, Gisborne. Preliminary design drawings have been prepared for earthworks, stormwater, wastewater, and water supply.

This report sets out the design basis and describes the assessments that were carried out to:

- Demonstrate how stormwater quality and quantity are to be managed, including consideration overland flow paths through the site from the wider catchment.
- Demonstrate that the site can be serviced, taking into consideration the capacity of the local networks and the requirements of the Gisborne District Council.
- Demonstrates that conformance to standards and codes can be achieved.

The development consists of 5 duplex units and 2 single units. Design flow rates based on 12 dwellings are provided in this report to provide a basis for the Council to access the potential impact of the development on the Council's wastewater, stormwater, and water supply networks.

Bulk Earthworks

Earthworks will be required to shape the site such that stormwater runoff is controlled by draining lots to the proposed roads and defined overland flow paths to avoid adverse stormwater effects on adjoining lots.

The topographical survey of the existing site indicates that approximately a third of the site falls towards Aberdeen Road, and the remainder towards the neighbouring properties to the south. The concept earthworks design aims to match existing levels as much as practical.

Stormwater

Most of the site drains from north to south. The existing ground level at the southern part of the site is approximately 1m lower than at the road boundary. This is a significant constraint. It will not be practicable to raise the southern part of the site to achieve drainage to Aberdeen Road. Part of the site will have to continue to drain southwards.

Overall, it is proposed to limit the stormwater runoff from the site to the pre-development levels during the 1 in 100-year event. Rainwater tanks will be installed to attenuate runoff from all roof areas prior to being discharged to Aberdeen Road via kerb connections. A 'Rainsmart' system which will be situated under the access road and carpark area to attenuate and dispose runoff from contributing areas by soakage.

The concept design aims to ensure that the sum of the of the runoff rates from unattenuated areas, the discharge from the rainwater tanks, and the overflow from the 'Rainsmart' system is no greater than for the pre-developed site during the 1 in 100-year event.

Wastewater

It is proposed to extend a DN150 connection into the development from the DN150 in Aberdeen Road. Individual DN100 connections will extend from each dwelling unit to connect to the common private wastewater pipeline within the accessway.

The calculated average daily dry weather flow (ADWF) for the development is 7,860L (0.09L/s), and the estimated peak wet weather flow (PWWF) is 30,720L (0.36L/s).

Water Supply

It is proposed to extend a DN50 connection into the development from the DN100 water main in Aberdeen Road. A testable backflow prevention device and meter will be installed inside the boundary of the development. Individual connections to the common private water supply pipeline will be provided to each dwelling. A manifold will be installed within each dwelling lot.

The calculated average daily consuption for the development is 0.15L/s.

Fire hydrants must be provided within 135m of fire risks, such that 12.5L/s is available within 135m run distance and 25L/s is available within 270m run distance from a maximum of two fire hydrants. The two hydrants in Aberdeen Road between Asquith Street and Stanley Road satisfy these requirements.

Power and Communications

Drawings have been created to show the proposed alignments for power and telecommunication services within the site. Liaison with the relevant providers has not yet been undertaken.

Table of Contents

Table of Tables

Table of Figures

2 Purpose of this Report

This document details the proposed civil engineering works, assessment of effects and associated mitigation measures for the proposed residential subdivision at 556 and 560 Aberdeen Road, Gisborne. Preliminary design drawings have been prepared for earthworks, stormwater, wastewater, and water supply.

The information is at a level suitable for subdivision consent application. It is not at the level of detail required for building consent or engineering approval. Further regulatory approvals that will be required for this development include engineering approval and building consent approval from the Gisborne District Council.

3 Site Description

The site comprises the property located at 556 – 560 Aberdeen Road, Gisborne, occupying an area of 0.27 ha. The development will consist of the following.

Table 1 - Proposed development

Type	Number	Lots
2- storey duplex unit	8	1, 2, 7, 8, 9, 10, 11, 12
Standard duplex	2	5, 6
House	1	4
Accessible	1	3

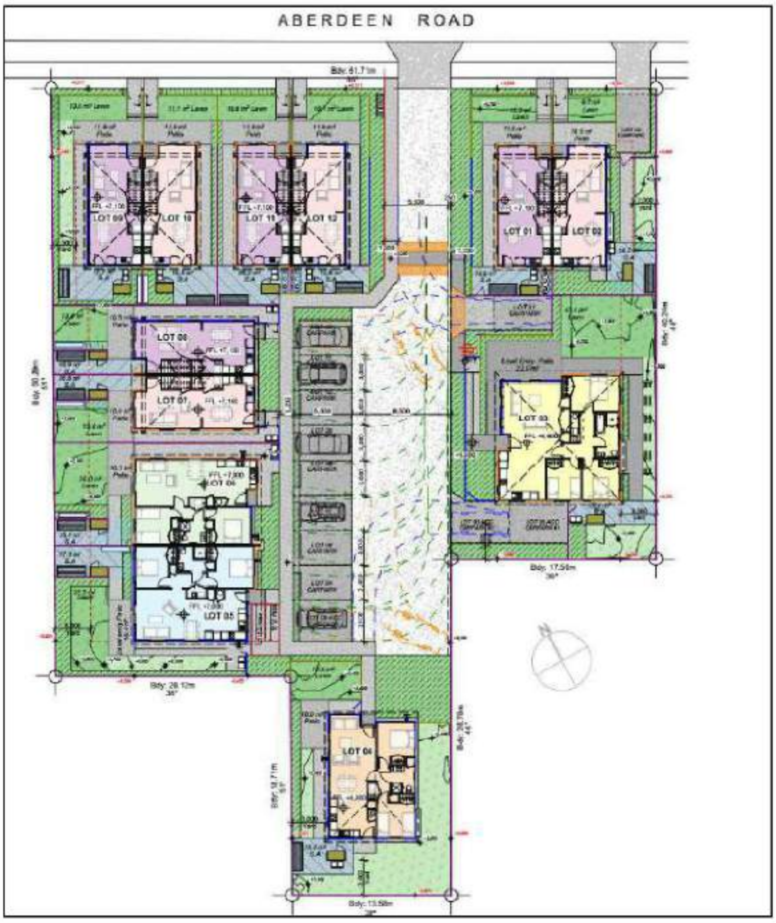


Figure 1 - Scheme Plan

4 Existing Site

The existing site consists of three parcels, occupied by two houses and three outbuildings. Both properties contain some impervious areas.

Figure 2 - Existing Site

ADDRESS	LEGAL DESCRIPTION	AREA (m^2)
556 Aberdeen Road	LOT 2 PT 1 DP1585	1,659
560 Aberdeen Road	LOT 11 DP3481	1,012
TOTAL		**2,671**

5 Bulk Earthworks

5.1 Earthworks Proposal

Earthworks will be required to shape the site such that stormwater runoff is controlled by draining lots to the proposed access lane and defined overland flow paths to avoid adverse stormwater effects on adjoining properties.

The topographical survey of the existing site indicates that approximately a third of the site falls towards Aberdeen Road, and the remainder towards the neighbouring properties to the south. The concept earthworks design aims to match existing levels as much as practical.

5.1.1 Summary of Earthworks Volumes

The earthworks concept plan is provided in Appendix A. Overall, the site will require the following net earthworks volumes from the existing ground level to the finished level.

Table 2 – Preliminary earthworks volume summary

AREA (m2)	CUT (m^3)	FILL (m^3)	NET FILL VOLUME (m^3)
2,671	135	281	146

6 Stormwater

6.1 General

Most of the site drains from north to south. The existing ground level at the southern part of the site is approximately 1m lower than at the road boundary. This is a significant constraint. It will not be practicable to raise the southern part of the site to achieve drainage to Aberdeen Road. Part of the site will have to continue to drain southwards.

6.2 Stormwater Proposal

Overall, it is proposed to limit the stormwater runoff from the site to the pre-development levels during the 1 in 100-year event. Rainwater tanks will be installed to attenuate runoff from all roof areas prior to being discharged to Aberdeen Road via kerb connections. A 'Rainsmart' system which will be situated under the access road and carpark area to attenuate and dispose runoff from contributing areas by soakage.

The concept design aims to ensure that the sum of the of the runoff rates from unattenuated areas, the discharge from the rainwater tanks, and the overflow from the 'Rainsmart' system is no greater than for the pre-developed site during the 1 in 100-year event.

6.2.1 Rainwater Tanks

Each dwelling unit will have a rainwater tank to receive roof runoff. Sizing of the rainwater tanks aims to ensure that they do not overflow during the 1 in 100-year event. The proposed tanks size, orifice sizes and corresponding discharge rates from each lot are summarised from the calculations provided in Appendix B in Table 3 below.

Table 3 - Rainwater tank summary

LOT	ORIFICE SIZE (mm)	DISCHARGE RATE (L/s)	ROOF AREA (m^2)	TANK SIZE (Litres)
1	16	0.6	49	1,000
2	16	0.6	49	1,000
3	32	2.4	125	2,000
4	20	0.9	89	2,000
5	20	0.9	90	2,000
6	20	0.9	90	2,000
7	16	0.6	49	1,000
8	16	0.6	49	1,000
9	16	0.6	49	1,000
10	16	0.6	49	1,000
11	16	0.6	49	1,000
12	16	0.6	49	1,000
TOTAL		10.1	788	16,000

The combined discharge rate of 9.2L/s exceeds the capacity of a double kerb connection of 8L/s. A dispensation is requested to allow both, a double kerb connection and a single kerb connection to Aberdeen Road.

6.3 Rainsmart System

6.3.1 Allowable Runoff

Total runoff from the site shall be limited to pre-development rates for the 1 in 100-year event.

The total pre-development runoff from the site during the 1 in 100-year event based on the 20-minute storm duration (from the calculations contained in Appendix B) is provided in Table 4.

Table 4 - Pre-development 1 in 100-year runoff

SUB-CATCHMENT	A: AREA (m2)	C x A	Q: 1 in 100-YEAR RUNOFF RATE (L/S)
NORTH (to Aberdeen Road)	1,242	630.3	14.3
SOUTH	1,429	425.7	13.7
TOTAL	**2,671**	**1,056.0**	**28.0**

Sizing of the Rainsmart system aim to ensure that the sum of the discharge rates from the roof tanks, unattenuated surfaces and overflows from the Rainsmart system to not exceed pre-development levels.

6.3.2 Post Development Rates

North Catchment

The total runoff from the development to Aberdeen Road is the sum of the discharge from the rainwater tanks, and the paved and landscaped areas of lots 1, 2, 9, 10, 11 and 12 fronting Aberdeen Road.

SURFACE TYPE	DISCHARGE RATE (L/s)
Unattenuated surface runoff	9.8
Rainwater tanks combined discharge rate	10.1
TOTAL	**19.9**

The discharge rate of 19.9L/s is 5.7L/s greater than the pre-development rate of 14.3L/s runoff to Aberdeen Road.

South Catchment

A Rainsmart system is proposed to attenuate and dispose runoff from contributing surface areas to ground by soakage. The Rainsmart system has been sized to ensure that the total runoff from the site does not exceed the pre-development rate of runoff during the 1 in 100-year event.

The allowable overflow rate from the Rainsmart system is 0.9L/s as summarised below.

Table 5 - Allowable Rainsmart system overflow rate

SURFACE DESCRIPTION	RUNOFF RATE (L/s)
North catchment post-development runoff rate	19.94L/s
Unattenuated runoff from the south catchment	7.12L/s
Sub-total	**27.1L/s**
Allowable post development rate	**28.0L/s**
ALLOWABLE RAINSMART OVERFLOW RATE	**0.9L/s**

6.3.3 Rainsmart system sizing

The permeability test results contained in Appendix C shows that for location PT-02 the average observed infiltration rate for test 3 was 1,505L/m^2 hr. On this basis a design infiltration rate of 375mm/hr has been used which is 25% of the observed rate.

As provided in Table 5, the allowable overflow rate from the Rainsmart system during the 1 in 100-year event is 0.9L/s. The Rainsmart system will receive runoff from a total of 85m^2 of garden areas, and 815m^2 of paved areas.

6.4 Stormwater Treatment

The sumps within the access lane will be fitted with gross pollutant screens to capture debris larger than the aperture of the screens. It is proposed to fit a Hynds First Defense vortex separator just upstream of the point of discharge to the Rainsmart system. A 2-year, 1 hour design storm will be used as the basis for sizing the treatment device.

6.5 Flood Assessment

The floor levels of the units fronting Aberdeen Road have been set to be at least 150mm above the road centreline level of RL 6.60m, and the floor levels of the remaining units will be at least 500mm above the flood level of RL 5.839m (from the Gisborne District Council 'rain on grid' GIS layer).

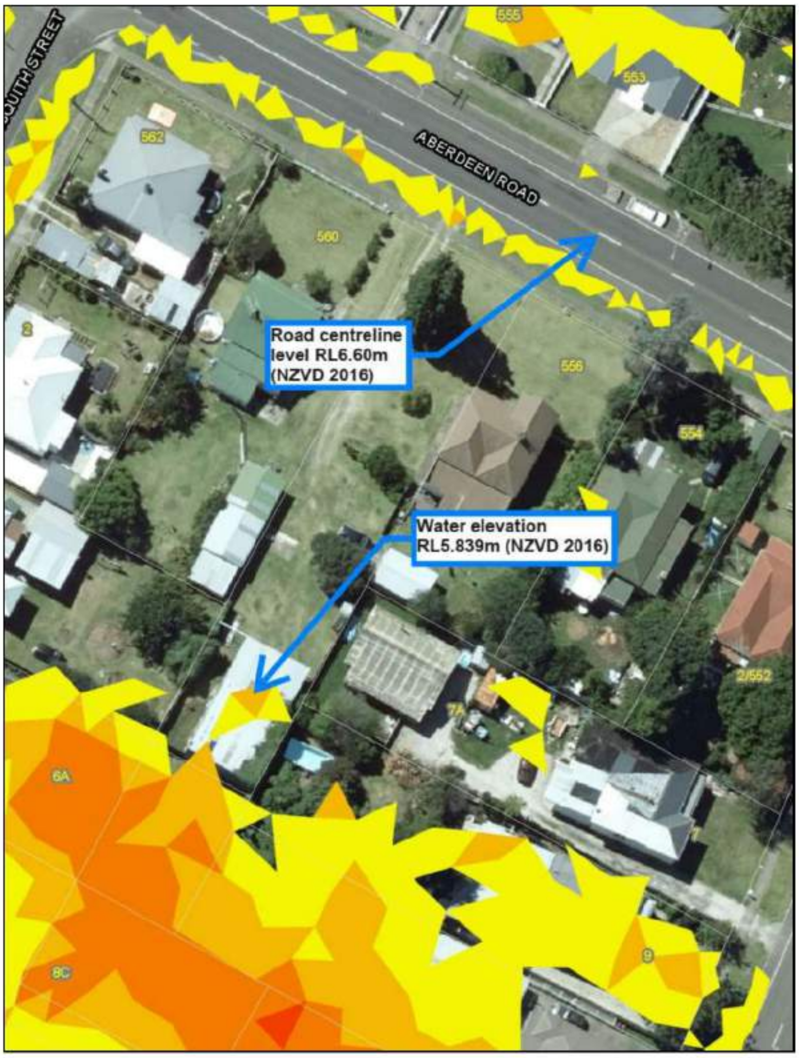
The site is not in any flood overlay areas, but a ponding area has been identified to the south of the site, as shown in Figure 3.

The proposed preliminary finished floor levels in terms of New Zealand Vertical Datum 2016 are as tabled below.

UNIT	FINISHED FLOOR LEVEL
1 and 2	RL 7.10m
3	RL 7.10m
4	RL 6.75m
5 and 6	RL 7.00m
7 and 8	RL 7.15m
9 and 10	RL 7.10m
11 and 12	RL 7.10m

The floor levels of the units fronting Aberdeen Road have been set to be at least 150mm above the road centreline level of RL 6.60m, and the floor levels of the remaining units will be at least 500mm above the flood level of RL 5.839m (from the Gisborne District Council 'rain on grid' GIS layer).

It is expected that Unit 4 will have a timber sub-floor which will be a minimum of 610mm above the building perimeter levels. Floor levels of the other units will generally be at least 150mm above surrounding ground levels. Confirmation of the finished floor levels are subject to change during detailed design.



Road centreline level RL6.60m (NZVD 2016)

Water elevation RL5.839m (NZVD 2016)

Figure 3 – Gisborne District Council flood levels

7 Access and Parking

Part C of the Tairāwhiti Resource Management Plan gives a minimum accessway width of 5.5m for between 8 and 10 dwellings. A 4.2m wide accessway plus a 1.2m wide footpath is proposed to service the 11 dwellings that do not front Aberdeen Road. The accessway width therefore does not comply with this requirement. A dispensation is sought for this. Lot 2 shall be provided access directly from Aberdeen Road.

A total of 13 carparks are included within the development.

Part C of the Tairāwhiti Resource Management Plan gives a minimum total depth of 13.2m, for the total required width of the carpark and manoeuvring space as follows.

Table 6 - Carparks and associated turning area requirements

Parking angle	Width of space	Depth of parking space	Total Depth
90 degrees	2.8m	4.9m	13.2m

The proposed design shows a that the total width measured from the face of kerb to the edge of the shared path across the shared parking area of 13.1m. This can be addressed during detailed design.

8 Wastewater

8.1 Wastewater Proposal

It is proposed to extend a DN150 connection into the development from the DN150 in Aberdeen Road. Individual DN100 connections will extend from each dwelling unit to connect to the common private wastewater pipeline within the accessway.

The wastewater system within the site will be designed and installed in accordance with the requirements of G13/AS3.

8.2 Wastewater Design Flow Rates

The purpose of the design flow rates provided in this report is to provide a basis for the Council to access the potential impact of the development on the wastewater network.

Clause 4.3.1 of the Gisborne District Council Engineering Code of Practice provides the basis for the determination of the design flow using the method outlined in NZS4404:2010. The Gisborne District Council specifies that domestic dry weather wastewater flow is 200 litres per day per person and an equivalent population of 3.2 people per dwelling.

Table 7 - Design wastewater flows

DESIGN FLOW	**Litres / day (L/day)**	**Litres / second (L/s)**
ADWF: Average Dry Weather Flow	7,860	0.09
PDWF: Peak Dry Weather Flow (ADWF x 2.5)	19,200	0.22
PWWF: Peak Wet Weather Flow (4 X ADWF)	30,720	0.36

9 Water Supply

9.1 Water Supply Proposal

The layout within the development will ensure that domestic demand is met. It is proposed to extend a DN50 connection into the development from the DN100 water main in Aberdeen Road. A testable backflow prevention device and meter will be installed inside the boundary of the development. Individual connections to the common private water supply pipeline will be provided to each dwelling. A manifold will be installed within each dwelling lot.

The water supply system within the site will be designed and installed in accordance with the requirements of G12/AS1.

9.1.1 Water Supply Design Flow Rates

Clause 5.3.2 of the Gisborne District Council Engineering Code of Practice provides the basis for the determination of the design flow. The Gisborne District Council specifies that domestic demand is 330 litres per day per person and an equivalent population of 3.2 people per dwelling.

DESIGN FLOW	Litres / day (L/day)	Litres / second (L/s)
Average consumption	12,672	0.15

9.1 Firefighting requirements

The New Zealand Fire Fighting Code of Practice SNZ PAS 4509 sets out the requirements for firefighting purposes. Fire hydrants must be provided within 135m of fire risks, such that 12.5L/s is available within 135m run distance and 25L/s is available within 270m run distance from a maximum of two fire hydrants. The two hydrants in Aberdeen Road between Asquith Street and Stanley Road satisfy these requirements.

10Power and Telecommunications

Drawings have been created to show the proposed alignments for power and telecommunication services within the site. Liaison with the relevant providers has not yet been undertaken.

Appendix A Preliminary Design Drawings

TW Property Group

INFRASTRUCTURE SOLUTIONS
PROJECT MANAGEMENT
PO Box 7335, Taradale 4141
Phone : 06 650 5565 Email : admin@infir.nz
www.infir.nz

Residential Development
556-560 Aberdeen Road
Gisborne

SITE LOCATION PLAN
(NOT TO SCALE)

FOR RESOURCE CONSENT

GENERAL NOTES

1. All construction work outside the property boundary shall comply with the Gisborne Engineering Code of Practice (GECOP"). Where conflict exists between the requirements set out in the specification and the Code of Practice, the Code shall take precedence.
2. All work inside the property boundary shall comply with the New Zealand Building Code, unless such works will be vested with council, in which case, GECOP takes precedence.
3. A full copy of GECOP shall be kept onsite throughout construction.
4. Horizontal datum: ESPG:2107 NZGD/Poverty Bay Circuit 2000
5. Vertical datum: ESPG:1169 New Zealand Vertical Datum 2016
6. Drawings are intended to be read in conjunction with any and all information provided by the development Architect, in addition to information provided by the Landscape Architect if applicable.
7. All measurements to be confirmed on site.
8. Dimensions are in meters unless otherwise stated.
9. 3rd decimal place in setting-out and level data is for purpose of accuracy only, to avoid or highlight rounding errors, and does not represent construction tolerances.
10. All services are to be marked on site and located before construction.
11. All work on site is to be in accordance with the Contractor's Health and Safety Plan and the Health and Safety at Work Act.
12. Connections to the Gisborne District Council water supply and wastewater and stormwater networks must only be undertaken by approved contractors.
13. Concrete grades: Slabs and other in-situ work 32MPa minimum except where otherwise noted.
14. Concrete work shall comply with NZS4210.

EARTHWORKS

15. All earthworks must comply with the requirements of NZS4431:2022 and be tested in accordance with NZS4402.
16. Subgrade testing is required to confirm pavement design before pavement construction.
17. During construction, stormwater runoff shall be controlled on site in accordance with an approved erosion and sediment control plan.

ACCESS & PARKING

18. Final pavement design shall be subject to site testing.

STORMWATER

19. All stormwater works within the development site shall comply with document E1 / AS1 Surface Water of the New Zealand Building Code.
20. Concrete pipe shall comply with AS/NZS4058, minimum Class 2, unless noted otherwise.
21. PVC pipes shall comply with AS/NZS1254 of AS/NZS1260, minimum SN8 (unless noted otherwise).
22. Downpipe location and sizing shall be provided by the architect.

WASTEWATER

23. All wastewater works outside the property boundary shall comply with the Gisborne Engineering Code of Practice. Where conflict exists between the requirements set out in the specification and the Code of Practice, the Code shall take precedence.
24. All wastewater works within the development site shall comply with document G13 / AS3 of the New Zealand Building Code.
25. The location of existing services shall be confirmed on site prior to construction.
26. PVC pipes shall comply with AS/NZS 1254 of AS/NZS 1260, minimum SN8.
27. All pipes outside private property that will be vested in Council shall be SN16.
28. PE pipelines (pressure systems only) shall be PE100 PN16 conforming to AS/NZS4130.

WATER RETICULATION

29. All water supply works within the property shall comply with NZ Building Code - Acceptable Solutions & Verifiable Methods (G12 / AS1). All water supply works outside the property boundary shall comply with the Gisborne Engineering Code of Practice. Where conflict exists between the requirements set out in the specification and the Code of Practice, the Code shall take precedence.
30. The location of existing services shall be confirmed on site prior to construction.
31. PVC pipes shall comply with AS/NZS1477, minimum pressure rating PN9.
32. PE pipelines shall be PE100 SDR17 Series 1, in accordance with AS/NZS4130.
33. Ductile iron flanges shall conform to AS/NZS4087 Figure B5.
34. The connection point to the Gisborne District Council network is shown indicative only and shall be confirmed prior to the commencement of works.

SERVICES

35. Where indicated on the plans, existing service locations have been determined from Before-U-Dig plans or Gisborne District Council GIS data and may not fully reflect the true location or extent of existing services.
36. Location and extent of all services shall be verified on site prior to commencing construction and installing new services.
37. Connection points to existing services are indicative only and shall be confirmed prior to the commencement of works.

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0	ORIGINAL	[illegible]	26.10.2023

NOTES :

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TW Property Group

PROJECT
RESIDENTIAL DEVLOPMENT
556-560 ABERDEEN ROAD
GISBORNE

INFRASTRUCTURE SOLUTIONS | PROJECT MANAGEMENT
PO Box 7336, Taradale 4141
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ORIGINAL DESIGNED:
CAD CHECKED:
ORIGINAL APPROVED:
CLIENT APPROVED:
ENGINEER APPROVED:
DRAWN BY: SL
A3 ORIG SCALE: NA
DWG / SHEET: J23215 / 001
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OVERALL SITE DEVELOPMENT PLAN

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EARTHWORKS
EXISTING GROUND CONTOURS (EGL)

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EARTHWORKS
FINISHED GROUND CONTOURS (FGL)

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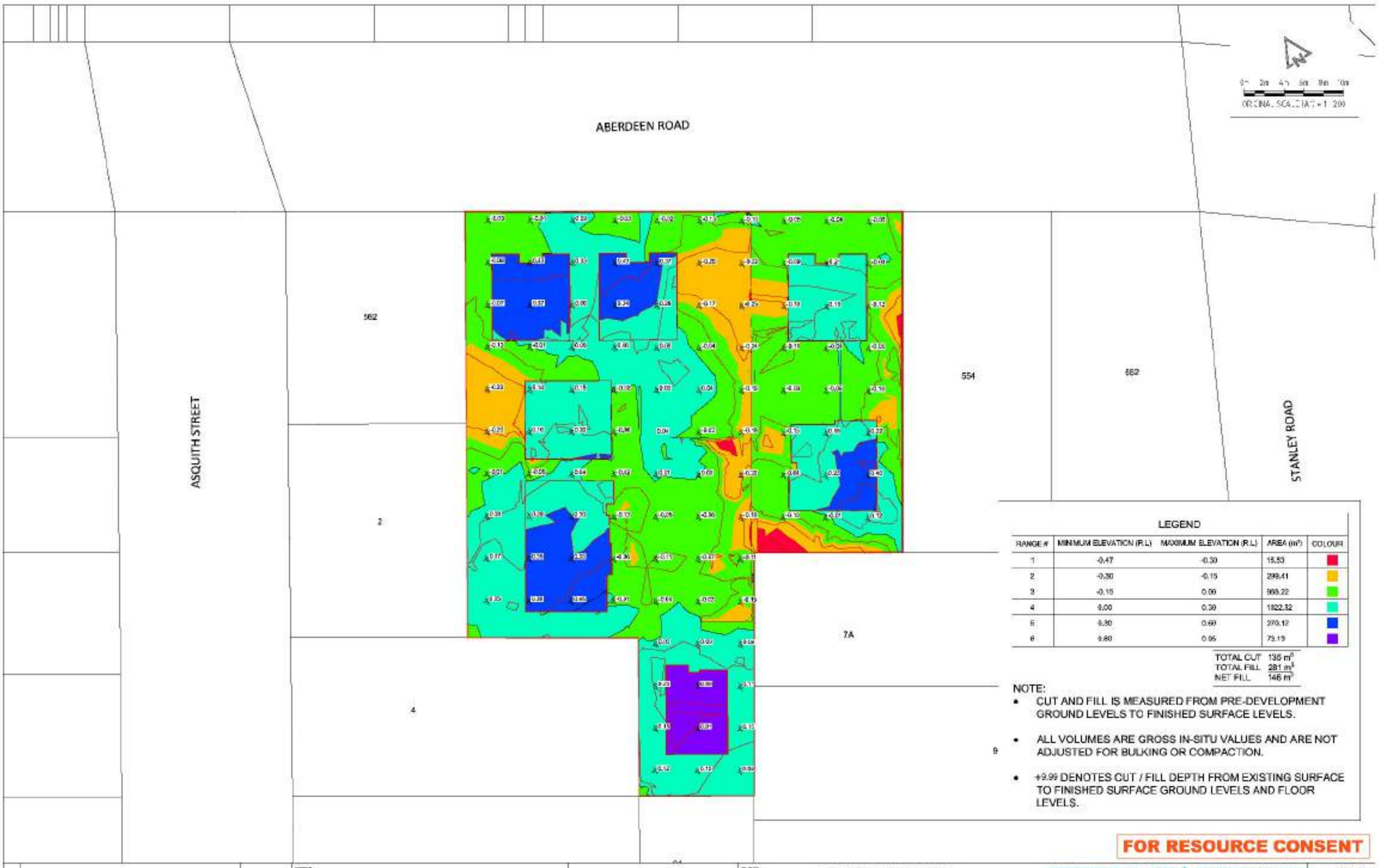

LEGEND

RANGE #	MINIMUM ELEVATION (R.L)	MAXIMUM ELEVATION (R.L)	AREA (m²)	COLOUR
1	-0.47	-0.30	15.53	🟥
2	-0.30	-0.15	299.41	🟧
3	-0.15	0.00	988.22	🟩
4	0.00	0.30	1922.32	🟦
5	0.30	0.60	270.12	🟦
6	0.60	0.95	73.19	🟪

TOTAL CUT	135 m³
TOTAL FILL	281 m³
NET FILL	146 m³

NOTE:
- CUT AND FILL IS MEASURED FROM PRE-DEVELOPMENT GROUND LEVELS TO FINISHED SURFACE LEVELS.
- ALL VOLUMES ARE GROSS IN-SITU VALUES AND ARE NOT ADJUSTED FOR BULKING OR COMPACTION.
- +9.99 DENOTES CUT / FILL DEPTH FROM EXISTING SURFACE TO FINISHED SURFACE GROUND LEVELS AND FLOOR LEVELS.

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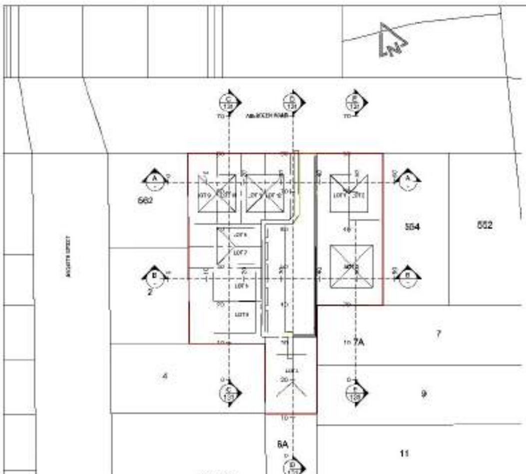

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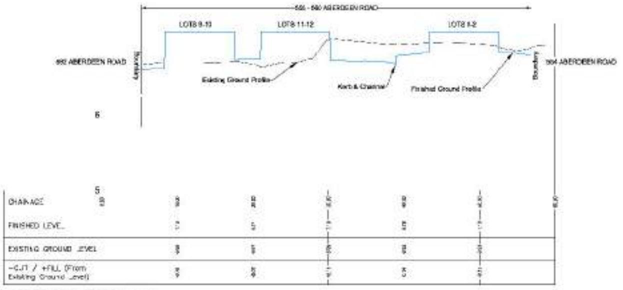

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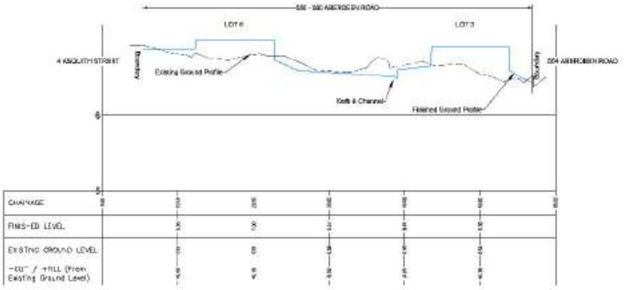

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LONG SECTIONS (1 of 2)

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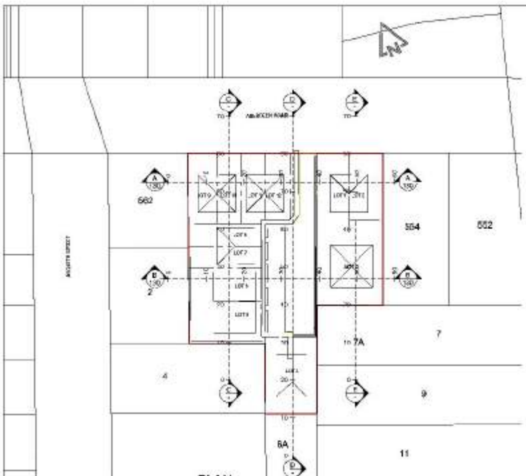

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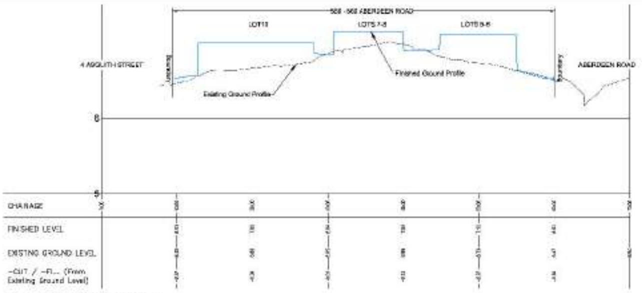

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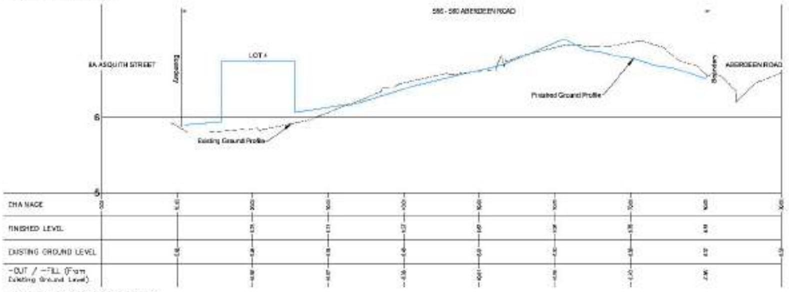

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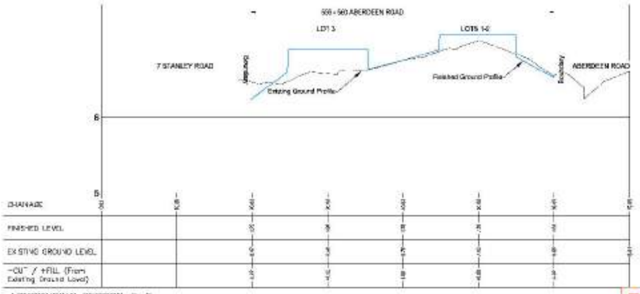

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556-560 ABERDEEN ROAD
GISBORNE

INFRASTRUCTURE SOLUTIONS | PROJECT MANAGEMENT
PO Box 7336, Taradale 4141
Phone : 06 650 5565 Email : admin@infir.nz

DRAWING TITLE
EARTHWORKS
LONG SECTIONS (2 of 2)

DRAWN BY: SL
SCALE: AS SHOWN
DRAWING / SHEET: J23215 / 131
REVISION: 0

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FOR RESOURCE CONSENT

REV	DESCRIPTION TO REVISION	REV BY	DATE
0	ORIGINAL	KP	[illegible]

NOTES :

CLIENT
TW PROPERTY GROUP

PROJECT
RESIDENTIAL DEVELOPMENT
556-560 ABERDEEN ROAD
GISBORNE

INFRASTRUCTURE SOLUTIONS | PROJECT MANAGEMENT
PO Box 7336, Taradale 4141
Phone : 06 650 6565 Email : admin@infir.nz

DRAWING TITLE
EARTHWORKS
EROSION & SEDIMENT CONTROL PLAN

PROPOSAL DESIGNED :	CAD CHECKED :	DESIGNER APPROVED :	CLIENT APPROVED :	ENGINEER APPROVED :
DRAWN BY : KP	SCALE @ A3 : 1:200	JOB NO / DWG / SHEET : J23215 / 140		REVISION : 0

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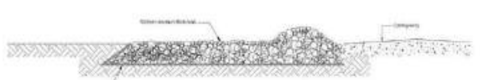
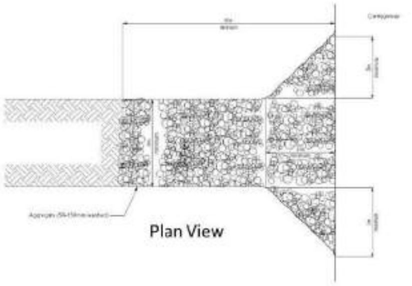
Design parameter	Specification
Aggregate size	50 - 150 mm washed aggregate
Minimum thickness	150 mm
Minimum length	10 m
Minimum width	4 m



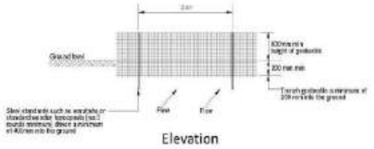
Side Elevation



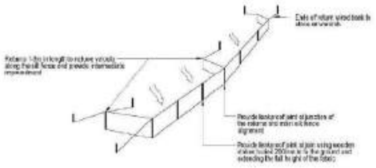
Plan View

STABILIZED CONSTRUCTION ENTRANCE SCHEMATIC

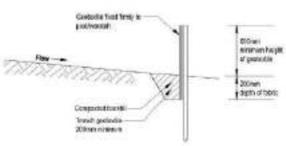
From GD05 - Erosion & Sediment Control Guide - 06/2015



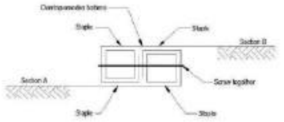
Elevation



Silt fence with returns and support wire



Cross-section



Standard fabric joint

SILT FENCE SCHEMATIC

From GD05 - Erosion & Sediment Control Guide - 06/2015

REV	DESCRIPTION TO REVISION	REV BY	DATE
0	ORIGINAL	KP	06.10.2020

NOTES :

FOR RESOURCE CONSENT

CLIENT
TW PROPERTY GROUP

PROJECT
RESIDENTIAL DEVELOPMENT
556-560 ABERDEEN ROAD
GISBORNE

INFRASTRUCTURE SOLUTIONS | PROJECT MANAGEMENT
PO Box 7336, Taradale 4141
Phone : 06 650 5565 Email : admin@infir.nz

DRAWING TITLE
EARTHWORKS
EROSION & SEDIMENT CONTROL DETAIL

DRAWN BY: KP
SCALE: NA
DRAWING / SHEET: J23215 / M1
REVISION: 0

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FOR RESOURCE CONSENT

REV	DESCRIPTION TO REVISION	REV BY	DATE
0			
0	ORIGINAL	SE	30.10.2025

NOTES :

CLIENT
TW PROPERTY GROUP

PROJECT
RESIDENTIAL DEVELOPMENT
556-560 ABERDEEN ROAD
GISBORNE

INFRASTRUCTURE SOLUTIONS | PROJECT MANAGEMENT
PO Box 7336, Taradale 4141
Phone : 06 650 5565 Email : admin@infir.nz

DRAWING TITLE
ACCESS AND PARKING
OVERVIEW

PROPOSAL CHECKED :	CAD CHECKED :	PROPOSAL APPROVED :	CLIENT APPROVED :	ENGINEER APPROVED :
DRAWN BY : SE	SCALE : 1:100	DRG / DWG / SHEET : J23215 / 200		REVISION : 0

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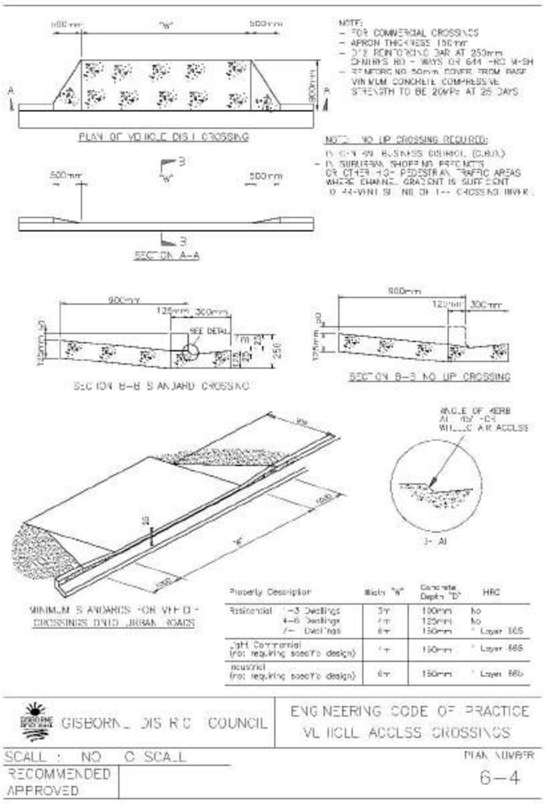


NOTE:
- FOR COMMERCIAL CROSSINGS
- APRON THICKNESS 150mm
- D12 REINFORCING BAR AT 250mm CENTRES BOTH WAYS OR 644 HRC MESH
- REINFORCING 50mm COVER FROM BASE MINIMUM CONCRETE COMPRESSIVE STRENGTH TO BE 20MPa AT 28 DAYS

NOTE: NO LIP CROSSING REQUIRED:
- IN CENTRAL BUSINESS DISTRICT (C.B.D.)
- IN SUBURBAN SHOPPING PRECINCTS OR OTHER HIGH PEDESTRIAN TRAFFIC AREAS WHERE CHANNEL GRADIENT IS SUFFICIENT TO PREVENT SILTING OF THE CROSSING INVERT.

Property Description		Width "W"	Concrete Depth "D"	HRC
Residential	1–3 Dwellings	3m	100mm	No
	4–6 Dwellings	4m	125mm	No
	7– Dwellings	6m	150mm	1 Layer 665
Light Commercial (not requiring specific design)		4m	150mm	1 Layer 665
Industrial (not requiring specific design)		6m	150mm	1 Layer 665

GISBORNE DISTRICT COUNCIL

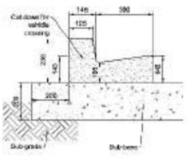
ENGINEERING CODE OF PRACTICE
VEHICLE ACCESS CROSSINGS

SCALE : NOT TO SCALE

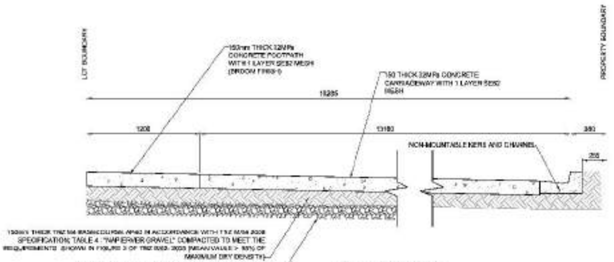
RECOMMENDED
APPROVED

PLAN NUMBER
6–4

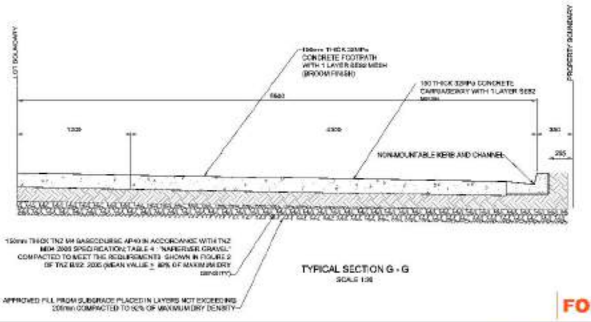
TYPICAL VEHICLE CROSSING
SCALE 1:20



KERB & CHANNEL
Scale: 1:10



TYPICAL SECTION F - F
SCALE 1:20



TYPICAL SECTION G - G
SCALE 1:20

FOR RESOURCE CONSENT

REV	DESCRIPTION TO REVISION	REV BY	DATE
0	ORIGINAL	GT	25.10.2023

NOTES :

CLIENT
TW PROPERTY GROUP

PROJECT
RESIDENTIAL DEVELOPMENT
556-560 ABERDEEN ROAD
NAPIER

INFRASTRUCTURE SOLUTIONS | PROJECT MANAGEMENT
PO Box 7335, Taradale 4141
Phone : 06 650 6565 Email : admin@infir.nz

DRAWING TITLE
ACCESS AND PARKING
TYPICAL DETAILS

ORIGINAL DESIGNED:	CAD CHECKED:	ORIGINAL APPROVED:	CLIENT APPROVED:	ENGINEER APPROVED:
DRAWN BY: SE	SCALE: AS SHOWN	JOB / DWG / SHEET: J23215 / 200		REVISION: 0

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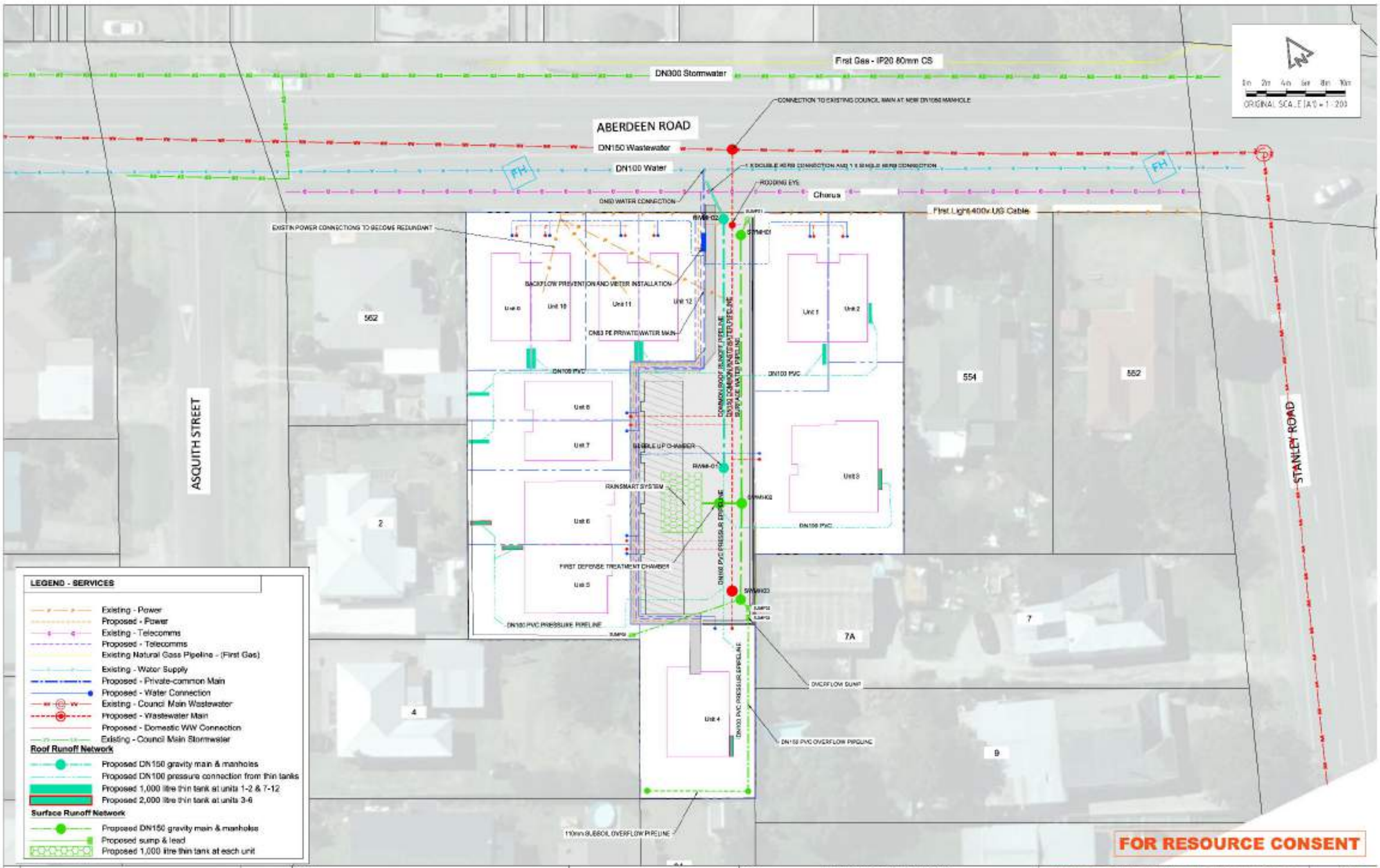

FOR RESOURCE CONSENT

REV	DESCRIPTION TO REVISION	REV BY	DATE
0	ORIGINAL	[illegible]	2023.10.06

NOTES :

CLIENT
TW PROPERTY GROUP

PROJECT
RESIDENTIAL DEVELOPMENT
556-560 ABERDEEN ROAD
GISBORNE

INFRASTRUCTURE SOLUTIONS | PROJECT MANAGEMENT
PO Box 7336, Taradale 4141
Phone : 06 650 5565 Email : admin@infir.nz

DRAWING TITLE
SERVICES
OVERALL SERVICES PLAN

PROPOSAL CHECKED :	CAD CHECKED :	PROPOSAL APPROVED :	CLIENT APPROVED :	ENGINEER APPROVED :
DRAWN BY : SE	A3 ORIG SCALE : 1:200	PROJ / DRG / SHEET : J23215 / 300	REVISION : 0	

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Appendix B Calculations

JOB #: [illegible]
CLIENT: TM Property Group
ADDRESS: 556 - 560 Aberdeen road, [illegible]
DATE: [illegible]

STORMWATER

Developed Surface Areas

LOT	Grass/ Garden	Paths	Access road and footpath	Roof	Total
1	48	36		49	133
2	57	58		49	130
3	107	103		125	335
4	108	58		98	280
5	70	56		90	216
6	34	45		90	169
7	34	33		49	116
8	18	46		49	113
9	47	46		49	142
10	25	47		49	121
11	19	47		49	115
12	29	39		49	117
Access Lane	19		559		578
TOTAL	692	633	559	798	2671

Design Parameters

PARAMETER	VALUE	REFERENCE
RCP8.5 1% AEP 10 mins to rainfall intensity (mm/hr)	163	HIRDs
RCP8.5 5% AEP 10 mins to rainfall intensity (mm/hr)	116	HIRDS
Roof runoff coefficient	0.9	E1/VM1, table 1
Sealed pavement runoff coefficient	0.9	E1/VM1, table 1
Un-developed surface runoff coefficient	0.3	E1/VM1, table 1
Grass / garden areas	0.3	E1/VM1, table 1

Roof Tanks

UNIT	ROOF AREA (m2)	MAXIMUM STORAGE VOLUME REQUIRED (m³)	PROPOSED TANK VOLUME (m3)	TANK HEIGHT (m2)	AVERAGE DEPTH (m)	ORIFICE SIZE (m)	DISCHARGE COEFFICIENT	RELEASE RATE (L/s)	MIN TANK SIZE (m³)		
1	49	1.0	1	2.4	1.2	0.016	0.62	0.6	0.99	0.000201	1
2	49	1.0	1	2.4	1.2	0.016	0.62	0.6	0.99	0.000201	1
3	125	1.8	2	2.4	1.2	0.030	0.62	2.4	1.85	0.000804	2
4	98	2.0	2	2.4	1.2	0.02	0.62	0.9	1.97	0.000314	2
5	90	2.0	2	2.4	1.2	0.02	0.62	0.9	2.01	0.000314	2
6	90	2.0	2	2.4	1.2	0.02	0.62	0.9	2.01	0.000314	2
7	49	1.0	1	2.4	1.2	0.016	0.62	0.6	0.99	0.000201	1
8	49	1.0	1	2.4	1.2	0.016	0.62	0.6	0.99	0.000201	1
9	49	1.0	1	2.4	1.2	0.016	0.62	0.6	0.99	0.000201	1
10	49	1.0	1	2.4	1.2	0.016	0.62	0.6	0.99	0.000201	1
11	49	1.0	1	2.4	1.2	0.016	0.62	0.6	0.99	0.000201	1
12	49	1.0	1	2.4	1.2	0.016	0.62	0.6	0.99	0.000201	1
TOTAL	798							10.1			16

STORM DURATION	RAINFALL DEPTH (mm)	UNIT 1			UNIT 2			UNIT 3			UNIT 4			UNIT 5			UNIT 6		
		RUNOFF VOLUME	DISCHARGE VOLUME	STORAGE VOLUME (m³)	RUNOFF VOLUME (m³)	DISCHARGE VOLUME (m³)	STORAGE VOLUME (m³)	RUNOFF VOLUME (m³)	DISCHARGE VOLUME (m³)	STORAGE VOLUME (m³)	RUNOFF VOLUME (m³)	DISCHARGE VOLUME (m³)	STORAGE VOLUME (m³)	RUNOFF VOLUME (m³)	DISCHARGE VOLUME (m³)	STORAGE VOLUME (m³)	RUNOFF VOLUME (m³)	DISCHARGE VOLUME (m³)	STORAGE VOLUME (m³)
10	26.4	1.3	0.4	0.9	1.3	0.4	0.9	3.3	1.5	1.9	2.4	0.6	1.8	2.4	0.6	1.8	2.4	0.6	1.8
20	34.0	1.7	0.7	1.0	1.7	0.7	1.0	4.3	2.9	1.4	3.0	1.1	1.9	3.1	1.1	2.0	3.1	1.1	2.0
30	41.2	2.0	1.1	0.9	2.0	1.1	0.9	5.2	4.4	0.8	3.7	1.7	2.0	3.7	1.7	2.0	3.7	1.7	2.0
60	54.7	2.7	2.2	0.5	2.7	2.2	0.5	6.8	8.7	-1.9	4.9	3.4	1.5	4.9	3.4	1.5	4.9	3.4	1.5
120	71.7	3.5	4.4	-0.8	3.5	4.4	-0.8	9.0	17.4	-8.5	6.4	6.8	-0.4	6.5	6.8	-0.3	6.5	6.8	-0.3
360	108	5.2	13.1	-7.8	5.2	13.1	-7.8	13.5	52.3	-38.8	9.6	20.4	-10.8	9.8	20.4	-10.6	9.8	20.4	-10.6
720	131	6.4	26.1	-19.7	6.4	26.1	-19.7	16.4	104.5	-88.1	11.7	40.8	-29.2	11.8	40.8	-29.0	11.8	40.8	-29.0
1440	157	7.7	52.3	-44.5	7.7	52.3	-44.5	19.6	209.0	-189.4	14.0	81.7	-67.7	14.2	81.7	-67.5	14.2	81.7	-67.5
2880	184	9.1	104.5	-95.5	9.1	104.5	-95.5	23.0	418.1	-395.1	16.4	163.3	-146.9	16.6	163.3	-146.7	16.6	163.3	-146.7
4320	198	9.7	156.8	-147.0	9.7	156.8	-147.0	24.8	627.1	-602.4	17.6	245.0	-227.3	17.8	245.0	-227.1	17.8	245.0	-227.1
5760	207	10.2	209.0	-198.9	10.2	209.0	-198.9	25.9	836.2	-810.3	18.4	326.6	-308.2	18.7	326.6	-308.0	18.7	326.6	-308.0
7200	213	10.5	261.3	-250.8	10.5	261.3	-250.8	26.6	1045.2	-1018.6	19.0	408.3	-389.3	19.2	408.3	-389.1	19.2	408.3	-389.1
			MAX	0.99		MAX	0.99		MAX	1.85		MAX	1.97		MAX	2.01		MAX	2.01

STORM DURATION	RAINFALL DEPTH (mm)	UNIT 7			UNIT 8			UNIT 9			UNIT 10			UNIT 11			UNIT 12		
		RUNOFF VOLUME (m³)	DISCHARGE VOLUME (m³)	STORAGE VOLUME (m³)	RUNOFF VOLUME (m³)	DISCHARGE VOLUME (m³)	STORAGE VOLUME (m³)	RUNOFF VOLUME (m³)	DISCHARGE VOLUME (m³)	STORAGE VOLUME (m³)	RUNOFF VOLUME (m³)	DISCHARGE VOLUME (m³)	STORAGE VOLUME (m³)	RUNOFF VOLUME (m³)	DISCHARGE VOLUME (m³)	STORAGE VOLUME (m³)	RUNOFF VOLUME (m³)	DISCHARGE VOLUME (m³)	STORAGE VOLUME (m³)
10	26.4	1.3	0.4	0.9	1.3	0.4	0.9	1.3	0.4	0.9	1.3	0.4	0.9	1.3	0.4	0.9	1.3	0.4	0.9
20	34.0	1.7	0.7	1.0	1.7	0.7	1.0	1.7	0.7	1.0	1.7	0.7	1.0	1.7	0.7	1.0	1.7	0.7	1.0
30	41.2	2.0	1.1	0.9	2.0	1.1	0.9	2.0	1.1	0.9	2.0	1.1	0.9	2.0	1.1	0.9	2.0	1.1	0.9
60	54.7	2.7	2.2	0.5	2.7	2.2	0.5	2.7	2.2	0.5	2.7	2.2	0.5	2.7	2.2	0.5	2.7	2.2	0.5
120	71.7	3.5	4.4	-0.8	3.5	4.4	-0.8	3.5	4.4	-0.8	3.5	4.4	-0.8	3.5	4.4	-0.8	3.5	4.4	-0.8
360	108	5.2	13.1	-7.8	5.2	13.1	-7.8	5.2	13.1	-7.8	5.2	13.1	-7.8	5.2	13.1	-7.8	5.2	13.1	-7.8
720	131	6.4	26.1	-19.7	6.4	26.1	-19.7	6.4	26.1	-19.7	6.4	26.1	-19.7	6.4	26.1	-19.7	6.4	26.1	-19.7
1440	157	7.7	52.3	-44.5	7.7	52.3	-44.5	7.7	52.3	-44.5	7.7	52.3	-44.5	7.7	52.3	-44.5	7.7	52.3	-44.5
2880	184	9.1	104.5	-95.5	9.1	104.5	-95.5	9.1	104.5	-95.5	9.1	104.5	-95.5	9.1	104.5	-95.5	9.1	104.5	-95.5
4320	198	9.7	156.8	-147.0	9.7	156.8	-147.0	9.7	156.8	-147.0	9.7	156.8	-147.0	9.7	156.8	-147.0	9.7	156.8	-147.0
5760	207	10.2	209.0	-198.9	10.2	209.0	-198.9	10.2	209.0	-198.9	10.2	209.0	-198.9	10.2	209.0	-198.9	10.2	209.0	-198.9
7200	213	10.5	261.3	-250.8	10.5	261.3	-250.8	10.5	261.3	-250.8	10.5	261.3	-250.8	10.5	261.3	-250.8	10.5	261.3	-250.8
			MAX	0.99		MAX	0.99		MAX	0.99		MAX	0.99		MAX	0.99		MAX	0.99

LOT	ROOF AREA	ORIFICE SIZE	DISCHARGE RATE (L/s)
LOT 1	49	0.016	0.6
LOT 2	49	0.016	0.6
LOT 3	125	0.030	2.4
LOT 4	98	0.02	0.9
LOT 5	90	0.02	0.9
LOT 6	90	0.02	0.9
LOT 7	49	0.016	0.6
LOT 8	49	0.016	0.6
LOT 9	49	0.016	0.6
LOT 10	49	0.016	0.6
LOT 11	49	0.016	0.6
LOT 12	49	0.016	0.6
	798		10.1

JOB #: J22189
CLIENT: TW Proprty Group
ADDRESS: 556 - 560 Aberdeen road, Gisborne
DATE: 09.10.2023

STORMWATER

Design Parameters

PARAMETER	VALUE	REFERENCE
RCP8.5 1% AEP 10 minute rainfall intensity (mm/hr)	162	HIRDs
RCP8.5 1% AEP 20 minute rainfall intensity (mm/hr)	116	HIRDS
Roof runoff coefficient	0.9	E1/VM1, table 1
Sealed pavement runoff coefficient	0.85	E1/VM1, table 1
Un-developed surface runoff coefficient	0.25	E1/VM1, table 1
Grass / garden areas	0.2	E1/VM1, table 1

PRE DEVELOPMENT RUNOFF

Time of Concentration

$$t = \frac{107nL^{1/3}}{S^{0.2}}$$

Where	NORTH	SOUTH
n mannings cooefficient	0.0275	0.0275
L Length of channel	19.9	58
s Average surface slope	2.5%	2.3%
T Time of concentration in minutes	16.6	23.5

Use time of concentration of 10 minutes for both the north and south catchments

Pre Development Runoff

SURFACE TYPE	NORTH CATCHMENT			SOUTH CATCHMENT		
	A: Area (m2)	C x A	Q (L/s)	A: Area (m2)	C x A	Q (L/s)
ROOF AREAS	492	442.8	14.3		0	0.0
SEALED SURFACES	0	0	0.0	114	96.9	3.1
UN-DEVELOPED	750	187.5	0.0	1315	328.75	10.6
TOTAL	1242	630.3	14.3	1429	425.65	13.7

LOT	CATCHMENT	Grass/ Garden	Patio	Access road and footpath	Roof	Total
1	N	68	66		49	183
2	N	57	50		49	156
3	S	137	105		125	367
4	S	149	43		89	281
5	S	70	56		90	216
6	S	34	45		90	169
7	S	24	41		49	114
8	S	18	46		49	113
9	N	47	46		49	142
10	N	25	47		49	121
11	N	19	47		49	115
12	N	25	43		49	117
Access Lane	S	19		558		578
TOTAL		692	633	558	788	2671

POST DEVELOPMENT RUNOFF

Surface characteristics

NORTH CATCHMENT

LOT	PAVEMENT AREAS TO RAINSMART SYSTEM		GARDEN / GRASS TO RAINSMART SYSTEM		TOTAL ATTENUATED C X A	PAVEMENT AREAS NOT TO RAINSMART SYSTEM		GARDEN / GRASS NOT TO RAINSMART SYSTEM		TOTAL UNATTENUATED C X A
	A: Pavement area (m²)	C x A	A: Garden area (m²)	C x A		A: Pavement area (m²)	C x A	A: Garden area (m²)	C x A	
1	54.9	46.6	25.8	5.2	51.8	10.8	9.2	41.9	10.5	19.6
2		0.0		0.0	0.0	49.7	42.3	57.5	14.4	56.6
9		0.0		0.0	0.0	46.1	39.2	47.0	11.8	50.9
10		0.0		0.0	0.0	46.6	39.6	24.8	6.2	45.8
11	22.3	19.0		0.0	19.0	24.6	20.9	18.6	4.7	25.5
12	23.6	20.1	8.3	1.7	21.7	18.9	16.1	16.8	4.2	20.3
TOTAL	100.8	85.6	34.1	6.8	92.5	196.7	167.2	206.5	51.6	218.8

Unattenuated surface runoff	9.8
Attenuated roof runoff	10.1
TOTAL NORTH RUNOFF	**19.9**
ALLOWABLE NORTH RUNOFF	14.3
EXCESS RUNOFF	5.7

SOUTH CATCHMENT

LOT	PAVEMENT AREAS TO RAINSMART SYSTEM		GARDEN / GRASS TO RAINSMART SYSTEM		TOTAL ATTENUATED C X A	PAVEMENT AREAS NOT TO RAINSMART SYSTEM		GARDEN / GRASS NOT TO RAINSMART SYSTEM		TOTAL UNATTENUATED C X A
	A: Pavement area (m²)	C x A	A: Garden area (m²)	C x A		A: Pavement area (m²)	C x A	A: Garden area (m²)	C x A	
3	69.3	58.9	38.9	7.8	66.7	35.9	30.5	58.0	24.5	55.0
4				0.0	0.0	42.5	36.2	149.2	37.3	73.5
5	55.7	47.4	5.9	1.2	48.5	0.0	0.0	63.8	15.9	15.9
6	44.6	37.9	6.9	1.4	39.3	0.0	0.0	27.4	6.8	6.8
7	41.2	35.0	8.3	1.7	36.7	0.0	0.0	15.4	3.9	3.9
8	45.9	39.0	5.8	1.2	40.2	0.0	0.0	12.5	3.1	3.1
ACCESS LANE	558.4	474.7	19.1	3.8	478.5	0.0	0.0	0.1	0.0	0.0
TOTAL	815.1	692.9	84.9	17.0	709.9	78.4	66.7	366.4	91.6	158.3

Unattenuated surface runoff	7.12
Excess north runoff	5.7
Sub-total	**12.8**
Allowable south runoff	13.7
allowable 100-year overflow	0.9

RAINSMART SIZING

Rainsmart size	No modules (no)	Dimensions (m)
L	10	7.15
W	14	5.6
D	2	0.88
Area (m²)		40.0
Net Volume (m³)		33.5

Total number of units	280
Infiltration rate (mm/hr)	375

ATTENUATED C x A	709.9
ALLOWABLE OVERFLOW RATE	0.9

Duration (minutes)	I_{100}	Q	V_{runoff} (m³)	V_{inf} (m³)	V_{stor}	Balance	Overflow rate	Overflow volume for period	OK / NOT OK
minutes	mm/hr	l/sec	m³	m³	m³	m³	l/s	m³	
10	162	31.5	19.2	2.5	16.7	16.8	0.0	0.0	OK
20	116	22.9	27.4	5.0	22.4	11.0	0.0	0.0	OK
30	95.4	18.8	33.9	7.5	26.4	7.1	0.0	0.0	OK
60	68.8	13.6	48.8	15.0	33.8	-0.3	0.1	0.3	OK
120	48.8	9.6	69.3	30.0	39.3	-5.8	0.8	5.8	OK
360	26.9	5.3	114.6	90.1	24.5	9.0	0.0	0.0	OK
720	17.6	3.5	149.9	180.2	0.0	33.5	0.0	0.0	OK
1440	11.1	2.2	189.1	360.4	0.0	33.5	0.0	0.0	OK
2880	5.65	1.3	226.6	720.7	0.0	33.5	0.0	0.0	OK
4320	4.82	1.0	246.3	1081.1	0.0	33.5	0.0	0.0	OK

JOB #: **J22189**
CLIENT: **TW Proprty Group**
ADDRESS: **556 - 560 Aberdeen road, Gisborne**
DATE: **10.10.2023**

WASTEWATER

Equivalent Population

EP per unit	Number	EP
3.2	12	38.4

Design Flow Rates

200 Litres per day per person

DESIGN FLOW	**PEAKING FACTOR**	**L/day**	**L/s**
Average dry weather flow	1	7680	0.09
Peak Dry Weather Flow	2.5	19200	0.22
Peak Wet Weather Flow	4	30720	0.36

JOB #: **J22189**
CLIENT: **TW Proprty Group**
ADDRESS: **556 - 560 Aberdeen road, Gisborne**
DATE: **10.10.2023**

WATER SUPPLY

Equivalent Population

EP per unit	Number	EP
3.2	12	38.4

Design Flow Rates

330 Litres per day per person

DESIGN FLOW	**PEAKING FACTOR**	**L/day**	**L/s**
Average consuption	1	12672	0.15

Appendix C Infiltration Test

Hand Auger Borehole Log

Method: 100mm Hand Auger | Level Logger

Test ID:	PT-01	**Client:**	NZHG	**Coordinates:**	5709882mN, 2036105mE
Project ID:	24477	**Project:**	Geotechnical Due Diligence	**System:**	NZTM
Sheet:	1 of 1	**Location:**	556-560 Abeerdeen Rd, Gisborne	**Elevation:**	Ground
Test Date:	29/06/2023	**Test Site:**	Refer to geotechnical investigation plan	**Located By:**	Site plan/map
Logged By:	RB				
Checked By:					
Vane ID:					

Depth (m)	Material Description	Geology	Water	In-situ Testing: Dynamic Cone Penetrometer (blows / 50mm) 2 4 6 8; Shear Vane, Su (kPa) 50 100 150 200	Test Values peak / remoulded (sensitivity)	Depth (m)
0.0	Organic silty SAND; dark greyish brown. Moist; sand, fine to medium.	Topsoil	Groundwater Not Encountered			
0.5	SAND, with some silt; dark blackish brown. Moist; sand, fine to medium. - INTERBEDDED WITH - SAND, with some pumiceous sand and silt; dark brown. Moist; sand, fine to coarse. 1.1m: Level Logger Depth	Uncontrolled Fill / Disturbed ground				
1.0						-1.0
1.5	SAND, with trace silt; light brown. Moist to wet; sand, fine to coarse. 1.5m: Wet.	Holocene Beach Deposits				

Hole Depth: 1.60m

Termination: Target soil moisture content

Materials described in general accordance with NZGS Field Description of Soil and Rock (2005). No correlation is implied between shear vane and DCP values.

Generated with CORE-GS by Geroc - HA/TP Log with Photo v8.1 - 4/07/2023 9:42:32 am

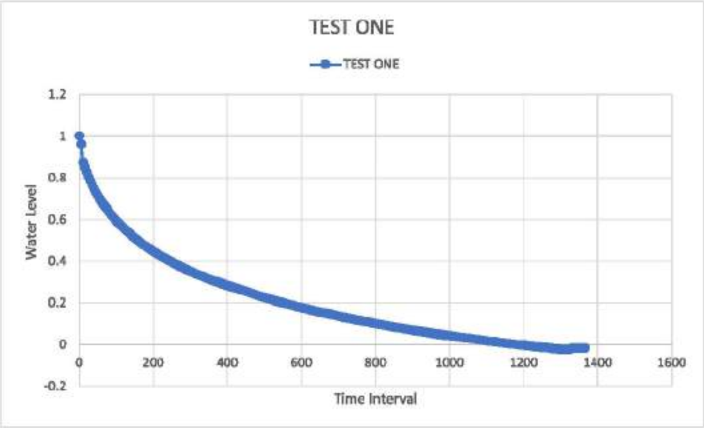
Test Name:	PT-01	**Test hole Diameter:**	0.1	**Base Area (B):**	0.008
Test Date:	July 29th 2023	**Test hole Depth:**	1.5	**Circumfrence (C):**	0.314
Level Loggger #:	2128031	**Level Logger Depth:**	1.05	**Test One:** 12:22:10	**Test Two:**

Level	Time	time steps		Depth Steps		Volume Soaked	Soakage Surface Area	Soakage Rate	
		t0	t1	h0	h1	V=(h0-h1)*B	A=(C*(h0+h1)/2)+B	SR=V/A/(t1-t0)	SR*60*60*1000
	hh:mm:ss	s		m		m^3	m^2	$m^3m^{-2}s^{-1}$	$Lm^{-2}h^{-1}$
				TEST ONE					
1.002243	12:22:10	0	5	-	-	-	-	-	-
0.96208	12:22:15	5	10	1.002	0.962	3.15E-04	0.316	1.99E-04	718
0.874006	12:22:20	10	15	0.962	0.874	6.92E-04	0.296	4.67E-04	1681
0.849949	12:22:25	15	20	0.874	0.850	1.89E-04	0.279	1.36E-04	488
0.828236	12:22:30	20	25	0.850	0.828	1.71E-04	0.271	1.26E-04	452
0.804689	12:22:35	25	30	0.828	0.805	1.85E-04	0.264	1.40E-04	504
0.784811	12:22:40	30	35	0.805	0.785	1.56E-04	0.258	1.21E-04	436
0.766055	12:22:45	35	40	0.785	0.766	1.47E-04	0.251	1.17E-04	422
0.748624	12:22:50	40	45	0.766	0.749	1.37E-04	0.246	1.11E-04	401
0.731702	12:22:55	45	50	0.749	0.732	1.33E-04	0.240	1.11E-04	398
0.715596	12:23:00	50	55	0.732	0.716	1.26E-04	0.235	1.08E-04	387
0.701121	12:23:05	55	60	0.716	0.701	1.14E-04	0.230	9.87E-05	355
0.686646	12:23:10	60	65	0.701	0.687	1.14E-04	0.226	1.01E-04	362
0.674006	12:23:15	65	70	0.687	0.674	9.93E-05	0.222	8.96E-05	323
0.661162	12:23:20	70	75	0.674	0.661	1.01E-04	0.218	9.27E-05	334
0.649032	12:23:25	75	80	0.661	0.649	9.53E-05	0.214	8.92E-05	321
0.637105	12:23:30	80	85	0.649	0.637	9.37E-05	0.210	8.93E-05	321
0.626096	12:23:35	85	90	0.637	0.626	8.65E-05	0.206	8.38E-05	302
0.615291	12:23:40	90	95	0.626	0.615	8.49E-05	0.203	8.37E-05	301
0.604995	12:23:45	95	100	0.615	0.605	8.09E-05	0.200	8.10E-05	292
0.595719	12:23:50	100	105	0.605	0.596	7.29E-05	0.196	7.42E-05	267
0.586544	12:23:55	105	110	0.596	0.587	7.21E-05	0.194	7.45E-05	268
0.577166	12:24:00	110	115	0.587	0.577	7.37E-05	0.191	7.73E-05	278
0.567992	12:24:05	115	120	0.577	0.568	7.21E-05	0.188	7.68E-05	276
0.560143	12:24:10	120	125	0.568	0.560	6.16E-05	0.185	6.66E-05	240
0.55107	12:24:15	125	130	0.560	0.551	7.13E-05	0.182	7.81E-05	281
0.542813	12:24:20	130	135	0.551	0.543	6.48E-05	0.180	7.22E-05	260
0.535066	12:24:25	135	140	0.543	0.535	6.08E-05	0.177	6.87E-05	247
0.526911	12:24:30	140	145	0.535	0.527	6.40E-05	0.175	7.33E-05	264
0.518858	12:24:35	145	150	0.527	0.519	6.32E-05	0.172	7.35E-05	265
0.511519	12:24:40	150	155	0.519	0.512	5.76E-05	0.170	6.79E-05	245
0.504893	12:24:45	155	160	0.512	0.505	5.20E-05	0.168	6.21E-05	224
0.497655	12:24:50	160	165	0.505	0.498	5.68E-05	0.165	6.88E-05	248
0.491233	12:24:55	165	170	0.498	0.491	5.04E-05	0.163	6.18E-05	223
0.483588	12:25:00	170	175	0.491	0.484	6.00E-05	0.161	7.46E-05	269
0.477268	12:25:05	175	180	0.484	0.477	4.96E-05	0.159	6.25E-05	225
0.47156	12:25:10	180	185	0.477	0.472	4.48E-05	0.157	5.72E-05	206
0.465647	12:25:15	185	190	0.472	0.466	4.64E-05	0.155	5.99E-05	216
0.459939	12:25:20	190	195	0.466	0.460	4.48E-05	0.153	5.85E-05	211
0.453211	12:25:25	195	200	0.460	0.453	5.28E-05	0.151	6.99E-05	251
0.446687	12:25:30	200	205	0.453	0.447	5.12E-05	0.149	6.87E-05	247
0.441386	12:25:35	205	210	0.447	0.441	4.16E-05	0.147	5.65E-05	203
0.43629	12:25:40	210	215	0.441	0.436	4.00E-05	0.146	5.49E-05	198
0.430581	12:25:45	215	220	0.436	0.431	4.48E-05	0.144	6.23E-05	224
0.425688	12:25:50	220	225	0.431	0.426	3.84E-05	0.142	5.40E-05	194
0.420591	12:25:55	225	230	0.426	0.421	4.00E-05	0.141	5.69E-05	205
0.414985	12:26:00	230	235	0.421	0.415	4.40E-05	0.139	6.33E-05	228
0.410499	12:26:05	235	240	0.415	0.410	3.52E-05	0.138	5.12E-05	184
0.405097	12:26:10	240	245	0.410	0.405	4.24E-05	0.136	6.24E-05	225
0.400714	12:26:15	245	250	0.405	0.401	3.44E-05	0.134	5.12E-05	184
0.395617	12:26:20	250	255	0.401	0.396	4.00E-05	0.133	6.02E-05	217
0.391437	12:26:25	255	260	0.396	0.391	3.28E-05	0.131	4.99E-05	180
0.386748	12:26:30	260	265	0.391	0.387	3.68E-05	0.130	5.66E-05	204
0.382059	12:26:35	265	270	0.387	0.382	3.68E-05	0.129	5.73E-05	206
0.377472	12:26:40	270	275	0.382	0.377	3.60E-05	0.127	5.67E-05	204
0.372885	12:26:45	275	280	0.377	0.373	3.60E-05	0.126	5.73E-05	206
0.368603	12:26:50	280	285	0.373	0.369	3.36E-05	0.124	5.41E-05	195
0.364424	12:26:55	285	290	0.369	0.364	3.28E-05	0.123	5.34E-05	192
0.360143	12:27:00	290	295	0.364	0.360	3.36E-05	0.122	5.53E-05	199
0.356371	12:27:05	295	300	0.360	0.356	2.96E-05	0.120	4.92E-05	177
0.351886	12:27:10	300	305	0.356	0.352	3.52E-05	0.119	5.92E-05	213
0.34791	12:27:15	305	310	0.352	0.348	3.12E-05	0.118	5.30E-05	191
0.344037	12:27:20	310	315	0.348	0.344	3.04E-05	0.117	5.22E-05	188
0.340163	12:27:25	315	320	0.344	0.340	3.04E-05	0.115	5.28E-05	190
0.336493	12:27:30	320	325	0.340	0.336	2.88E-05	0.114	5.05E-05	182
0.332722	12:27:35	325	330	0.336	0.333	2.96E-05	0.113	5.24E-05	189
0.329052	12:27:40	330	335	0.333	0.329	2.88E-05	0.112	5.16E-05	186

0.325382	12:27:45	335	340	0.329	0.325	2.88E-05	0.111	5.21E-05	188
0.321916	12:27:50	340	345	0.325	0.322	2.72E-05	0.110	4.97E-05	179
0.318756	12:27:55	345	350	0.322	0.319	2.48E-05	0.108	4.58E-05	165
0.315698	12:28:00	350	355	0.319	0.316	2.40E-05	0.108	4.47E-05	161
0.31213	12:28:05	355	360	0.316	0.312	2.80E-05	0.106	5.26E-05	189
0.309072	12:28:10	360	365	0.312	0.309	2.40E-05	0.105	4.56E-05	164
0.305505	12:28:15	365	370	0.309	0.306	2.80E-05	0.104	5.37E-05	193
0.302141	12:28:20	370	375	0.306	0.302	2.64E-05	0.103	5.12E-05	184
0.299083	12:28:25	375	380	0.302	0.299	2.40E-05	0.102	4.70E-05	169
0.29633	12:28:30	380	385	0.299	0.296	2.16E-05	0.101	4.26E-05	154
0.292966	12:28:35	385	390	0.296	0.293	2.64E-05	0.100	5.26E-05	189
0.289806	12:28:40	390	395	0.293	0.290	2.48E-05	0.099	4.99E-05	180
0.286748	12:28:45	395	400	0.290	0.287	2.40E-05	0.098	4.88E-05	176
0.2842	12:28:50	400	405	0.287	0.284	2.00E-05	0.098	4.10E-05	148
0.28104	12:28:55	405	410	0.284	0.281	2.48E-05	0.097	5.14E-05	185
0.278695	12:29:00	410	415	0.281	0.279	1.84E-05	0.096	3.85E-05	138
0.275535	12:29:05	415	420	0.279	0.276	2.48E-05	0.095	5.23E-05	188
0.272987	12:29:10	420	425	0.276	0.273	2.00E-05	0.094	4.26E-05	153
0.270133	12:29:15	425	430	0.273	0.270	2.24E-05	0.093	4.81E-05	173
0.267278	12:29:20	430	435	0.270	0.267	2.24E-05	0.092	4.86E-05	175
0.264832	12:29:25	435	440	0.267	0.265	1.92E-05	0.091	4.20E-05	151
0.261672	12:29:30	440	445	0.265	0.262	2.48E-05	0.091	5.48E-05	197
0.259123	12:29:35	445	450	0.262	0.259	2.00E-05	0.090	4.46E-05	161
0.255861	12:29:40	450	455	0.259	0.256	2.56E-05	0.089	5.77E-05	208
0.252905	12:29:45	455	460	0.256	0.253	2.32E-05	0.088	5.29E-05	190
0.249745	12:29:50	460	465	0.253	0.250	2.48E-05	0.087	5.72E-05	206
0.246687	12:29:55	465	470	0.250	0.247	2.40E-05	0.086	5.60E-05	201
0.243731	12:30:00	470	475	0.247	0.244	2.32E-05	0.085	5.47E-05	197
0.240673	12:30:05	475	480	0.244	0.241	2.40E-05	0.084	5.72E-05	206
0.237717	12:30:10	480	485	0.241	0.238	2.32E-05	0.083	5.59E-05	201
0.235066	12:30:15	485	490	0.238	0.235	2.08E-05	0.082	5.07E-05	183
0.231906	12:30:20	490	495	0.235	0.232	2.48E-05	0.081	6.11E-05	220
0.229052	12:30:25	495	500	0.232	0.229	2.24E-05	0.080	5.59E-05	201
0.226402	12:30:30	500	505	0.229	0.226	2.08E-05	0.079	5.24E-05	189
0.223445	12:30:35	505	510	0.226	0.223	2.32E-05	0.079	5.91E-05	213
0.220795	12:30:40	510	515	0.223	0.221	2.08E-05	0.078	5.36E-05	193
0.218349	12:30:45	515	520	0.221	0.218	1.92E-05	0.077	5.00E-05	180
0.215698	12:30:50	520	525	0.218	0.216	2.08E-05	0.076	5.48E-05	197
0.212742	12:30:55	525	530	0.216	0.213	2.32E-05	0.075	6.18E-05	222
0.210194	12:31:00	530	535	0.213	0.210	2.00E-05	0.074	5.39E-05	194
0.207543	12:31:05	535	540	0.210	0.208	2.08E-05	0.073	5.67E-05	204
0.205708	12:31:10	540	545	0.208	0.206	1.44E-05	0.073	3.96E-05	143
0.202854	12:31:15	545	550	0.206	0.203	2.24E-05	0.072	6.22E-05	224
0.200204	12:31:20	550	555	0.203	0.200	2.08E-05	0.071	5.85E-05	211
0.197655	12:31:25	555	560	0.200	0.198	2.00E-05	0.070	5.69E-05	205
0.195209	12:31:30	560	565	0.198	0.195	1.92E-05	0.070	5.52E-05	199
0.192864	12:31:35	565	570	0.195	0.193	1.84E-05	0.069	5.35E-05	193
0.190724	12:31:40	570	575	0.193	0.191	1.68E-05	0.068	2.47E-05	89
0.188175	12:31:45	575	580	0.191	0.188	2.00E-05	0.067	5.94E-05	214
0.185831	12:31:50	580	585	0.188	0.186	1.84E-05	0.067	5.53E-05	199
0.183384	12:31:55	585	590	0.186	0.183	1.92E-05	0.066	5.84E-05	210
0.18104	12:32:00	590	595	0.183	0.181	1.84E-05	0.065	5.66E-05	204
0.179511	12:32:05	595	600	0.181	0.180	1.20E-05	0.064	3.72E-05	134
0.177472	12:32:10	600	605	0.180	0.177	1.60E-05	0.064	5.01E-05	180
0.175025	12:32:15	605	610	0.177	0.175	1.92E-05	0.063	6.08E-05	219
0.173191	12:32:20	610	615	0.175	0.173	1.44E-05	0.063	4.61E-05	166
0.171458	12:32:25	615	620	0.173	0.171	1.36E-05	0.062	4.39E-05	158
0.169419	12:32:30	620	625	0.171	0.169	1.60E-05	0.061	5.22E-05	188
0.166361	12:32:35	625	630	0.169	0.166	2.40E-05	0.061	7.93E-05	285
0.164098	12:32:40	630	635	0.166	0.164	1.78E-05	0.060	5.95E-05	214
0.161865	12:32:45	635	640	0.164	0.162	1.75E-05	0.059	5.94E-05	214
0.160163	12:32:50	640	645	0.162	0.160	1.34E-05	0.058	4.58E-05	165
0.158145	12:32:55	645	650	0.160	0.158	1.59E-05	0.058	5.48E-05	197
0.156269	12:33:00	650	655	0.158	0.156	1.47E-05	0.057	5.15E-05	185
0.154475	12:33:05	655	660	0.156	0.154	1.41E-05	0.057	4.97E-05	179
0.152691	12:33:10	660	665	0.154	0.153	1.40E-05	0.056	4.99E-05	180
0.150112	12:33:15	665	670	0.153	0.150	2.03E-05	0.055	7.31E-05	263
0.149072	12:33:20	670	675	0.150	0.149	8.17E-06	0.055	2.98E-05	107
0.147431	12:33:25	675	680	0.149	0.147	1.29E-05	0.054	4.74E-05	171
0.14476	12:33:30	680	685	0.147	0.145	2.10E-05	0.054	7.80E-05	281
0.142926	12:33:35	685	690	0.145	0.143	1.44E-05	0.053	5.43E-05	196
0.140714	12:33:40	690	695	0.143	0.141	1.74E-05	0.052	6.63E-05	239
0.139266	12:33:45	695	700	0.141	0.139	1.14E-05	0.052	4.39E-05	158
0.136922	12:33:50	700	705	0.139	0.137	1.84E-05	0.051	7.19E-05	259
0.135199	12:33:55	705	710	0.137	0.135	1.35E-05	0.051	5.35E-05	193
0.133415	12:34:00	710	715	0.135	0.133	1.40E-05	0.050	5.60E-05	202
0.13157	12:34:05	715	720	0.133	0.132	1.45E-05	0.049	5.86E-05	211
0.130133	12:34:10	720	725	0.132	0.130	1.13E-05	0.049	4.61E-05	166
0.127808	12:34:15	725	730	0.130	0.128	1.83E-05	0.048	7.55E-05	272

0.126279	12:34:20	730	735	0.128	0.126	1.20E-05	0.048	5.03E-05	181
0.124383	12:34:25	735	740	0.126	0.124	1.49E-05	0.047	6.31E-05	227
0.122813	12:34:30	740	745	0.124	0.123	1.23E-05	0.047	5.28E-05	190
0.120846	12:34:35	745	750	0.123	0.121	1.55E-05	0.046	6.70E-05	241
0.118991	12:34:40	750	755	0.121	0.119	1.46E-05	0.046	6.40E-05	230
0.116667	12:34:45	755	760	0.119	0.117	1.83E-05	0.045	8.14E-05	293
0.114893	12:34:50	760	765	0.117	0.115	1.39E-05	0.044	6.30E-05	227
0.113344	12:34:55	765	770	0.115	0.113	1.22E-05	0.044	5.57E-05	200
0.11209	12:35:00	770	775	0.113	0.112	9.85E-06	0.043	4.55E-05	164
0.109623	12:35:05	775	780	0.112	0.110	1.94E-05	0.043	9.08E-05	327
0.10842	12:35:10	780	785	0.110	0.108	9.45E-06	0.042	4.49E-05	162
0.106789	12:35:15	785	790	0.108	0.107	1.28E-05	0.042	6.15E-05	221
0.104577	12:35:20	790	795	0.107	0.105	1.74E-05	0.041	8.46E-05	305
0.10265	12:35:25	795	800	0.105	0.103	1.51E-05	0.040	7.49E-05	270
0.100449	12:35:30	800	805	0.103	0.100	1.73E-05	0.040	8.70E-05	313
0.099001	12:35:35	805	810	0.100	0.099	1.14E-05	0.039	5.80E-05	209
0.097686	12:35:40	810	815	0.099	0.098	1.03E-05	0.039	5.33E-05	192
0.096096	12:35:45	815	820	0.098	0.096	1.25E-05	0.038	6.52E-05	235
0.094088	12:35:50	820	825	0.096	0.094	1.58E-05	0.038	8.36E-05	301
0.092773	12:35:55	825	830	0.094	0.093	1.03E-05	0.037	5.55E-05	200
0.091702	12:36:00	830	835	0.093	0.092	8.41E-06	0.037	4.56E-05	164
0.089898	12:36:05	835	840	0.092	0.090	1.42E-05	0.036	7.79E-05	280
0.088053	12:36:10	840	845	0.090	0.088	1.45E-05	0.036	8.09E-05	291
0.08682	12:36:15	845	850	0.088	0.087	9.69E-06	0.035	5.49E-05	197
0.085138	12:36:20	850	855	0.087	0.085	1.32E-05	0.035	7.58E-05	273
0.083252	12:36:25	855	860	0.085	0.083	1.48E-05	0.034	8.64E-05	311
0.081957	12:36:30	860	865	0.083	0.082	1.02E-05	0.034	6.02E-05	217
0.080591	12:36:35	865	870	0.082	0.081	1.07E-05	0.033	6.43E-05	231
0.079551	12:36:40	870	875	0.081	0.080	8.17E-06	0.033	4.95E-05	178
0.077971	12:36:45	875	880	0.080	0.078	1.24E-05	0.033	7.61E-05	274
0.076086	12:36:50	880	885	0.078	0.076	1.48E-05	0.032	9.24E-05	333
0.075056	12:36:55	885	890	0.076	0.075	8.09E-06	0.032	5.12E-05	184
0.072762	12:37:00	890	895	0.075	0.073	1.80E-05	0.031	1.16E-04	417
0.071916	12:37:05	895	900	0.073	0.072	6.65E-06	0.031	4.35E-05	156
0.070306	12:37:10	900	905	0.072	0.070	1.26E-05	0.030	8.38E-05	302
0.068502	12:37:15	905	910	0.070	0.069	1.42E-05	0.030	9.56E-05	344
0.066871	12:37:20	910	915	0.069	0.067	1.28E-05	0.029	8.80E-05	317
0.065933	12:37:25	915	920	0.067	0.066	7.37E-06	0.029	5.13E-05	185
0.06422	12:37:30	920	925	0.066	0.064	1.35E-05	0.028	9.51E-05	342
0.06314	12:37:35	925	930	0.064	0.063	8.49E-06	0.028	6.09E-05	219
0.061498	12:37:40	930	935	0.063	0.061	1.29E-05	0.027	9.40E-05	338
0.06002	12:37:45	935	940	0.061	0.060	1.16E-05	0.027	8.62E-05	310
0.05895	12:37:50	940	945	0.060	0.059	8.41E-06	0.027	6.33E-05	228
0.05737	12:37:55	945	950	0.059	0.057	1.24E-05	0.026	9.50E-05	342
0.056177	12:38:00	950	955	0.057	0.056	9.37E-06	0.026	7.29E-05	263
0.054628	12:38:05	955	960	0.056	0.055	1.22E-05	0.025	9.64E-05	347
0.053354	12:38:10	960	965	0.055	0.053	1.00E-05	0.025	8.07E-05	290
0.051631	12:38:15	965	970	0.053	0.052	1.35E-05	0.024	1.11E-04	400
0.050153	12:38:20	970	975	0.052	0.050	1.16E-05	0.024	9.74E-05	351
0.04946	12:38:25	975	980	0.050	0.049	5.44E-06	0.024	4.63E-05	167
0.048226	12:38:30	980	985	0.049	0.048	9.69E-06	0.023	8.35E-05	301
0.046432	12:38:35	985	990	0.048	0.046	1.41E-05	0.023	1.24E-04	446
0.04525	12:38:40	990	995	0.046	0.045	9.29E-06	0.022	8.35E-05	300
0.044077	12:38:45	995	1000	0.045	0.044	9.21E-06	0.022	8.41E-05	303
0.043017	12:38:50	1000	1005	0.044	0.043	8.33E-06	0.022	7.73E-05	278
0.041662	12:38:55	1005	1010	0.043	0.042	1.06E-05	0.021	1.01E-04	362
0.040326	12:39:00	1010	1015	0.042	0.040	1.05E-05	0.021	1.01E-04	364
0.038879	12:39:05	1015	1020	0.040	0.039	1.14E-05	0.020	1.12E-04	403
0.037931	12:39:10	1020	1025	0.039	0.038	7.45E-06	0.020	7.48E-05	269
0.036493	12:39:15	1025	1030	0.038	0.036	1.13E-05	0.020	1.16E-04	416
0.035138	12:39:20	1030	1035	0.036	0.035	1.06E-05	0.019	1.11E-04	401
0.034312	12:39:25	1035	1040	0.035	0.034	6.48E-06	0.019	6.91E-05	249
0.032997	12:39:30	1040	1045	0.034	0.033	1.03E-05	0.018	1.12E-04	404
0.031417	12:39:35	1045	1050	0.033	0.031	1.24E-05	0.018	1.38E-04	497
0.030285	12:39:40	1050	1055	0.031	0.030	8.89E-06	0.018	1.01E-04	365
0.029633	12:39:45	1055	1060	0.030	0.030	5.12E-06	0.017	5.94E-05	214
0.028349	12:39:50	1060	1065	0.030	0.028	1.01E-05	0.017	1.19E-04	428
0.027146	12:39:55	1065	1070	0.028	0.027	9.45E-06	0.017	1.14E-04	410
0.026167	12:40:00	1070	1075	0.027	0.026	7.69E-06	0.016	9.47E-05	341
0.024546	12:40:05	1075	1080	0.026	0.025	1.27E-05	0.016	1.61E-04	579
0.023945	12:40:10	1080	1085	0.025	0.024	4.72E-06	0.015	6.11E-05	220
0.022844	12:40:15	1085	1090	0.024	0.023	8.65E-06	0.015	1.14E-04	409
0.021488	12:40:20	1090	1095	0.023	0.021	1.06E-05	0.015	1.44E-04	517
0.020224	12:40:25	1095	1100	0.021	0.020	9.93E-06	0.014	1.38E-04	496
0.018665	12:40:30	1100	1105	0.020	0.019	1.22E-05	0.014	1.75E-04	632
0.017686	12:40:35	1105	1110	0.019	0.018	7.69E-06	0.014	1.13E-04	408
0.016504	12:40:40	1110	1115	0.018	0.017	9.29E-06	0.013	1.40E-04	506
0.015627	12:40:45	1115	1120	0.017	0.016	6.89E-06	0.013	1.07E-04	384
0.015076	12:40:50	1120	1125	0.016	0.015	4.32E-06	0.013	6.82E-05	246

0.014261	12:40:55	1125	1130	0.015	0.014	6.40E-06	0.012	1.03E-04	370
0.012365	12:41:00	1130	1135	0.014	0.012	1.49E-05	0.012	2.47E-04	891
0.011295	12:41:05	1135	1140	0.012	0.011	8.41E-06	0.012	1.45E-04	523
0.010459	12:41:10	1140	1145	0.011	0.010	6.56E-06	0.011	1.16E-04	419
0.009674	12:41:15	1145	1150	0.010	0.010	6.16E-06	0.011	1.12E-04	403
0.008114	12:41:20	1150	1155	0.010	0.008	1.22E-05	0.011	2.30E-04	828
0.007258	12:41:25	1155	1160	0.008	0.007	6.73E-06	0.010	1.31E-04	472
0.00578	12:41:30	1160	1165	0.007	0.006	1.16E-05	0.010	2.34E-04	844
0.005036	12:41:35	1165	1170	0.006	0.005	5.84E-06	0.010	1.22E-04	440
0.004047	12:41:40	1170	1175	0.005	0.004	7.77E-06	0.009	1.67E-04	602
0.003272	12:41:45	1175	1180	0.004	0.003	6.08E-06	0.009	1.35E-04	487
0.001957	12:41:50	1180	1185	0.003	0.002	1.03E-05	0.009	2.38E-04	857
0.000775	12:41:55	1185	1190	0.002	0.001	9.29E-06	0.008	2.24E-04	807
-0.00027	12:42:00	1190	1195	0.001	0.000	8.17E-06	0.008	2.06E-04	741
-0.00183	12:42:05	1195	1200	0.000	-0.002	1.23E-05	0.008	3.28E-04	1180
-0.00279	12:42:10	1200	1205	-0.002	-0.003	7.53E-06	0.007	2.11E-04	760
-0.00368	12:42:15	1205	1210	-0.003	-0.004	6.97E-06	0.007	2.04E-04	733
-0.00485	12:42:20	1210	1215	-0.004	-0.005	9.21E-06	0.007	2.83E-04	1018
-0.00638	12:42:25	1215	1220	-0.005	-0.006	1.20E-05	0.006	3.94E-04	1420
-0.00692	12:42:30	1220	1225	-0.006	-0.007	4.24E-06	0.006	1.47E-04	530
-0.008	12:42:35	1225	1230	-0.007	-0.008	8.49E-06	0.006	3.08E-04	1109
-0.00912	12:42:40	1230	1235	-0.008	-0.009	8.81E-06	0.005	3.41E-04	1228
-0.00986	12:42:45	1235	1240	-0.009	-0.010	5.76E-06	0.005	2.37E-04	852
-0.01071	12:42:50	1240	1245	-0.010	-0.011	6.73E-06	0.005	2.91E-04	1047
-0.01191	12:42:55	1245	1250	-0.011	-0.012	9.37E-06	0.004	4.36E-04	1568
-0.0128	12:43:00	1250	1255	-0.012	-0.013	7.05E-06	0.004	3.55E-04	1277
-0.01357	12:43:05	1255	1260	-0.013	-0.014	6.00E-06	0.004	3.24E-04	1165
-0.01401	12:43:10	1260	1265	-0.014	-0.014	3.44E-06	0.004	1.95E-04	704
-0.01496	12:43:15	1265	1270	-0.014	-0.015	7.53E-06	0.003	4.56E-04	1640
-0.01616	12:43:20	1270	1275	-0.015	-0.016	9.37E-06	0.003	6.32E-04	2274
-0.01645	12:43:25	1275	1280	-0.016	-0.016	2.32E-06	0.003	1.70E-04	612
-0.01848	12:43:30	1280	1285	-0.016	-0.018	1.59E-05	0.002	1.35E-03	4847
-0.01889	12:43:35	1285	1290	-0.018	-0.019	3.20E-06	0.002	3.23E-04	1162
-0.02001	12:43:40	1290	1295	-0.019	-0.020	8.81E-06	0.002	1.01E-03	3636
-0.02153	12:43:45	1295	1300	-0.020	-0.022	1.19E-05	0.001	1.80E-03	6463
-0.02224	12:43:50	1300	1305	-0.022	-0.022	5.60E-06	0.001	1.15E-03	4124
-0.02285	12:43:55	1305	1310	-0.022	-0.023	4.80E-06	0.001	1.25E-03	4491
-0.02324	12:44:00	1310	1315	-0.023	-0.023	3.04E-06	0.001	9.92E-04	3572
-0.0228	12:44:05	1315	1320	-0.023	-0.023	-3.44E-06	0.001	-1.11E-03	-3990
-0.02238	12:44:10	1320	1325	-0.023	-0.022	-3.36E-06	0.001	-8.88E-04	-3197
-0.02218	12:44:15	1325	1330	-0.022	-0.022	-1.52E-06	0.001	-3.56E-04	-1281
-0.01792	12:44:20	1330	1335	-0.022	-0.018	-3.35E-05	0.002	-4.30E-03	-15497
-0.0175	12:44:25	1335	1340	-0.018	-0.018	-3.28E-06	0.002	-2.87E-04	-1032
-0.017	12:44:30	1340	1345	-0.018	-0.017	-3.92E-06	0.002	-3.22E-04	-1161
-0.01656	12:44:35	1345	1350	-0.017	-0.017	-3.44E-06	0.003	-2.67E-04	-960
-0.01629	12:44:40	1350	1355	-0.017	-0.016	-2.16E-06	0.003	-1.61E-04	-578
-0.01598	12:44:45	1355	1360	-0.016	-0.016	-2.40E-06	0.003	-1.73E-04	-621
-0.01615	12:44:50	1360	1365	-0.016	-0.016	1.28E-06	0.003	9.13E-05	329
-0.01599	12:44:55	1365	1370	-0.016	-0.016	-1.20E-06	0.003	-8.56E-05	-308



Test one average soakage rate from 25-1100seconds
246 $Lm^{-2}h^{-1}$

LAND DEVELOPMENT & ENGINEERING

Hand Auger Borehole Log

Method: 100mm Hand Auger | Level Logger

Test ID:	**PT-02**		
Project ID:	24477		
Sheet:	1 of 1		
Client:	NZHG	**Coordinates:**	5709839mN, 2036107mE
Project:	Geotechnical Due Diligence	**System:**	NZTM
Location:	556-560 Abeerdeen Rd, Gisborne	**Elevation:**	Ground
Test Site:	Refer to geotechnical investigation plan	**Located By:**	Site plan/map
Test Date:	29/06/2023		
Logged By:	HAP		
Checked By:			
Vane ID:			

In-situ Testing

Dynamic Cone Penetrometer (blows / 50mm): 2, 4, 6, 8

Shear Vane, Su (kPa): 50, 100, 150, 200

Test Values peak / remoulded (sensitivity)

Depth (m)	Graphic Log	Material Description	Geology	Water	Depth (m)
0.0–0.4	TS	Organic silty SAND; dark greyish brown. Moist; sand, fine to medium; some rootlets.		Groundwater Not Encountered	
0.4–0.8		SAND, with trace silt; brown. Moist; sand, fine to coarse. 0.5m: Level Logger Depth 0.6m: Moist to wet.			
0.8		0.8m: Wet.			
0.5					
1.0					-1.0
1.5					

Hole Depth: 0.80m

Termination: Target soil moisture content

Materials described in general accordance with NZGS Field Description of Soil and Rock (2005). No correlation is implied between shear vane and DCP values.

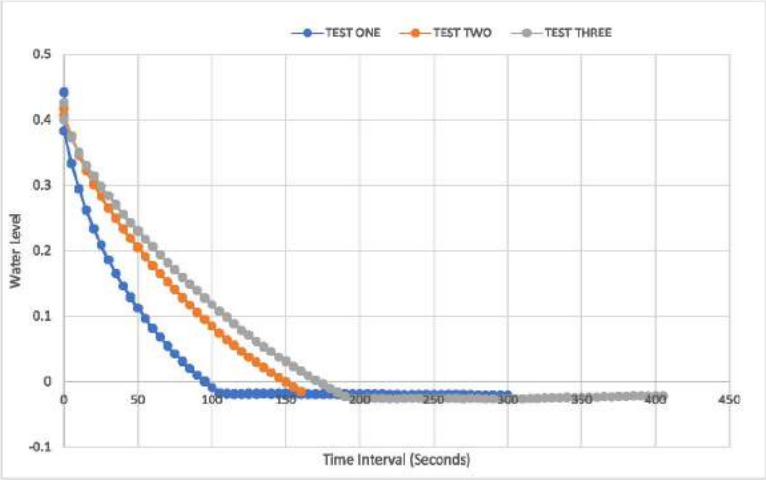
Generated with CORE-GS by Geroc - HA/TP Log with Photo v8.1 - 4/07/2023 9:42:34 am

Test Name:	PT-02	**Test hole Diameter:**	0.1	**Base Area (B):**	0.008	
Test Date:	July 29th 2023	**Test hole Depth:**	0.7	**Circumfrence (C):**	0.314	
Level Loggger #:	2128031	**Level Logger Depth:**	0.45	**T1:** 12:58:30	**T2:**	13:04:00
				T3: 13:07:05		

Level	Time	time steps		Depth Steps		Volume Soaked	Soakage Surface Area	Soakage Rate	
		t0	t1	h0	h1	V=(h0-h1)*B	A=(C*(h0+h1)/2)+B	SR=V/A/(t1-t0)	SR*60*60*1000
m	hh:mm:ss	s		m		m^3	m^2	$m^3m^{-2}s^{-1}$	$Lm^{-2}h^{-1}$
				TEST ONE					
0.442406	12:58:30	0		-	-	-	-	-	-
0.383078	12:58:35	0	5	0.442	0.383	4.66E-04	0.138	6.78E-04	2440
0.333843	12:58:40	5	10	0.383	0.334	3.87E-04	0.120	6.42E-04	2311
0.294801	12:58:45	10	15	0.334	0.295	3.07E-04	0.107	5.75E-04	2071
0.262283	12:58:50	15	20	0.295	0.262	2.55E-04	0.095	5.36E-04	1928
0.233945	12:58:55	20	25	0.262	0.234	2.23E-04	0.086	5.19E-04	1868
0.208869	12:59:00	25	30	0.234	0.209	1.97E-04	0.077	5.09E-04	1832
0.186137	12:59:05	30	35	0.209	0.186	1.79E-04	0.070	5.11E-04	1839
0.16524	12:59:10	35	40	0.186	0.165	1.64E-04	0.063	5.21E-04	1874
0.146198	12:59:15	40	45	0.165	0.146	1.50E-04	0.057	5.27E-04	1897
0.128919	12:59:20	45	50	0.146	0.129	1.36E-04	0.051	5.31E-04	1913
0.112222	12:59:25	50	55	0.129	0.112	1.31E-04	0.046	5.74E-04	2065
0.09633	12:59:30	55	60	0.112	0.096	1.25E-04	0.041	6.15E-04	2213
0.081417	12:59:35	60	65	0.096	0.081	1.17E-04	0.036	6.55E-04	2357
0.068114	12:59:40	65	70	0.081	0.068	1.04E-04	0.031	6.67E-04	2400
0.054873	12:59:45	70	75	0.068	0.055	1.04E-04	0.027	7.65E-04	2756
0.042518	12:59:50	75	80	0.055	0.043	9.70E-05	0.023	8.38E-04	3018
0.03055	12:59:55	80	85	0.043	0.031	9.40E-05	0.019	9.72E-04	3501
0.020061	13:00:00	85	90	0.031	0.020	8.24E-05	0.016	1.04E-03	3753
0.010163	13:00:05	90	95	0.020	0.010	7.77E-05	0.013	1.23E-03	4442
0.000224	13:00:10	95	100	0.010	0.000	7.81E-05	0.009	1.65E-03	5925
-0.0087	13:00:15	100	105	0.000	-0.009	7.01E-05	0.007	2.15E-03	7732
-0.01742	13:00:20	105	110	-0.009	-0.017	6.85E-05	0.004	3.65E-03	13152
-0.01815	13:00:25	110	115	-0.017	-0.018	5.76E-06	0.002	5.09E-04	1832
-0.01848	13:00:30	115	120	-0.018	-0.018	2.56E-06	0.002	2.44E-04	879
-0.01841	13:00:35	120	125	-0.018	-0.018	-5.60E-07	0.002	-5.44E-05	-196
-0.01817	13:00:40	125	130	-0.018	-0.018	-1.92E-06	0.002	-1.82E-04	-656
-0.01821	13:00:45	130	135	-0.018	-0.018	3.20E-07	0.002	2.99E-05	108
-0.01802	13:00:50	135	140	-0.018	-0.018	-1.44E-06	0.002	-1.33E-04	-480
-0.0183	13:00:55	140	145	-0.018	-0.018	2.16E-06	0.002	2.01E-04	724
-0.01814	13:01:00	145	150	-0.018	-0.018	-1.20E-06	0.002	-1.13E-04	-406
-0.01835	13:01:05	150	155	-0.018	-0.018	1.60E-06	0.002	1.51E-04	543
-0.01843	13:01:10	155	160	-0.018	-0.018	6.40E-07	0.002	6.17E-05	222
-0.01841	13:01:15	160	165	-0.018	-0.018	-1.60E-07	0.002	-1.55E-05	-56
-0.01866	13:01:20	165	170	-0.018	-0.019	2.00E-06	0.002	1.97E-04	710
-0.01905	13:01:25	170	175	-0.019	-0.019	3.04E-06	0.002	3.15E-04	1135
-0.01899	13:01:30	175	180	-0.019	-0.019	-4.80E-07	0.002	-5.12E-05	-184
-0.01861	13:01:35	180	185	-0.019	-0.019	-2.96E-06	0.002	-3.04E-04	-1095
-0.01881	13:01:40	185	190	-0.019	-0.019	1.52E-06	0.002	1.54E-04	554
-0.01865	13:01:45	190	195	-0.019	-0.019	-1.20E-06	0.002	-1.22E-04	-439
-0.01871	13:01:50	195	200	-0.019	-0.019	4.00E-07	0.002	4.03E-05	145
-0.01905	13:01:55	200	205	-0.019	-0.019	2.72E-06	0.002	2.83E-04	1019
-0.01882	13:02:00	205	210	-0.019	-0.019	-1.84E-06	0.002	-1.93E-04	-696
-0.01889	13:02:05	210	215	-0.019	-0.019	5.60E-07	0.002	5.80E-05	209
-0.01893	13:02:10	215	220	-0.019	-0.019	3.20E-07	0.002	3.35E-05	121
-0.01934	13:02:15	220	225	-0.019	-0.019	3.20E-06	0.002	3.48E-04	1251
-0.01963	13:02:20	225	230	-0.019	-0.020	2.32E-06	0.002	2.68E-04	965
-0.02003	13:02:25	230	235	-0.020	-0.020	3.12E-06	0.002	3.85E-04	1385
-0.01991	13:02:30	235	240	-0.020	-0.020	-9.61E-07	0.002	-1.22E-04	-438
-0.01978	13:02:35	240	245	-0.020	-0.020	-1.04E-06	0.002	-1.28E-04	-462
-0.01933	13:02:40	245	250	-0.020	-0.019	-3.52E-06	0.002	-4.12E-04	-1482
-0.01985	13:02:45	250	255	-0.019	-0.020	4.08E-06	0.002	4.80E-04	1729
-0.01993	13:02:50	255	260	-0.020	-0.020	6.40E-07	0.002	7.98E-05	287
-0.01954	13:02:55	260	265	-0.020	-0.020	-3.04E-06	0.002	-3.68E-04	-1324
-0.01957	13:03:00	265	270	-0.020	-0.020	2.40E-07	0.002	2.81E-05	101
-0.01978	13:03:05	270	275	-0.020	-0.020	1.60E-06	0.002	1.91E-04	689
-0.01995	13:03:10	275	280	-0.020	-0.020	1.36E-06	0.002	1.69E-04	607
-0.02049	13:03:15	280	285	-0.020	-0.020	4.24E-06	0.002	5.65E-04	2034
-0.02012	13:03:20	285	290	-0.020	-0.020	-2.88E-06	0.001	-3.91E-04	-1407
-0.0205	13:03:25	290	295	-0.020	-0.020	2.96E-06	0.001	4.02E-04	1448
-0.02048	13:03:30	295	300	-0.020	-0.020	-1.60E-07	0.001	-2.26E-05	-81
-0.02111	13:03:35	300	305	-0.020	-0.021	4.96E-06	0.001	7.52E-04	2705
				TEST TWO					
0.417227	13:04:00	0		-	-	-	-	-	-
0.406932	13:04:05	0	5	0.417	0.407	8.09E-05	0.137	1.18E-04	424
0.374618	13:04:10	5	10	0.407	0.375	2.54E-04	0.131	3.89E-04	1399

0.346381	13:04:15	10	15	0.375	0.346	2.22E-04	0.121	3.66E-04	1318
0.322732	13:04:20	15	20	0.346	0.323	1.86E-04	0.113	3.29E-04	1184
0.301937	13:04:25	20	25	0.323	0.302	1.63E-04	0.106	3.08E-04	1110
0.28318	13:04:30	25	30	0.302	0.283	1.47E-04	0.100	2.95E-04	1063
0.265443	13:04:35	30	35	0.283	0.265	1.39E-04	0.094	2.96E-04	1067
0.249541	13:04:40	35	40	0.265	0.250	1.25E-04	0.089	2.81E-04	1013
0.233537	13:04:45	40	45	0.250	0.234	1.26E-04	0.084	3.00E-04	1081
0.219062	13:04:50	45	50	0.234	0.219	1.14E-04	0.079	2.88E-04	1037
0.204893	13:04:55	50	55	0.219	0.205	1.11E-04	0.074	2.99E-04	1076
0.191131	13:05:00	55	60	0.205	0.191	1.08E-04	0.070	3.09E-04	1111
0.177166	13:05:05	60	65	0.191	0.177	1.10E-04	0.066	3.34E-04	1202
0.164934	13:05:10	65	70	0.177	0.165	9.61E-05	0.062	3.12E-04	1123
0.152304	13:05:15	70	75	0.165	0.152	9.92E-05	0.058	3.44E-04	1238
0.14053	13:05:20	75	80	0.152	0.141	9.25E-05	0.054	3.43E-04	1236
0.128461	13:05:25	80	85	0.141	0.128	9.48E-05	0.050	3.78E-04	1362
0.117034	13:05:30	85	90	0.128	0.117	8.97E-05	0.046	3.87E-04	1392
0.105576	13:05:35	90	95	0.117	0.106	9.00E-05	0.043	4.20E-04	1513
0.094985	13:05:40	95	100	0.106	0.095	8.32E-05	0.039	4.23E-04	1522
0.085036	13:05:45	100	105	0.095	0.085	7.81E-05	0.036	4.33E-04	1557
0.074393	13:05:50	105	110	0.085	0.074	8.36E-05	0.033	5.08E-04	1829
0.064006	13:05:55	110	115	0.074	0.064	8.16E-05	0.030	5.51E-04	1985
0.05579	13:06:00	115	120	0.064	0.056	6.45E-05	0.027	4.84E-04	1742
0.046381	13:06:05	120	125	0.056	0.046	7.39E-05	0.024	6.18E-04	2226
0.037849	13:06:10	125	130	0.046	0.038	6.70E-05	0.021	6.36E-04	2288
0.029582	13:06:15	130	135	0.038	0.030	6.49E-05	0.018	7.04E-04	2534
0.021702	13:06:20	135	140	0.030	0.022	6.19E-05	0.016	7.78E-04	2801
0.013996	13:06:25	140	145	0.022	0.014	6.05E-05	0.013	8.99E-04	3237
0.006463	13:06:30	145	150	0.014	0.006	5.92E-05	0.011	1.07E-03	3849
-0.00068	13:06:35	150	155	0.006	-0.001	5.61E-05	0.009	1.28E-03	4612
-0.00819	13:06:40	155	160	-0.001	-0.008	5.89E-05	0.006	1.82E-03	6567
-0.01479	13:06:45	160	165	-0.008	-0.015	5.19E-05	0.004	2.44E-03	8800
						TEST THREE			
0.426504	13:07:05	0		-	-	-	-	-	-
0.400815	13:07:10	0	5	0.427	0.401	2.02E-04	0.138	2.93E-04	1054
0.373293	13:07:15	5	10	0.401	0.373	2.16E-04	0.129	3.34E-04	1202
0.349847	13:07:20	10	15	0.373	0.350	1.84E-04	0.121	3.03E-04	1092
0.330581	13:07:25	15	20	0.350	0.331	1.51E-04	0.115	2.64E-04	950
0.314169	13:07:30	20	25	0.331	0.314	1.29E-04	0.109	2.36E-04	850
0.298777	13:07:35	25	30	0.314	0.299	1.21E-04	0.104	2.32E-04	836
0.284404	13:07:40	30	35	0.299	0.284	1.13E-04	0.099	2.27E-04	817
0.270336	13:07:45	35	40	0.284	0.270	1.10E-04	0.095	2.33E-04	837
0.255861	13:07:50	40	45	0.270	0.256	1.14E-04	0.091	2.51E-04	904
0.242712	13:07:55	45	50	0.256	0.243	1.03E-04	0.086	2.40E-04	863
0.230275	13:08:00	50	55	0.243	0.230	9.77E-05	0.082	2.38E-04	856
0.217635	13:08:05	55	60	0.230	0.218	9.93E-05	0.078	2.54E-04	914
0.206422	13:08:10	60	65	0.218	0.206	8.81E-05	0.074	2.37E-04	852
0.194088	13:08:15	65	70	0.206	0.194	9.69E-05	0.071	2.74E-04	986
0.181855	13:08:20	70	75	0.194	0.182	9.61E-05	0.067	2.87E-04	1034
0.17054	13:08:25	75	80	0.182	0.171	8.89E-05	0.063	2.81E-04	1012
0.159613	13:08:30	80	85	0.171	0.160	8.58E-05	0.060	2.87E-04	1035
0.148899	13:08:35	85	90	0.160	0.149	8.41E-05	0.056	2.99E-04	1076
0.139235	13:08:40	90	95	0.149	0.139	7.59E-05	0.053	2.86E-04	1029
0.127666	13:08:45	95	100	0.139	0.128	9.09E-05	0.050	3.65E-04	1314
0.117737	13:08:50	100	105	0.128	0.118	7.80E-05	0.046	3.36E-04	1210
0.10789	13:08:55	105	110	0.118	0.108	7.73E-05	0.043	3.57E-04	1286
0.098624	13:09:00	110	115	0.108	0.099	7.28E-05	0.040	3.61E-04	1300
0.088573	13:09:05	115	120	0.099	0.089	7.89E-05	0.037	4.24E-04	1525
0.078257	13:09:10	120	125	0.089	0.078	8.10E-05	0.034	4.76E-04	1713
0.070714	13:09:15	125	130	0.078	0.071	5.92E-05	0.031	3.79E-04	1365
0.061407	13:09:20	130	135	0.071	0.061	7.31E-05	0.029	5.11E-04	1840
0.053629	13:09:25	135	140	0.061	0.054	6.11E-05	0.026	4.71E-04	1697
0.045708	13:09:30	140	145	0.054	0.046	6.22E-05	0.023	5.30E-04	1909
0.037747	13:09:35	145	150	0.046	0.038	6.25E-05	0.021	5.97E-04	2148
0.031162	13:09:40	150	155	0.038	0.031	5.17E-05	0.019	5.54E-04	1994
0.023517	13:09:45	155	160	0.031	0.024	6.00E-05	0.016	7.30E-04	2629
0.016667	13:09:50	160	165	0.024	0.017	5.38E-05	0.014	7.60E-04	2734
0.009113	13:09:55	165	170	0.017	0.009	5.93E-05	0.012	9.97E-04	3588
0.002518	13:10:00	170	175	0.009	0.003	5.18E-05	0.010	1.07E-03	3852
-0.00392	13:10:05	175	180	0.003	-0.004	5.06E-05	0.008	1.33E-03	4773
-0.01048	13:10:10	180	185	-0.004	-0.010	5.15E-05	0.006	1.84E-03	6629
-0.01636	13:10:15	185	190	-0.010	-0.016	4.62E-05	0.004	2.54E-03	9143
-0.02253	13:10:20	190	195	-0.016	-0.023	4.84E-05	0.002	5.55E-03	19982
-0.02572	13:10:25	195	200	-0.023	-0.026	2.51E-05	0.000	1.82E-02	65512
-0.02597	13:10:30	200	205	-0.026	-0.026	2.00E-06	0.000	-1.51E-03	-5422
-0.02577	13:10:35	205	210	-0.026	-0.026	-1.60E-06	0.000	1.17E-03	4211
-0.02539	13:10:40	210	215	-0.026	-0.025	-2.96E-06	0.000	3.25E-03	11684
-0.02574	13:10:45	215	220	-0.025	-0.026	2.72E-06	0.000	-3.06E-03	-11027
-0.02582	13:10:50	220	225	-0.026	-0.026	6.40E-07	0.000	-5.23E-04	-1882
-0.02584	13:10:55	225	230	-0.026	-0.026	1.60E-07	0.000	-1.23E-04	-442

-0.02536	13:11:00	230	235	-0.026	-0.025	-3.76E-06	0.000	3.98E-03	14339
-0.02523	13:11:05	235	240	-0.025	-0.025	-1.04E-06	0.000	2.24E-03	8069
-0.02529	13:11:10	240	245	-0.025	-0.025	4.80E-07	0.000	-1.18E-03	-4235
-0.0256	13:11:15	245	250	-0.025	-0.026	2.40E-06	0.000	-3.45E-03	-12414
-0.02545	13:11:20	250	255	-0.026	-0.025	-1.12E-06	0.000	1.36E-03	4893
-0.02551	13:11:25	255	260	-0.025	-0.026	4.80E-07	0.000	-6.32E-04	-2274
-0.02527	13:11:30	260	265	-0.026	-0.025	-1.92E-06	0.000	3.12E-03	11221
-0.02535	13:11:35	265	270	-0.025	-0.025	6.40E-07	0.000	-1.31E-03	-4721
-0.0261	13:11:40	270	275	-0.025	-0.026	5.84E-06	0.000	-5.14E-03	-18507
-0.02551	13:11:45	275	280	-0.026	-0.026	-4.56E-06	0.000	3.61E-03	12987
-0.02559	13:11:50	280	285	-0.026	-0.026	5.60E-07	0.000	-6.48E-04	-2333
-0.02612	13:11:55	285	290	-0.026	-0.026	4.16E-06	0.000	-3.11E-03	-11210
-0.02631	13:12:00	290	295	-0.026	-0.026	1.52E-06	0.000	-7.98E-04	-2874
-0.02599	13:12:05	295	300	-0.026	-0.026	-2.48E-06	0.000	1.37E-03	4938
-0.02587	13:12:10	300	305	-0.026	-0.026	-9.61E-07	0.000	6.56E-04	2361
-0.02602	13:12:15	305	310	-0.026	-0.026	1.20E-06	0.000	-8.06E-04	-2903
-0.02617	13:12:20	310	315	-0.026	-0.026	1.12E-06	0.000	-6.51E-04	-2344
-0.02579	13:12:25	315	320	-0.026	-0.026	-2.96E-06	0.000	1.93E-03	6938
-0.02538	13:12:30	320	325	-0.026	-0.025	-3.20E-06	0.000	3.48E-03	12522
-0.02491	13:12:35	325	330	-0.025	-0.025	-3.68E-06	0.000	1.59E-02	57103
-0.02452	13:12:40	330	335	-0.025	-0.025	-3.12E-06	0.000	-6.96E-03	-25071
-0.02449	13:12:45	335	340	-0.025	-0.024	-2.40E-07	0.000	-3.06E-04	-1102
-0.02396	13:12:50	340	345	-0.024	-0.024	-4.16E-06	0.000	-3.40E-03	-12235
-0.02457	13:12:55	345	350	-0.024	-0.025	4.80E-06	0.000	4.14E-03	14897
-0.02403	13:13:00	350	355	-0.025	-0.024	-4.24E-06	0.000	-3.84E-03	-13826
-0.02365	13:13:05	355	360	-0.024	-0.024	-2.96E-06	0.000	-1.62E-03	-5842
-0.02359	13:13:10	360	365	-0.024	-0.024	-4.80E-07	0.000	-2.21E-04	-797
-0.02274	13:13:15	365	370	-0.024	-0.023	-6.65E-06	0.001	-2.31E-03	-8300
-0.02311	13:13:20	370	375	-0.023	-0.023	2.88E-06	0.001	8.85E-04	3184
-0.02256	13:13:25	375	380	-0.023	-0.023	-4.32E-06	0.001	-1.27E-03	-4574
-0.02263	13:13:30	380	385	-0.023	-0.023	5.60E-07	0.001	1.48E-04	534
-0.02206	13:13:35	385	390	-0.023	-0.022	-4.48E-06	0.001	-1.07E-03	-3869
-0.02176	13:13:40	390	395	-0.022	-0.022	-2.32E-06	0.001	-4.79E-04	-1723
-0.02182	13:13:45	395	400	-0.022	-0.022	4.80E-07	0.001	9.54E-05	343
-0.02203	13:13:50	400	405	-0.022	-0.022	1.60E-06	0.001	3.32E-04	1194
-0.02181	13:13:55	405	410	-0.022	-0.022	-1.68E-06	0.001	-3.48E-04	-1252



Test one average soakage rate from 25-100seconds
2728 $Lm^{-2}h^{-1}$

Test two average soakage rate from 25-150seconds
1683 $Lm^{-2}h^{-1}$

Test three average soakage rate from 25-175seconds
1505 $Lm^{-2}h^{-1}$

Hand Auger Borehole Log

Method: 100mm Hand Auger | Level Logger

Test ID:	PT-03	**Project ID:**	24477	**Sheet:**	1 of 1

Client:	NZHG	**Coordinates:**	5709866mN, 2036136mE	**Test Date:**	29/06/2023
Project:	Geotechnical Due Diligence	**System:**	NZTM	**Logged By:**	HAP
Location:	556-560 Abeerdeen Rd, Gisborne	**Elevation:**	Ground	**Checked By:**	
Test Site:	Refer to geotechnical investigation plan	**Located By:**	Site plan/map	**Vane ID:**	

Depth (m)	Graphic Log	Material Description	Geology	Water	In-situ Testing Dynamic Cone Penetrometer (blows / 50mm) 2 4 6 8 Shear Vane, Su (kPa) 50 100 150 200	Test Values peak / remoulded (sensitivity)	Depth (m)
0.0–0.4	TS	Organic silty SAND; dark greyish brown. Moist; some rootlets. 0.3m: With minor rootlets.	Topsoil	Groundwater Not Encountered			
0.4–1.3 (0.5, 1.0)		SAND, with trace silt; golden brown. Moist; sand, fine to medium; trace rootlets. 1.0m: -MIXING WITH- light grey brown SAND.	Holocene Beach Deposits				-1.0
1.3–1.8 (1.5)		SAND, with minor shells, with trace silt; light greyish brown. Moist; sand, fine to coarse; shells retrieved as medium gravel sized fragments. 1.6m: Level Logger Depth 1.7m: Moist to wet.					

Hole Depth: 1.80m

Termination: Target soil moisture content

Materials described in general accordance with NZGS Field Description of Soil and Rock (2005). No correlation is implied between shear vane and DCP values.

Generated with CORE-GS by Geroc - HA/TP Log with Photo v8.1 - 4/07/2023 9:42:35 am

Test Name:	PT-03	**Test hole Diameter:**	0.1	**Base Area (B):**		0.008	
Test Date:	July 29th 2023	**Test hole Depth:**	1.8	**Circumfrence (C):**		0.314	
Level Loggger #:	2128031	**Level Logger Depth:**	1.55	**T1:**	10:18:10	**T2:**	10:38:40
				T3:			

Level	Time	time steps		Depth Steps		Volume Soaked	Soakage Surface Area	Soakage Rate	
		t0	t1	h0	h1	V=(h0-h1)*B	A=(C*(h0+h1)/2)+B	SR=V/A/(t1-t0)	SR*60*60*1000
m	hh:mm:ss	s		m		m^3	m^2	$m^3m^{-2}s^{-1}$	$Lm^{-2}h^{-1}$
TEST ONE									
1.433252	10:18:10	0		-	-	-	-	-	-
1.470051	10:18:15	0	5	1.433	1.470	-2.89E-04	0.464	-1.25E-04	-449
1.287482	10:18:20	5	10	1.470	1.287	1.43E-03	0.441	6.50E-04	2341
1.105117	10:18:25	10	15	1.287	1.105	1.43E-03	0.384	7.47E-04	2688
0.969032	10:18:30	15	20	1.105	0.969	1.07E-03	0.334	6.41E-04	2306
0.86261	10:18:35	20	25	0.969	0.863	8.36E-04	0.296	5.66E-04	2036
0.78055	10:18:40	25	30	0.863	0.781	6.44E-04	0.266	4.85E-04	1745
0.719286	10:18:45	30	35	0.781	0.719	4.81E-04	0.243	3.95E-04	1423
0.669235	10:18:50	35	40	0.719	0.669	3.93E-04	0.226	3.48E-04	1253
0.628767	10:18:55	40	45	0.669	0.629	3.18E-04	0.212	3.00E-04	1081
0.59686	10:19:00	45	50	0.629	0.597	2.51E-04	0.200	2.50E-04	900
0.571274	10:19:05	50	55	0.597	0.571	2.01E-04	0.191	2.10E-04	756
0.551295	10:19:10	55	60	0.571	0.534	2.90E-04	0.182	3.19E-04	1150
0.534373	10:19:15	60	65	0.534	0.534	0.00E+00	0.176	0.00E+00	0
0.519694	10:19:20	65	70	0.534	0.520	1.15E-04	0.173	1.33E-04	479
0.50685	10:19:25	70	75	0.520	0.507	1.01E-04	0.169	1.19E-04	430
0.493874	10:19:30	75	80	0.507	0.494	1.02E-04	0.165	1.24E-04	445
0.480948	10:19:35	80	85	0.494	0.481	1.02E-04	0.161	1.26E-04	454
0.468787	10:19:40	85	90	0.481	0.469	9.55E-05	0.157	1.22E-04	438
0.456626	10:19:45	90	95	0.469	0.457	9.55E-05	0.153	1.25E-04	449
0.444322	10:19:50	95	100	0.457	0.444	9.66E-05	0.149	1.29E-04	466
0.432722	10:19:55	100	105	0.444	0.433	9.11E-05	0.146	1.25E-04	450
0.420989	10:20:00	105	110	0.433	0.421	9.22E-05	0.142	1.30E-04	467
0.409246	10:20:05	110	115	0.421	0.409	9.22E-05	0.138	1.33E-04	480
0.397299	10:20:10	115	120	0.409	0.397	9.38E-05	0.135	1.39E-04	502
0.386137	10:20:15	120	125	0.397	0.386	8.77E-05	0.131	1.34E-04	482
0.375056	10:20:20	125	130	0.386	0.375	8.70E-05	0.127	1.37E-04	492
0.364118	10:20:25	130	135	0.375	0.364	8.59E-05	0.124	1.39E-04	499
0.353272	10:20:30	135	140	0.364	0.353	8.52E-05	0.121	1.41E-04	509
0.342864	10:20:35	140	145	0.353	0.343	8.17E-05	0.117	1.39E-04	502
0.332722	10:20:40	145	150	0.343	0.333	7.97E-05	0.114	1.40E-04	503
0.322467	10:20:45	150	155	0.333	0.322	8.05E-05	0.111	1.45E-04	524
0.312681	10:20:50	155	160	0.322	0.313	7.69E-05	0.108	1.43E-04	514
0.303028	10:20:55	160	165	0.313	0.303	7.58E-05	0.105	1.45E-04	522
0.294485	10:21:00	165	170	0.303	0.294	6.71E-05	0.102	1.32E-04	475
0.285657	10:21:05	170	175	0.294	0.286	6.93E-05	0.099	1.40E-04	504
0.277523	10:21:10	175	180	0.286	0.278	6.39E-05	0.096	1.33E-04	478
0.268716	10:21:15	180	185	0.278	0.269	6.92E-05	0.094	1.48E-04	532
0.261346	10:21:20	185	190	0.269	0.261	5.79E-05	0.091	1.27E-04	457
0.253751	10:21:25	190	195	0.261	0.254	5.96E-05	0.089	1.34E-04	484
0.246718	10:21:30	195	200	0.254	0.247	5.52E-05	0.086	1.28E-04	460
0.239929	10:21:35	200	205	0.247	0.240	5.33E-05	0.084	1.27E-04	455
0.233323	10:21:40	205	210	0.240	0.233	5.19E-05	0.082	1.26E-04	454
0.226748	10:21:45	210	215	0.233	0.227	5.16E-05	0.080	1.29E-04	464
0.220968	10:21:50	215	220	0.227	0.221	4.54E-05	0.078	1.16E-04	418
0.21578	10:21:55	220	225	0.221	0.216	4.08E-05	0.076	1.07E-04	384
0.210163	10:22:00	225	230	0.216	0.210	4.41E-05	0.075	1.18E-04	425
0.204618	10:22:05	230	235	0.210	0.205	4.36E-05	0.073	1.19E-04	430
0.199837	10:22:10	235	240	0.205	0.200	3.75E-05	0.071	1.05E-04	379
0.195189	10:22:15	240	245	0.200	0.195	3.65E-05	0.070	1.04E-04	376
0.190652	10:22:20	245	250	0.195	0.191	3.56E-05	0.068	1.04E-04	375
0.186208	10:22:25	250	255	0.191	0.186	3.49E-05	0.067	1.04E-04	375
0.182477	10:22:30	255	260	0.186	0.182	2.93E-05	0.066	8.91E-05	321
0.178338	10:22:35	260	265	0.182	0.178	3.25E-05	0.065	1.01E-04	363
0.174353	10:22:40	265	270	0.178	0.174	3.13E-05	0.063	9.90E-05	356
0.170347	10:22:45	270	275	0.174	0.170	3.15E-05	0.062	1.01E-04	365
0.167085	10:22:50	275	280	0.170	0.167	2.56E-05	0.061	8.42E-05	303
0.163517	10:22:55	280	285	0.167	0.164	2.80E-05	0.060	9.37E-05	337
0.160153	10:23:00	285	290	0.164	0.160	2.64E-05	0.059	9.00E-05	324
0.157115	10:23:05	290	295	0.160	0.157	2.39E-05	0.058	8.27E-05	298
0.153741	10:23:10	295	300	0.157	0.154	2.65E-05	0.057	9.35E-05	337
0.151254	10:23:15	300	305	0.154	0.151	1.95E-05	0.056	7.01E-05	252
0.147951	10:23:20	305	310	0.151	0.148	2.59E-05	0.055	9.46E-05	340
0.145484	10:23:25	310	315	0.148	0.145	1.94E-05	0.054	7.18E-05	259

0.14213	10:23:30	315	320	0.145	0.142	2.63E-05	0.053	9.93E-05	358
0.139837	10:23:35	320	325	0.142	0.140	1.80E-05	0.052	6.91E-05	249
0.13737	10:23:40	325	330	0.140	0.137	1.94E-05	0.051	7.54E-05	271
0.134393	10:23:45	330	335	0.137	0.134	2.34E-05	0.051	9.25E-05	333
0.131376	10:23:50	335	340	0.134	0.131	2.37E-05	0.050	9.56E-05	344
0.129246	10:23:55	340	345	0.131	0.129	1.67E-05	0.049	6.86E-05	247
0.126636	10:24:00	345	350	0.129	0.127	2.05E-05	0.048	8.53E-05	307
0.123996	10:24:05	350	355	0.127	0.124	2.07E-05	0.047	8.78E-05	316
0.122345	10:24:10	355	360	0.124	0.122	1.30E-05	0.047	5.57E-05	201
0.119419	10:24:15	360	365	0.122	0.119	2.30E-05	0.046	1.00E-04	361
0.117778	10:24:20	365	370	0.119	0.118	1.29E-05	0.045	5.71E-05	206
0.115821	10:24:25	370	375	0.118	0.116	1.54E-05	0.045	6.90E-05	248
0.114139	10:24:30	375	380	0.116	0.114	1.32E-05	0.044	6.01E-05	216
0.112192	10:24:35	380	385	0.114	0.112	1.53E-05	0.043	7.05E-05	254
0.110234	10:24:40	385	390	0.112	0.110	1.54E-05	0.043	7.18E-05	259
0.108451	10:24:45	390	395	0.110	0.108	1.40E-05	0.042	6.64E-05	239
0.107238	10:24:50	395	400	0.108	0.107	9.53E-06	0.042	4.57E-05	164
0.105953	10:24:55	400	405	0.107	0.106	1.01E-05	0.041	4.88E-05	176
0.104913	10:25:00	405	410	0.106	0.105	8.17E-06	0.041	3.99E-05	143
0.10317	10:25:05	410	415	0.105	0.103	1.37E-05	0.041	6.75E-05	243
0.102181	10:25:10	415	420	0.103	0.102	7.77E-06	0.040	3.87E-05	139
0.100907	10:25:15	420	425	0.102	0.101	1.00E-05	0.040	5.03E-05	181
0.098981	10:25:20	425	430	0.101	0.099	1.51E-05	0.039	7.71E-05	278
0.098104	10:25:25	430	435	0.099	0.098	6.89E-06	0.039	3.55E-05	128
0.09629	10:25:30	435	440	0.098	0.096	1.43E-05	0.038	7.42E-05	267
0.095229	10:25:35	440	445	0.096	0.095	8.33E-06	0.038	4.39E-05	158
0.094383	10:25:40	445	450	0.095	0.094	6.65E-06	0.038	3.53E-05	127
0.093731	10:25:45	450	455	0.094	0.094	5.12E-06	0.037	2.74E-05	99
0.09159	10:25:50	455	460	0.094	0.092	1.68E-05	0.037	9.10E-05	327
0.090897	10:25:55	460	465	0.092	0.091	5.44E-06	0.037	2.98E-05	107
0.08945	10:26:00	465	470	0.091	0.089	1.14E-05	0.036	6.28E-05	226
0.088532	10:26:05	470	475	0.089	0.089	7.21E-06	0.036	4.02E-05	145
0.087452	10:26:10	475	480	0.089	0.087	8.49E-06	0.035	4.78E-05	172
0.086024	10:26:15	480	485	0.087	0.086	1.12E-05	0.035	6.39E-05	230
0.084964	10:26:20	485	490	0.086	0.085	8.33E-06	0.035	4.80E-05	173
0.083833	10:26:25	490	495	0.085	0.084	8.89E-06	0.034	5.17E-05	186
0.082793	10:26:30	495	500	0.084	0.083	8.17E-06	0.034	4.80E-05	173
0.082141	10:26:35	500	505	0.083	0.082	5.12E-06	0.034	3.04E-05	109
0.080724	10:26:40	505	510	0.082	0.081	1.11E-05	0.033	6.66E-05	240
0.079755	10:26:45	510	515	0.081	0.080	7.61E-06	0.033	4.60E-05	166
0.079021	10:26:50	515	520	0.080	0.079	5.76E-06	0.033	3.52E-05	127
0.078328	10:26:55	520	525	0.079	0.078	5.44E-06	0.033	3.34E-05	120
0.077156	10:27:00	525	530	0.078	0.077	9.21E-06	0.032	5.70E-05	205
0.076514	10:27:05	530	535	0.077	0.077	5.04E-06	0.032	3.15E-05	114
0.07527	10:27:10	535	540	0.077	0.075	9.77E-06	0.032	6.16E-05	222
0.073945	10:27:15	540	545	0.075	0.074	1.04E-05	0.031	6.65E-05	239
0.073415	10:27:20	545	550	0.074	0.073	4.16E-06	0.031	2.69E-05	97
0.072141	10:27:25	550	555	0.073	0.072	1.00E-05	0.031	6.52E-05	235
0.071753	10:27:30	555	560	0.072	0.072	3.04E-06	0.030	2.00E-05	72
0.070632	10:27:35	560	565	0.072	0.071	8.81E-06	0.030	5.83E-05	210
0.069939	10:27:40	565	570	0.071	0.070	5.44E-06	0.030	3.64E-05	131
0.069317	10:27:45	570	575	0.070	0.069	4.88E-06	0.030	3.29E-05	118
0.068685	10:27:50	575	580	0.069	0.069	4.96E-06	0.030	3.36E-05	121
0.067829	10:27:55	580	585	0.069	0.068	6.73E-06	0.029	4.59E-05	165
0.067197	10:28:00	585	590	0.068	0.067	4.96E-06	0.029	3.42E-05	123
0.06631	10:28:05	590	595	0.067	0.066	6.97E-06	0.029	4.83E-05	174
0.065647	10:28:10	595	600	0.066	0.066	5.20E-06	0.029	3.64E-05	131
0.064954	10:28:15	600	605	0.066	0.065	5.44E-06	0.028	3.84E-05	138
0.064608	10:28:20	605	610	0.065	0.065	2.72E-06	0.028	1.93E-05	69
0.063058	10:28:25	610	615	0.065	0.063	1.22E-05	0.028	8.72E-05	314
0.062548	10:28:30	615	620	0.063	0.063	4.00E-06	0.028	2.90E-05	104
0.061947	10:28:35	620	625	0.063	0.062	4.72E-06	0.027	3.45E-05	124
0.061193	10:28:40	625	630	0.062	0.061	5.92E-06	0.027	4.36E-05	157
0.060418	10:28:45	630	635	0.061	0.060	6.08E-06	0.027	4.51E-05	163
0.060316	10:28:50	635	640	0.060	0.060	8.01E-07	0.027	5.97E-06	21
0.059195	10:28:55	640	645	0.060	0.059	8.81E-06	0.027	6.61E-05	238
0.058481	10:29:00	645	650	0.059	0.058	5.60E-06	0.026	4.26E-05	153
0.058124	10:29:05	650	655	0.058	0.058	2.80E-06	0.026	2.14E-05	77
0.057187	10:29:10	655	660	0.058	0.057	7.37E-06	0.026	5.67E-05	204
0.057034	10:29:15	660	665	0.057	0.057	1.20E-06	0.026	9.31E-06	34
0.055953	10:29:20	665	670	0.057	0.056	8.49E-06	0.026	6.63E-05	239
0.055525	10:29:25	670	675	0.056	0.056	3.36E-06	0.025	2.65E-05	95
0.054893	10:29:30	675	680	0.056	0.055	4.96E-06	0.025	3.94E-05	142
0.054434	10:29:35	680	685	0.055	0.054	3.60E-06	0.025	2.88E-05	104
0.053639	10:29:40	685	690	0.054	0.054	6.24E-06	0.025	5.03E-05	181
0.053048	10:29:45	690	695	0.054	0.053	4.64E-06	0.025	3.77E-05	136

0.052212	10:29:50	695	700	0.053	0.052	6.56E-06	0.024	5.38E-05	194
0.05208	10:29:55	700	705	0.052	0.052	1.04E-06	0.024	8.59E-06	31
0.051631	10:30:00	705	710	0.052	0.052	3.52E-06	0.024	2.92E-05	105
0.051284	10:30:05	710	715	0.052	0.051	2.72E-06	0.024	2.27E-05	82
0.050897	10:30:10	715	720	0.051	0.051	3.04E-06	0.024	2.55E-05	92
0.049806	10:30:15	720	725	0.051	0.050	8.57E-06	0.024	7.24E-05	261
0.04945	10:30:20	725	730	0.050	0.049	2.80E-06	0.023	2.39E-05	86
0.048736	10:30:25	730	735	0.049	0.049	5.60E-06	0.023	4.82E-05	173
0.04842	10:30:30	735	740	0.049	0.048	2.48E-06	0.023	2.15E-05	77
0.047951	10:30:35	740	745	0.048	0.048	3.68E-06	0.023	3.20E-05	115
0.047472	10:30:40	745	750	0.048	0.047	3.76E-06	0.023	3.29E-05	119
0.046799	10:30:45	750	755	0.047	0.047	5.28E-06	0.023	4.66E-05	168
0.046412	10:30:50	755	760	0.047	0.046	3.04E-06	0.022	2.70E-05	97
0.045994	10:30:55	760	765	0.046	0.046	3.28E-06	0.022	2.93E-05	106
0.045739	10:31:00	765	770	0.046	0.046	2.00E-06	0.022	1.80E-05	65
0.045392	10:31:05	770	775	0.046	0.045	2.72E-06	0.022	2.46E-05	88
0.044801	10:31:10	775	780	0.045	0.045	4.64E-06	0.022	4.22E-05	152
0.044383	10:31:15	780	785	0.045	0.044	3.28E-06	0.022	3.00E-05	108
0.044027	10:31:20	785	790	0.044	0.044	2.80E-06	0.022	2.58E-05	93
0.043221	10:31:25	790	795	0.044	0.043	6.32E-06	0.022	5.87E-05	211
0.04318	10:31:30	795	800	0.043	0.043	3.20E-07	0.021	2.99E-06	11
0.043272	10:31:35	800	805	0.043	0.043	-7.21E-07	0.021	-6.72E-06	-24
0.042599	10:31:40	805	810	0.043	0.043	5.28E-06	0.021	4.95E-05	178
0.041886	10:31:45	810	815	0.043	0.042	5.60E-06	0.021	5.31E-05	191
0.041947	10:31:50	815	820	0.042	0.042	-4.80E-07	0.021	-4.57E-06	-16
0.041305	10:31:55	820	825	0.042	0.041	5.04E-06	0.021	4.82E-05	174
0.040591	10:32:00	825	830	0.041	0.041	5.60E-06	0.021	5.41E-05	195
0.041009	10:32:05	830	835	0.041	0.041	-3.28E-06	0.021	-3.18E-05	-114
0.03999	10:32:10	835	840	0.041	0.040	8.01E-06	0.021	7.78E-05	280
0.040051	10:32:15	840	845	0.040	0.040	-4.80E-07	0.020	-4.70E-06	-17
0.039174	10:32:20	845	850	0.040	0.039	6.89E-06	0.020	6.78E-05	244
0.03841	10:32:25	850	855	0.039	0.038	6.00E-06	0.020	5.99E-05	216
0.038135	10:32:30	855	860	0.038	0.038	2.16E-06	0.020	2.17E-05	78
0.038165	10:32:35	860	865	0.038	0.038	-2.40E-07	0.020	-2.42E-06	-9
0.037971	10:32:40	865	870	0.038	0.038	1.52E-06	0.020	1.54E-05	55
0.037278	10:32:45	870	875	0.038	0.037	5.44E-06	0.020	5.53E-05	199
0.036544	10:32:50	875	880	0.037	0.037	5.76E-06	0.019	5.93E-05	213
0.036269	10:32:55	880	885	0.037	0.036	2.16E-06	0.019	2.24E-05	81
0.035933	10:33:00	885	890	0.036	0.036	2.64E-06	0.019	2.75E-05	99
0.035729	10:33:05	890	895	0.036	0.036	1.60E-06	0.019	1.68E-05	60
0.035311	10:33:10	895	900	0.036	0.035	3.28E-06	0.019	3.45E-05	124
0.034924	10:33:15	900	905	0.035	0.035	3.04E-06	0.019	3.22E-05	116
0.034343	10:33:20	905	910	0.035	0.034	4.56E-06	0.019	4.87E-05	175
0.034343	10:33:25	910	915	0.034	0.034	0.00E+00	0.019	0.00E+00	0
0.033884	10:33:30	915	920	0.034	0.034	3.60E-06	0.019	3.88E-05	140
0.033435	10:33:35	920	925	0.034	0.033	3.52E-06	0.018	3.82E-05	138
0.03314	10:33:40	925	930	0.033	0.033	2.32E-06	0.018	2.54E-05	91
0.032793	10:33:45	930	935	0.033	0.033	2.72E-06	0.018	2.99E-05	108
0.032538	10:33:50	935	940	0.033	0.033	2.00E-06	0.018	2.21E-05	80
0.03209	10:33:55	940	945	0.033	0.032	3.52E-06	0.018	3.91E-05	141
0.031611	10:34:00	945	950	0.032	0.032	3.76E-06	0.018	4.21E-05	152
0.031203	10:34:05	950	955	0.032	0.031	3.20E-06	0.018	3.61E-05	130
0.031162	10:34:10	955	960	0.031	0.031	3.20E-07	0.018	3.63E-06	13
0.031019	10:34:15	960	965	0.031	0.031	1.12E-06	0.018	1.27E-05	46
0.030459	10:34:20	965	970	0.031	0.030	4.40E-06	0.018	5.03E-05	181
0.029929	10:34:25	970	975	0.030	0.030	4.16E-06	0.017	4.80E-05	173
0.029867	10:34:30	975	980	0.030	0.030	4.80E-07	0.017	5.57E-06	20
0.02949	10:34:35	980	985	0.030	0.029	2.96E-06	0.017	3.45E-05	124
0.029103	10:34:40	985	990	0.029	0.029	3.04E-06	0.017	3.57E-05	128
0.028583	10:34:45	990	995	0.029	0.029	4.08E-06	0.017	4.83E-05	174
0.028236	10:34:50	995	1000	0.029	0.028	2.72E-06	0.017	3.24E-05	117
0.027717	10:34:55	1000	1005	0.028	0.028	4.08E-06	0.017	4.91E-05	177
0.027441	10:35:00	1005	1010	0.028	0.027	2.16E-06	0.017	2.62E-05	94
0.026993	10:35:05	1010	1015	0.027	0.027	3.52E-06	0.016	4.29E-05	155
0.026738	10:35:10	1015	1020	0.027	0.027	2.00E-06	0.016	2.46E-05	88
0.026432	10:35:15	1020	1025	0.027	0.026	2.40E-06	0.016	2.96E-05	107
0.026045	10:35:20	1025	1030	0.026	0.026	3.04E-06	0.016	3.78E-05	136
0.025831	10:35:25	1030	1035	0.026	0.026	1.68E-06	0.016	2.10E-05	76
0.026004	10:35:30	1035	1040	0.026	0.026	-1.36E-06	0.016	-1.70E-05	-61
0.025403	10:35:35	1040	1045	0.026	0.025	4.72E-06	0.016	5.93E-05	214
0.02527	10:35:40	1045	1050	0.025	0.025	1.04E-06	0.016	1.32E-05	47
0.025168	10:35:45	1050	1055	0.025	0.025	8.01E-07	0.016	1.01E-05	37
0.024353	10:35:50	1055	1060	0.025	0.024	6.40E-06	0.016	8.19E-05	295
0.023945	10:35:55	1060	1065	0.024	0.024	3.20E-06	0.015	4.15E-05	149
0.024149	10:36:00	1065	1070	0.024	0.024	-1.60E-06	0.015	-2.08E-05	-75
0.023843	10:36:05	1070	1075	0.024	0.024	2.40E-06	0.015	3.12E-05	112

0.023456	10:36:10	1075	1080	0.024	0.023	3.04E-06	0.015	3.98E-05	143
0.023231	10:36:15	1080	1085	0.023	0.023	1.76E-06	0.015	2.32E-05	84
0.022875	10:36:20	1085	1090	0.023	0.023	2.80E-06	0.015	3.71E-05	134
0.022334	10:36:25	1090	1095	0.023	0.022	4.24E-06	0.015	5.67E-05	204
0.022059	10:36:30	1095	1100	0.022	0.022	2.16E-06	0.015	2.92E-05	105
0.021865	10:36:35	1100	1105	0.022	0.022	1.52E-06	0.015	2.06E-05	74
0.021335	10:36:40	1105	1110	0.022	0.021	4.16E-06	0.015	5.69E-05	205
0.021101	10:36:45	1110	1115	0.021	0.021	1.84E-06	0.015	2.54E-05	91
0.021223	10:36:50	1115	1120	0.021	0.021	-9.61E-07	0.015	-1.32E-05	-48
0.021376	10:36:55	1120	1125	0.021	0.021	-1.20E-06	0.015	-1.65E-05	-59
0.021019	10:37:00	1125	1130	0.021	0.021	2.80E-06	0.015	3.86E-05	139
0.020612	10:37:05	1130	1135	0.021	0.021	3.20E-06	0.014	4.45E-05	160
0.020275	10:37:10	1135	1140	0.021	0.020	2.64E-06	0.014	3.70E-05	133
0.019898	10:37:15	1140	1145	0.020	0.020	2.96E-06	0.014	4.18E-05	151
0.019582	10:37:20	1145	1150	0.020	0.020	2.48E-06	0.014	3.53E-05	127
0.019429	10:37:25	1150	1155	0.020	0.019	1.20E-06	0.014	1.72E-05	62
0.018991	10:37:30	1155	1160	0.019	0.019	3.44E-06	0.014	4.96E-05	178
0.01897	10:37:35	1160	1165	0.019	0.019	1.60E-07	0.014	2.32E-06	8
0.01792	10:37:40	1165	1170	0.019	0.018	8.25E-06	0.014	1.21E-04	435
0.020255	10:37:45	1170	1175	0.018	0.020	-1.83E-05	0.014	-2.65E-04	-953
0.019083	10:37:50	1175	1180	0.020	0.019	9.21E-06	0.014	1.31E-04	472
0.018196	10:37:55	1180	1185	0.019	0.018	6.97E-06	0.014	1.02E-04	366
						TEST TWO			
0.308981	10:38:40	0		-	-	-	-	-	-
0.275454	10:38:45	0	5	0.30898063	0.27545362	2.63E-04	0.100	5.28E-04	1902
0.256911	10:38:50	5	10	0.27545362	0.25691131	1.46E-04	0.091	3.18E-04	1146
0.243965	10:38:55	10	15	0.25691131	0.24396534	1.02E-04	0.087	2.35E-04	846
0.23474	10:39:00	15	20	0.24396534	0.23474006	7.25E-05	0.083	1.74E-04	628
0.226789	10:39:05	20	25	0.23474006	0.22678899	6.24E-05	0.080	1.55E-04	560
0.219337	10:39:10	25	30	0.22678899	0.21933741	5.85E-05	0.078	1.50E-04	541
0.213282	10:39:15	30	35	0.21933741	0.21328236	4.76E-05	0.076	1.25E-04	452
0.208094	10:39:20	35	40	0.21328236	0.20809378	4.08E-05	0.074	1.10E-04	396
0.202579	10:39:25	40	45	0.20809378	0.202579	4.33E-05	0.072	1.20E-04	431
0.198114	10:39:30	45	50	0.202579	0.19811417	3.51E-05	0.071	9.91E-05	357
0.194169	10:39:35	50	55	0.19811417	0.19416922	3.10E-05	0.069	8.92E-05	321
0.189878	10:39:40	55	60	0.19416922	0.18987768	3.37E-05	0.068	9.89E-05	356
0.186707	10:39:45	60	65	0.18987768	0.18670744	2.49E-05	0.067	7.43E-05	268
0.182783	10:39:50	65	70	0.18670744	0.18278287	3.08E-05	0.066	9.36E-05	337
0.179633	10:39:55	70	75	0.18278287	0.17963303	2.47E-05	0.065	7.64E-05	275
0.17632	10:40:00	75	80	0.17963303	0.17632008	2.60E-05	0.064	8.16E-05	294
0.17366	10:40:05	80	85	0.17632008	0.17365953	2.09E-05	0.063	6.65E-05	239
0.170989	10:40:10	85	90	0.17365953	0.17098879	2.10E-05	0.062	6.77E-05	244
0.168828	10:40:15	90	95	0.17098879	0.16882773	1.70E-05	0.061	5.54E-05	200
0.166453	10:40:20	95	100	0.16882773	0.1664526	1.87E-05	0.061	6.16E-05	222
0.164475	10:40:25	100	105	0.1664526	0.16447503	1.55E-05	0.060	5.19E-05	187
0.162742	10:40:30	105	110	0.16447503	0.1627421	1.36E-05	0.059	4.59E-05	165
0.161203	10:40:35	110	115	0.1627421	0.16120285	1.21E-05	0.059	4.12E-05	148
0.159164	10:40:40	115	120	0.16120285	0.15916412	1.60E-05	0.058	5.50E-05	198
0.157604	10:40:45	120	125	0.15916412	0.15760449	1.22E-05	0.058	4.25E-05	153
0.15577	10:40:50	125	130	0.15760449	0.15576962	1.44E-05	0.057	5.05E-05	182
0.154271	10:40:55	130	135	0.15576962	0.15427115	1.18E-05	0.057	4.16E-05	150
0.152457	10:41:00	135	140	0.15427115	0.15245668	1.43E-05	0.056	5.09E-05	183
0.151131	10:41:05	140	145	0.15245668	0.1511315	1.04E-05	0.056	3.75E-05	135
0.149541	10:41:10	145	150	0.1511315	0.14954128	1.25E-05	0.055	4.53E-05	163
0.14792	10:41:15	150	155	0.14954128	0.14792049	1.27E-05	0.055	4.66E-05	168
0.14633	10:41:20	155	160	0.14792049	0.14633028	1.25E-05	0.054	4.62E-05	166
0.144975	10:41:25	160	165	0.14633028	0.14497452	1.06E-05	0.054	3.97E-05	143
0.143619	10:41:30	165	170	0.14497452	0.14361876	1.06E-05	0.053	4.00E-05	144
0.142222	10:41:35	170	175	0.14361876	0.14222222	1.10E-05	0.053	4.16E-05	150
0.140724	10:41:40	175	180	0.14222222	0.14072375	1.18E-05	0.052	4.50E-05	162
0.139134	10:41:45	180	185	0.14072375	0.13913354	1.25E-05	0.052	4.82E-05	174
0.137554	10:41:50	185	190	0.13913354	0.13755352	1.24E-05	0.051	4.84E-05	174
0.135933	10:41:55	190	195	0.13755352	0.13593272	1.27E-05	0.051	5.01E-05	180
0.135219	10:42:00	195	200	0.13593272	0.13521916	5.60E-06	0.050	2.22E-05	80
0.133904	10:42:05	200	205	0.13521916	0.13390418	1.03E-05	0.050	4.12E-05	148
0.132834	10:42:10	205	210	0.13390418	0.13283384	8.41E-06	0.050	3.38E-05	122
0.13159	10:42:15	210	215	0.13283384	0.13159021	9.77E-06	0.049	3.96E-05	142
0.130449	10:42:20	215	220	0.13159021	0.13044852	8.97E-06	0.049	3.66E-05	132
0.129429	10:42:25	220	225	0.13044852	0.12942915	8.01E-06	0.049	3.29E-05	118
0.128073	10:42:30	225	230	0.12942915	0.12807339	1.06E-05	0.048	4.41E-05	159
0.127554	10:42:35	230	235	0.12807339	0.12755352	4.08E-06	0.048	1.70E-05	61
0.126259	10:42:40	235	240	0.12755352	0.12625892	1.02E-05	0.048	4.26E-05	153
0.124934	10:42:45	240	245	0.12625892	0.12493374	1.04E-05	0.047	4.40E-05	158
0.123965	10:42:50	245	250	0.12493374	0.12396534	7.61E-06	0.047	3.24E-05	117
0.122661	10:42:55	250	255	0.12396534	0.12266055	1.02E-05	0.047	4.40E-05	158
0.122171	10:43:00	255	260	0.12266055	0.12217125	3.84E-06	0.046	1.66E-05	60

0.121091	10:43:05	260	265	0.12217125	0.12109072	8.49E-06	0.046	3.68E-05	133
0.120061	10:43:10	265	270	0.12109072	0.12006116	8.09E-06	0.046	3.54E-05	127
0.119011	10:43:15	270	275	0.12006116	0.11901121	8.25E-06	0.045	3.63E-05	131
0.118002	10:43:20	275	280	0.11901121	0.11800204	7.93E-06	0.045	3.52E-05	127
0.117462	10:43:25	280	285	0.11800204	0.11746177	4.24E-06	0.045	1.89E-05	68
0.116493	10:43:30	285	290	0.11746177	0.11649337	7.61E-06	0.045	3.41E-05	123
0.115413	10:43:35	290	295	0.11649337	0.11541284	8.49E-06	0.044	3.83E-05	138
0.114771	10:43:40	295	300	0.11541284	0.11477064	5.04E-06	0.044	2.29E-05	83
0.113751	10:43:45	300	305	0.11477064	0.11375127	8.01E-06	0.044	3.66E-05	132
0.113099	10:43:50	305	310	0.11375127	0.11309888	5.12E-06	0.043	2.36E-05	85
0.11263	10:43:55	310	315	0.11309888	0.11262997	3.68E-06	0.043	1.70E-05	61
0.112263	10:44:00	315	320	0.11262997	0.112263	2.88E-06	0.043	1.33E-05	48
0.111325	10:44:05	320	325	0.112263	0.11132518	7.37E-06	0.043	3.43E-05	123
0.110612	10:44:10	325	330	0.11132518	0.11061162	5.60E-06	0.043	2.62E-05	94
0.109664	10:44:15	330	335	0.11061162	0.10966361	7.45E-06	0.042	3.51E-05	126
0.108624	10:44:20	335	340	0.10966361	0.10862385	8.17E-06	0.042	3.88E-05	140
0.107717	10:44:25	340	345	0.10862385	0.10771662	7.13E-06	0.042	3.41E-05	123
0.107462	10:44:30	345	350	0.10771662	0.10746177	2.00E-06	0.042	9.61E-06	35
0.106707	10:44:35	350	355	0.10746177	0.10670744	5.92E-06	0.041	2.86E-05	103
0.105841	10:44:40	355	360	0.10670744	0.10584098	6.81E-06	0.041	3.30E-05	119
0.105392	10:44:45	360	365	0.10584098	0.10539246	3.52E-06	0.041	1.72E-05	62
0.104924	10:44:50	365	370	0.10539246	0.10492355	3.68E-06	0.041	1.80E-05	65
0.104444	10:44:55	370	375	0.10492355	0.10444444	3.76E-06	0.041	1.85E-05	66
0.103303	10:45:00	375	380	0.10444444	0.10330275	8.97E-06	0.040	4.43E-05	159
0.102956	10:45:05	380	385	0.10330275	0.10295617	2.72E-06	0.040	1.35E-05	49
0.102701	10:45:10	385	390	0.10295617	0.10270133	2.00E-06	0.040	9.97E-06	36
0.102253	10:45:15	390	395	0.10270133	0.1022528	3.52E-06	0.040	1.76E-05	63
0.101651	10:45:20	395	400	0.1022528	0.10165138	4.72E-06	0.040	2.37E-05	85
0.10104	10:45:25	400	405	0.10165138	0.10103976	4.80E-06	0.040	2.42E-05	87
0.09999	10:45:30	405	410	0.10103976	0.09998981	8.25E-06	0.039	4.18E-05	151
0.099439	10:45:35	410	415	0.09998981	0.09943935	4.32E-06	0.039	2.21E-05	79
0.099164	10:45:40	415	420	0.09943935	0.09916412	2.16E-06	0.039	1.11E-05	40
0.098216	10:45:45	420	425	0.09916412	0.09821611	7.45E-06	0.039	3.83E-05	138
0.097431	10:45:50	425	430	0.09821611	0.09743119	6.16E-06	0.039	3.20E-05	115
0.097095	10:45:55	430	435	0.09743119	0.0970948	2.64E-06	0.038	1.38E-05	50
0.096096	10:46:00	435	440	0.0970948	0.09609582	7.85E-06	0.038	4.11E-05	148
0.095933	10:46:05	440	445	0.09609582	0.09593272	1.28E-06	0.038	6.74E-06	24
0.095454	10:46:10	445	450	0.09593272	0.09545362	3.76E-06	0.038	1.98E-05	71
0.09476	10:46:15	450	455	0.09545362	0.09476045	5.44E-06	0.038	2.89E-05	104
0.093935	10:46:20	455	460	0.09476045	0.09393476	6.48E-06	0.037	3.46E-05	125
0.092875	10:46:25	460	465	0.09393476	0.09287462	8.33E-06	0.037	4.48E-05	161
0.091998	10:46:30	465	470	0.09287462	0.09199796	6.89E-06	0.037	3.73E-05	134
0.091488	10:46:35	470	475	0.09199796	0.09148828	4.00E-06	0.037	2.18E-05	79
0.090571	10:46:40	475	480	0.09148828	0.09057085	7.21E-06	0.036	3.95E-05	142
0.089276	10:46:45	480	485	0.09057085	0.08927625	1.02E-05	0.036	5.63E-05	203
0.088981	10:46:50	485	490	0.08927625	0.08898063	2.32E-06	0.036	1.30E-05	47
0.088206	10:46:55	490	495	0.08898063	0.08820591	6.08E-06	0.036	3.41E-05	123
0.087054	10:47:00	495	500	0.08820591	0.08705403	9.05E-06	0.035	5.11E-05	184
0.086371	10:47:05	500	505	0.08705403	0.08637105	5.36E-06	0.035	3.06E-05	110
0.0858	10:47:10	505	510	0.08637105	0.0858002	4.48E-06	0.035	2.57E-05	92
0.084852	10:47:15	510	515	0.0858002	0.08485219	7.45E-06	0.035	4.30E-05	155
0.084383	10:47:20	515	520	0.08485219	0.08438328	3.68E-06	0.034	2.14E-05	77
0.083588	10:47:25	520	525	0.08438328	0.08358818	6.24E-06	0.034	3.65E-05	131
0.082834	10:47:30	525	530	0.08358818	0.08283384	5.92E-06	0.034	3.49E-05	125
0.081978	10:47:35	530	535	0.08283384	0.08197757	6.73E-06	0.034	3.99E-05	144
0.081274	10:47:40	535	540	0.08197757	0.08127421	5.52E-06	0.033	3.30E-05	119
0.080948	10:47:45	540	545	0.08127421	0.08094801	2.56E-06	0.033	1.54E-05	55
0.080102	10:47:50	545	550	0.08094801	0.08010194	6.65E-06	0.033	4.01E-05	144
0.079776	10:47:55	550	555	0.08010194	0.07977574	2.56E-06	0.033	1.55E-05	56
0.079032	10:48:00	555	560	0.07977574	0.0790316	5.84E-06	0.033	3.56E-05	128
0.078552	10:48:05	560	565	0.0790316	0.0785525	3.76E-06	0.033	2.31E-05	83
0.078206	10:48:10	565	570	0.0785525	0.07820591	2.72E-06	0.032	1.68E-05	60
0.077645	10:48:15	570	575	0.07820591	0.07764526	4.40E-06	0.032	2.72E-05	98
0.076463	10:48:20	575	580	0.07764526	0.07646279	9.29E-06	0.032	5.79E-05	209
0.076075	10:48:25	580	585	0.07646279	0.07607543	3.04E-06	0.032	1.91E-05	69
0.076045	10:48:30	585	590	0.07607543	0.07604485	2.40E-07	0.032	1.51E-06	5
0.075607	10:48:35	590	595	0.07604485	0.07560652	3.44E-06	0.032	2.17E-05	78
0.074924	10:48:40	595	600	0.07560652	0.07492355	5.36E-06	0.031	3.41E-05	123
0.074669	10:48:45	600	605	0.07492355	0.07466871	2.00E-06	0.031	1.28E-05	46
0.074128	10:48:50	605	610	0.07466871	0.07412844	4.24E-06	0.031	2.72E-05	98
0.07367	10:48:55	610	615	0.07412844	0.07366972	3.60E-06	0.031	2.32E-05	83
0.072997	10:49:00	615	620	0.07366972	0.07299694	5.28E-06	0.031	3.42E-05	123
0.07262	10:49:05	620	625	0.07299694	0.07261978	2.96E-06	0.031	1.93E-05	69
0.072334	10:49:10	625	630	0.07261978	0.07233435	2.24E-06	0.031	1.46E-05	53
0.071825	10:49:15	630	635	0.07233435	0.07182467	4.00E-06	0.030	2.63E-05	95
0.071468	10:49:20	635	640	0.07182467	0.07146789	2.80E-06	0.030	1.85E-05	66

0.071376	10:49:25	640	645	0.07146789	0.07137615	7.21E-07	0.030	4.76E-06	17
0.070866	10:49:30	645	650	0.07137615	0.07086646	4.00E-06	0.030	2.65E-05	95
0.070499	10:49:35	650	655	0.07086646	0.07049949	2.88E-06	0.030	1.92E-05	69
0.070061	10:49:40	655	660	0.07049949	0.07006116	3.44E-06	0.030	2.30E-05	83
0.069348	10:49:45	660	665	0.07006116	0.0693476	5.60E-06	0.030	3.77E-05	136
0.069246	10:49:50	665	670	0.0693476	0.06924567	8.01E-07	0.030	5.41E-06	19
0.068807	10:49:55	670	675	0.06924567	0.06880734	3.44E-06	0.030	2.33E-05	84
0.068338	10:50:00	675	680	0.06880734	0.06833843	3.68E-06	0.029	2.51E-05	90
0.067951	10:50:05	680	685	0.06833843	0.06795107	3.04E-06	0.029	2.08E-05	75
0.067574	10:50:10	685	690	0.06795107	0.0675739	2.96E-06	0.029	2.03E-05	73
0.067431	10:50:15	690	695	0.0675739	0.06743119	1.12E-06	0.029	7.71E-06	28
0.067136	10:50:20	695	700	0.06743119	0.06713558	2.32E-06	0.029	1.60E-05	58
0.066606	10:50:25	700	705	0.06713558	0.0666055	4.16E-06	0.029	2.88E-05	104
0.066055	10:50:30	705	710	0.0666055	0.06605505	4.32E-06	0.029	3.01E-05	108
0.066065	10:50:35	710	715	0.06605505	0.06606524	-8.01E-08	0.029	-5.60E-07	-2
0.065688	10:50:40	715	720	0.06606524	0.06568807	2.96E-06	0.029	2.08E-05	75
0.06525	10:50:45	720	725	0.06568807	0.06524975	3.44E-06	0.028	2.42E-05	87
0.06476	10:50:50	725	730	0.06524975	0.06476045	3.84E-06	0.028	2.72E-05	98
0.06475	10:50:55	730	735	0.06476045	0.06475025	8.01E-08	0.028	5.68E-07	2
0.064455	10:51:00	735	740	0.06475025	0.06445464	2.32E-06	0.028	1.65E-05	59
0.064027	10:51:05	740	745	0.06445464	0.0640265	3.36E-06	0.028	2.40E-05	86
0.063639	10:51:10	745	750	0.0640265	0.06363914	3.04E-06	0.028	2.18E-05	78
0.063191	10:51:15	750	755	0.06363914	0.06319062	3.52E-06	0.028	2.54E-05	91
0.063089	10:51:20	755	760	0.06319062	0.06308869	8.01E-07	0.028	5.78E-06	21
0.062742	10:51:25	760	765	0.06308869	0.0627421	2.72E-06	0.028	1.97E-05	71
0.062294	10:51:30	765	770	0.0627421	0.06229358	3.52E-06	0.027	2.56E-05	92
0.061937	10:51:35	770	775	0.06229358	0.0619368	2.80E-06	0.027	2.05E-05	74
0.061814	10:51:40	775	780	0.0619368	0.06181448	9.61E-07	0.027	7.04E-06	25
0.061651	10:51:45	780	785	0.06181448	0.06165138	1.28E-06	0.027	9.40E-06	34
0.061019	10:51:50	785	790	0.06165138	0.06101937	4.96E-06	0.027	3.66E-05	132
0.060979	10:51:55	790	795	0.06101937	0.06097859	3.20E-07	0.027	2.37E-06	9
0.06052	10:52:00	795	800	0.06097859	0.06051988	3.60E-06	0.027	2.67E-05	96
0.060224	10:52:05	800	805	0.06051988	0.06022426	2.32E-06	0.027	1.73E-05	62
0.059929	10:52:10	805	810	0.06022426	0.05992864	2.32E-06	0.027	1.74E-05	63
0.059827	10:52:15	810	815	0.05992864	0.05982671	8.01E-07	0.027	6.00E-06	22
0.059185	10:52:20	815	820	0.05982671	0.05918451	5.04E-06	0.027	3.80E-05	137
0.059297	10:52:25	820	825	0.05918451	0.05929664	-8.81E-07	0.026	-6.66E-06	-24
0.05894	10:52:30	825	830	0.05929664	0.05893986	2.80E-06	0.026	2.12E-05	76
0.058828	10:52:35	830	835	0.05893986	0.05882773	8.81E-07	0.026	6.68E-06	24
0.057961	10:52:40	835	840	0.05882773	0.05796126	6.81E-06	0.026	5.19E-05	187
0.058155	10:52:45	840	845	0.05796126	0.05815494	-1.52E-06	0.026	-1.17E-05	-42
0.057676	10:52:50	845	850	0.05815494	0.05767584	3.76E-06	0.026	2.89E-05	104
0.057431	10:52:55	850	855	0.05767584	0.05743119	1.92E-06	0.026	1.48E-05	53
0.057452	10:53:00	855	860	0.05743119	0.05745158	-1.60E-07	0.026	-1.24E-06	-4
0.057176	10:53:05	860	865	0.05745158	0.05717635	2.16E-06	0.026	1.67E-05	60
0.056769	10:53:10	865	870	0.05717635	0.0567686	3.20E-06	0.026	2.49E-05	90
0.056442	10:53:15	870	875	0.0567686	0.05644241	2.56E-06	0.026	2.00E-05	72
0.056279	10:53:20	875	880	0.05644241	0.05627931	1.28E-06	0.026	1.00E-05	36
0.055607	10:53:25	880	885	0.05627931	0.05560652	5.28E-06	0.025	4.16E-05	150
0.055647	10:53:30	885	890	0.05560652	0.0556473	-3.20E-07	0.025	-2.53E-06	-9
0.055199	10:53:35	890	895	0.0556473	0.05519878	3.52E-06	0.025	2.79E-05	100
0.055117	10:53:40	895	900	0.05519878	0.05511723	6.40E-07	0.025	5.09E-06	18
0.054995	10:53:45	900	905	0.05511723	0.0549949	9.61E-07	0.025	7.64E-06	28
0.054669	10:53:50	905	910	0.0549949	0.05466871	2.56E-06	0.025	2.04E-05	74
0.054781	10:53:55	910	915	0.05466871	0.05478084	-8.81E-07	0.025	-7.03E-06	-25
0.054139	10:54:00	915	920	0.05478084	0.05413863	5.04E-06	0.025	4.04E-05	145
0.053833	10:54:05	920	925	0.05413863	0.05383282	2.40E-06	0.025	1.94E-05	70
0.053955	10:54:10	925	930	0.05383282	0.05395515	-9.61E-07	0.025	-7.75E-06	-28
0.053782	10:54:15	930	935	0.05395515	0.05378186	1.36E-06	0.025	1.10E-05	40
0.05318	10:54:20	935	940	0.05378186	0.05318043	4.72E-06	0.025	3.83E-05	138
0.052966	10:54:25	940	945	0.05318043	0.05296636	1.68E-06	0.025	1.37E-05	49
0.052416	10:54:30	945	950	0.05296636	0.0524159	4.32E-06	0.024	3.54E-05	128
0.052171	10:54:35	950	955	0.0524159	0.05217125	1.92E-06	0.024	1.58E-05	57
0.052171	10:54:40	955	960	0.05217125	0.05217125	0.00E+00	0.024	0.00E+00	0
0.051509	10:54:45	960	965	0.05217125	0.05150866	5.20E-06	0.024	4.31E-05	155
0.051509	10:54:50	965	970	0.05150866	0.05150866	0.00E+00	0.024	0.00E+00	0
0.05103	10:54:55	970	975	0.05150866	0.05102956	3.76E-06	0.024	3.14E-05	113
0.050826	10:55:00	975	980	0.05102956	0.05082569	1.60E-06	0.024	1.34E-05	48
0.050571	10:55:05	980	985	0.05082569	0.05057085	2.00E-06	0.024	1.68E-05	61
0.050296	10:55:10	985	990	0.05057085	0.05029562	2.16E-06	0.024	1.82E-05	66
0.050102	10:55:15	990	995	0.05029562	0.05010194	1.52E-06	0.024	1.29E-05	46
0.04949	10:55:20	995	1000	0.05010194	0.04949032	4.80E-06	0.023	4.09E-05	147
0.049419	10:55:25	1000	1005	0.04949032	0.04941896	5.60E-07	0.023	4.79E-06	17
0.049072	10:55:30	1005	1010	0.04941896	0.04907238	2.72E-06	0.023	2.33E-05	84
0.048869	10:55:35	1010	1015	0.04907238	0.0488685	1.60E-06	0.023	1.38E-05	50
0.048665	10:55:40	1015	1020	0.0488685	0.04866463	1.60E-06	0.023	1.38E-05	50

0.048022	10:55:45	1020	1025	0.04866463	0.04802243	5.04E-06	0.023	4.38E-05	158
0.047951	10:55:50	1025	1030	0.04802243	0.04795107	5.60E-07	0.023	4.89E-06	18
0.047574	10:55:55	1030	1035	0.04795107	0.0475739	2.96E-06	0.023	2.59E-05	93
0.046871	10:56:00	1035	1040	0.0475739	0.04687054	5.52E-06	0.023	4.87E-05	175
0.046748	10:56:05	1040	1045	0.04687054	0.04674822	9.61E-07	0.023	8.52E-06	31
0.046453	10:56:10	1045	1050	0.04674822	0.0464526	2.32E-06	0.022	2.06E-05	74
0.046249	10:56:15	1050	1055	0.0464526	0.04624873	1.60E-06	0.022	1.43E-05	51
0.046177	10:56:20	1055	1060	0.04624873	0.04617737	5.60E-07	0.022	5.01E-06	18
0.045872	10:56:25	1060	1065	0.04617737	0.04587156	2.40E-06	0.022	2.15E-05	78
0.04577	10:56:30	1065	1070	0.04587156	0.04576962	8.01E-07	0.022	7.20E-06	26
0.045138	10:56:35	1070	1075	0.04576962	0.04513761	4.96E-06	0.022	4.49E-05	161
0.04472	10:56:40	1075	1080	0.04513761	0.04471967	3.28E-06	0.022	2.99E-05	108
0.044281	10:56:45	1080	1085	0.04471967	0.04428135	3.44E-06	0.022	3.15E-05	114
0.044587	10:56:50	1085	1090	0.04428135	0.04458716	-2.40E-06	0.022	-2.20E-05	-79
0.044271	10:56:55	1090	1095	0.04458716	0.04427115	2.48E-06	0.022	2.28E-05	82
0.043925	10:57:00	1095	1100	0.04427115	0.04392457	2.72E-06	0.022	2.51E-05	90
0.04371	10:57:05	1100	1105	0.04392457	0.0437105	1.68E-06	0.022	1.56E-05	56
0.04367	10:57:10	1105	1110	0.0437105	0.04366972	3.20E-07	0.022	2.97E-06	11
0.043028	10:57:15	1110	1115	0.04366972	0.04302752	5.04E-06	0.021	4.70E-05	169
0.043231	10:57:20	1115	1120	0.04302752	0.0432314	-1.60E-06	0.021	-1.50E-05	-54
0.04314	10:57:25	1120	1125	0.0432314	0.04313965	7.21E-07	0.021	6.73E-06	24
0.042824	10:57:30	1125	1130	0.04313965	0.04282365	2.48E-06	0.021	2.32E-05	84
0.042681	10:57:35	1130	1135	0.04282365	0.04268094	1.12E-06	0.021	1.05E-05	38
0.042304	10:57:40	1135	1140	0.04268094	0.04230377	2.96E-06	0.021	2.79E-05	101
0.041407	10:57:45	1140	1145	0.04230377	0.04140673	7.05E-06	0.021	6.71E-05	242
0.041152	10:57:50	1145	1150	0.04140673	0.04115189	2.00E-06	0.021	1.92E-05	69
0.041101	10:57:55	1150	1155	0.04115189	0.04110092	4.00E-07	0.021	3.85E-06	14
0.040724	10:58:00	1155	1160	0.04110092	0.04072375	2.96E-06	0.021	2.86E-05	103
0.040734	10:58:05	1160	1165	0.04072375	0.04073394	-8.01E-08	0.021	-7.75E-07	-3
0.040316	10:58:10	1165	1170	0.04073394	0.040316	3.28E-06	0.021	3.19E-05	115
0.040306	10:58:15	1170	1175	0.040316	0.04030581	8.01E-08	0.021	7.80E-07	3
0.039715	10:58:20	1175	1180	0.04030581	0.03971458	4.64E-06	0.020	4.55E-05	164
0.039562	10:58:25	1180	1185	0.03971458	0.03956167	1.20E-06	0.020	1.18E-05	43
0.039205	10:58:30	1185	1190	0.03956167	0.03920489	2.80E-06	0.020	2.77E-05	100
0.039195	10:58:35	1190	1195	0.03920489	0.0391947	8.01E-08	0.020	7.94E-07	3
0.038675	10:58:40	1195	1200	0.0391947	0.03867482	4.08E-06	0.020	4.07E-05	146
0.038603	10:58:45	1200	1205	0.03867482	0.03860347	5.60E-07	0.020	5.61E-06	20
0.038216	10:58:50	1205	1210	0.03860347	0.03821611	3.04E-06	0.020	3.05E-05	110
0.038328	10:58:55	1210	1215	0.03821611	0.03832824	-8.81E-07	0.020	-8.86E-06	-32
0.038033	10:59:00	1215	1220	0.03832824	0.03803262	2.32E-06	0.020	2.34E-05	84
0.037095	10:59:05	1220	1225	0.03803262	0.0370948	7.37E-06	0.020	7.49E-05	270
0.037044	10:59:10	1225	1230	0.0370948	0.03704383	4.00E-07	0.019	4.11E-06	15
0.036911	10:59:15	1230	1235	0.03704383	0.03691131	1.04E-06	0.019	1.07E-05	38
0.036799	10:59:20	1235	1240	0.03691131	0.03679918	8.81E-07	0.019	9.06E-06	33
0.036718	10:59:25	1240	1245	0.03679918	0.03671764	6.40E-07	0.019	6.60E-06	24
0.036371	10:59:30	1245	1250	0.03671764	0.03637105	2.72E-06	0.019	2.82E-05	101
0.036055	10:59:35	1250	1255	0.03637105	0.03605505	2.48E-06	0.019	2.58E-05	93
0.035688	10:59:40	1255	1260	0.03605505	0.03568807	2.88E-06	0.019	3.01E-05	109
0.035576	10:59:45	1260	1265	0.03568807	0.03557594	8.81E-07	0.019	9.25E-06	33
0.035454	10:59:50	1265	1270	0.03557594	0.03545362	9.61E-07	0.019	1.01E-05	36
0.035076	10:59:55	1270	1275	0.03545362	0.03507645	2.96E-06	0.019	3.13E-05	113
0.035148	11:00:00	1275	1280	0.03507645	0.03514781	-5.60E-07	0.019	-5.94E-06	-21
0.034913	11:00:05	1280	1285	0.03514781	0.03491335	1.84E-06	0.019	1.95E-05	70
0.034546	11:00:10	1285	1290	0.03491335	0.03454638	2.88E-06	0.019	3.07E-05	111
0.034057	11:00:15	1290	1295	0.03454638	0.03405708	3.84E-06	0.019	4.13E-05	149
0.033863	11:00:20	1295	1300	0.03405708	0.0338634	1.52E-06	0.019	1.64E-05	59
0.033394	11:00:25	1300	1305	0.0338634	0.0333945	3.68E-06	0.018	4.00E-05	144
0.033242	11:00:30	1305	1310	0.0333945	0.03324159	1.20E-06	0.018	1.31E-05	47
0.032905	11:00:35	1310	1315	0.03324159	0.0329052	2.64E-06	0.018	2.90E-05	104
0.032803	11:00:40	1315	1320	0.0329052	0.03280326	8.01E-07	0.018	8.81E-06	32
0.032181	11:00:45	1320	1325	0.03280326	0.03218145	4.88E-06	0.018	5.41E-05	195
0.032018	11:00:50	1325	1330	0.03218145	0.03201835	1.28E-06	0.018	1.43E-05	51
0.031743	11:00:55	1330	1335	0.03201835	0.03174312	2.16E-06	0.018	2.42E-05	87
0.031193	11:01:00	1335	1340	0.03174312	0.03119266	4.32E-06	0.018	4.87E-05	175
0.030948	11:01:05	1340	1345	0.03119266	0.03094801	1.92E-06	0.018	2.18E-05	79
0.030612	11:01:10	1345	1350	0.03094801	0.03061162	2.64E-06	0.018	3.02E-05	109
0.029908	11:01:15	1350	1355	0.03061162	0.02990826	5.52E-06	0.017	6.36E-05	229
0.028705	11:01:20	1355	1360	0.02990826	0.0287054	9.45E-06	0.017	1.11E-04	399
0.026218	11:01:25	1360	1365	0.0287054	0.02621814	1.95E-05	0.016	2.37E-04	853
0.020856	11:01:30	1365	1370	0.02621814	0.02085627	4.21E-05	0.015	5.52E-04	1988
0.008828	11:01:35	1370	1375	0.02085627	0.00882773	9.45E-05	0.013	1.51E-03	5434
0.008532	11:01:40	1375	1380	0.00882773	0.00853211	2.32E-06	0.011	4.39E-05	158
0.007676	11:01:45	1380	1385	0.00853211	0.00767584	6.73E-06	0.010	1.29E-04	466
0.007778	11:01:50	1385	1390	0.00767584	0.00777778	-8.01E-07	0.010	-1.56E-05	-56
0.007166	11:01:55	1390	1395	0.00777778	0.00716616	4.80E-06	0.010	9.42E-05	339
0.00633	11:02:00	1395	1400	0.00716616	0.00633028	6.56E-06	0.010	1.32E-04	474

0.006004	11:02:05	1400	1405	0.00633028	0.00600408	2.56E-06	0.010	5.23E-05	188
0.005015	11:02:10	1405	1410	0.00600408	0.00501529	7.77E-06	0.010	1.62E-04	583
0.004444	11:02:15	1410	1415	0.00501529	0.00444444	4.48E-06	0.009	9.60E-05	346
0.003445	11:02:20	1415	1420	0.00444444	0.00344546	7.85E-06	0.009	1.73E-04	621
0.003303	11:02:25	1420	1425	0.00344546	0.00330275	1.12E-06	0.009	2.51E-05	91
0.002589	11:02:30	1425	1430	0.00330275	0.00258919	5.60E-06	0.009	1.28E-04	460
0.002273	11:02:35	1430	1435	0.00258919	0.00227319	2.48E-06	0.009	5.76E-05	207
0.001611	11:02:40	1435	1440	0.00227319	0.0016106	5.20E-06	0.008	1.23E-04	443
0.001101	11:02:45	1440	1445	0.0016106	0.00110092	4.00E-06	0.008	9.67E-05	348
0.00052	11:02:50	1445	1450	0.00110092	0.00051988	4.56E-06	0.008	1.13E-04	405
0.000306	11:02:55	1450	1455	0.00051988	0.00030581	1.68E-06	0.008	4.21E-05	152
0.000296	11:03:00	1455	1460	0.00030581	0.00029562	8.01E-08	0.008	2.01E-06	7
0.001223	11:03:05	1460	1465	0.00029562	0.00122324	-7.29E-06	0.008	-1.80E-04	-648
0.001244	11:03:10	1465	1470	0.00122324	0.00124363	-1.60E-07	0.008	-3.89E-06	-14
0.00157	11:03:15	1470	1475	0.00124363	0.00156983	-2.56E-06	0.008	-6.18E-05	-222
0.001081	11:03:20	1475	1480	0.00156983	0.00108053	3.84E-06	0.008	9.29E-05	335
0.00107	11:03:25	1480	1485	0.00108053	0.00107034	8.01E-08	0.008	1.95E-06	7
0.000367	11:03:30	1485	1490	0.00107034	0.00036697	5.52E-06	0.008	1.37E-04	492
0.000703	11:03:35	1490	1495	0.00036697	0.00070336	-2.64E-06	0.008	-6.59E-05	-237
0.000459	11:03:40	1495	1500	0.00070336	0.00045872	1.92E-06	0.008	4.78E-05	172
8.15E-05	11:03:45	1500	1505	0.00045872	8.1549E-05	2.96E-06	0.008	7.46E-05	269
0.000122	11:03:50	1505	1510	8.1549E-05	0.00012232	-3.20E-07	0.008	-8.12E-06	-29
4.08E-05	11:03:55	1510	1515	0.00012232	4.0775E-05	6.40E-07	0.008	1.63E-05	59
-0.00025	11:04:00	1515	1520	4.0775E-05	-0.0002548	2.32E-06	0.008	5.94E-05	214
-0.00043	11:04:05	1520	1525	-0.0002548	-0.0004281	1.36E-06	0.008	3.51E-05	126
-0.00068	11:04:10	1525	1530	-0.0004281	-0.000683	2.00E-06	0.008	5.21E-05	188
0.000765	11:04:15	1530	1535	-0.000683	0.00076453	-1.14E-05	0.008	-2.89E-04	-1041
0.000775	11:04:20	1535	1540	0.00076453	0.00077472	-8.01E-08	0.008	-1.98E-06	-7
-0.0001	11:04:25	1540	1545	0.00077472	-0.0001019	6.89E-06	0.008	1.73E-04	623
0.000408	11:04:30	1545	1550	-0.0001019	0.00040775	-4.00E-06	0.008	-1.01E-04	-365
0	11:04:35	1550	1555	0.00040775	0	3.20E-06	0.008	8.09E-05	291
TEST THREE									
0.89085	11:05:10	0		-	-	-	-	-	-
0.79013	11:05:15	0	5	0.89084608	0.79013252	7.91E-04	0.272	5.82E-04	2095
0.71817	11:05:20	5	10	0.79013252	0.71816514	5.65E-04	0.245	4.62E-04	1663
0.66241	11:05:25	10	15	0.71816514	0.66240571	4.38E-04	0.225	3.90E-04	1403
0.62051	11:05:30	15	20	0.66240571	0.62050968	3.29E-04	0.209	3.14E-04	1132
0.58718	11:05:35	20	25	0.62050968	0.58717635	2.62E-04	0.198	2.65E-04	954
0.55945	11:05:40	25	30	0.58717635	0.55944954	2.18E-04	0.188	2.32E-04	834
0.53468	11:05:45	30	35	0.55944954	0.5346789	1.95E-04	0.180	2.17E-04	779
0.51276	11:05:50	35	40	0.5346789	0.51276249	1.72E-04	0.172	2.00E-04	719
0.49390	11:05:55	40	45	0.51276249	0.49390418	1.48E-04	0.166	1.78E-04	642
0.47578	11:06:00	45	50	0.49390418	0.47577982	1.42E-04	0.160	1.78E-04	640
0.45968	11:06:05	50	55	0.47577982	0.459684	1.26E-04	0.155	1.63E-04	588
0.44498	11:06:10	55	60	0.459684	0.44498471	1.15E-04	0.150	1.54E-04	554
0.43118	11:06:15	60	65	0.44498471	0.43118247	1.08E-04	0.145	1.49E-04	536
0.41907	11:06:20	65	70	0.43118247	0.41907238	9.51E-05	0.141	1.35E-04	484
0.40801	11:06:25	70	75	0.41907238	0.40801223	8.69E-05	0.138	1.26E-04	454
0.39742	11:06:30	75	80	0.40801223	0.397421	8.32E-05	0.134	1.24E-04	446
0.38811	11:06:35	80	85	0.397421	0.38811417	7.31E-05	0.131	1.11E-04	401
0.37976	11:06:40	85	90	0.38811417	0.37975535	6.56E-05	0.128	1.02E-04	368
0.37163	11:06:45	90	95	0.37975535	0.37163099	6.38E-05	0.126	1.01E-04	365
0.36472	11:06:50	95	100	0.37163099	0.36471967	5.43E-05	0.124	8.79E-05	316
0.35811	11:06:55	100	105	0.36471967	0.35811417	5.19E-05	0.121	8.55E-05	308
0.35230	11:07:00	105	110	0.35811417	0.35230377	4.56E-05	0.119	7.64E-05	275
0.34732	11:07:05	110	115	0.35230377	0.34731906	3.91E-05	0.118	6.65E-05	239
0.34238	11:07:10	115	120	0.34731906	0.34237513	3.88E-05	0.116	6.68E-05	241
0.33759	11:07:15	120	125	0.34237513	0.33759429	3.75E-05	0.115	6.55E-05	236
0.33303	11:07:20	125	130	0.33759429	0.33302752	3.59E-05	0.113	6.34E-05	228
0.32912	11:07:25	130	135	0.33302752	0.32912334	3.07E-05	0.112	5.48E-05	197
0.32475	11:07:30	135	140	0.32912334	0.32475025	3.43E-05	0.111	6.21E-05	224
0.32066	11:07:35	140	145	0.32475025	0.32066259	3.21E-05	0.109	5.88E-05	212
0.31654	11:07:40	145	150	0.32066259	0.31654434	3.23E-05	0.108	5.99E-05	216
0.31270	11:07:45	150	155	0.31654434	0.31270133	3.02E-05	0.107	5.66E-05	204
0.30867	11:07:50	155	160	0.31270133	0.30867482	3.16E-05	0.105	6.00E-05	216
0.30490	11:07:55	160	165	0.30867482	0.30490316	2.96E-05	0.104	5.68E-05	205
0.30129	11:08:00	165	170	0.30490316	0.3012946	2.83E-05	0.103	5.50E-05	198
0.29775	11:08:05	170	175	0.3012946	0.2977472	2.79E-05	0.102	5.47E-05	197
0.29428	11:08:10	175	180	0.2977472	0.29428135	2.72E-05	0.101	5.40E-05	194
0.29101	11:08:15	180	185	0.29428135	0.29100917	2.57E-05	0.100	5.15E-05	185
0.28795	11:08:20	185	190	0.29100917	0.28795107	2.40E-05	0.099	4.86E-05	175
0.28478	11:08:25	190	195	0.28795107	0.28478084	2.49E-05	0.098	5.09E-05	183
0.28171	11:08:30	195	200	0.28478084	0.28171254	2.41E-05	0.097	4.98E-05	179
0.27849	11:08:35	200	205	0.28171254	0.27849134	2.53E-05	0.096	5.28E-05	190
0.27572	11:08:40	205	210	0.27849134	0.27571865	2.18E-05	0.095	4.59E-05	165
0.27253	11:08:45	210	215	0.27571865	0.27252803	2.51E-05	0.094	5.33E-05	192

0.26987	11:08:50	215	220	0.27252803	0.26986748	2.09E-05	0.093	4.49E-05	162
0.26703	11:08:55	220	225	0.26986748	0.26703364	2.23E-05	0.092	4.83E-05	174
0.26437	11:09:00	225	230	0.26703364	0.26437309	2.09E-05	0.091	4.58E-05	165
0.26177	11:09:05	230	235	0.26437309	0.2617737	2.04E-05	0.091	4.51E-05	162
0.25915	11:09:10	235	240	0.2617737	0.25915392	2.06E-05	0.090	4.59E-05	165
0.25664	11:09:15	240	245	0.25915392	0.25663609	1.98E-05	0.089	4.45E-05	160
0.25418	11:09:20	245	250	0.25663609	0.25417941	1.93E-05	0.088	4.38E-05	158
0.25191	11:09:25	250	255	0.25417941	0.25190622	1.79E-05	0.087	4.09E-05	147
0.24951	11:09:30	255	260	0.25190622	0.2495107	1.88E-05	0.087	4.34E-05	156
0.24713	11:09:35	260	265	0.2495107	0.24712538	1.87E-05	0.086	4.36E-05	157
0.24438	11:09:40	265	270	0.24712538	0.24438328	2.15E-05	0.085	5.06E-05	182
0.24243	11:09:45	270	275	0.24438328	0.2424261	1.54E-05	0.084	3.65E-05	131
0.24009	11:09:50	275	280	0.2424261	0.24009174	1.83E-05	0.084	4.38E-05	158
0.23863	11:09:55	280	285	0.24009174	0.23863405	1.14E-05	0.083	2.76E-05	99
0.23600	11:10:00	285	290	0.23863405	0.23600408	2.07E-05	0.082	5.01E-05	180
0.23431	11:10:05	290	295	0.23600408	0.23431193	1.33E-05	0.082	3.25E-05	117
0.23204	11:10:10	295	300	0.23431193	0.23203874	1.79E-05	0.081	4.40E-05	158
0.22959	11:10:15	300	305	0.23203874	0.22959225	1.92E-05	0.080	4.78E-05	172
0.22807	11:10:20	305	310	0.22959225	0.22807339	1.19E-05	0.080	2.99E-05	108
0.22603	11:10:25	310	315	0.22807339	0.22603466	1.60E-05	0.079	4.04E-05	146
0.22437	11:10:30	315	320	0.22603466	0.22437309	1.30E-05	0.079	3.32E-05	120
0.22259	11:10:35	320	325	0.22437309	0.22258919	1.40E-05	0.078	3.59E-05	129
0.22031	11:10:40	325	330	0.22258919	0.22030581	1.79E-05	0.077	4.63E-05	167
0.21877	11:10:45	330	335	0.22030581	0.21876656	1.21E-05	0.077	3.15E-05	113
0.21661	11:10:50	335	340	0.21876656	0.2166055	1.70E-05	0.076	4.45E-05	160
0.21505	11:10:55	340	345	0.2166055	0.21504587	1.22E-05	0.076	3.24E-05	117
0.21339	11:11:00	345	350	0.21504587	0.2133945	1.30E-05	0.075	3.45E-05	124
0.21136	11:11:05	350	355	0.2133945	0.21135576	1.60E-05	0.075	4.29E-05	155
0.21019	11:11:10	355	360	0.21135576	0.21019368	9.13E-06	0.074	2.46E-05	89
0.20841	11:11:15	360	365	0.21019368	0.20840979	1.40E-05	0.074	3.81E-05	137
0.20657	11:11:20	365	370	0.20840979	0.20657492	1.44E-05	0.073	3.95E-05	142
0.20489	11:11:25	370	375	0.20657492	0.20489297	1.32E-05	0.072	3.64E-05	131
0.20365	11:11:30	375	380	0.20489297	0.20364934	9.77E-06	0.072	2.71E-05	98
0.20193	11:11:35	380	385	0.20364934	0.20192661	1.35E-05	0.072	3.78E-05	136
0.20030	11:11:40	385	390	0.20192661	0.20029562	1.28E-05	0.071	3.61E-05	130
0.19858	11:11:45	390	395	0.20029562	0.19858308	1.35E-05	0.071	3.82E-05	137
0.19737	11:11:50	395	400	0.19858308	0.19737003	9.53E-06	0.070	2.72E-05	98
0.19601	11:11:55	400	405	0.19737003	0.19601427	1.06E-05	0.070	3.06E-05	110
0.19440	11:12:00	405	410	0.19601427	0.19440367	1.26E-05	0.069	3.66E-05	132
0.19323	11:12:05	410	415	0.19440367	0.1932314	9.21E-06	0.069	2.68E-05	96
0.19155	11:12:10	415	420	0.1932314	0.19154944	1.32E-05	0.068	3.87E-05	139
0.19035	11:12:15	420	425	0.19154944	0.19034659	9.45E-06	0.068	2.79E-05	100
0.18866	11:12:20	425	430	0.19034659	0.18866463	1.32E-05	0.067	3.92E-05	141
0.18717	11:12:25	430	435	0.18866463	0.18716616	1.18E-05	0.067	3.52E-05	127
0.18581	11:12:30	435	440	0.18716616	0.1858104	1.06E-05	0.066	3.21E-05	115
0.18444	11:12:35	440	445	0.1858104	0.18444444	1.07E-05	0.066	3.25E-05	117
0.18305	11:12:40	445	450	0.18444444	0.18304791	1.10E-05	0.066	3.35E-05	120
0.18150	11:12:45	450	455	0.18304791	0.18149847	1.22E-05	0.065	3.74E-05	135
0.17990	11:12:50	455	460	0.18149847	0.17989806	1.26E-05	0.065	3.89E-05	140
0.17825	11:12:55	460	465	0.17989806	0.17824669	1.30E-05	0.064	4.05E-05	146
0.17616	11:13:00	465	470	0.17824669	0.17615698	1.64E-05	0.064	5.17E-05	186
0.17464	11:13:05	470	475	0.17615698	0.17463812	1.19E-05	0.063	3.79E-05	136
0.17337	11:13:10	475	480	0.17463812	0.17337411	9.93E-06	0.063	3.18E-05	114
0.17146	11:13:15	480	485	0.17337411	0.1714577	1.51E-05	0.062	4.85E-05	175
0.17014	11:13:20	485	490	0.1714577	0.17014271	1.03E-05	0.062	3.36E-05	121
0.16831	11:13:25	490	495	0.17014271	0.16830785	1.44E-05	0.061	4.72E-05	170
0.16693	11:13:30	495	500	0.16830785	0.1669317	1.08E-05	0.061	3.57E-05	129
0.16550	11:13:35	500	505	0.1669317	0.16550459	1.12E-05	0.060	3.73E-05	134
0.16439	11:13:40	505	510	0.16550459	0.16439348	8.73E-06	0.060	2.92E-05	105
0.16323	11:13:45	510	515	0.16439348	0.1632314	9.13E-06	0.059	3.08E-05	111
0.16200	11:13:50	515	520	0.1632314	0.16199796	9.69E-06	0.059	3.29E-05	118
0.16078	11:13:55	520	525	0.16199796	0.16078491	9.53E-06	0.059	3.25E-05	117
0.15893	11:14:00	525	530	0.16078491	0.15892966	1.46E-05	0.058	5.02E-05	181
0.15820	11:14:05	530	535	0.15892966	0.15819572	5.76E-06	0.058	2.00E-05	72
0.15722	11:14:10	535	540	0.15819572	0.15721713	7.69E-06	0.057	2.68E-05	96
0.15545	11:14:15	540	545	0.15721713	0.15545362	1.39E-05	0.057	4.86E-05	175
0.15454	11:14:20	545	550	0.15545362	0.15453619	7.21E-06	0.057	2.55E-05	92
0.15336	11:14:25	550	555	0.15453619	0.15336391	9.21E-06	0.056	3.28E-05	118
0.15216	11:14:30	555	560	0.15336391	0.15216106	9.45E-06	0.056	3.38E-05	122
0.15144	11:14:35	560	565	0.15216106	0.15143731	5.68E-06	0.056	2.05E-05	74
0.14998	11:14:40	565	570	0.15143731	0.14997961	1.14E-05	0.055	4.15E-05	149
0.14899	11:14:45	570	575	0.14997961	0.14899083	7.77E-06	0.055	2.83E-05	102
0.14766	11:14:50	575	580	0.14899083	0.14765545	1.05E-05	0.054	3.85E-05	139
0.14652	11:14:55	580	585	0.14765545	0.14652396	8.89E-06	0.054	3.29E-05	118
0.14534	11:15:00	585	590	0.14652396	0.14534149	9.29E-06	0.054	3.46E-05	125
0.14473	11:15:05	590	595	0.14534149	0.14472987	4.80E-06	0.053	1.80E-05	65

0.14385	11:15:10	595	600	0.14472987	0.14385321	6.89E-06	0.053	2.59E-05	93
0.14273	11:15:15	600	605	0.14385321	0.14273191	8.81E-06	0.053	3.33E-05	120
0.14168	11:15:20	605	610	0.14273191	0.14168196	8.25E-06	0.053	3.14E-05	113
0.14063	11:15:25	610	615	0.14168196	0.14063201	8.25E-06	0.052	3.16E-05	114
0.14009	11:15:30	615	620	0.14063201	0.14009174	4.24E-06	0.052	1.63E-05	59
0.13935	11:15:35	620	625	0.14009174	0.1393476	5.84E-06	0.052	2.26E-05	81
0.13788	11:15:40	625	630	0.1393476	0.13787971	1.15E-05	0.051	4.49E-05	161
0.13670	11:15:45	630	635	0.13787971	0.13669725	9.29E-06	0.051	3.64E-05	131
0.13583	11:15:50	635	640	0.13669725	0.13583078	6.81E-06	0.051	2.69E-05	97
0.13517	11:15:55	640	645	0.13583078	0.1351682	5.20E-06	0.050	2.06E-05	74
0.13442	11:16:00	645	650	0.1351682	0.13442406	5.84E-06	0.050	2.33E-05	84
0.13316	11:16:05	650	655	0.13442406	0.13316004	9.93E-06	0.050	3.98E-05	143
0.13221	11:16:10	655	660	0.13316004	0.13221203	7.45E-06	0.050	3.01E-05	108
0.13135	11:16:15	660	665	0.13221203	0.13134557	6.81E-06	0.049	2.76E-05	99
0.13058	11:16:20	665	670	0.13134557	0.13058104	6.00E-06	0.049	2.45E-05	88
0.12979	11:16:25	670	675	0.13058104	0.12978593	6.24E-06	0.049	2.56E-05	92
0.12895	11:16:30	675	680	0.12978593	0.12895005	6.56E-06	0.048	2.71E-05	97
0.12852	11:16:35	680	685	0.12895005	0.12852192	3.36E-06	0.048	1.39E-05	50
0.12747	11:16:40	685	690	0.12852192	0.12747197	8.25E-06	0.048	3.43E-05	124
0.12675	11:16:45	690	695	0.12747197	0.12674822	5.68E-06	0.048	2.38E-05	86
0.12578	11:16:50	695	700	0.12674822	0.12577982	7.61E-06	0.048	3.20E-05	115
0.12490	11:16:55	700	705	0.12577982	0.12490316	6.89E-06	0.047	2.92E-05	105
0.12396	11:17:00	705	710	0.12490316	0.12395515	7.45E-06	0.047	3.17E-05	114
0.12357	11:17:05	710	715	0.12395515	0.12356779	3.04E-06	0.047	1.30E-05	47
0.12223	11:17:10	715	720	0.12356779	0.12223242	1.05E-05	0.046	4.51E-05	163
0.12152	11:17:15	720	725	0.12223242	0.12151886	5.60E-06	0.046	2.43E-05	87
0.12127	11:17:20	725	730	0.12151886	0.12127421	1.92E-06	0.046	8.36E-06	30
0.12047	11:17:25	730	735	0.12127421	0.12046891	6.32E-06	0.046	2.76E-05	99
0.11982	11:17:30	735	740	0.12046891	0.11981651	5.12E-06	0.046	2.25E-05	81
0.11885	11:17:35	740	745	0.11981651	0.11884811	7.61E-06	0.045	3.35E-05	121
0.11827	11:17:40	745	750	0.11884811	0.11826707	4.56E-06	0.045	2.02E-05	73
0.11748	11:17:45	750	755	0.11826707	0.11748216	6.16E-06	0.045	2.75E-05	99
0.11687	11:17:50	755	760	0.11748216	0.11687054	4.80E-06	0.045	2.15E-05	77
0.11616	11:17:55	760	765	0.11687054	0.11615698	5.60E-06	0.044	2.52E-05	91
0.11551	11:18:00	765	770	0.11615698	0.11551478	5.04E-06	0.044	2.28E-05	82
0.11459	11:18:05	770	775	0.11551478	0.11458716	7.29E-06	0.044	3.31E-05	119
0.11359	11:18:10	775	780	0.11458716	0.11358818	7.85E-06	0.044	3.59E-05	129
0.11294	11:18:15	780	785	0.11358818	0.11293578	5.12E-06	0.043	2.36E-05	85
0.11220	11:18:20	785	790	0.11293578	0.11220183	5.76E-06	0.043	2.67E-05	96
0.11158	11:18:25	790	795	0.11220183	0.11158002	4.88E-06	0.043	2.27E-05	82
0.11073	11:18:30	795	800	0.11158002	0.11073394	6.65E-06	0.043	3.11E-05	112
0.11021	11:18:35	800	805	0.11073394	0.11021407	4.08E-06	0.043	1.92E-05	69
0.10936	11:18:40	805	810	0.11021407	0.1093578	6.73E-06	0.042	3.18E-05	114
0.10867	11:18:45	810	815	0.1093578	0.10867482	5.36E-06	0.042	2.55E-05	92
0.10813	11:18:50	815	820	0.10867482	0.10813456	4.24E-06	0.042	2.02E-05	73
0.10714	11:18:55	820	825	0.10813456	0.10713558	7.85E-06	0.042	3.77E-05	136
0.10640	11:19:00	825	830	0.10713558	0.10640163	5.76E-06	0.041	2.78E-05	100
0.10529	11:19:05	830	835	0.10640163	0.10529052	8.73E-06	0.041	4.25E-05	153
0.10390	11:19:10	835	840	0.10529052	0.10390418	1.09E-05	0.041	5.35E-05	193
0.10326	11:19:15	840	845	0.10390418	0.10326198	5.04E-06	0.040	2.50E-05	90
0.10227	11:19:20	845	850	0.10326198	0.10227319	7.77E-06	0.040	3.87E-05	139
0.10148	11:19:25	850	855	0.10227319	0.10147808	6.24E-06	0.040	3.13E-05	113
0.09993	11:19:30	855	860	0.10147808	0.09992864	1.22E-05	0.039	6.16E-05	222
0.09924	11:19:35	860	865	0.09992864	0.09923547	5.44E-06	0.039	2.78E-05	100
0.09814	11:19:40	865	870	0.09923547	0.09814475	8.57E-06	0.039	4.41E-05	159
0.09721	11:19:45	870	875	0.09814475	0.09720693	7.37E-06	0.039	3.82E-05	138
0.09617	11:19:50	875	880	0.09720693	0.09616718	8.17E-06	0.038	4.27E-05	154
0.09470	11:19:55	880	885	0.09616718	0.09469929	1.15E-05	0.038	6.09E-05	219
0.09372	11:20:00	885	890	0.09469929	0.09372069	7.69E-06	0.037	4.10E-05	148
0.09188	11:20:05	890	895	0.09372069	0.09187564	1.45E-05	0.037	7.83E-05	282
0.09109	11:20:10	895	900	0.09187564	0.09109072	6.16E-06	0.037	3.37E-05	121
0.08986	11:20:15	900	905	0.09109072	0.08985729	9.69E-06	0.036	5.34E-05	192
0.08840	11:20:20	905	910	0.08985729	0.08839959	1.14E-05	0.036	6.39E-05	230
0.08723	11:20:25	910	915	0.08839959	0.08722732	9.21E-06	0.035	5.20E-05	187
0.08453	11:20:30	915	920	0.08722732	0.08452599	2.12E-05	0.035	1.22E-04	439
0.08206	11:20:35	920	925	0.08452599	0.08205912	1.94E-05	0.034	1.14E-04	410
0.07954	11:20:40	925	930	0.08205912	0.07954128	1.98E-05	0.033	1.19E-04	428
0.07504	11:20:45	930	935	0.07954128	0.07503568	3.54E-05	0.032	2.20E-04	793
0.07143	11:20:50	935	940	0.07503568	0.07142712	2.83E-05	0.031	1.84E-04	661
0.06224	11:20:55	940	945	0.07142712	0.06224261	7.21E-05	0.029	5.00E-04	1800
0.03070	11:21:00	945	950	0.06224261	0.03070336	2.48E-04	0.022	2.21E-03	7943
0.01935	11:21:05	950	955	0.03070336	0.0193476	8.92E-05	0.016	1.13E-03	4086
0.01723	11:21:10	955	960	0.0193476	0.01722732	1.67E-05	0.014	2.45E-04	882
0.01724	11:21:15	960	965	0.01722732	0.01723751	-8.01E-08	0.013	-1.21E-06	-4
0.01647	11:21:20	965	970	0.01723751	0.01647299	6.00E-06	0.013	9.13E-05	329
0.01664	11:21:25	970	975	0.01647299	0.01663609	-1.28E-06	0.013	-1.96E-05	-71

0.01655	11:21:30	975	980	0.01663609	0.01655454	6.40E-07	0.013	9.80E-06	35
0.01652	11:21:35	980	985	0.01655454	0.01652396	2.40E-07	0.013	3.68E-06	13
0.01585	11:21:40	985	990	0.01652396	0.01585117	5.28E-06	0.013	8.17E-05	294
0.01561	11:21:45	990	995	0.01585117	0.01560652	1.92E-06	0.013	3.00E-05	108
0.01540	11:21:50	995	1000	0.01560652	0.01540265	1.60E-06	0.013	2.52E-05	91
0.01505	11:21:55	1000	1005	0.01540265	0.01504587	2.80E-06	0.013	4.43E-05	160
0.01478	11:22:00	1005	1010	0.01504587	0.01478084	2.08E-06	0.013	3.32E-05	120
0.01449	11:22:05	1010	1015	0.01478084	0.01448522	2.32E-06	0.012	3.73E-05	134
0.01410	11:22:10	1015	1020	0.01448522	0.01409786	3.04E-06	0.012	4.93E-05	177
0.01420	11:22:15	1020	1025	0.01409786	0.0141998	-8.01E-07	0.012	-1.30E-05	-47
0.01405	11:22:20	1025	1030	0.0141998	0.01404689	1.20E-06	0.012	1.95E-05	70
0.01352	11:22:25	1030	1035	0.01404689	0.01351682	4.16E-06	0.012	6.83E-05	246
0.01280	11:22:30	1035	1040	0.01351682	0.01280326	5.60E-06	0.012	9.35E-05	337
0.01314	11:22:35	1040	1045	0.01280326	0.01313965	-2.64E-06	0.012	-4.43E-05	-159
0.01306	11:22:40	1045	1050	0.01313965	0.0130581	6.40E-07	0.012	1.07E-05	39
0.01223	11:22:45	1050	1055	0.0130581	0.01223242	6.48E-06	0.012	1.10E-04	395
0.01229	11:22:50	1055	1060	0.01223242	0.01229358	-4.80E-07	0.012	-8.21E-06	-30
0.01174	11:22:55	1060	1065	0.01229358	0.01174312	4.32E-06	0.012	7.43E-05	268
0.01153	11:23:00	1065	1070	0.01174312	0.01152905	1.68E-06	0.012	2.92E-05	105
0.01138	11:23:05	1070	1075	0.01152905	0.01137615	1.20E-06	0.011	2.10E-05	76
0.01158	11:23:10	1075	1080	0.01137615	0.01158002	-1.60E-06	0.011	-2.79E-05	-101
0.01147	11:23:15	1080	1085	0.01158002	0.01146789	8.81E-07	0.011	1.54E-05	55
0.01083	11:23:20	1085	1090	0.01146789	0.01082569	5.04E-06	0.011	8.88E-05	320
0.01101	11:23:25	1090	1095	0.01082569	0.01100917	-1.44E-06	0.011	-2.55E-05	-92
0.01039	11:23:30	1095	1100	0.01100917	0.01038736	4.88E-06	0.011	8.71E-05	314
0.00999	11:23:35	1100	1105	0.01038736	0.00998981	3.12E-06	0.011	5.65E-05	203
0.00937	11:23:40	1105	1110	0.00998981	0.00936799	4.88E-06	0.011	8.97E-05	323
0.00976	11:23:45	1110	1115	0.00936799	0.00975535	-3.04E-06	0.011	-5.60E-05	-202
0.00958	11:23:50	1115	1120	0.00975535	0.00958206	1.36E-06	0.011	2.50E-05	90
0.00955	11:23:55	1120	1125	0.00958206	0.00955148	2.40E-07	0.011	4.42E-06	16
0.00933	11:24:00	1125	1130	0.00955148	0.00932722	1.76E-06	0.011	3.26E-05	117
0.00925	11:24:05	1130	1135	0.00932722	0.00924567	6.40E-07	0.011	1.19E-05	43
0.00890	11:24:10	1135	1140	0.00924567	0.00889908	2.72E-06	0.011	5.09E-05	183
0.00891	11:24:15	1140	1145	0.00889908	0.00890928	-8.01E-08	0.011	-1.50E-06	-5
0.00867	11:24:20	1145	1150	0.00890928	0.00867482	1.84E-06	0.011	3.47E-05	125
0.00860	11:24:25	1150	1155	0.00867482	0.00860347	5.60E-07	0.011	1.06E-05	38
0.00854	11:24:30	1155	1160	0.00860347	0.0085423	4.80E-07	0.011	9.11E-06	33
0.00805	11:24:35	1160	1165	0.0085423	0.00805301	3.84E-06	0.010	7.35E-05	265
0.00778	11:24:40	1165	1170	0.00805301	0.00777778	2.16E-06	0.010	4.18E-05	151
0.00771	11:24:45	1170	1175	0.00777778	0.00770642	5.60E-07	0.010	1.09E-05	39
0.00805	11:24:50	1175	1180	0.00770642	0.00805301	-2.72E-06	0.010	-5.27E-05	-190
0.00754	11:24:55	1180	1185	0.00805301	0.00754332	4.00E-06	0.010	7.77E-05	280
0.00745	11:25:00	1185	1190	0.00754332	0.00745158	7.21E-07	0.010	1.41E-05	51
0.00728	11:25:05	1190	1195	0.00745158	0.00727829	1.36E-06	0.010	2.68E-05	96
0.00743	11:25:10	1195	1200	0.00727829	0.00743119	-1.20E-06	0.010	-2.36E-05	-85
0.00675	11:25:15	1200	1205	0.00743119	0.00674822	5.36E-06	0.010	1.06E-04	383
0.00652	11:25:20	1205	1210	0.00674822	0.00652396	1.76E-06	0.010	3.54E-05	128
0.00633	11:25:25	1210	1215	0.00652396	0.00633028	1.52E-06	0.010	3.08E-05	111
0.00617	11:25:30	1215	1220	0.00633028	0.00616718	1.28E-06	0.010	2.61E-05	94
0.00602	11:25:35	1220	1225	0.00616718	0.00602446	1.12E-06	0.010	2.29E-05	83
0.00534	11:25:40	1225	1230	0.00602446	0.00534149	5.36E-06	0.010	1.11E-04	401
0.00549	11:25:45	1230	1235	0.00534149	0.00549439	-1.20E-06	0.010	-2.51E-05	-90
0.00549	11:25:50	1235	1240	0.00549439	0.00549439	0.00E+00	0.010	0.00E+00	0
0.00515	11:25:55	1240	1245	0.00549439	0.00514781	2.72E-06	0.010	5.72E-05	206
0.00477	11:26:00	1245	1250	0.00514781	0.00477064	2.96E-06	0.009	6.29E-05	227
0.00478	11:26:05	1250	1255	0.00477064	0.00478084	-8.01E-08	0.009	-1.71E-06	-6
0.00473	11:26:10	1255	1260	0.00478084	0.00472987	4.00E-07	0.009	8.56E-06	31
0.00435	11:26:15	1260	1265	0.00472987	0.0043527	2.96E-06	0.009	6.38E-05	230
0.00422	11:26:20	1265	1270	0.0043527	0.00422018	1.04E-06	0.009	2.26E-05	81
0.00531	11:26:25	1270	1275	0.00422018	0.00531091	-8.57E-06	0.009	-1.83E-04	-660
0.00408	11:26:30	1275	1280	0.00531091	0.00407747	9.69E-06	0.009	2.08E-04	748
0.00341	11:26:35	1280	1285	0.00407747	0.00341488	5.20E-06	0.009	1.15E-04	415
0.00359	11:26:40	1285	1290	0.00341488	0.00358818	-1.36E-06	0.009	-3.04E-05	-109
0.00357	11:26:45	1290	1295	0.00358818	0.00356779	1.60E-07	0.009	3.57E-06	13
0.00357	11:26:50	1295	1300	0.00356779	0.00356779	0.00E+00	0.009	0.00E+00	0
0.00320	11:26:55	1300	1305	0.00356779	0.00320082	2.88E-06	0.009	6.46E-05	233
0.00291	11:27:00	1305	1310	0.00320082	0.0029052	2.32E-06	0.009	5.27E-05	190
0.00266	11:27:05	1310	1315	0.0029052	0.00266055	1.92E-06	0.009	4.40E-05	159
0.00249	11:27:10	1315	1320	0.00266055	0.00248726	1.36E-06	0.009	3.14E-05	113
0.00198	11:27:15	1320	1325	0.00248726	0.00197757	4.00E-06	0.009	9.36E-05	337
0.00215	11:27:20	1325	1330	0.00197757	0.00215087	-1.36E-06	0.009	-3.20E-05	-115
0.00194	11:27:25	1330	1335	0.00215087	0.0019368	1.68E-06	0.008	3.96E-05	142
0.00170	11:27:30	1335	1340	0.0019368	0.00170234	1.84E-06	0.008	4.37E-05	157
0.00181	11:27:35	1340	1345	0.00170234	0.00181448	-8.81E-07	0.008	-2.10E-05	-75
0.00170	11:27:40	1345	1350	0.00181448	0.00170234	8.81E-07	0.008	2.10E-05	75
0.00140	11:27:45	1350	1355	0.00170234	0.00139653	2.40E-06	0.008	5.76E-05	207

0.00144	11:27:50	1355	1360	0.00139653	0.00143731	-3.20E-07	0.008	-7.72E-06	-28
0.00117	11:27:55	1360	1365	0.00143731	0.00117227	2.08E-06	0.008	5.04E-05	181
0.00096	11:28:00	1365	1370	0.00117227	0.00095821	1.68E-06	0.008	4.11E-05	148
0.00067	11:28:05	1370	1375	0.00095821	0.00067278	2.24E-06	0.008	5.53E-05	199
0.00068	11:28:10	1375	1380	0.00067278	0.00068298	-8.01E-08	0.008	-1.98E-06	-7
0.00062	11:28:15	1380	1385	0.00068298	0.00062181	4.80E-07	0.008	1.19E-05	43
0.00334	11:28:20	1385	1390	0.00062181	0.00334353	-2.14E-05	0.008	-5.04E-04	-1816
0.00127	11:28:25	1390	1395	0.00334353	0.00127421	1.63E-05	0.009	3.79E-04	1364
0.00002	11:28:30	1395	1400	0.00127421	2.0387E-05	9.85E-06	0.008	2.44E-04	880
-0.00008	11:28:35	1400	1405	2.0387E-05	-8.155E-05	8.01E-07	0.008	2.04E-05	73
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-0.00180	11:29:20	1445	1450	-0.0017635	-0.0018043	3.20E-07	0.007	8.78E-06	32
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-0.00916	11:32:45	1650	1655	-0.0085627	-0.0091641	4.72E-06	0.005	1.86E-04	671
-0.00933	11:32:50	1655	1660	-0.0091641	-0.0093272	1.28E-06	0.005	5.18E-05	186
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-0.01025	11:33:20	1685	1690	-0.0100408	-0.0102548	1.68E-06	0.005	7.21E-05	259
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-0.01059	11:33:35	1700	1705	-0.0106014	-0.0105912	-8.01E-08	0.005	-3.54E-06	-13
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-0.01088	11:33:45	1710	1715	-0.0104485	-0.0108767	3.36E-06	0.005	1.49E-04	538
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-0.01158	11:33:55	1720	1725	-0.0111009	-0.01158	3.76E-06	0.004	1.75E-04	631
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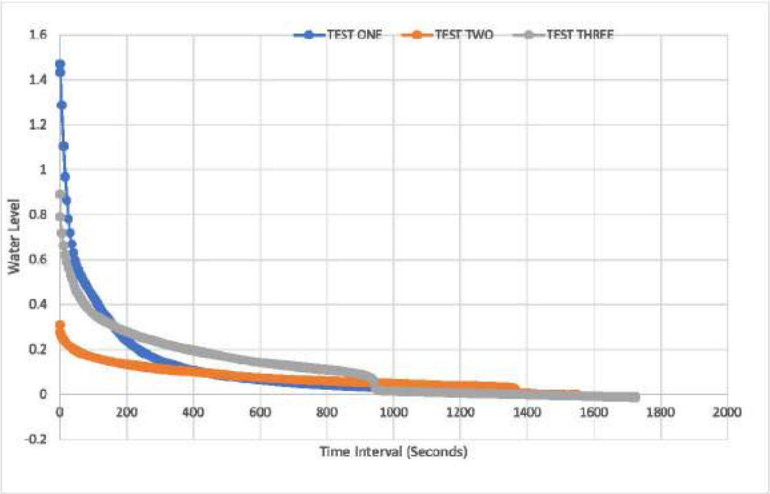


Test one average soakage rate from 25-500seconds
399 Lm^{-2}h^{-1}

Test two average soakage rate from 25-300seconds
193 Lm^{-2}h^{-1}

Test three average soak rate 25-400 seconds
243 Lm^{-2}h^{-1}

Appendix 7

District Plan Compliance Analysis

District Plan Compliance Analysis – Tairāwhiti Resource Management Plan

Part C1-4 Region Wide Provisions

C1 – Air Quality: N/A to current application

C2 – Built Environment, Infrastructure, Energy:

C2.1.7 Rules for Provision of Infrastructure for Development (Works and Services)

C2.1.7.1 General Standards		
Condition		**Analysis**
A	**GENERAL SERVICING REQUIREMENTS** a) Reticulated services shall be provided to the net area of new allotments. b) Vehicle crossings shall be provided to the boundary of the road reserve for new allotments. c) Services shall be reticulated underground in any new road reserve, shared accessway or new allotment within the Reticulated Services Boundary and in residential and commercial zones district wide. provided that stormwater infrastructure may be provided above ground where retention or attenuation measures are required or low impact design approaches are to be used. Individual customer connections may be provided above ground where there is an existing overhead supply. d) Where there is a shared access way the necessary works and services shall be provided to the terminus of the right-of-way. e) The location of reticulated services and vehicle crossings shall be identified prior to consent approval.	**Complies** a) It is proposed to provide reticulated services to the net area of each allotment as part of the proposed subdivision b) It is proposed to form a jointly owned access lot to serve all units as part of the subdivision application. c) All services are to be reticulated underground and located within the JOAL where the services are to be private. d) The proposed lots/dwellings are serviced by a shared accessway/JOAL and all connections are to be provided to the boundary of each lot. e) The submitted subdivision scheme plan and servicing plans indicate the location of reticulated services and the vehicle crossing.
B	**STRUCTURE PLANS** a) Where relevant, subdivision, development and provision of infrastructure shall be consistent with the Taruheru Block Infrastructure Plan (Schedule G24) the Roading Concept Plan for the Rural Industrial A Zone (Appendix H11) and the Structure Plan for the Citrus Grove development control area (Schedule G10)	**N/A** Site is not located within a structure plan area.

C	**STREET PLANTING** a) For new roads in residential, commercial and industrial zones either: i. A minimum of 5m^2 of land shall be set aside within the road reserve for each potential allotment accessed from that road (based on minimum permitted site areas) for the purpose of landscaping. Such areas may be combined but shall still be located evenly throughout the road. The land shall be free from utility services; or ii. A dedicated berm for landscaping shall be provided. The minimum planting is one tree per allotment. The land shall be free from underground utility services.	**N/A**
D	**STORMWATER SYSTEMS** a) Sites shall be provided within their site area with a means of collecting, managing and discharging stormwater from the roof of all buildings, accessways and from all impervious surfaces. b) Any connections or discharge points to the existing public stormwater system, where available, shall be at an outlet or outlets approved by the Council. c) Primary stormwater systems shall have sufficient capacity to convey a 10% AEP rainfall event without relying on secondary flow paths. d) Secondary stormwater systems shall be sufficient capacity to convey a 1% AEP rainfall event while protecting buildings and household gully traps from inundation. e) Secondary flow paths shall be free of obstructions and located on public land, land protected by an easement or land identified as a public drain. f) Stormwater conveyance shall be by way of gravity outfall with ground levels and/or contours identified prior to consent approval; and g) With regard to Rules c) and d) where stormwater runoff is greater than the capacity of the system which is to receive it, runoff shall be managed to the relevant pre-development rates or the capacity of the system shall be upgraded.	**Complies** It is proposed to attenuate stormwater in a combination of above ground tanks collecting roof water from each dwelling and by the use of a below ground rainsmart system located within the JOAL. It is proposed to attenuate runoff to limit the stormwater runoff from the site to the pre-development levels during the 1 in 100-year event. Due to the variation in existing ground levels across the site, it is not practicable to achieve drainage to Aberdeen Road for the whole site. Runoff from roof areas will therefore drain via a double kerb connection and single kerb connection to Aberdeen Road. Runoff from paved areas will be directed to the underground rainsmart system and discharged to ground via soakage.
E	**WATER SUPPLY** a) Water supply within Reticulated Services Boundary i. Sites for any activity that will require a water supply shall be provided with a connection or connection point to the Council reticulated water system.	**Complies** It is proposed to extend a DN50 connection into the development from the DN100 water main in Aberdeen Road. The common ridermain will be located beneath the JOAL and individual connections to each lot are proposed to each dwelling.
F	**WASTEWATER SYSTEMS** a) Within the Reticulated Services Boundary, sites for any activity that will create wastewater shall be provided with a connection or connection point to the Council reticulated wastewater system.	**Complies** It is proposed to install a DN150 gravity main discharging to the existing DN150 sewer main in Aberdeen Road. Individual DN100 connections will extend from each dwelling to the common wastewater pipe beneath the JOAL.

G	**ENERGY AND TELECOMMUNICATIONS** a) Sites for any activity that requires electricity and telecommunication services, shall be provided with those services	**Complies** Power and telecommunication utilities are to be provided within the proposed JOAL's.
H	**ROADS**	
H1	**Infrastructural Requirements** a) All proposed new roads shall connect to, and be compatible with, the district roading hierarchy, as depicted in the roading hierarchy maps. b) To meet the access needs of potential users, all new or upgraded roads required for subdivision or development shall comply with the following rules for minimum widths.	**N/A** – No new roads are proposed. **N/A**
H2	**Sightlines** a) All new vehicle crossing /accessways shall be designed, located and developed to ensure that the sight lines (illustrated in Figure C2.13) are established and maintained with no obstructions, whether temporary or permanent. Sight lines are to be in accordance with Figure C2.1.3 and Figure C2.4 specified below. b) All new intersections shall be designed, located and developed to ensure that the sight lines (illustrated in Figure C2.1.3) are established and maintained with no obstructions, whether temporary or permanent. Sight lines are to be in accordance with Figure C2.13 and Figure C2.4 specified below.	**Complies** a) The new vehicle crossing will be compliant with the sightlines provided for within Figure C2.13. **N/A**
I	**ACCESS**	
I1	**Sightlines at Vehicle Crossings** a) All vehicle crossings shall be constructed and located to ensure that the sight lines specified in Figure C2.4 are maintained with no obstructions, whether temporary or permanent, for the distances specified in Figure C2.13.	**Complies** The proposed subdivision will require the installation of two new crossings. These crossings will be designed and located so as to comply with the sightlines specified in C2.4 for the distances specified in Figure C2.12.
I2	**Distances of Vehicle Crossings from Intersections** a) Sites shall maintain distances of crossings from intersections, so as to comply with Figures C2.6 and C2.7.	**Complies** The posted speed limit for Aberdeen Road is 50 km/h which is a 'Collector' Road and thus Figure 2.7 is the relevant performance criteria where a 20m setback distance is required. The proposed vehicle crossings will be set back at least 40m from Asquith Street and 30m from Stanley Road.

I3	**Manoeuvring Areas** a) Subject to (b) with the exception of sites containing no more than one single dwelling unit, all sites shall provide either accessways, aisles and turning areas or parking spaces adequate to enable vehicles to enter and exit to the road in a forward direction. Note: An adequate turning area is one that provides for the car tracking curves depicted in Figure C2.1.4. b) Sites fronting arterial roads: The construction, addition to, or alteration of buildings (including new dwelling units) shall not encroach on or reduce on-site manoeuvring areas beyond the point that they continue to provide the ability for vehicles to enter and exit to the road in a forward direction.	**Complies** All lots/units can achieve adequate on-site maneuvering within the JOAL's. **N/A** Aberdeen Road is a collector road.
I4	**Surfaces** a) In residential, commercial or industrial zones or reserves adjoining these zones, all vehicle crossings between the road carriageway and the road reserve boundary shall be finished with a sealed surface and drained. b) In rural zones, or reserves adjoining rural zones, all vehicle crossings between the road carriageway and the road reserve boundary shall be: i. Finished with a sealed surface where the adjoining carriageway is sealed. ii. Finished with a hard surface where the adjoining carriageway is unsealed.	**Complies** The proposed vehicle crossings and the JOAL are to be formed in a concrete surface. **N/A**
	c) All shared accessways and associated turning areas shall be: i. Finished with a sealed surface and drained in residential, commercial or industrial zones or reserves adjoining these zones. ii. Finished with a hard surface in rural zones, or reserves adjoining rural zones. d) All accessways and associated turning areas for industrial and commercial activities shall be: i. Finished with a sealed surface and drained in residential, commercial or industrial zones or reserves adjoining these zones. ii. Finished with a hard surface in rural zones, or reserves adjoining rural zones.	**Complies** As above, the JOAL's are to be finished in a concrete surface that is drained in accordance with the overall stormwater design for the site. **N/A** The proposed use is residential
I5	**Access to sites with more than one road frontage** a) For properties that have legal frontage on to two roads: i. Where the property is located in a Rural zone and adjoins an arterial or principal road, access shall be from the road with the lesser traffic function, as identified in the Roading Hierarchy Maps. ii. Where the property is located in a Commercial zone, Industrial zone or a Port Management zone, and adjoins an arterial or principal road, access shall be from the road with the lesser traffic function, as identified in the Roading Hierarchy Maps.	**N/A** – The proposed sites have only one road frontage. **N/A**

I6	**Minimum distance between vehicle crossings** a) The minimum distance between vehicle crossings on any one site shall be 15m. b) In commercial zones, industrial zones and the Port Management zones the minimum distances between vehicle crossings on any two adjacent sites shall be 2m, unless a combined crossing not exceeding 9m serves the two adjacent sites, or the vehicle crossing is for two or more residential dwelling units located on the one site. Note: Attention is drawn to NZ Transport Agency requirement for permission to construct any accessway or vehicle crossing in the road reserve of any state highway.	**Complies** The development is served by one vehicle crossing. **N/A** – the site is not within commercial zones, industrial zones nor the Port Management Zone.
I7	**Single-site vehicle access** a) The width of accessways and vehicle crossings for individual sites shall comply with the rules in Figure C2.8.	**Does not comply** – Prior to subdivision, there will be two vehicle crossings serving one site which achieve a separation distance of only 14m. Following the subdivision, this will become compliant.
	b) The number of accessways and vehicle crossings onto a road frontage on any one site shall not exceed that shown in Figure C2.9. and c) Accessways shall comply with the standards set out in New Zealand Fire Service fire-fighting water supplies Code of Practice SNZ 4509:2008.	**Complies** – The overall frontage of the site is 51m, as such two crossings are permitted. **Complies** – Two fire hydrants are on Aberdeen Road are located between Asquith Street and Stanley Road which comply with this national standard.
I8	**Multiple-site access and/or multiple unit access** a) Up to 10 potential dwelling units may share access from a single accessway and vehicular crossing. b) Access to serve more than 10 dwelling units are required to be served by a public road vested in the Gisborne District Council. c) Up to three commercial or industrial sites may share access from a single accessway and vehicular crossing. d) More than three commercial or industrial sites are required to be served by a public road vested in the Gisborne District Council. e) To meet the access needs of potential users, every accessway and vehicle crossing serving more than one site shall be constructed in accordance with the Figure C2.10. f) Accessways shall comply with the standards set out in New Zealand Fire Service Firefighting Water Supplies Code of Practice SNZ PAS 4509:2008.	**Does not comply** – the proposed JOAL will provide access to 11 dwellings. **Does not comply** – As above, the proposed JOAL will service 11 units however it is not proposed to vest this to Council. **N/A** – not a commercial or industrial site. **N/A** – not a commercial or industrial site. Complies. **Does not comply** – proposed access has been designed in accordance with the requirement for 10 dwellings being 5.5m wide. As this is serving 11 dwellings, this does not comply. **Complies** – As above, compliance with these standards is achieved.

J	**PARKING**	
J1	**Provision of Parking and Loading Spaces** a) Unless otherwise provided for in this chapter, parking spaces and loading bays shall be provided on site in accordance with Figure C2.11 below. b) When activities on the same site occur at different times during the day, then the number of parking spaces and loading bays to be provided shall be for the maximum requirement at any one time during the day or night. c) In Figure C2.11 GFA = gross floor area. d) Parking spaces and loading bay requirements are as follows in Figure C2.11	**N/A** – The NPS-UD made it mandatory for Council to remove minimum parking standards and this done by Council in November 2022. Notwithstanding, the proposal includes a total of thirteen parks are provided. **N/A** **N/A** **N/A**
J2	**Waiver of Parking Space or Loading Bay Requirements** a) It shall not be necessary to provide parking spaces, loading bays or financial contributions in lieu of parking spaces or loading bays on sites in the Inner Commercial zone or the Fringe Commercial zone: provided that 1. The site has frontage to streets marked as continuous street facade on the urban maps. 2. The site has no legal access to any other road or service lane.	**N/A**
J3	**Assessment of Number of Spaces** a) The required number of parking spaces and loading bays shall be: i. Calculated in respect of each activity undertaken on the site. ii. Re-calculated in the event of a change in activity. iii. Re-calculated in the event of a change in the scale or intensity of land use.	**N/A**
J4	**Sharing of Parking and Loading Spaces** a) Parking spaces and loading bays may be shared between different activities that occupy the same site. provided that: 1. The occupier requiring the parking spaces or loading bay is located adjacent to the occupier who provides the parking spaces or loading bay. 2. The total number of required parking spaces or loading bays calculated from Figure C2.11 for the site is still provided. 3. The written agreement of the occupier providing the parking or loading bay is obtained and a copy of the agreement is lodged with Gisborne District Council prior to the commencement of the activity	**N/A**
J5	**Availability of Spaces** a) All required loading and parking spaces shall be kept clear and available for use of occupants or visitors during the normal hours of operation of that use. With the exception of the following activities, no parking space or loading bay shall obstruct access to any other parking space or loading bay: i. Parking spaces for single residential or minor dwelling units.	**N/A**

	ii. Parking spaces for home occupations. iii. Parking spaces for service stations.	
J6	**Provision of Parking Spaces for the Disabled**	**N/A**
J7	**Design and Construction of Parking Spaces** c) All parking spaces shall be formed and constructed to comply with either the following rules for dimensions in Figure C2.12 (to accommodate the 90 percentile car illustrated in Figure C2.12 or the Australian/New Zealand Standard AS/NZS 2890.1:2004, Part 1 off-street car parking or any subsequent replacement AS/NZS for this standard.	**Complies**
J8	**Design and Construction of Loading Bays**	**N/A.**

C3 –Coastal Management: N/A to current application

C4 – Cultural and Historic Heritage: N/A to current application

Part C5-8 Region Wide Provisions

C5 – Environmental Risk: N/A to current application

C6 – Freshwater: Discretionary Activity pursuant to Rule 6.2.3(13)(a) for point source discharge of liquids to land where the discharge is not provided for in a norther rule in this plan.

6.2.3 Rules for Point Source Discharge		
Flood Hazard Overlay F7 (Urban Stormwater Flood Hazard Area) Rules		
6.2.3(2)	**Permitted Activity** The discharge of stormwater from land, roofs, paved areas and roads, or diversion of the same to a public stormwater network, except: a) From industrial or trade premises; or b) Discharges to Regionally Significant Wetlands and Outstanding Waterbodies identified in Schedule G17 (Regionally Significant Wetlands) and G18 (Outstanding Waterbodies) not lawfully established before the date of notification of this plan. Note: This rule applies to point source discharges of stormwater from forestry roads and earthworks associated with plantation forestry. It prevails over Regulations 97(1) in the Resource Management (National Environment Standards for Plantation Forestry) Regulations 2017. Permitted Activity Standards:	
	a) Discharge shall be by pipe, open drain, swale, constructed wetland or vegetated filter into a natural watercourse which is the natural receiver of surface drainage water from that area; b) For stormwater discharge not lawfully established before the date of notification of this Plan; i. Where the impervious area is greater than 1000m² and the stormwater does not originate from a farming, horticultural, rural community facility or local roading activity;	N/A
	ii. Where the impervious area is greater than 1000m² and the stormwater originates from within the area serviced by the public stormwater network of the Gisborne urban area;	**Does not comply** – impervious area on the site is greater than 1000m² and the stormwater will discharge into both the stormwater network and to ground through a rainsmart soakage system.
	Contaminant reduction methods shall be designed and implemented to treat stormwater from the impervious area in accordance with TP 10, or by alternative methods that are	Contaminant reduction methods have been employed in line with TP10 including a Hynds First Defence system installed upstream of the soakage device. This will treat and attenuate

	demonstrated to achieve an equivalent level of contaminant removal as TP 10 devices. These methods include but are not limited to constructed wetlands, swales, vegetative filters or infiltration practices. **See Advisory Note.**	runoff from paved surfaces across the site including driveways and parking areas. All discharge from the dwelling roofs will be first attenuated onsite via individual attenuation tanks then discharged to the kerb without treatment noting this will be runoff from inert materials.
	c) The discharge shall not contain any wastes from an industrial or trade process;	**N/A**
	d) The discharge shall not cause erosion of the banks or bed of the watercourse at, or downstream of, the discharge point;	**Will comply**
	e) The discharge shall not give rise to or exacerbate any flooding of land upstream or downstream of the discharge point in rainfall events up to the 10 per cent AEP or flooding of dwellings on other properties in rainfall events up to the 1 per cent AEP;	**Will comply**
	f) The discharge shall not contain hazardous substances, agricultural chemicals, or cause exceedance in trigger values for 95% species protection for substances that are toxic to aquatic ecosystems (as measured relative to the ANZECC Guidelines for Fresh and Marine Water Quality, 2000) in receiving water bodies after reasonable mixing;	**Will comply**
	g) The discharge shall meet the following water quality standards downstream of the discharge point after reasonable mixing:	
	i. No conspicuous change in the colour or visual clarity of the receiving water;	**Will comply**
	ii. No emission of objectionable odour;	**Will comply**
	iii. No production of conspicuous oil or grease films, scums or foams, or floatable materials;	**Will comply**
	iv. No rendering of fresh water unsuitable for consumption by farm animals;	**Will comply**
	v. No significant adverse effects on aquatic life.	**Will comply**
	Advisory Note: *Demonstration of compliance with this Rule is required to be given to the Council. Compliance with this rule will be deemed to have occurred where the stormwater treatment is undertaken in accordance with Stormwater Management Devices: Design Guidelines Manual 2003. Technical Publication 10 (TP10) of the Auckland Council.*	

C7 – Land Management: N/A to current application

C8 – Natural Hazards:

<table>
<tr><th colspan="3">C8.2.3 Regional Rules for Flood Hazards</th></tr>
<tr><th colspan="3">C8.2.3.1 General Standards</th></tr>
<tr><td>A.</td><td>Obstruction of Loodwaters – Rural Industrial A Zone:
Not more than 33 percent of the F4 floodway width identified on any one site, within this zone is to be obstructed by buildings or other solid objects (including solid fences).</td><td>N/A</td></tr>
<tr><td>B.</td><td>Ground level within the Citrus Grove Development Control Area
a) No building shall be constructed prior to the floodways and minimum ground level of 3.9m above mean sea level as set out in the structure plan and Schedule G10 a) to c) being achieved.
b) No site shall be used for industrial or commercial purposes prior to the floodways and minimum ground level of 3.9m above mean sea level as set out in the structure plan and Schedule G10 a) to c) being achieved.</td><td>N/A</td></tr>
<tr><td>C.</td><td>Maintenance of constructed Floodways within the Citrus Grove Development Control Area:
No activity or use shall be undertaken or established within the constructed floodways which would affect and/or compromise floodway capacity and structural integrity.</td><td>N/A</td></tr>
<tr><td>D.</td><td>Minimum habitable floor levels

F3, F4 and F5: All residential buildings and habitable buildings shall have minimum habitable floor levels as specified below:
<table><tr><td>Poverty Bay and Gisborne urban area:</td><td>300mm above the design flood standard or 600 mm above general ground level whichever is the greatest;</td></tr><tr><td>Mangatuna and Wharekaka (Tolaga Bay):</td><td>500mm above the design flood standard;</td></tr><tr><td>Te Karaka:</td><td>1.0m above general ground level or 300mm above flood level, whichever is the greater.</td></tr></table>
F7: Any new residential building erected or relocated in the area shall have minimum habitable floor levels as follows (the highest level shall apply):

a) 300mm above general ground level or
b) 200mm above the 1977 and/or 1985 flood level or
c) 200mm freeboard above any adjacent road crown, footpath or ground acting as a hydraulic control or weir.</td><td>N/A</td></tr>
<tr><th colspan="3">Flood Hazard Overlay F7 (Urban Stormwater Flood Hazard Area) Rules</th></tr>
<tr><td>8.2.3(33)</td><td>Restricted Discretionary Activity
Any activity in the road reserve that may result in the diversion or ponding of flood waters, including any new road, road alteration or shape correction.</td><td>N/A</td></tr>
<tr><td>8.2.3(34)</td><td>Restricted Discretionary Activity
Any new solid fence, or alterations to existing solid fence, along any property boundary.</td><td>N/A</td></tr>
</table>

8.2.3(35)	**Restricted Discretionary Activity** Earthworks that change the permanent level of the land.	N/A

C9 – Natural Heritage - N/A – The subject site is not located within any natural heritage overlay areas.

C10 – Subdivision - The proposal is determined to be a Discretionary subdivision consent pursuant to Rule C10.1.6 (9).

<table>
<tr><th colspan="2">C10.1.6 Rules for Subdivisions</th></tr>
<tr><th colspan="2">C10.1.6.1 General Standards</th></tr>
<tr><td>A. General Rules

a) Subdivisions shall comply with C2 – Built Environment, Infrastructure and Energy and C9.2 Esplanade Reserves/Strips.</td><td>Does not comply – as above, proposal does not comply with all standards within chapter C2.</td></tr>
<tr><td>B. Allotment Sizes and Dimensions

a) Subdivisions shall comply with the rules for allotment sizes and shape factor and road frontage requirements in C10.1:


<table>
<tr><th>Zone</th><th>Minimum Net Area</th><th>Shape Factor and Road Frontage Requirements</th></tr>
<tr><td>Residential dwellings
Inner Residential Zone</td><td>350m^2 per unit or 280m^2 per unit attached on one side to another unit or 250m^2 per dwelling unit attached on two or more sides (including vertically).</td><td>Nil</td></tr>
<tr><td>General Residential and Residential Protection Zones (reticulated)</td><td>400m^2 per unit or 320m^2 per unit attached on one side to another unit or 250m^2 per dwelling unit attached on two or more sides (including vertically)</td><td></td></tr>
<tr><td>General Residential and Residential Protection Zones (non-reticulated)</td><td>1000m^2 per unit</td><td></td></tr>
<tr><td>Residential Lifestyle Zone</td><td>3000m^2</td><td>Refer Rule C10.1.6(8)</td></tr>
<tr><td>Taruheru Subdivision Block</td><td>800m^2 per unit</td><td></td></tr>
<tr><td>All residential zones covered by a site caution layer</td><td>1000m^2 per unit</td><td></td></tr>
</table>

provided that:</td><td>Does not comply – Site is within the General Residential Zone and the Lot areas are proposed as follows:

Lot 1: 156m^2
Lot 2: 157m^2
Lot 3: 343m^2
Lot 4: 280m^2
Lot 5: 217m^2
Lot 6: 167m^2
Lot 7: 114m^2
Lot 8: 114m^2
Lot 9: 144m^2
Lot 10: 118m^2
Lot 11: 117m^2
Lot 12: 118m^2

Lots 3 and 4 both having one unit have a proposed area of 343m^2 and 280m^2 which does not meet the minimum of 400m^2 required within the General Residential Zone.

Lots 1, 2 and 5 – 12 each have a unit attached at one side to another unit however do not meet the minimum of 320m^2 required.</td></tr>
<tr><td>1. In Rural Productive and Rural Residential zones where an existing site used for farming purposes is occupied by more than one dwelling-house erected prior to 31 March 1987, and any of those dwelling houses, excluding at least one to remain on the site, is no longer required for farming the site, a new site may be created notwithstanding that the site does not meet the requirements in Figure C10.1, but subject to compliance with the following:
i. Minimum area – 1000m^2
ii. Maximum area – 2000m^2
iii. Maximum shape factor and road frontage</td><td>N/A</td></tr>
</table>

requirement. Every site shall be of such a shape as to contain a rectangle 13m x 18m without encroachment on to any yard, iv. the new boundaries of the site to be created are to be so located as to ensure that the existing buildings conform with the requirements of the Plan. 2. The rules for minimum allotment sizes and dimensions shall not apply to subdivisions for meteorological activities.	 **N/A**
C. Building Platforms **a)** Every site that is intended to be used for any building shall contain a building platform that is stable and not affected by any potentially unstable land.	 **Complies**
D. Existing Buildings a) Any new boundaries created by subdivision shall be located such that any existing buildings comply with the rules of the relevant zone and (where relevant) overlay; or that the appropriate resource consents have been obtained.	 **N/A** – all existing buildings will be removed.
E. Boundary Adjustment a) Boundary adjustments shall not create any additional sites or reduce any site below the minimum subdivision size for the zone except where a single site is being created exclusively for a network utility service. This provision shall not apply where sites are to be amalgamated.	 **N/A**
F. Easements a) The granting of a subdivision consent may include a condition requiring the reservation of a memorandum of easement in respect of any of the following: i. the creation of right of way access to any allotment pursuant to section 321 of the Local Government Act 1974; ii. the right to maintain shelter belts; iii. the right in respect of a dominant tenement or easement in gross to lay, construct, erect, convey, discharge or maintain an underground or overhead water, electric power, telecommunications, gas, sewage, or stormwater service; iv. the right to construct and maintain a party wall; v. any other easement that the specific situation may require. b) For stormwater pipes, sewer pipes and water supply pipes that are to be vested in the Gisborne district Council, easement widths shall be the larger of: i. a width equal to 1.5 times the depth to the invert level with the service laid in the centre, or	 **Complies** – Schedule of easements proposed which covers these aspects.

ii. a minimum of 3m with the service laid in the centre.	

C11 – General Controls (signage, lighting and glare, radiofrequency, petrochemicals exploration) - N/A to this application

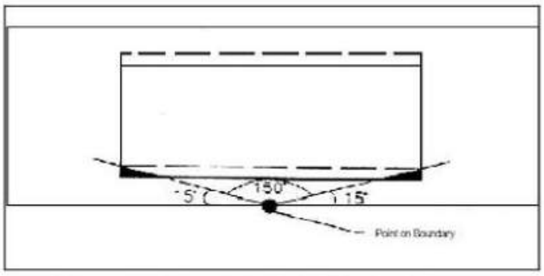
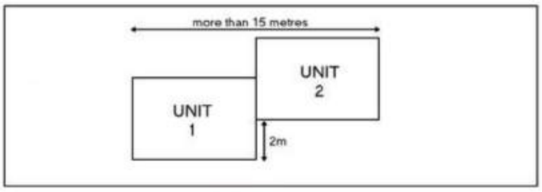
C11.2 Noise and Vibration

C11.2.15.2 Rules and Standards for Noise for Construction Activities- All Zones	
A Long Term Construction	
1. Emissions of Construction noise shall not exceed 168 Calendar days in any 12 month period.	**Will comply** – it is anticipated that the construction noise will not exceed 168 calendar days.
2. The construction activity shall comply with the noise limits specified in Figure C.11	**Will Comply** – We anticipate a condition of consent limiting construction hours to 7am – 6pm, Monday – Saturday. Any works are expected to operate within the limits outlined in C.11.

Part D – Area Based Provisions

DD1 – Residential Zones – Restricted Discretionary Activity pursuant to Rule 1.61(17) of the District Plan.

DD1.61 Rules For Residential Zones	
DD1.6.1.1 General Standards	
A. Nuisance a) A heavy vehicle, being a motor vehicle which has a gross laden weight exceeding 3,500kg may only arrive at or depart from a street adjacent to, or a site within any residential zone, between the hours of 0600-2200. No other activity associated with such vehicles shall be conducted outside 0600-2200 hours unless the activity satisfies the rules in this Plan.	**N/A**
b) No barricade or structure shall be placed on any property, so as to unreasonably prevent or inhibit entry by the police or any authorised officer of the consent authority.	**N/A**
B. Recession Planes a) Buildings, parts of buildings, and structures (excluding chimneys, antennas and support structures, shall be contained within recession planes commencing 2.75m above each site boundary. The angles of the recession plane at each site boundary shall be determined using the recession plane indicator. **provided that** a building or structure may be erected where it exceeds the boundary of the recession plane by not more than one metre if the written consent of the adjoining neighbour is obtained and submitted to the consent authority.	**Pre-Subdivision: Complies** – proposed dwellings will comply with HIRB at all external boundaries. **Post Subdivision: Does not comply** – proposed units will infringe the height in relation to boundary planes as follows: Unit 1: As it relates to the western boundary with the JOAL by a maximum height of 0.55m for the length of the dwelling and due to the dwelling being constructed as a duplex it sits wholly within the recessing plane along the eastern/common boundary with Unit 2. Unit 2: Unit 2 will sit wholly within the recession plane as it relates to the western boundary due to it being a duplex unit constructed on the boundary. Unit 5: As it relates to the northern boundary (and common boundary with Unit 6) due to being a duplex by a maximum height of 1.32m for the length of the dwelling. Unit 6: As it relates to the southern boundary (and common boundary with Unit 5) due to being a duplex by a maximum height of 1.32m for the length of the dwelling. Unit 7: As it relates to the southern boundary with Lot 6 by a maximum vertical height of 3.25m for the length of the dwelling and to the northern boundary by 4.42m due to sitting wholly within the infringement and being a duplex unit. Unit 8: As it relates to the southern boundary by 4.42m as it sits wholly within the recession plane being a duplex unit for the length of the dwelling and the northern boundary by a maximum vertical height of 2.11m for the length of the dwelling. Unit 9: As it relates to the southern boundary by a

	maximum vertical height of 0.736m and the eastern common boundary with Lot 10 by a maximum vertical height of 4.3m as it sits wholly within the recession plane. Unit 10: As it relates to the western boundary with Lot 9 by a maximum vertical height of 4.3m and to the eastern boundary by a maximum vertical height of 2.17m for the length of the dwelling. Unit 11: As it relates to the western boundary by a maximum vertical height of 1.59m and to the eastern/common boundary with Lot 12 by a maximum vertical height of 4.32m for the length of the dwelling. Unit 12: As it relates to the western/common boundary with Lot 11 by a maximum vertical height of 4.32m and to the eastern boundary with the JOAL by a maximum vertical height of 1.86m for the length of the dwelling.
C. Building Length b) No building, other than a single dwelling unit, where it adjoins a residential or reserve zone shall be more than 15m long without: i. having a vertical or horizontal offset in plan of at least 2m; or ii. being confined within the arms of a 150o angle formed by two lines intersecting at a common point on all site boundaries such that each line forms an angle of 15o with the boundary (see Figure DD1.2 or iii. being offset from each other unit by not less than 25% of the width of the unit nearest the road, with a minimum offset of 2m (see Figure DD1.3); or iv. the written consent of the adjoining property owners, shall be obtained and submitted to the consent authority at the time a building consent is sought, or prior to the commencement of the activity.  Figure DD1.2 – Measurements of Building Length  Figure DD1.3 – Measurements of Building Length	**Complies** – no dwelling will be greater than 15m in length.
D. Residential Protection Zone a) No activity – including any building or	**N/A**

construction of any building – shall reduce the vegetative cover visible from a public space by more than 20%, where that vegetation is identified as significant on the list of Residential Protection zone sites. b) No dwelling-unit or other structure shall be erected in the front yard of any existing dwelling-unit detailed for protection on any site within the zone, where such a dwelling is identified on the list of Residential Protection zone sites. c) No additional dwelling-unit may be erected in the side yard of any existing dwelling-unit. d) Except for routine maintenance, there shall be no addition to or alteration of the front or side façade of any dwelling-unit or other building detailed for protection in this zone, where such a dwelling is identified as significant on the list of Residential Protection zone sites. e) No dwelling-unit or other building detailed for protection may be demolished, relocated on-site or removed from a site in this zone, where such a dwelling is identified as significant on the list of Residential Protection zone sites.	
E. Storage a) For sites zoned Inner Residential between Grey Street, Awapuni Road, Customhouse Street and the Waikanae Stream, no goods or materials other than those for sale shall be stored on any uncovered portion of the site so that they are visible from a street, public place or residential or reserve zoned land.	**N/A**
F. Building Materials a) For sites zoned Inner Residential between Grey Street, Awapuni Road, Customhouse Street and the Waikanae Stream the exterior of buildings shall not, after construction, be clad in unpainted corrugated iron or remain as unpainted concrete blocks.	**N/A**
G. Sponge Bay Block a) No residential development or subdivision of the land legally described as Lot 2 DP 370338 (CT GS285086) and Kaiti 315 Block (CT GS2D/1362) shall be permitted at an intensity greater than one dwelling per hectare of land area, until the land is reticulated with water supply and wastewater services. The provision of these services to the subject land shall be at the full cost of the developer.	**N/A**

Rule Table DD1.6.1		
Permitted Activities		
1.6.1(2)	Construction, addition to or alteration of residential buildings excluding minor dwelling units – Permitted provided the following activity standards are met:	

	Minimum Site Area	
	a. Inner Residential zone: 350m^2 per dwelling-unit or 280m^2 per dwelling-unit attached on one side to another dwelling-unit or 250m^2 per unit attached on two sides to other dwelling units (including vertically);	**N/A**
	b. General Residential & Residential Protection zones (reticulated sites only): 400m^2 per dwelling-unit or 320m^2 per unit attached on one side to another dwelling-unit or 250m^2 per unit attached on two sides to other dwelling units (including vertically)	**Does not comply** – proposed site areas are as follows: Lot 1: 156m^2 Lot 2: 157m^2 Lot 3: 343m^2 Lot 4: 280m^2 Lot 5: 217m^2 Lot 6: 167m^2 Lot 7: 114m^2 Lot 8: 114m^2 Lot 9: 144m^2 Lot 10: 118m^2 Lot 11: 117m^2 Lot 12: 118m^2 **N/A**
	c. General Residential & Residential Protection zones (non-reticulated sites only): 1000m^2 per dwelling-unit	**N/A**
	d. Residential Lifestyle zone: 3,000m^2 per dwelling unit	**N/A**
	e. Taruheru Subdivision Block – All residential zones: 800m^2 per dwelling-unit provided that a dwelling-unit may be erected on a site less than 800m^2 in extent if the site was created by means of subdivision after 1 October 1994.	**N/A**
	f. All residential zones covered by a Site Caution Layer: 1000m^2 per dwelling-unit Note: Potential building sites in the Site Caution Layer may be required to have a geotechnical report to determine slope stability, pursuant to the Building Act 2004	
	Site Coverage	
	a. Maximum net area of any site which may be covered by buildings: 35%	**Pre-Subdivision: Complies** – Proposed coverage of overall site is 31.9%. **Post Subdivision: Does not comply** – proposed site coverage are as follows: Lot 1: 22.3% Lot 2: 34% Lot 3: 26.1% Lot 4: 29.6% Lot 5: 25.4% Lot 6: 38.2% Lot 7: 36.2% Lot 8: 36.2% Lot 9: 39.4% Lot 10: 52.4% Lot 11: 52.4% Lot 12: 29.5% As above, Lots 6 – 11 do not comply.
	b. Where a site within a residential zone abuts an access strip or right of way to an adjoining rear site, when calculating the site coverage of that site, that portion of the area of that access strip or right-of-way	**N/A**

	derived by applying the following formula may be added to the area of that site for the purpose of assessing the site coverage: c. Formula: Length of the boundary of contact multiplied by half the average width of the access strip or right-of-way as it exists along that boundary of contact.	
	Yard Distances a. Front sites: Front yard: 4.5m Other yards: 2m	**Pre-Subdivision: Does not comply** – all proposed dwellings will meet the 4.5m front yard setback and 2m setback from side external boundaries. Proposed storage sheds on Lots 2, 3 and 4 will infringe the 2m setback by 1m, 1.37m and 1.74m respectively. **Post Subdivision: Does not comply** – The proposed front lots will not comply with side yards as follows: Lot 10 – will infringe its eastern 2m side yard by 0.266m. Lot 11 – will infringe its western 2m side yard by 0.356m.
	b. Rear sites: All yards: 3m	**Post Subdivision: Does not comply** – Sites with no street frontage become rear sites. Of which, the following infringements are generated: Lot 3 – the proposed dwelling will infringe the 3m setback with the JOAL by 0.15m for a length of 4.3m. Lot 5 – The proposed dwelling will infringe the 3m setback from the JOAL by 0.27m – 1.42m. Additionally, being a duplex the dwelling will sit wholly within the 3m setback of the northern boundary. The 1.2m^2 storage shed will additionally be within the 3m yard setback as it relates to the northern boundary being set back 1.8m. Lot 6 – the proposed dwelling will infringe the 3m setback along the JOAL by a maximum of 1.42m and as it relates to the northern boundary by a maximum of 1.77m. Additionally, being a duplex the dwelling will sit wholly within the 3m setback of the southern boundary. The 1.2m^2 storage shed will also be within the 3m yard setback as it relates to the southern boundary being setback 1.4m. Lot 7 – The proposed dwelling will infringe the 3m setback to the JOAL by 0.893m for the length of the dwelling and to the southern boundary by 1.66m. Additionally, being a duplex the dwelling will sit wholly within the 3m setback of the northern boundary. Lot 8 – The proposed dwelling will infringe the 3m setback to the JOAL by 0.893m for the length of the dwelling and to the northern boundary by 1.66m. Additionally, being a duplex the dwelling will sit wholly within the 3m setback of the southern boundary 1.3m.

	c. Front yard on Awapuni Road between Grey Street and Customhouse Street 4.5m provided that a building may be erected closer to or on any "Other yard" boundary or any yard boundary on a rear site if the written consent of the adjoining property owner is obtained and submitted to the consent authority at the time a building consent is sought, or prior to the commencement of the activity. d. Residential Lifestyle zone: All yards 4.5m e. Eaves, porches, bay or box windows, steps and chimneys may be located 0.6m within any yard area. f. Yard distances shall not be applied between a minor dwelling and the principal dwelling erected on the site. g. All yards adjacent to the Waikanae Stream 20m from MHWM	**N/A** **N/A** **N/A**
	Parking a. Residential Protection zone: Parking spaces shall not be located in the front yard, other than on a vehicular accessway.	**N/A**
	Service Area a. Each dwelling-unit, on sites comprising more than one dwelling-unit, shall be provided with 15m² of exclusive outdoor service area, which shall be screened from adjoining sites and outdoor living spaces and exclude any area set aside for outdoor living space.	**Pre-Subdivisions: Complies** – All dwellings are provided with a service area between 15m² – 17.7m² in area. **Post Subdivision: N/A**

Appendix 8

Design Process Overview

Design Process Overview - 556-560 Aberdeen Road, Gisborne - 12 Lot residential development proposal

First 5% Design

The architect was briefed with 13x units on this development site, and the below was presented to Kainga Ora for support. A typology mix of 2 & 3 BR units was supported at this location.

KO provided the following feedback:

- A single-vehicle crossing is preferred.
- Vehicle turning for lots 1,2 & 5 too tight.
- Lot 13 parking on road not acceptable.
- CPTED concerns
- Urban designers suggested overdevelopment where one vehicle crossing is removed and one unit.

Second 5% design:

This design was workshopped with KO over a team meeting with their UD team. This design was also provided to GDC for initial feedback. Note that the proposal reduced the number of lots by 1 to improve the overall design.

KO provided the following feedback:

- Pedestrian access to the south to be more defined.
- Adjust the position of houses to maximise northern ODLs. We are governed by set-back DP rules so we did this where we could.
- Swap SW single-story duplex with SW two-story duplex and rotate 90 degrees.
- Generally happy with the design.

GDC feedback:

- Awhina White indicated the proposal likely to be assessed as a restricted discretionary activity with only breaches in density and site coverage (**Appendix 1**).
- Barry Sanders provided engineering feedback and had a discussion with Johan Ehlers about our proposed solution. The servicing solution is in line with Barry's recommendation. (Correspondence included at **Appendix 2**).

Third 5% design:

This iteration was provided to KO.

- Majority of feedback from KO was around internal layouts and washing line/rubbish bin positions, landscaping, and fencing, which we could address all queries.
- A further workshop with their UD team allowed us to progress to the next stage of design.

First 15% design:

Changes from 5% to 15% were more internal and relocation of bins and washing lines etc.

- Resolution required to address CPTED issues for lots 9&10.
- Review of landscaping detail

Incorporating KO's final comments, we arrived a t an approved design, which we received a business case approval for and contracted to deliver subject to all approvals from local authorities.

The 30% design is what we have landed at where KO is happy and we still largely comply with council DP rules.

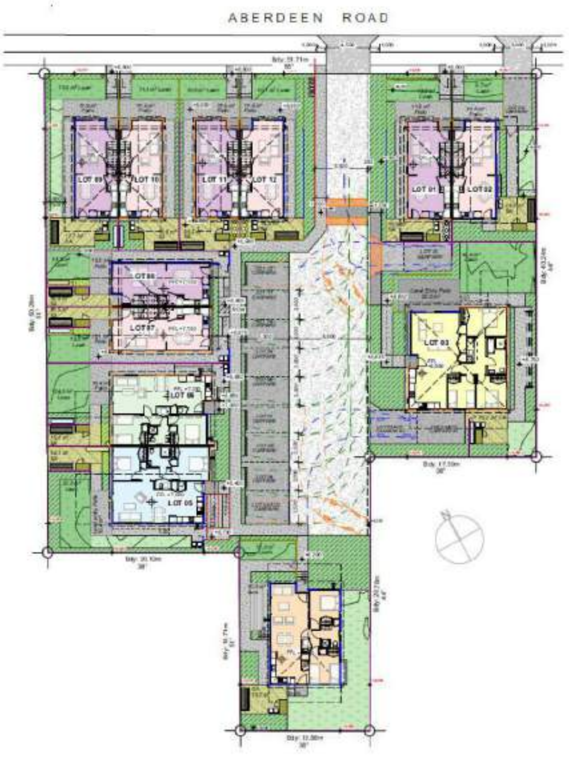
The engineering solution works and is in line with council recommendations.

30% Design/RC Set

This design was based on all previous feedback from Kainga Ora's urban design team, whilst maintaining compliance with as many DP controls as possible.

The Stradegy team has also provided feedback throughout the various 5% design stages, which helped shape the final proposal.

The 30% design set was reintroduced to Council at a pre-app meeting on 13 November 2023 with Principal Planner Awhina White. The feedback received was largely around the proposed density and information requirements within the application report to support the proposed infringements to density. No particular changes were requested to the design.



Appendix 1 – Pre-Application Correspondence with Awhina White

From:	Awhina White
To:	Mitch Jackson; Barry Sanders
Cc:	Esta Kowhai; James Jenkins; Paul O"Shaughnessy; Johan Ehlers
Subject:	RE: 556-560 Aberdeen Road, Gisborne
Date:	Wednesday, 28 June 2023 1:02:14 pm
Attachments:	image002.png image003.jpg

Hi Mitch

The subject site is zoned General Residential, is covered by the Heritage Alert Overlay and is located on a Collector Road.

The overall site area of both properties is 2670m2.

1. Within the General Residential zone, under the minimum site area requirements, you can construct one dwelling on a site containing not less than 400m2 or 320m2 per unit attached on one side to another. Based on the drawings submitted, the proposal exceeds the minimum site area requirements. Therefore, consent is required under Rule 1.6.1(17) of the Tairawhiti District Plan as a Restricted Discretionary activity.

2. The minimum front yard setback requirement is 4.5m. The drawings submitted show an infringement of patios located in the front yard. I am assuming that the eaves are the only other encroachment, and all other buildings comply with the minimum setbacks. Therefore, consent is required under Rule 1.6.1(17) of the Tairawhiti District Plan as a Restricted Discretionary activity.

3. The Tairawhiti District Plan requires that sites are not covered by more than 35% of buildings. The drawings submitted show an infringement of this requirement. Therefore, consent is required under Rule 1.6.1(17) of the Tairawhiti District Plan as a Restricted Discretionary activity.

4. I'm not sure based on the plans if the areas shown for outdoor living areas are the dedicated spaces. If they are, then some sites do not meet the minimum requirement of 15m2 of outdoor service area per dwelling. Again Rule 1.6.1(17) of the Tairawhiti District Plan would be triggered as a Restricted Discretionary activity.

5. Based on the plans submitted the height of the buildings seem to be compliant with the requirements.

6. The plans show a total of 12 units/dwellings to be serviced of the accessway. Under the Tairawhiti District Plan the requirement is that where 10 dwellings units are located on an accessway then it should be vested in the Council as a public Road. You will need to apply for a dispensation of this requirement. The accessway, carparking, maneuvering areas and vehicle crossing will need to be sealed. Again Rule 1.6.1(17) of the Tairawhiti District Plan would be triggered as a Restricted Discretionary activity as this is a matter under works, services and infrastructure.

7. As part of your resource consent you will need to submit your engineered plans for connecting to wastewater, water and stormwater. The application should also include your assessment of connecting to electricity and confirmation from a telecommunications provider that wireless services (coverage) is available at the site.

8. As the property is covered by the Heritage Alert Overlay, an advice note would be imposed on the consent advising that in the event any archaeological deposits are encountered you would need stop works immediately and notify Heritage New Zealand and the relevant iwi authority.

9. Dependent on the planner's assessment written consents of neighboring properties may be required. I am unable to make this determination at this stage. There would always be an option of limited notification in the event you were unsuccessful in obtaining these.

Barry Sanders our Development Engineer will respond to the engineering requirements for wastewater,

water, stormwater, roading, impervious surfaces, vehicle crossing, accessway, carparking and maneuvering.

Should you require anything further, please do not hesitate to contact me.

Regards

Awhina White
Principal Planner
Te Kaunihera O Te Tairāwhiti - Gisborne District Council
E: Awhina.White@gdc.govt.nz | P: +64 6 867 2049, 0800 653 800 | D: 06 869 2932 | M: 027 254 7707
A: 15 Fitzherbert Street, Gisborne | Web | Fb | App

From: Mitch Jackson <mitch@twproperty.co.nz>
Sent: Wednesday, June 28, 2023 11:11 AM
To: Awhina White <Awhina.White@gdc.govt.nz>; Barry Sanders <Barry.Sanders@gdc.govt.nz>
Cc: Esta Kowhai <esther.kowhai@gdc.govt.nz>; James Jenkins <james.jenkins@twproperty.co.nz>; Paul O'Shaughnessy <paul@stradegy.co.nz>; Johan Ehlers <Johan@infir.nz>
Subject: 556-560 Aberdeen Road, Gisborne

Hi Team,

Hope you're well.

We have recently secured a conditional contract for 556-560 Aberdeen Road, Gisborne.

We're proposing to remove/ demolish the existing dwellings and build 12x units

- 8x 2 BR two-story
- 3x 2 BR one-story
- 1x 3 BR one-story

Please see attached design 5% design for reference.

We intend to on-sell this development to Kainga Ora, who are initially supportive of the design.

Can I please request feedback on the attached design from both an engineering & planning perspective to outline any red flags in obtaining an RC.

In terms of engineering, we are proposing the following to service the development.

- Wastewater
- We're proposing to connect into the existing DN150 that runs along Aberdeen Road. We'll extend the DN150 up the central JOAL and install individual 100mm lateral connections.
- Are there any known any known capacity issues with the existing network that we need to be aware of?

- Stormwater
- The existing ground level on the southern part of the site is 1m lower than at the road boundary, which makes raising the site not a viable solution.
- We're proposing to discharge ground surface areas to the existing DN300 main in Aberdeen Road, however, if this is not a viable solution, we intend to utilise the existing soakage soils within the area.
- Therefore, we are proposing to have roof runoff discharge to the existing main in Aberdeen Road, then have surface water run-off discharge to soak pits and to the south (where it currently drains to).
- Please note, we intend to undertake the required soakage testing and intend to attenuate all SW to pre-development flows.
- The attached servicing due diligence report (based on 13x units) includes pre & post-development flow calculations as well as required attenuation calculations to confirm what storage we require. We are proposing to reduce this to 12 (as per the attached design), as we believe this is better outcome overall.
- Would the above proposed solution be acceptable to GDC?

- Water
- We're proposing to connect into the existing DN100 main along Aberdeen Road and install a rider DN63 rider up the JOAL, then have individual connections to each lot with manifolds outside each boundary.
- The firefighting capacity requirements are also outlined in the servicing DD report attached. The existing infrastructure should be sufficient.

- Power & Comms
- Proposing to install roadside pedestals for both power & fibre and install individual connections to each lot.

Please note the pre-lim DD servicing report attached is based on an alternative scheme which has 13x units & two accessways, not 12x units & a central access. The calculations will not be accurate, however; what we are now proposing will have less of an effect than the 13x lot design, as there are less impermeable surfaces.

Please let me know if you have any queries regarding the above proposal. I'm more than happy to discuss further.

Regards,

Mitch Jackson
Development Manager
Mob: +64 21 261 1257
14 West Quay, Ahuriri
Napier, 4110 | New Zealand

footer.jpg

Appendix 2 – Pre-Application Correspondence with Barry Sanders Regarding Stormwater

From: Johan Ehlers
To: Mitch Jackson
Cc: Isaac Aitken
Subject: 550 / 560 Aberdeen Road soakage
Date: Thursday, 13 July 2023 12:33:02 pm
Attachments: image001.png
image004.png

Hi Mitch,

Isaac reminded me this morning that I need to go back to you about my discussion with Barry Sanders about the soakage design.

I called Barry on the 6th of July and found him in Australia. It was 9:35 am here so it must have been very early where he was.

Barry confirmed that the robustness he is looking for is in terms of:

1. Using a lower infiltration rate for design purposes than the bserved infiltration rate. We are proposing to use 500mm/hr against the 1,500mm observed rate.
2. Barry agreed that the groundwater table is currently as high as it gets and that we can use the level as it was observed.

The test holes did not reach the groundwater table, although the one at the rear of the property where the 1,500mm/hr infiltration rate was measured was close to the groundwater table depth. We should just work with the depth of the test hole because we know that was still above the groundwater table.

Soakage is therefore workable at this site. Barry wants all roof water to be discharged to Aberdeen Road, so it is only ground surfaces on the part of the site that will drain away from Aberdeen Road that will be serviced by the soakage pit.

Regards

Johan Ehlers
p 06 650 5565
c 021 1355 671
www.infir.nz

From: Phillip Dodds
To: Barry Sanders; Mitch Jackson; Awhina White
Cc: Esta Kowhai; James Jenkins; Paul O'Shaughnessy; Johan Ehlers; Judith Robertson; James Mashiri; Robin Beale
Subject: RE: 556-560 Aberdeen Road, Gisborne
Date: Monday, 3 July 2023 2:53:55 pm
Attachments: image003.png
image004.png

This site is at the top of the gravity Stanley catchment.

In heavy rain in excess of the 1 in 25 year level this catchment can surcharge.

I would make sure the guly traps are as high as possible and that the individual waste connections have vents (TV) that cannot be isolated by high sewer levels.

From: Barry Sanders <Barry.Sanders@gdc.govt.nz>
Sent: Friday, 30 June 2023 4:42 PM
To: Mitch Jackson <mitch@twproperty.co.nz>; Awhina White <Awhina.White@gdc.govt.nz>
Cc: Esta Kowhai <esther.kowhai@gdc.govt.nz>; James Jenkins <james.jenkins@twproperty.co.nz>; Paul O'Shaughnessy <paul@stradegy.co.nz>; Johan Ehlers <Johan@infir.nz>; Phillip Dodds <Phillip.Dodds@gdc.govt.nz>; Judith Robertson <Judith.Robertson@gdc.govt.nz>; James Mashiri <James.Mashiri@gdc.govt.nz>; Robin Beale <Robin.Beale@gdc.govt.nz>
Subject: RE: 556-560 Aberdeen Road, Gisborne

Mitch, my comments in red below.

Barry

From: Mitch Jackson <mitch@twproperty.co.nz>
Sent: Thursday, June 29, 2023 1:18 PM
To: Awhina White <Awhina.White@gdc.govt.nz>; Barry Sanders <Barry.Sanders@gdc.govt.nz>
Cc: Esta Kowhai <esther.kowhai@gdc.govt.nz>; James Jenkins <james.jenkins@twproperty.co.nz>; Paul O'Shaughnessy <paul@stradegy.co.nz>; Johan Ehlers <Johan@infir.nz>
Subject: RE: 556-560 Aberdeen Road, Gisborne

Hi Awhina,

Thanks for your quick response, much appreciated!

I look forward to Barry's email.

Thanks,

Mitch Jackson
Development Manager
Mob: +64 21 261 1257
14 West Quay, Ahuriri
Napier, 4110 | New Zealand

From: Awhina White <Awhina.White@gdc.govt.nz>
Sent: Wednesday, June 28, 2023 1:02 PM
To: Mitch Jackson <mitch@twproperty.co.nz>; Barry Sanders <Barry.Sanders@gdc.govt.nz>
Cc: Esta Kowhai <esther.kowhai@gdc.govt.nz>; James Jenkins <james.jenkins@twproperty.co.nz>; Paul O'Shaughnessy <paul@stradegy.co.nz>; Johan Ehlers <Johan@infir.nz>
Subject: RE: 556-560 Aberdeen Road, Gisborne

Hi Mitch

The subject site is zoned General Residential, is covered by the Heritage Alert Overlay and is located on a Collector Road.

The overall site area of both properties is 2670m2.

1. Within the General Residential zone, under the minimum site area requirements, you can construct one dwelling on a site containing not less than 400m2 or 320m2 per unit attached on one side to another. Based on the drawings submitted, the proposal exceeds the minimum site area requirements. Therefore, consent is required under Rule 1.6.1(17) of the Tairawhiti District Plan as a Restricted Discretionary activity.
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6. The plans show a total of 12 units/dwellings to be serviced of the accessway. Under the Tairawhiti District Plan the requirement is that where 10 dwellings units are located on an accessway then it should be vested in the Council as a public Road. You will need to apply for a dispensation of this requirement. The accessway, carparking, maneuvering areas and vehicle crossing will need to be sealed. Again Rule 1.6.1(17) of the Tairawhiti District Plan would be triggered as a Restricted Discretionary activity as this is a matter under works, services and infrastructure. Minimum trafficable widths will need to be maintained to allow for emergency vehicle access and no parking either side of the internal access.
7. As part of your resource consent you will need to submit your engineered plans for connecting to wastewater, water and stormwater. The application should also include your assessment of connecting to electricity and confirmation from a telecommunications provider that wireless services (coverage) is available at the site.
8. As the property is covered by the Heritage Alert Overlay, an advice note would be imposed on the consent advising that in the event any archaeological deposits are encountered you would need stop works immediately and notify Heritage New Zealand and the relevant iwi authority.
9. Dependent on the planner's assessment written consents of neighboring properties may be required. I am unable to make this determination at this stage. There would always be an option of limited notification in the event you were unsuccessful in obtaining these.

Barry Sanders our Development Engineer will respond to the engineering requirements for wastewater, water, stormwater, roading, impervious surfaces, vehicle crossing, accessway, carparking and maneuvering.

Should you require anything further, please do not hesitate to contact me.

Regards

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- We're proposing to connect into the existing DN150 that runs along Aberdeen Road. We'll extend the DN150 up the central JOAL and install individual 100mm lateral connections.
- Are there any known any known capacity issues with the existing network that we need to be aware of? Please contact Phil Dodds re this issue – we have had instances where there are some additional engineering constraints needed in the connection design.

- Stormwater
- The existing ground level on the southern part of the site is 1m lower than at the road boundary, which makes raising the site not a viable solution.
- We're proposing to discharge ground surface areas to the existing DN300 main in Aberdeen Road, however, if this is not a viable solution, we intend to utilise the existing soakage soils within the area. This needs careful design as soakage holes are not a good long-term solution generally becoming dysfunctional after a short number of years. We would prefer a more robust long term solution esp with ground water levels being high in winter (this should be tested).
- Therefore, we are proposing to have roof runoff discharge to the existing main in Aberdeen Road, then have surface water run-off discharge to soak pits and to the south (where it currently drains to).
- Please note, we intend to undertake the required soakage testing and intend to attenuate all SW to pre-development flows. Comments as above
- The attached servicing due diligence report (based on 13x units) includes pre & post-development flow calculations as well as required attenuation calculations to confirm what storage we require. We are proposing to reduce this to 12 (as per the attached design), as we believe this is better outcome overall.
- Would the above proposed solution be acceptable to GDC?

The image below shows capacity of stormwater for the 10% AEP storm event. No capacity left in Aberdeen Rd but there is some in Asquith Street. I suggest you over attenuate the roof areas for the 1% AEP storm to Aberdeen and some soakage(if ground water testing allows this as viable) - or you will need to pump.

- Water
- We're proposing to connect into the existing DN100 main along Aberdeen Road and install a rider DN63 rider up the JOAL, then have individual connections to each lot with manifolds outside each boundary.
- The firefighting capacity requirements are also outlined in the servicing DD report attached. The existing infrastructure should be sufficient. Please contact Judith Robertson re this.

- Power & Comms
- Proposing to install roadside pedestals for both power & fibre and install individual connections to each lot. yes

Please note the pre-lim DD servicing report attached is based on an alternative scheme which has 13x units & two accessways, not 12x units & a central access. The calculations will not be accurate, however; what we are now proposing will have less of an effect than the 13x lot design, as there are less impermeable surfaces.

Please let me know if you have any queries regarding the above proposal. I'm more than happy to discuss further.

Regards,

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